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TECTONIC SIGNIFICANCE OF MICROEARTHQUAKE ACTIVITY FROM COMPOSITE FAULT-PLANE SOLUTIONS IN THE RIO GRANDE RIFT NEAR SOCORRO, NEW MEXICO

by

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ABSTRACT

A moving array of high-gain short-period seismographs centered near Socorro, New Mexico detected 1200 microearthquakes during 316 recording days from May 1975 through January 1978. The locations of 534 of these microearthquakes were obtained through the use of P and S arrival times from four or more recording stations. Characteristics of these earthquakes include occurrence in swarms, and shallow depths of focus (generally less than 13 kilometers). The major part of the seismicity occurs in the southern end of the La Jencia basin, where previous studies have suggested that the high level of seismic activity is related to the upward intrusion of small crustal magma bodies to a depth of about 7 to 10 kilometers.

Composite fault-plane solutions indicate that the majority of the microearthquakes occur along north to northwest trending normal faults in general agreement with the major mapped faults in the study area. Many of the microearthquakes can be correlated with these mapped faults, an observation not made in previous studies. The composite solutions indicate that seismic activity is not occurring along a northeast-southwest trending transverse shear zone proposed by Chapin. In addition, listric faulting, bottoming at a depth of 13 kilometers, is not indicated by the composite solutions.

East-west horizontal extension of the upper crust is suggested from the composite solutions. Because no horizontal extension of the crust has been observed since 1972, doming of the crust related to upward intrusion of magma is believed to be the source for extension near Socorro as suggested in earlier studies.

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INTRODUCTION

The study area near Socorro, New Mexico is located within the Rio Grande rift, a major north-south structure formed by east-west crustal extension which began approximately 30 million years ago and has continued to recent times (Chapin and Seager, 1975). Comprehensive studies and reviews on the geological and geophysicial characteristics of the Rio Grande rift are given in Chapin (1971), Chapin and Seager (1975),Sanford et al. (1977), Cordell (1978), and Rio Grande Rift: Tectonics and Magmatism edited by Riecker (1979).

Figure 1 shows the extent of the Rio Grande rift and the other major tectonic provinces within New Mexico, along with the location of the study area. The area of interest extends approximately 40 kilometers north to 20 kilometers south of Socorro. The structural geology of the area of interest is dominated by basin and range type faulting with intragraben horsts comprising the younger central ranges of the rift (Chapin et al., 1978).

Sanford et al. (1981), studying the seismicity of New Mexico, have shown that the majority of earthquakes occur within the rift between Socorro and Belen which is located approximately 60 kilometers north of Socorro. They suggest that the seismic activity occurring in New Mexico is due to local geologic conditions rather than a regional stress

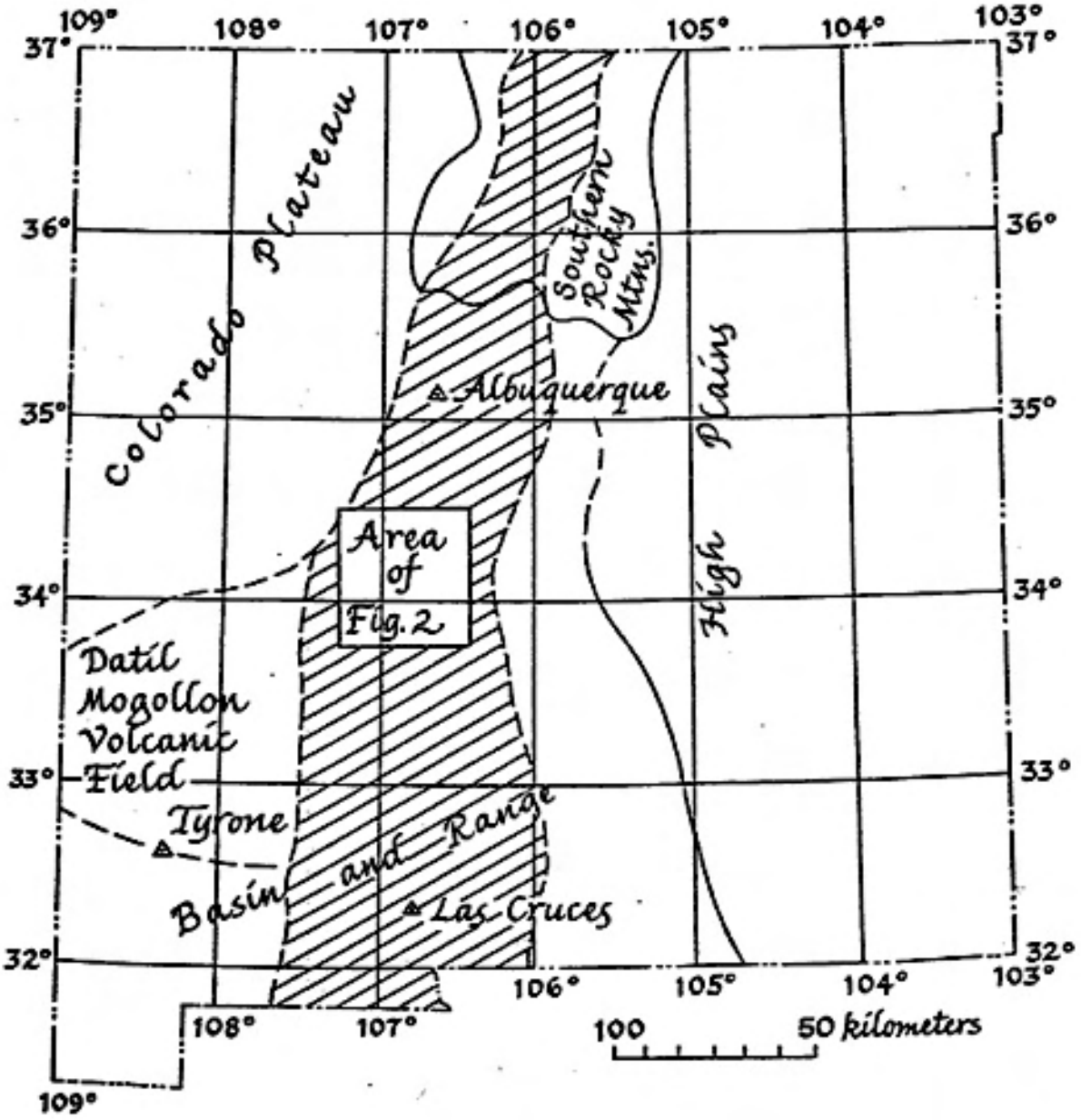


Figure 1. Physiographic provinces and the Rio Grande rift in New Mexico (after Chapin, 1971).

field. Doming of the crust in the Socorro area due to upward intrusion of magma could produce crustal extension on a local scale (Sanford et al., 1977; Sanford et al., 1979; Sanford et al., 1981). This hypothesis is in agreement with findings from other studies. Reilinger and Oliver (1976), and Reilinger et al. (1980) discovered a crustal bulge centered approximately 20 kilometers north of Socorro which has been uplifting at a maximum average rate of 5 mm/yr since 1911. In addition, Prescott et al. (1979) using geodetic measuring techniques, have discovered no horizontal crustal extension of the Rio Grande rift since 1972.

The earthquakes near Socorro are roughly centered on a 1700 sq-km sill-like mid-crustal magma body. This magma body at a depth of 19 kilometers, was first recognized through an analysis of strong S to S reflections observed on microearthquake seismograms (Sanford et al., 1973; Sanford et al., 1977; Rinehart et al., 1979). Later the same magma body was detected on COCORP P wave reflection profiles across the Rio Grande rift (Brown et al., 1979; Brown et al., 1980a). Other studies of microearthquake data near Socorro have determined the possible existence of smaller magma bodies in the upper crust. The screening of S waves from microearthquake foci (Shuleski, 1976; Johnston, 1978), high heat flow data (Reiter and Smith, 1977; Sanford, 1977), areas of anomalously high Poisson's ratio (Caravella, 1976; Fender, 1978; Frishman, 1979), and low P wave velocity zones

(Ward, 1980) provide most of the evidence for these crustal magma bodies. A recent evaluation of COCORP data near Socorro, (Brown et al., 1980b) suggests a small magma body at a depth of 6.4 kilometers in the southern end of the La Jencia basin. Comprehensive reviews concerning the previous geophysical studies of these magma bodies can be obtained from Chapin et al. (1978); Guidebook to the Rio Grande Rift in New Mexico and Colorado edited by Hawley (1978); Rinehart et al. (1979); Sanford et al. (1979); Sanford and Schlue (1980).

LOCATION PROCEDURE

A variable array of high-gain short-period seismographs operating at a normal peak magnification of 1.6×10^6 (at 40 Hz) was used for the microearthquake study (Sanford et al., 1979). The 25 recording sites occupied by a four to six station array of MEQ-800 Sprengnether seismographs are shown in figure 2. The response characteristics of the MEQ-800 instruments can be obtained from Rinehart (1979), or Ward (1980). Additional data were obtained late in the study from two portable DR-100 digital recorders developed by Sprengnether, and by telemetry of two stations 'LAD', and 'LPM' from the Albuquerque Seismological Laboratory (U.S.G.S.) The coordinates for each of the recording stations are given in Appendix 1.

A total of 1200 events were detected in 316 recording days from May 1975 through January 1978. The locations for 534 of these events (presented in Appendix 2) were obtained through the use of P and S wave arrival times from four or more recording stations. HYPO71, an earthquake location program developed by Lee and Lahr (1975), was utilized for the location procedure. A homogeneous, isotropic half space model was used with a P wave velocity of 5.85 km/sec and an S wave velocity of 3.38 km/sec. The S wave velocity was calculated by assuming a Poisson's ratio of 0.25 which is the average value obtained in previous studies for the

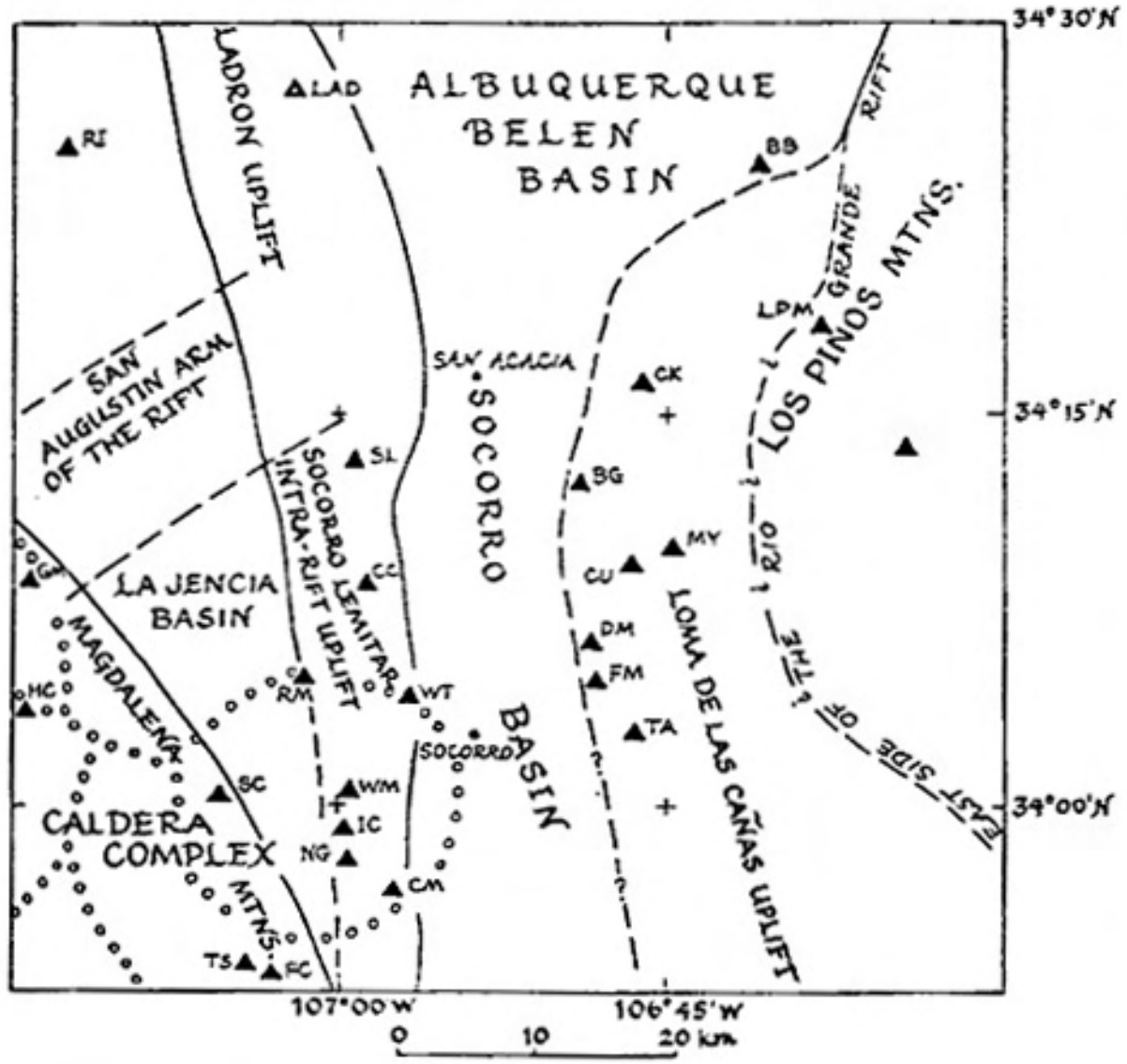


Figure 2. Major physical features near Socorro and locations of the seismic recording stations (from Rinehart et al. 1979).

Socorro area (Caravella, 1976; Fender, 1978; Frishman, 1979). Station corrections were also applied to account for low-velocity Phanerozic rock beneath some recording stations. Both the station corrections (given in Appendix 1) and the P wave velocity were taken from Ward (1980).

The accuracy of the P wave arrival time readings has been determined to be 0.03 seconds (Rinehart, 1979). The P wave arrival times were taken from previous independent studies on Open-File in the Geoscience Department at New Mexico Tech whereas most of the S wave arrivals were identified and measured by the author. Because the S wave arrives after the P wave in the presence of considerable background noise, the accuracy of the S readings is less than the P wave. For this reason, the quality weighting of the S wave arrival was set equal to half the weight of the P wave arrival.

In previous studies of the Socorro microearthquakes, hypocenters were located through the use of a New Mexico Tech (NMT) generalized linear inversion program employing P wave arrival times (Ward, 1980). The use of S wave data in HYPO71 provided better control for location of the hypocenters than the NMT program because the S-P time interval constrains the epicenter distance from a recording station. The HYPO71 locations are in good agreement with the locations obtained from the inversion process, however

the depths are believed to be more accurate than in previous studies (Mott, 1976; Shuleski, 1976) due to the addition of the S wave data. The depths of focus were calculated with respect to the average elevation of the stations recording the event; approximately 1.67 kilometers above sea level. In making comparisons of depths of focus between this and previous studies, note that depths were with respect to sea level in the earlier studies.

When large residuals occurred between observed and theoretical travel times, both P and S arrivals were rechecked. Additional sources of errors were poor azimuthal distribution of recording stations, clock errors in the seismographs, and in correct phase identification. It is important to realize that, although a half-space model is a good approximation for location of events in the Socorro area (Sanford et al., 1977; Rinehart et al., 1979; Sanford et al., 1979), the errors obtained for the hypocenter parameters are related to the crustal model used in the location program.

SEISMICITY

Figure 3 shows the areal distribution of the 534 located microearthquakes. The mid-crustal magma body and the major mapped faults are also outlined for reference. Nearly all the microearthquakes lie within the margins of the Rio Grande rift. The events are diffuse, roughly centered on the mid-crustal magma body. Most of the earthquakes cannot be directly correlated with the major mapped faults in the area (Sanford et al., 1972; Mott, 1976; Sanford et al., 1979). However, many active faults may be buried beneath the Tertiary fill of the study region.

The major portion of the seismic activity occurs to the southwest of Socorro in the southern end of the La Jencia basin. These events have previously been reported to be related to upward intrusion of small magma bodies in the upper crust (Shuleski, 1976; Chapin et al., 1978; Johnston, 1978). Sanford and Schlue (1980) suggest that the intrusion of magma in this area occurs in a complex network of dikes and sills. The other area of important microearthquake activity is the fault-bounded Rio Grande valley. Some of these earthquakes appear to be related to upward intrusion of magma; the others appear to be related to the major boundary faults.

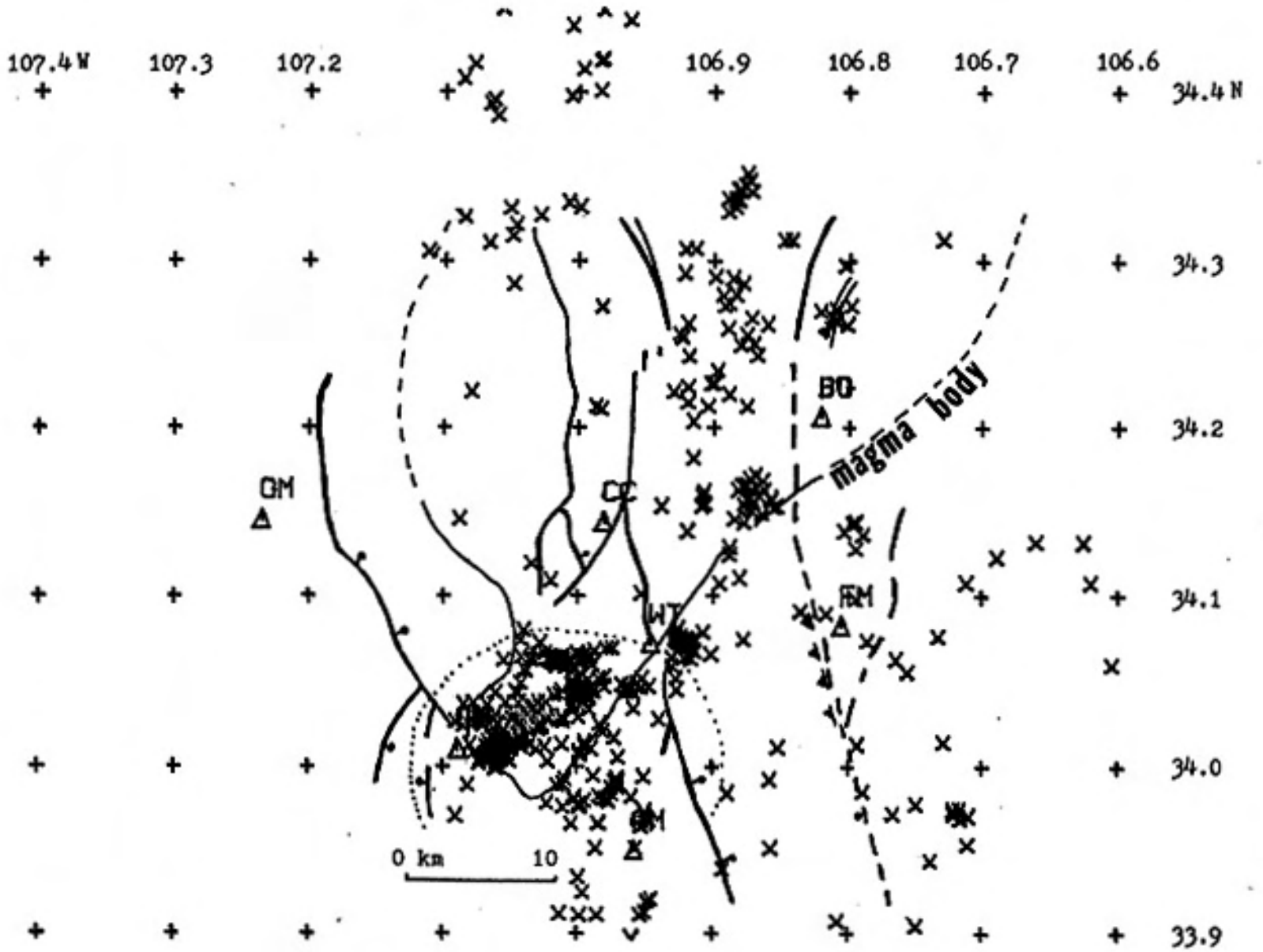


Figure 3. Areal distribution of epicenters with respect to major mapped faults and the mid-crustal magma body.

An interesting region is the area northwest of station 'SC'. This region is aseismic, although fault scarps in the area indicate that major earthquakes have occurred there in the recent past (Sanford et al., 1972; Sanford et al., 1979).

Sanford et al. (1979) state that near the Socorro area, 75 percent of the microearthquake activity occurs in swarms. The occurrence of swarms is indicative of recent or contemporary movement of magma (Richter, 1958). A swarm is defined as a sequence of earthquakes from a limited geographical area which contains no single outstanding event.

Although 534 events were located using HYPO71, only 336 of the most accurately located earthquakes were used for the remainder of this study. Several criteria were applied to reduce the data set: 1) event locations had to lie within the station array, 2) standard deviation of the origin time had to be less than 0.1 seconds, and 3) errors in epicenter and hypocenter had to be less than 1.1 kilometers.

Epicenters for the limited data set are shown in figure 4. The intense seismic activity southwest of Socorro in the La Jencia basin is still evident while the number of events in the Rio Grande valley is reduced. In figure 5 the hypocenters in the boxed region of figure 4 are projected onto a longitudinal cross section passing through the center

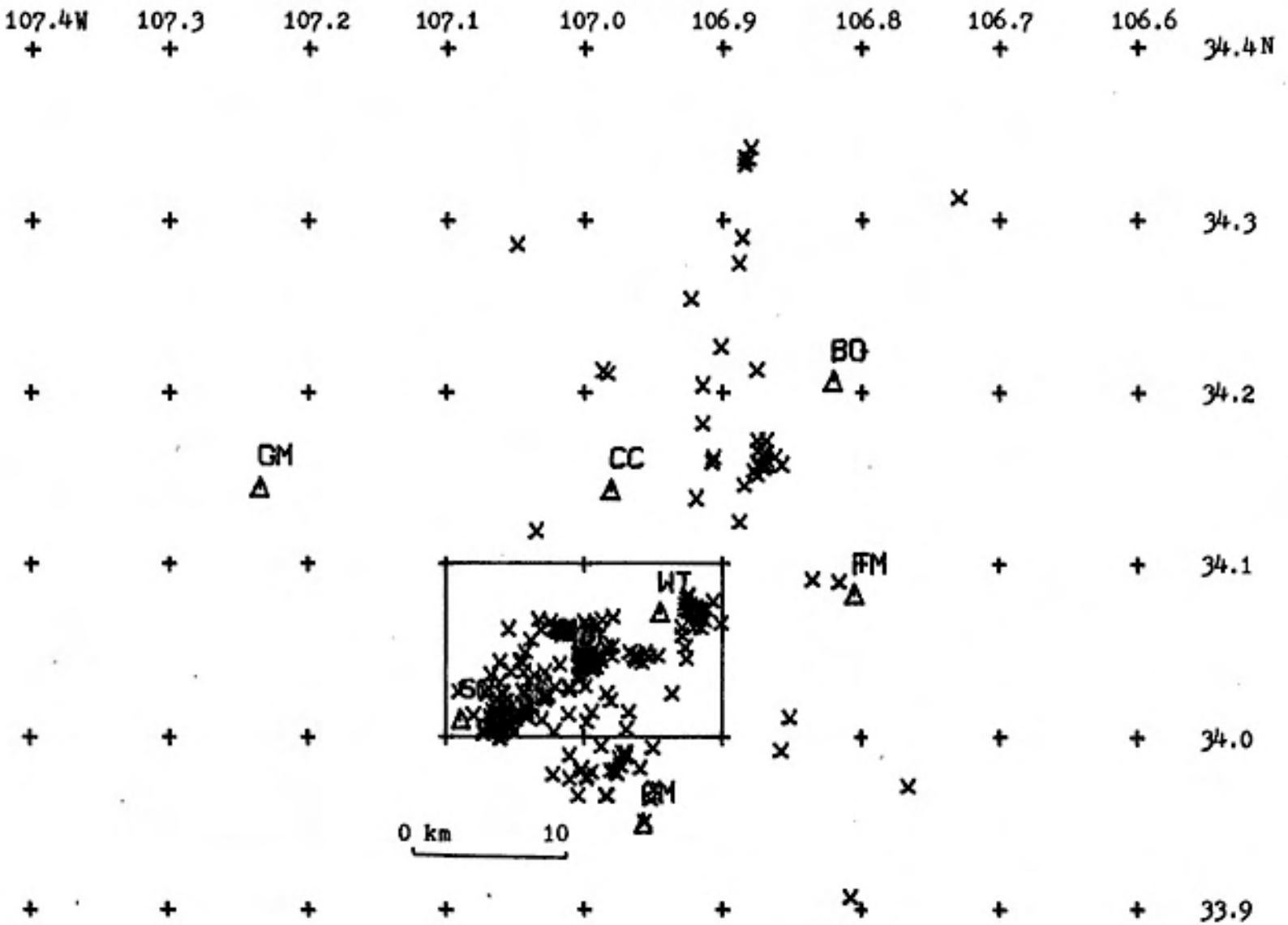


Figure 4. Areal distribution of epicenters for the limited data set (336 earthquakes). The earthquakes in the boxed region were used for the cross section in figure 5.

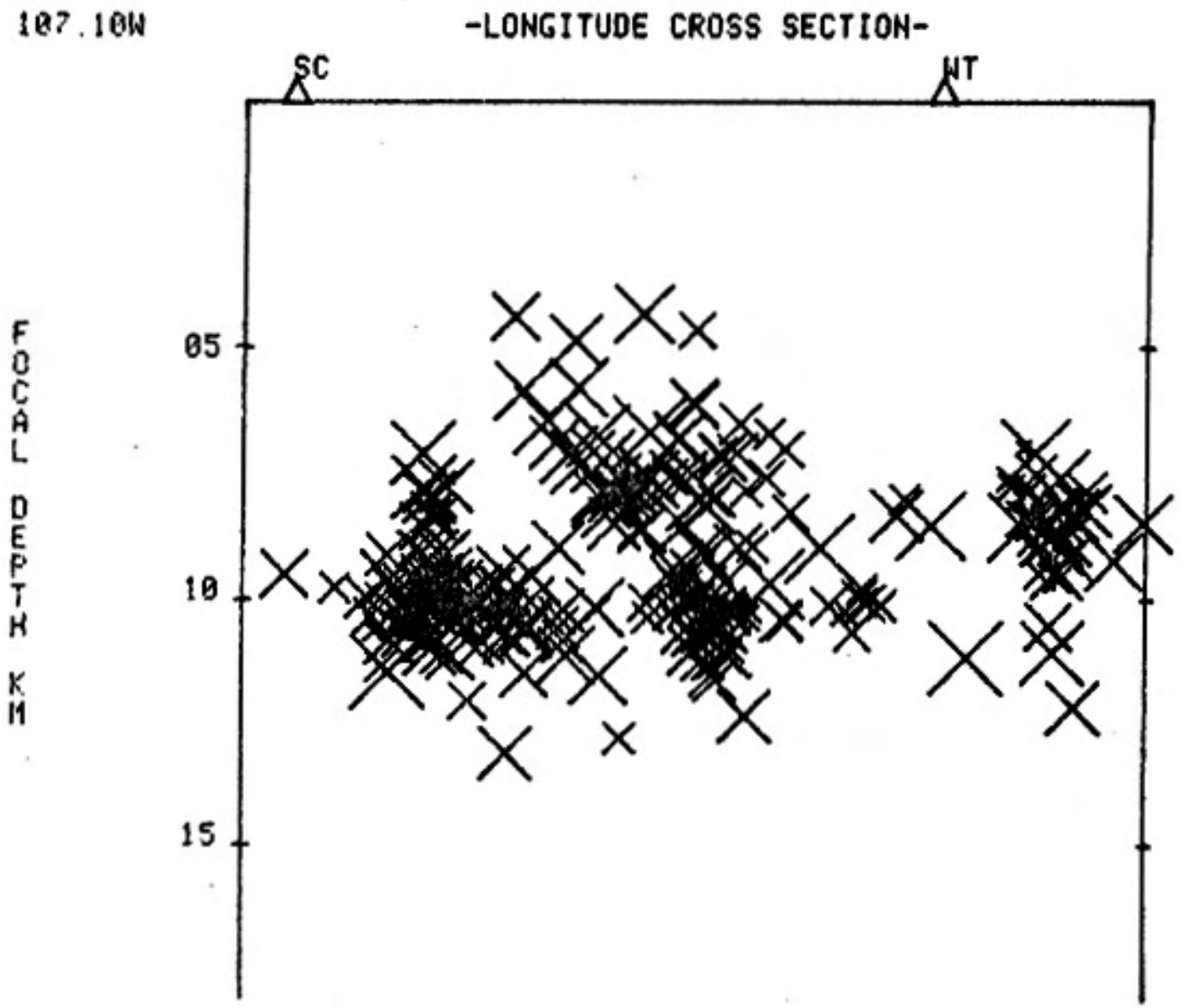


Figure 5. Cross section of hypocenters for epicenters within the boxed region of figure 4. The size of the x's are directly proportional to the error associated with the hypocenters. No vertical exaggeration is shown in the cross section.

of the area. The size of the crosses are directly proportional to the error associated with the hypocenters. The tight spatial clustering of events in the La Jencia basin is obvious from the seismicity map (figure 4) and the cross section. Several seismic gaps can also be seen from the cross section. These areas may indicate the presence of magma.

Figure 6 shows the number of microearthquakes as a function of depth. All the microearthquakes have shallow depths of focus, with the average focal depth occurring between 10 and 11 kilometers. An important characteristic of figure 6 is the absence of hypocenters below 13 kilometers suggesting that below this depth is a zone of abnormally high temperature which inhibits brittle fracturing of the crustal rock. The separation of a flat mid-crustal magma body from a brittle upper crust, which has vertical displacements of up to 5 kilometers, provides supporting evidence for the ductile behavior of the crust between a depth of 13 kilometers and 19 kilometers (Rinehart, 1979). The increase in the number of earthquakes to a focal depth of 10 kilometers is probably related to an increase in the strength of the crustal rock with depth (Rinehart, 1979; Sanford et al., 1979).

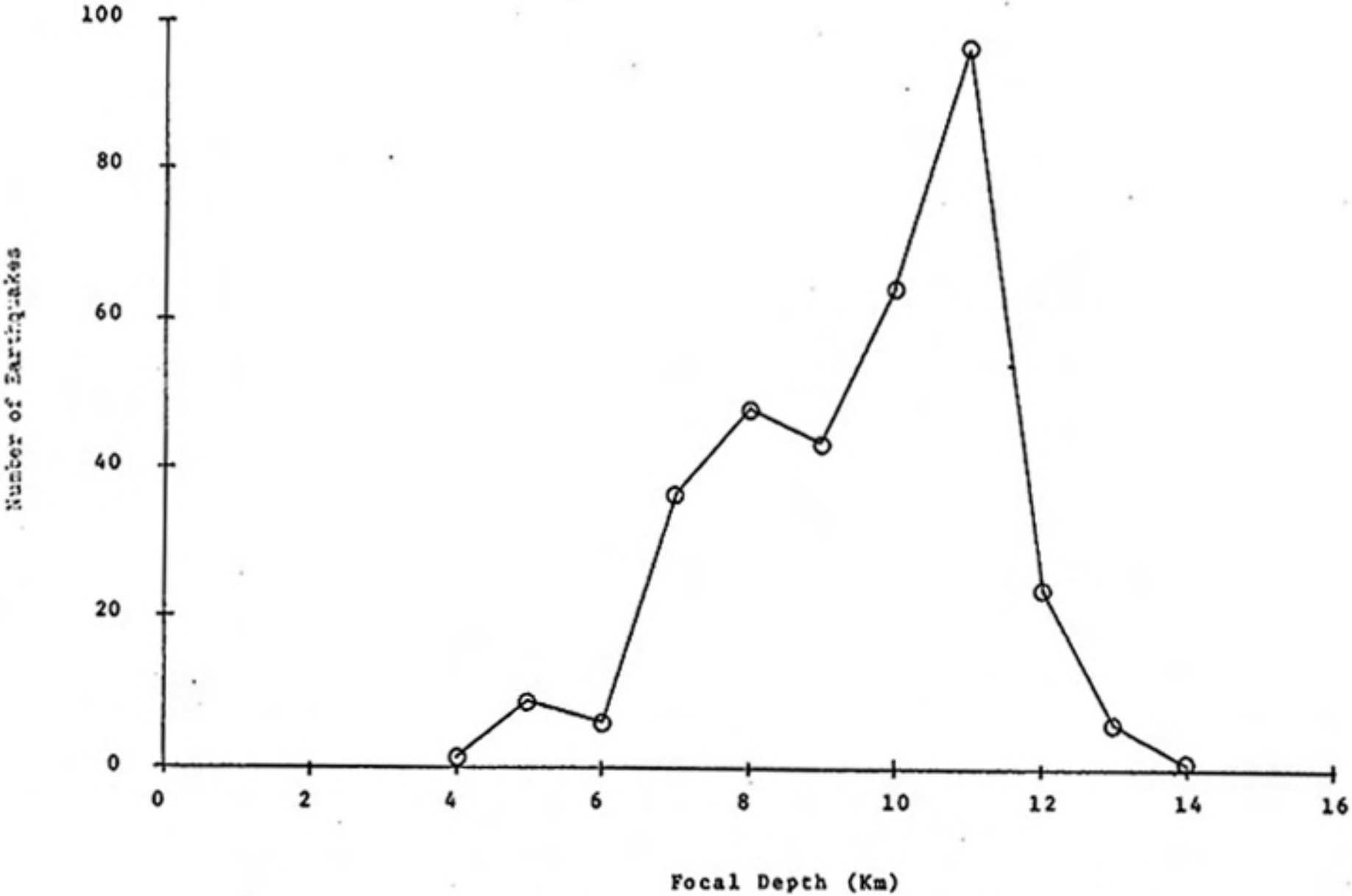


Figure 6. Number of earthquakes versus focal depth. Focal depth is with respect to the average elevation of the recording stations (~1.67 km).

Starting at a depth of three kilometers, the data set was subdivided into five depth intervals of two kilometers thickness (figures 7a-7e). Few earthquakes occur above a depth of five kilometers as shown in figure 7a. Figure 7b illustrates that the majority of the earthquakes within the Rio Grande valley occur between a depth of 5 to 7 kilometers. Most of the intense seismic activity in the southern end of the La Jencia basin occurs between 9 and 11 kilometers as shown in figure 7d.

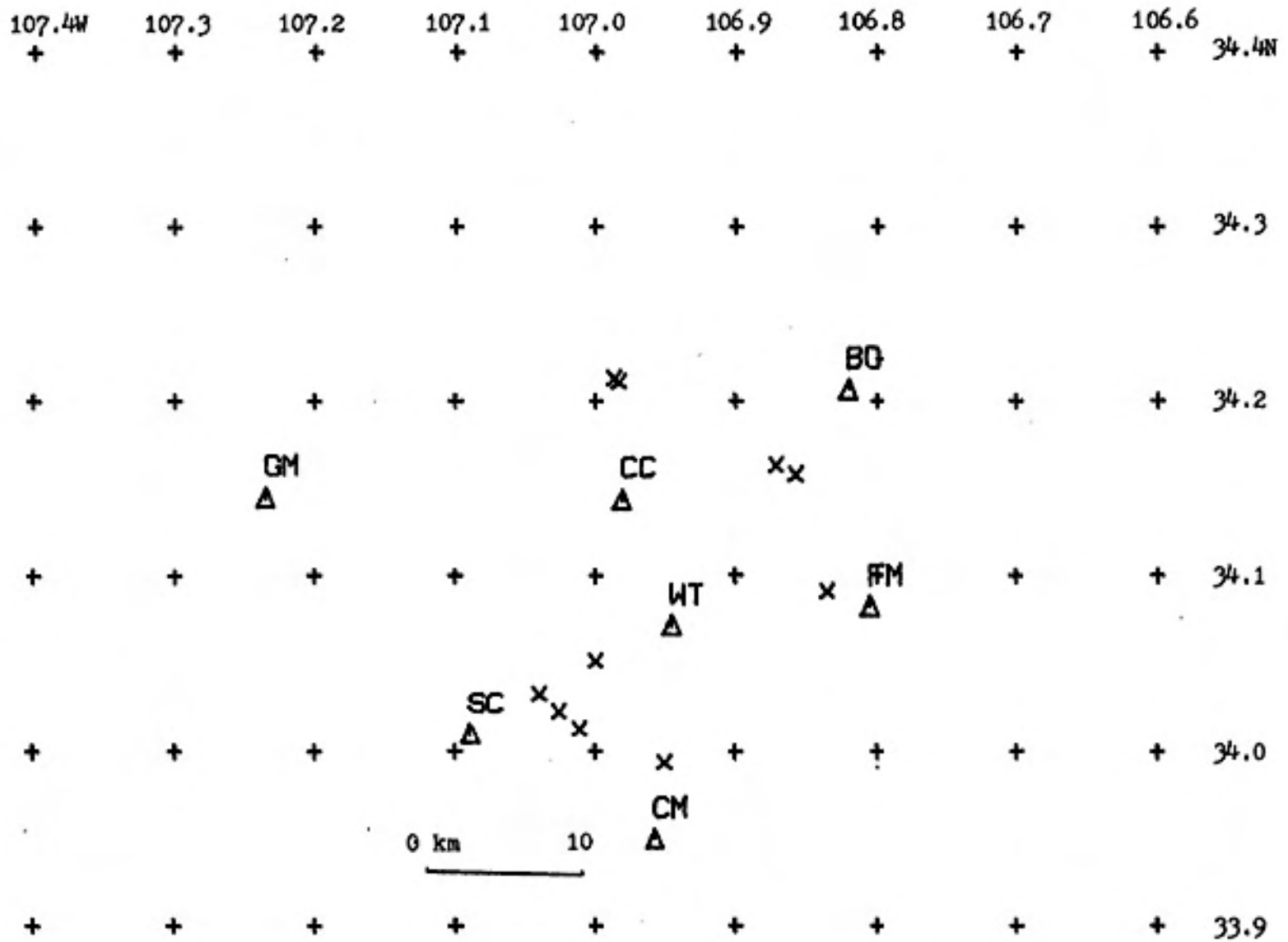


Figure 7a. Distribution of epicenters for events with hypocenters between 3 and 5 km. depth.

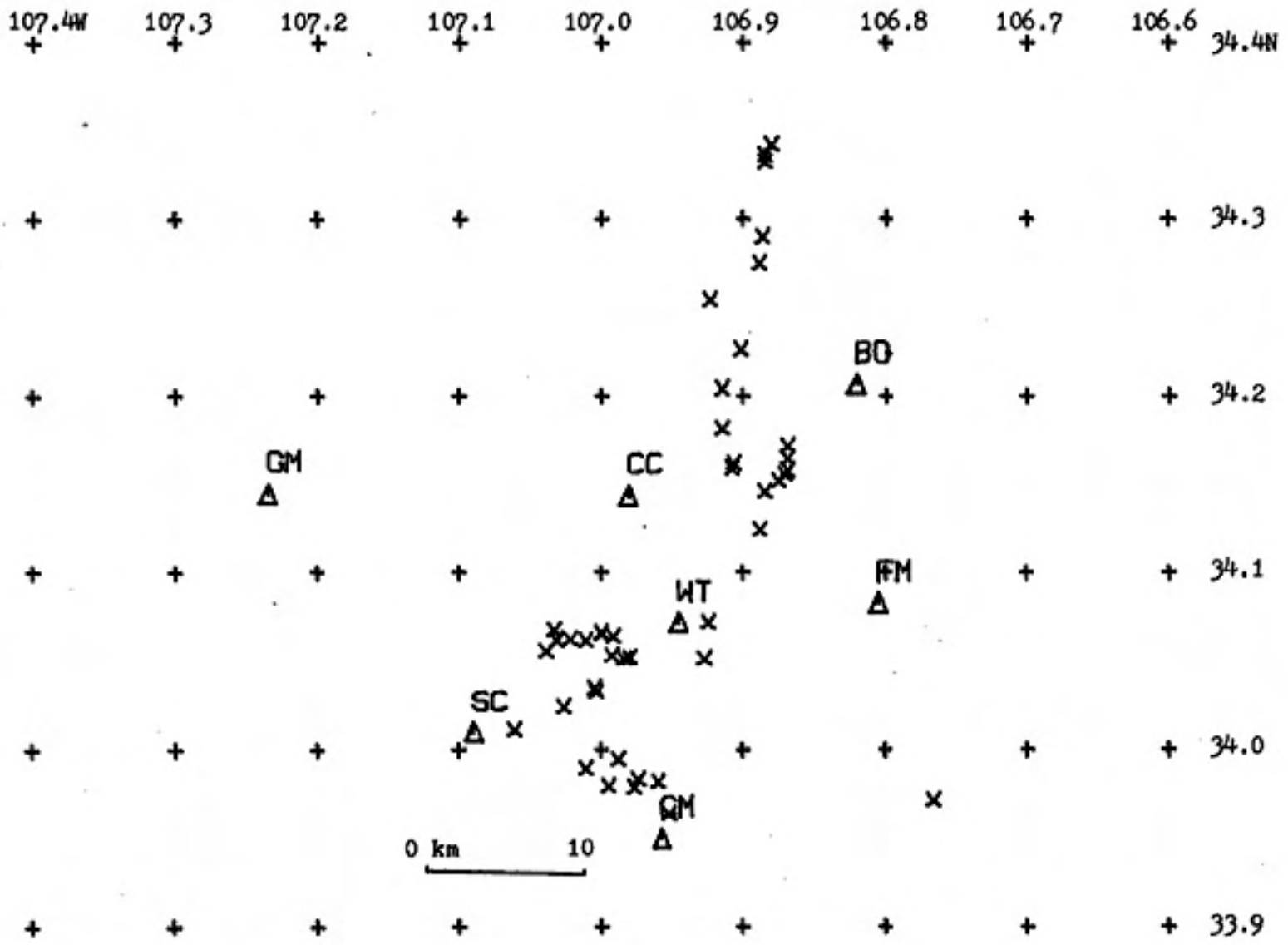


Figure 7b. Distribution of epicenters for events with hypocenters between 5 and 7 km. depth.

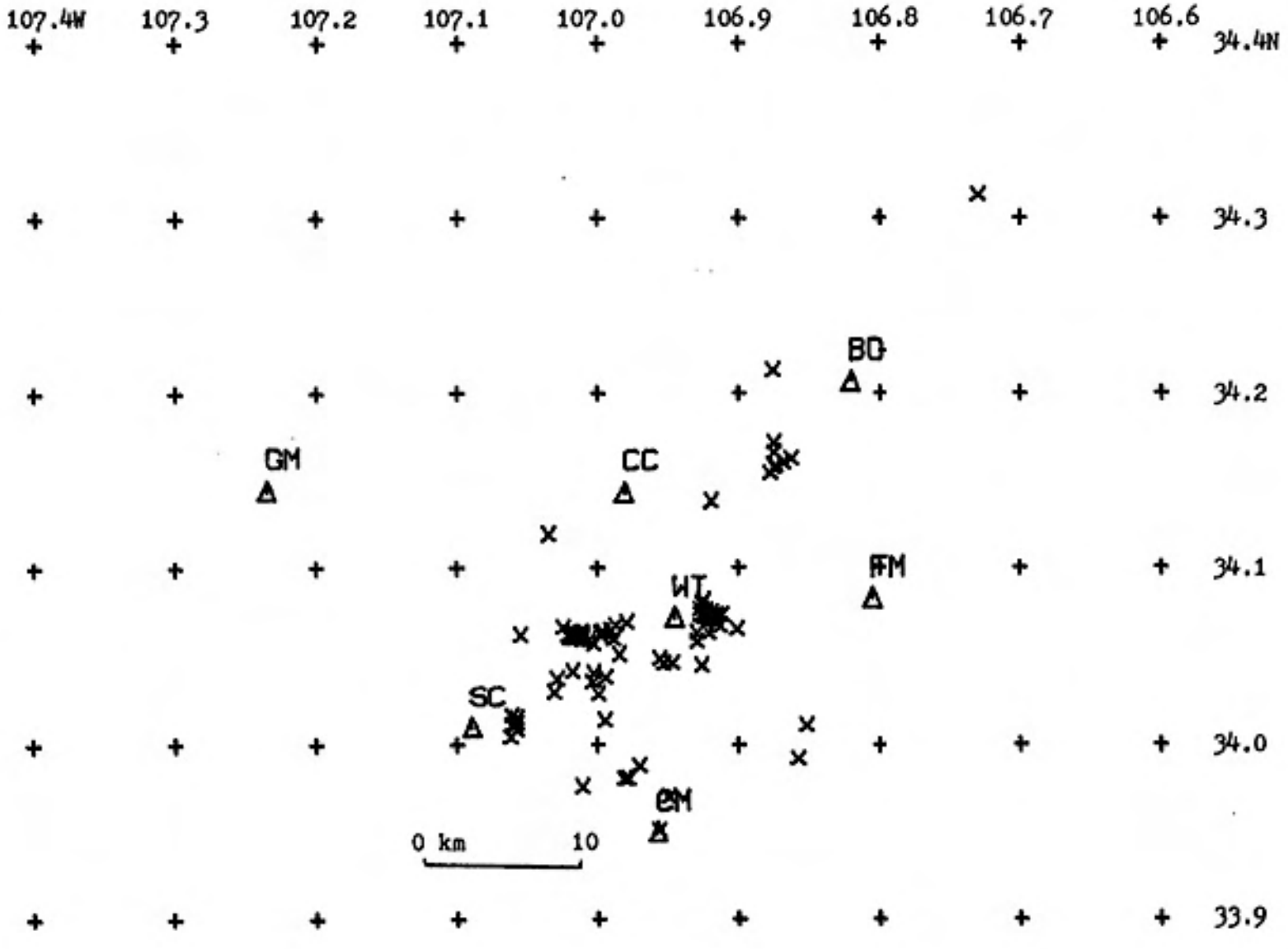


Figure 7c. Distribution of epicenters for events with hypocenters between 7 and 9 km. depth.

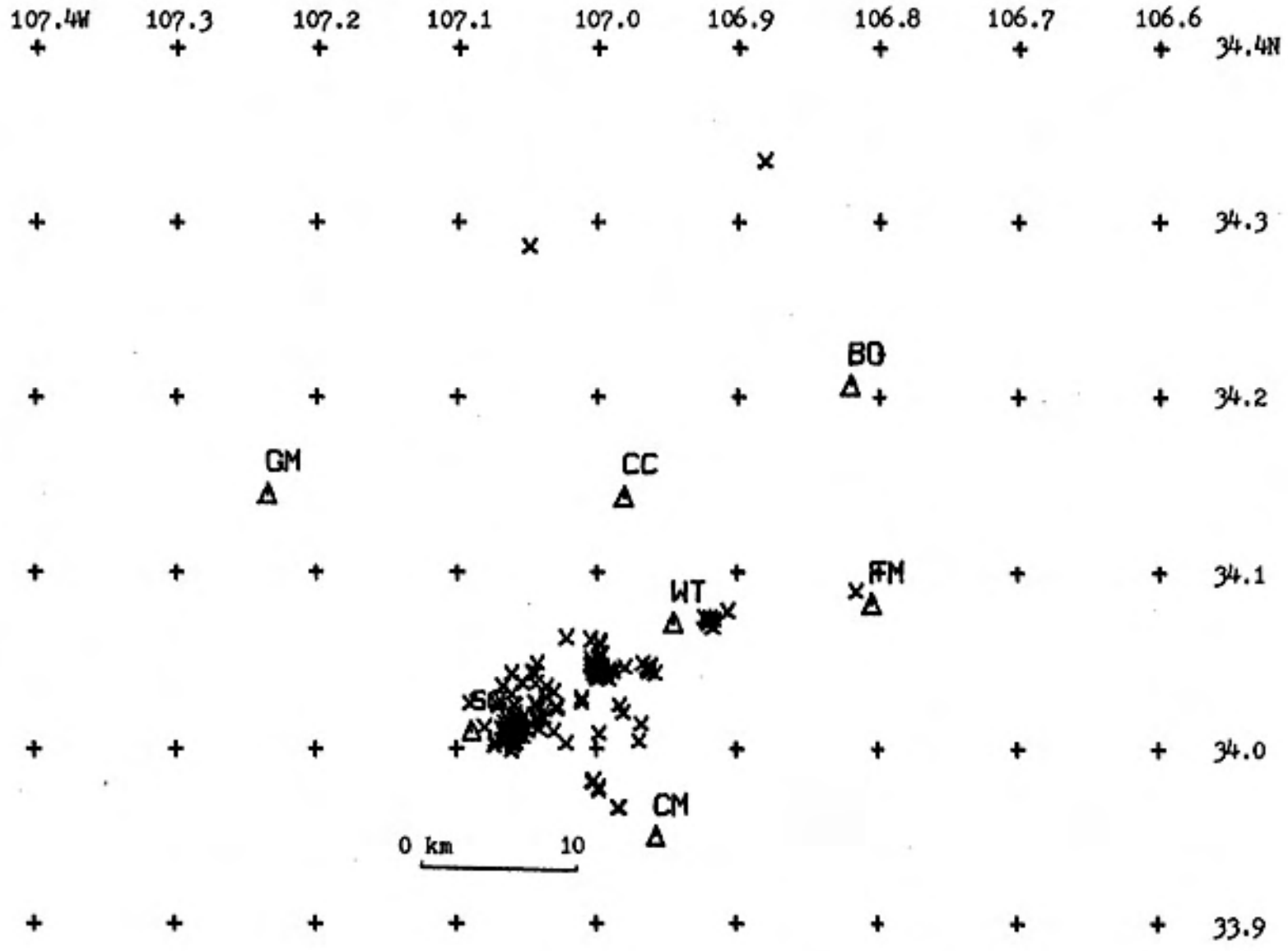
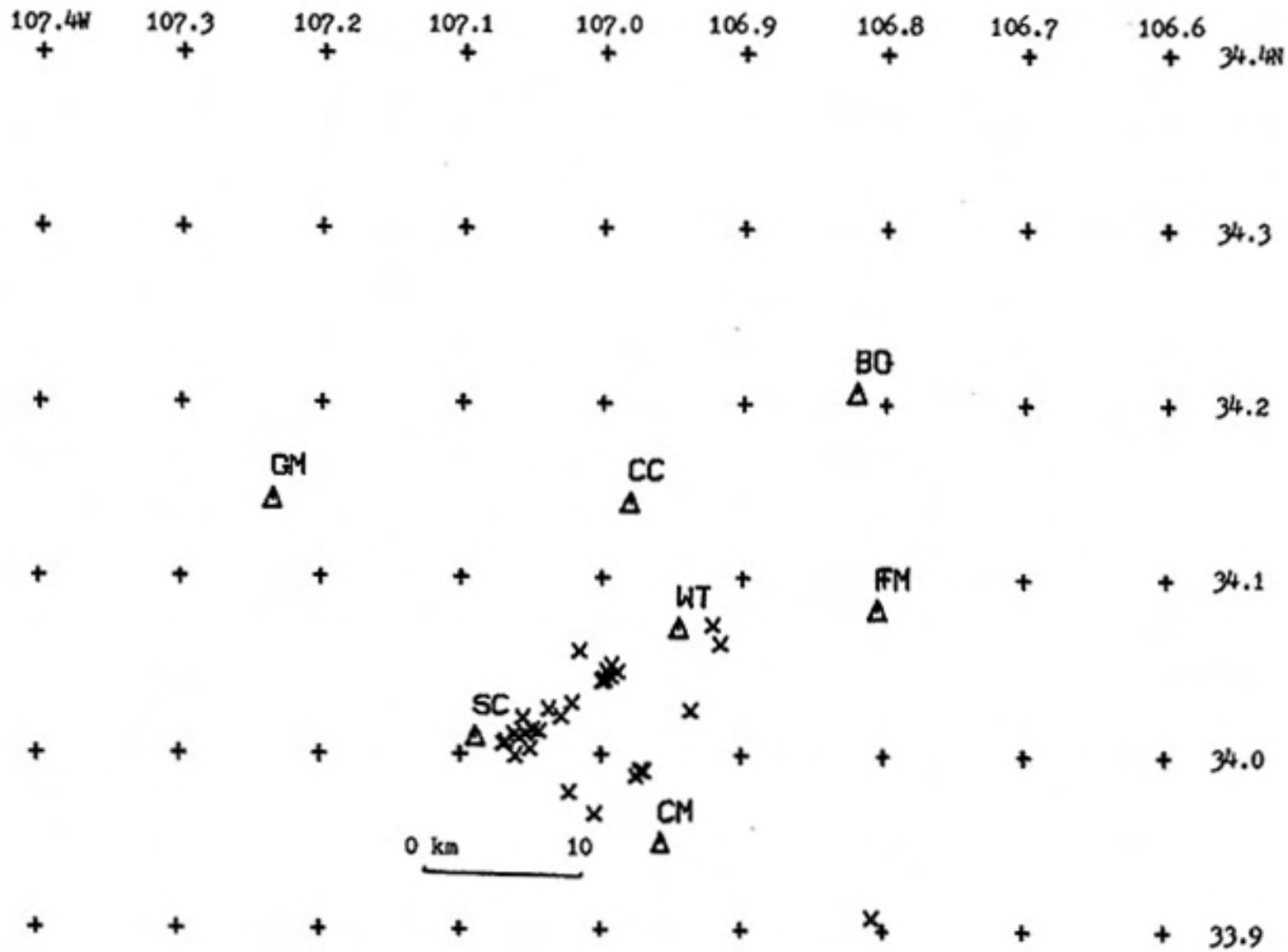


Figure 7d. Distribution of epicenters for events with hypocenters between 9 and 11 km. depth.



(23)

Figure 7e. Distribution of epicenters for events with hypocenters between 11 and 13 km. depth.

COMPOSITE FAULT PLANE SOLUTIONS

The focus of an earthquake can be thought of as being surrounded by an imaginary sphere termed the 'focal sphere'. Elastic waves generated from an earthquake are radiated in all directions through the focal sphere. The first motion (from these elastic waves) that is recorded at a station for local earthquakes is the P wave. These first motions will be compressions or dilatations, depending on the spatial orientation of the recording station relative to the hypocenter, as well as the focal mechanism. The nodal plane boundaries between regions that receive compressions and dilatations are defined as the fault plane and the auxiliary plane (which is perpendicular to the fault plane and slip direction). Figure 8 shows a cross section of the focal sphere for a fault exhibiting pure dip-slip motion. Two opposite quadrants demonstrate compressive motion while the other two quadrants exhibit dilatational motion. Stations A and B will record dilatations while station C will record a compression as the first motion (figure 8).

To determine the focal mechanism of an earthquake, the focal sphere can be projected onto a plane known as a stereonet. Fairbairn (1942) and Hobbs et al. (1976) discuss the technique for projection of the focal sphere into two dimensions. The first motion of the P wave (recorded by the various stations) is plotted on the stereonet at a point

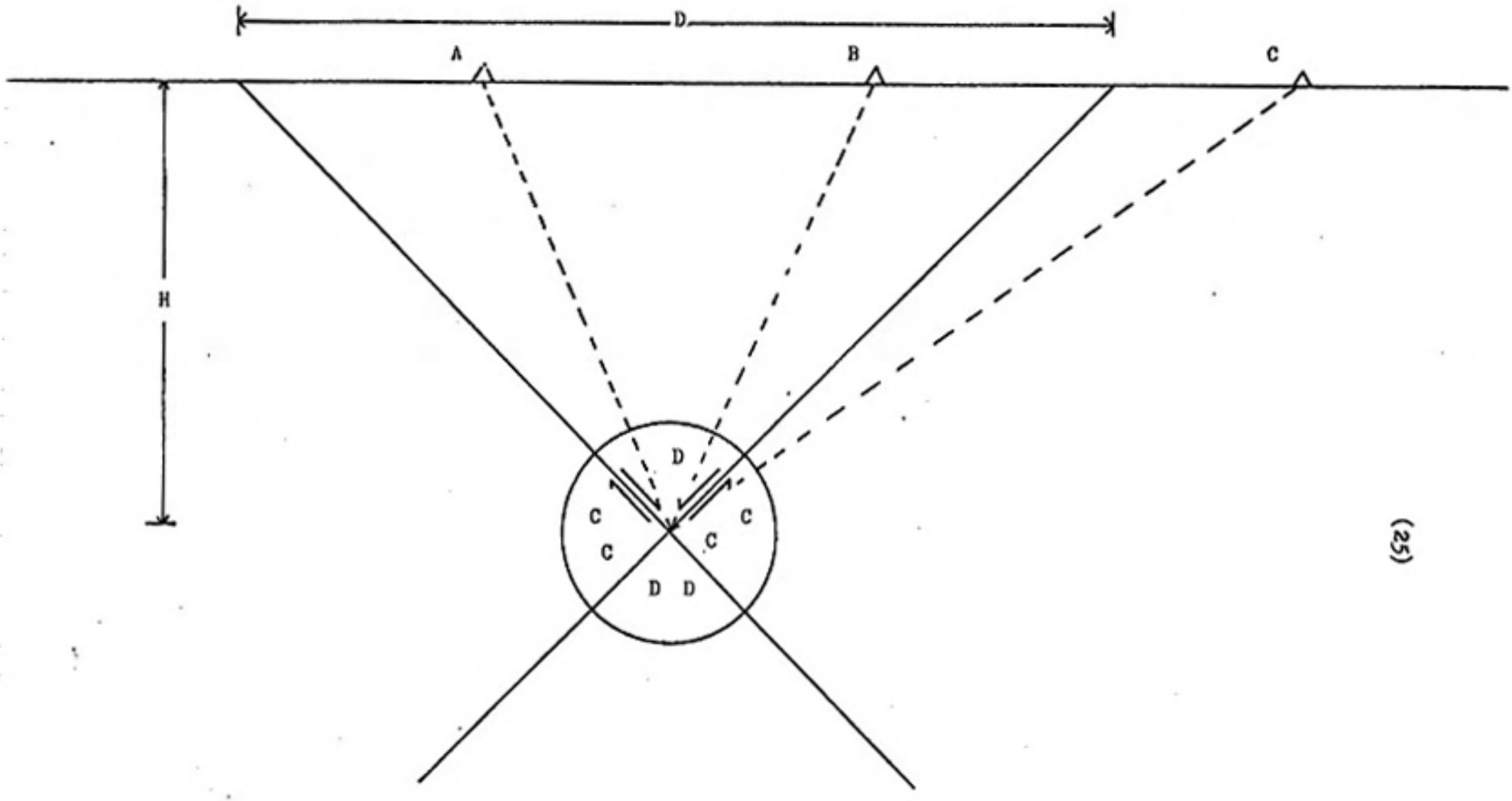


Figure 8. First motion pattern for a normal fault. D's are dilatations and C's are compressions. The solid lines are the two nodal planes, and the dashed lines are raypaths to recording stations.

corresponding to the azimuth, and the angle of incidence of the earthquake's raypath at the station. The azimuth is defined as the angle from the epicenter to the station, as measured from north, and the angle of incidence is measured from a vertical axis passing through the recording station.

Because a homogeneous, isotropic half-space was assumed for the crustal model, the direct P and S waves traverse straight ray paths from the earthquake focus to the station. As the first arrivals are the direct waves that intersect the upper hemisphere, the upper half of the focal sphere is utilized for fault plane solutions for local earthquakes.

Because fault plane solutions define two perpendicular nodal planes, it is impossible to define the actual fault plane without additional geological or geophysical information, such as the mapped orientation of faults or the distribution of hypocenters in an aftershock sequence. Figure 9 demonstrates the fault plane solutions obtainable from strike-slip, normal, and reverse faulting.

The five axes commonly used with fault plane solutions are:

P axis: The axis of greatest principal stress oriented $\pm$45 degrees from the fault plane. This axis is always located in a region of dilatations.

T axis: The axis of least principal stress oriented $\pm$45 degrees to the fault plane. It is always

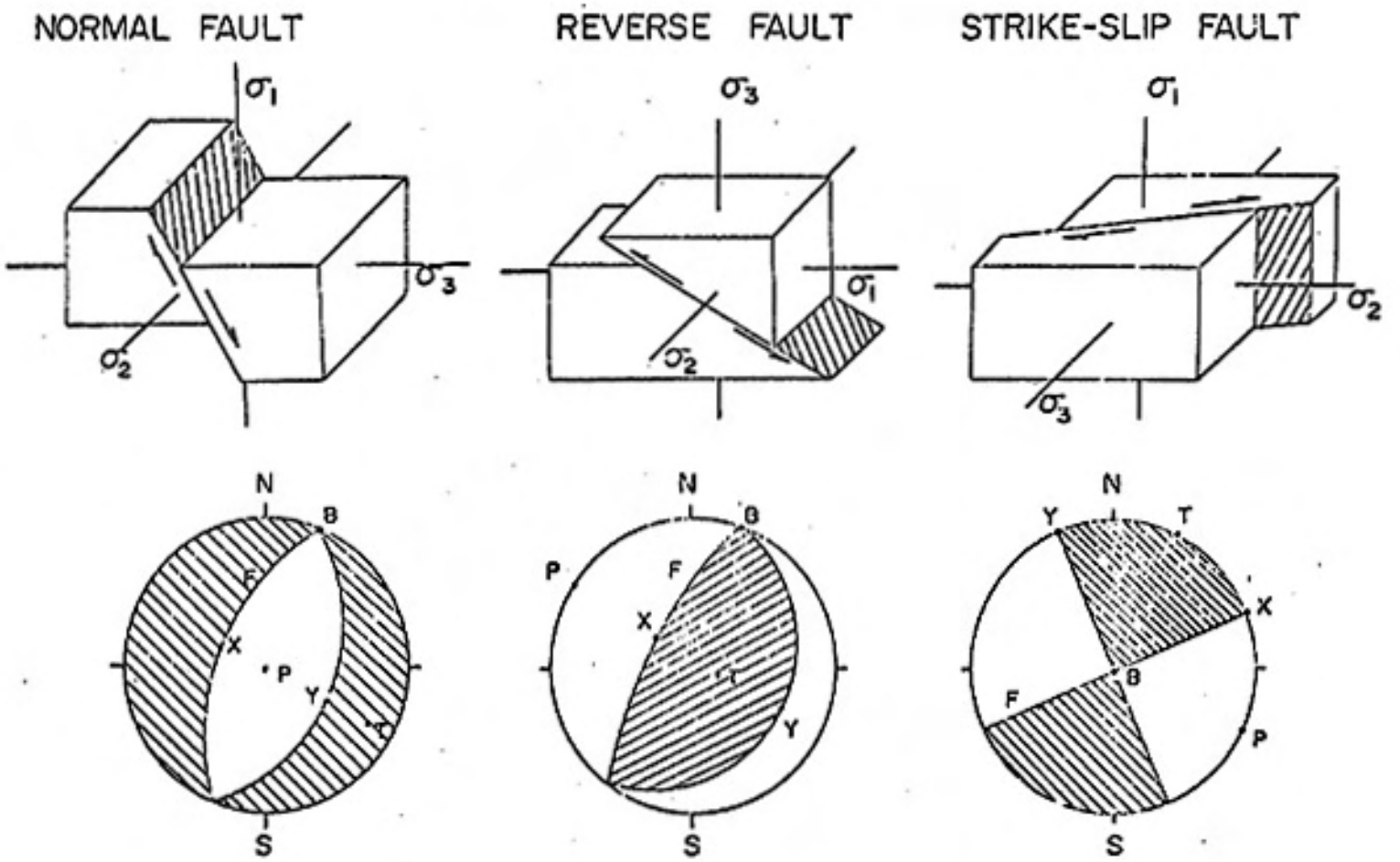


Figure 9. Fault plane solutions (lower focal sphere) for the three basic types of fault movement. Shaded areas are compressions, white areas are dilatations.

located in a region of compressions.

B axis: The axis of intermediate stress (null axis) located at the intersection of the fault plane and the auxiliary plane.

X axis: The direction of motion along the fault plane and the normal to the auxiliary plane.

Y axis: The node of the fault plane. It is normal to the fault plane and lies in the auxiliary plane.

Two orthogonal systems defined by the P,T,B and X,Y,B axes are rotated about the B axis at an angle of $\pm$45 degrees to each other.

An equal-area or Schmidt net was used for the fault plane solutions in this study. This stereonet produces the minimum amount of areal distortion from the projection of the focal sphere into two dimensions. Fairbairn (1942) defines the technique for constructing an equal-area stereonet. A computer program was used to plot the directions of first motions on the equal-area net. A listing of this program is given in Appendix 3.

Insufficient data were available in this study to determine the fault plane solution for a single earthquake because of the small number and/or poor distribution of stations recording the event. Instead, composite fault plane solutions were constructed. Composite fault plane

solutions combine first motion data from several earthquakes in the same geographic area which are assumed to have similar source mechanisms. These composite solutions generally exhibit a better distribution of compressions and dilatations and allow determination of the P nodal planes. Stauder and Ryall (1962) and Hadley and Combs (1974) have successfully utilized this technique in studying microearthquakes in Nevada and southern California, respectively.

The convention for first motion directions on the MEQ-800 earthquake seismograms was standard, i.e. a compression was "up" and a dilatation was "down". First motion directions for the two telemetered stations 'LAD' and 'LPM' were cross checked with mining explosions and teleseisms recorded at the two stations. Both 'LAD' and 'LPM' were determined to be reversed for all events used in this study. In addition, the data obtained from the digital recorders were also cross checked against mining explosions, teleseisms and, in some cases, with seismograms from MEQ-800 seismographs which were located adjacent to the digital units. The digital units were determined to have the standard directions for first motion.

Composite fault plane solutions were developed for twelve regions shown in figure 10. Figures 11 through 17 and 19 through 28 present composite fault plane solutions

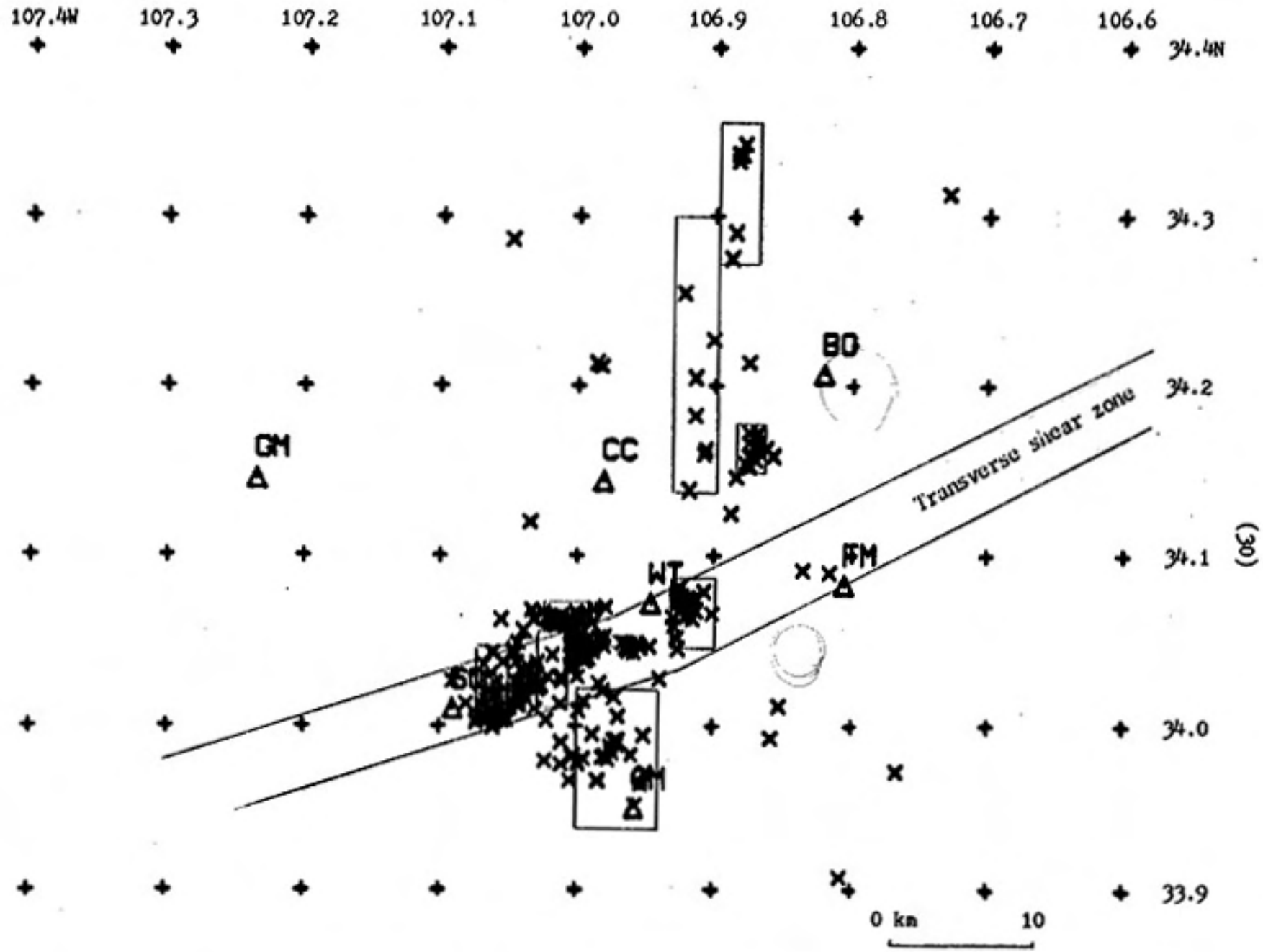
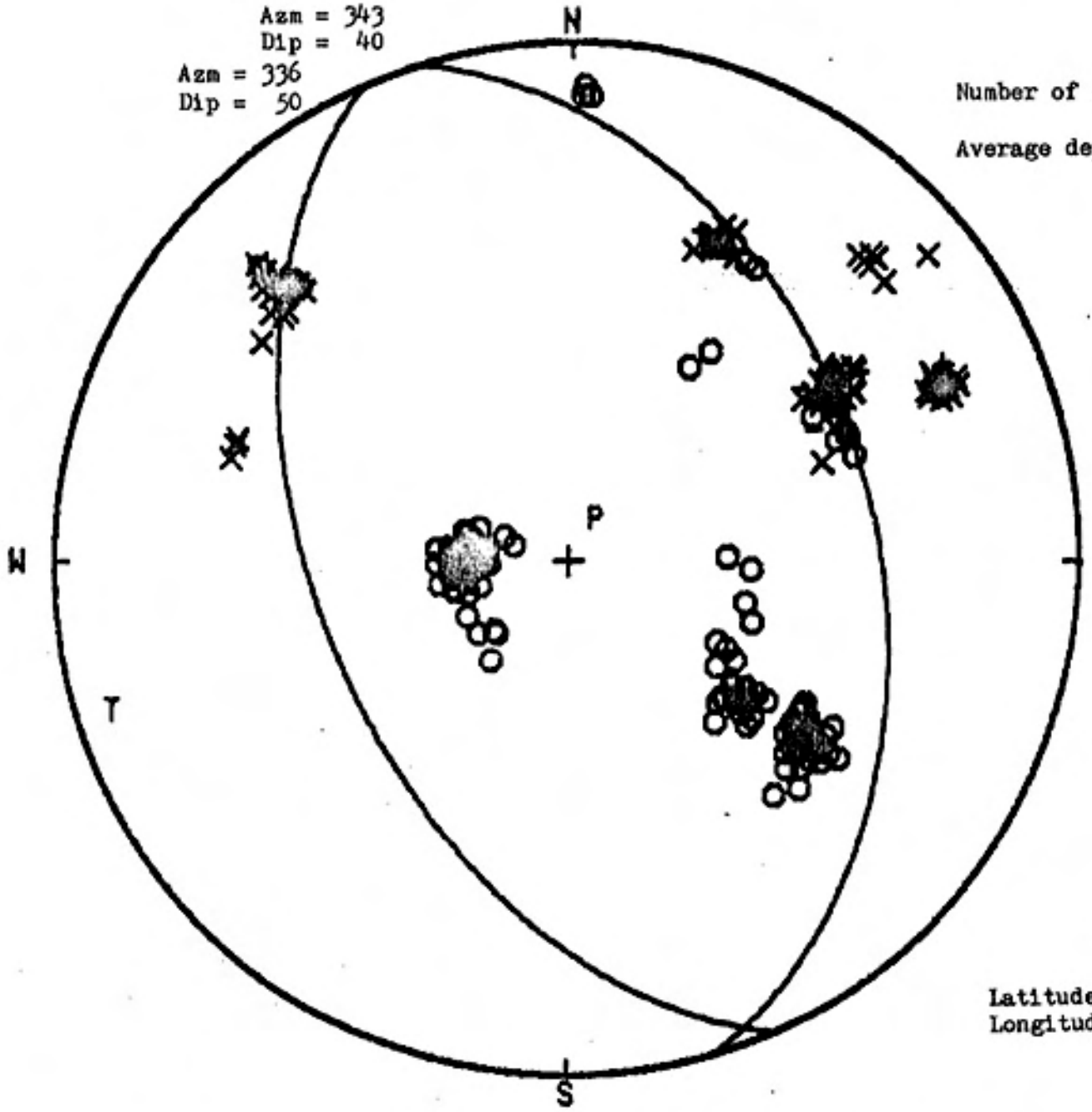


Figure 10. The location of the 12 areas used for the composite fault plane solutions. Also shown is the transverse shear zone proposed by Chapin et al. (1978).

for each region. The data used for each region are presented in Appendix 4. Well constrained composite solutions were obtained in areas 1, 2, 3, 6, 7, 8, and 11; solutions with more than one possible orientation were obtained in areas 4, 5, 9, 10, and 12.

Area 1 and area 2 are located to the west of the structural axis of the La Jencia basin (Sanford, 1968; Chapin et al., 1978). The fault plane solutions for both areas exhibit predominantly normal faulting with the nodal planes striking 336 and 354 degrees. These strikes agree with the orientations of the major mapped faults in the area. Based on the dips of mapped fault planes, the east dipping nodal plane was selected as the fault plane for area 1 while the fault plane for area 2 was indeterminate from geologic data. The average focal depth determined for these two regions was 9.94 $\pm$ 0.88 (s.d.) km and 10.38 $\pm$0.82 (s.d.) km based on 80 and 23 earthquakes, respectively.

The composite fault-plane solution for area 3 is similar to areas 1 and 2 in that the movement is predominantly dip-slip. However, the orientation of the nodal planes is more to the northwest than in the other regions. The strikes of the nodal planes are 321 and 333 degrees. The actual fault plane could not be identified from the two nodal planes. Thirty-six events with an average focal depth of 8.00 $\pm$1.21 (s.d.) km were used for



Number of events: 80

Average depth: 9.94 ± 0.88 (s.d.) km

Boundaries of composite

34°00' 34°2.63'

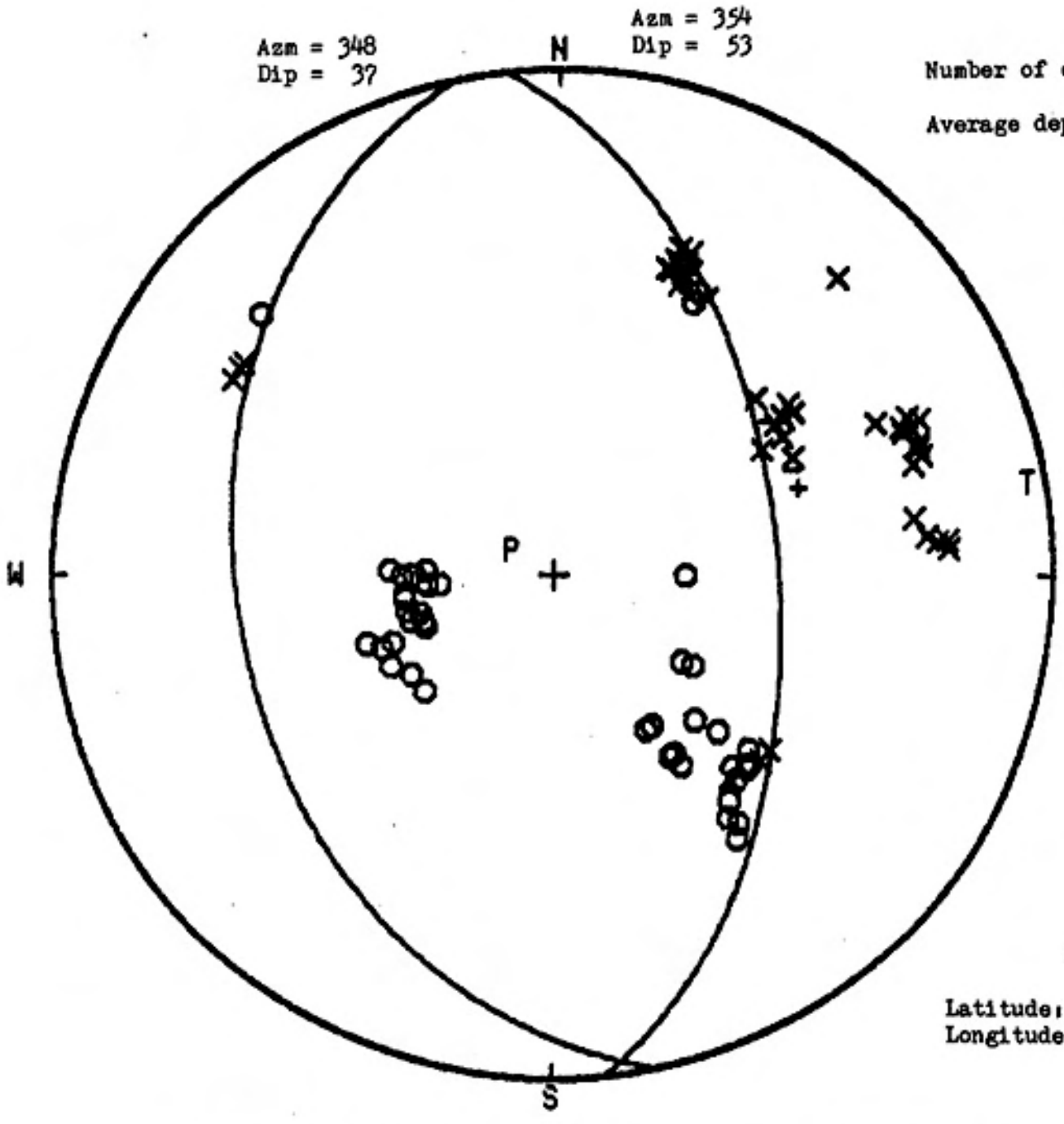
Latitude: 34.00000-34.04383

Longitude: 107.05000-107.07167

107°03.0' 107°043'

(32)

Figure 11. Composite fault-plane solution (upper focal sphere) for area 1. Circles are P wave dilatations and x's represent P wave compressions. P is the maximum principal stress, and T is the minimum principal stress.



Number of events: 23

Average depth: 10.37 ± 0.82 (s.d.) km

Boundaries of composite

34°0.61' 34°2.95'

Latitude: 34.01017-34.04917

Longitude: 107.02933-107.04850

107°1.76' 107°2.91'

Figure 12. Composite fault-plane solution (upper focal sphere) for area 2. Circles are P wave dilatations and x's represent P wave compressions. P is the maximum principal stress, and T is the minimum principal stress.

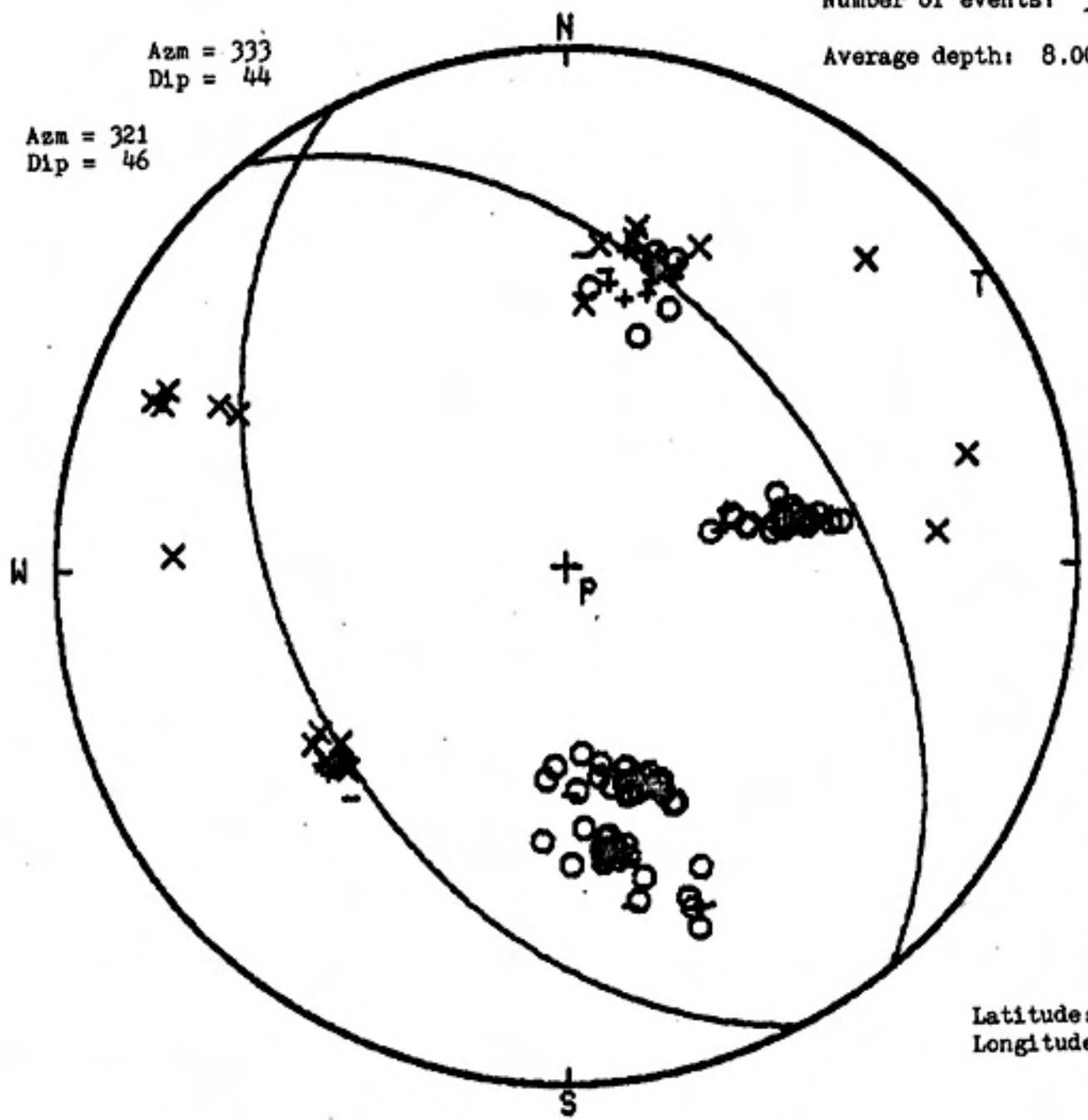


Figure 13. Composite fault-plane solution (upper focal sphere) for area 3. Circles are P wave dilatations and x's represent P wave compressions. P is the maximum principal stress, and T is the minimum principal stress.

the composite fault plane solution.

Areas 6 and 11 are located within the fault-bounded Rio Grande valley of the rift. The nodal plane which dips west in the composite solution of area 6 is the probable fault plane because it correlates with mapped faults along the eastern margin of the Rio Grande valley. Similarly, the east dipping nodal plane in the composite solution for area 11 is the probable fault plane because it correlates with mapped faults along the valley's western margin. Both preferred fault planes are oriented approximately north-south with a dip of 54 degrees. Eleven events with an average focal depth of 7.00 $\pm$0.34 (s.d.) km were used in the composite solution for area 6 while seven events with an average focal depth of 6.48 $\pm$0.48 (s.d.) km were used in the solution for area 11.

The composite solution for area 7 exhibits the largest amount of strike-slip movement of any of the areas. Although this region is located within the Rio Grande valley, the nodal planes for the composite fault-plane solution cannot be correlated with mapped faults on either margin. The strike of the east dipping nodal plane agrees with the strike of the nodal planes believed to be the fault planes in areas 6 and 11. However, the dip is too shallow to be correlated with the dominant mode throughout the area. Instead, the nearly vertical west-northwest nodal plane is

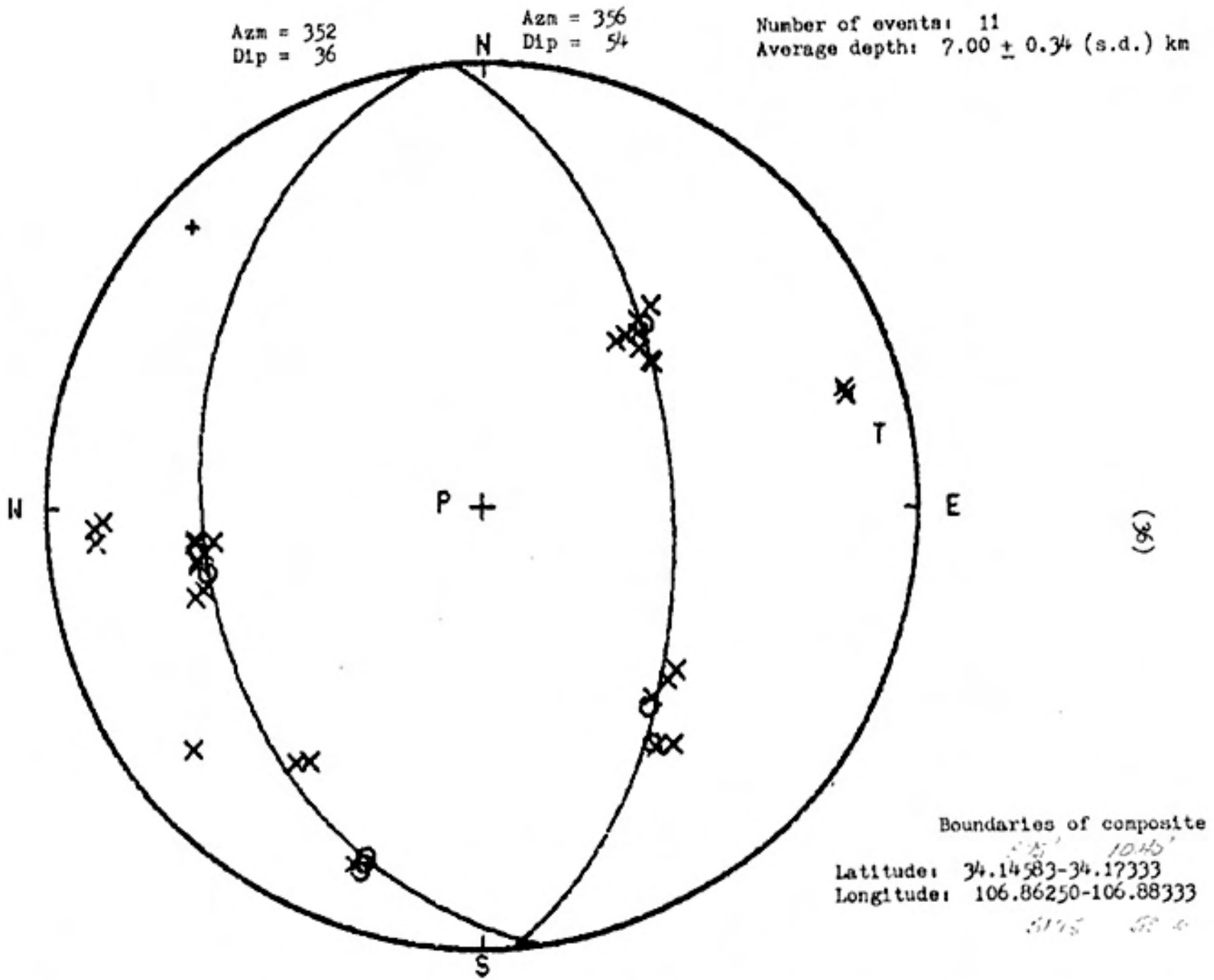
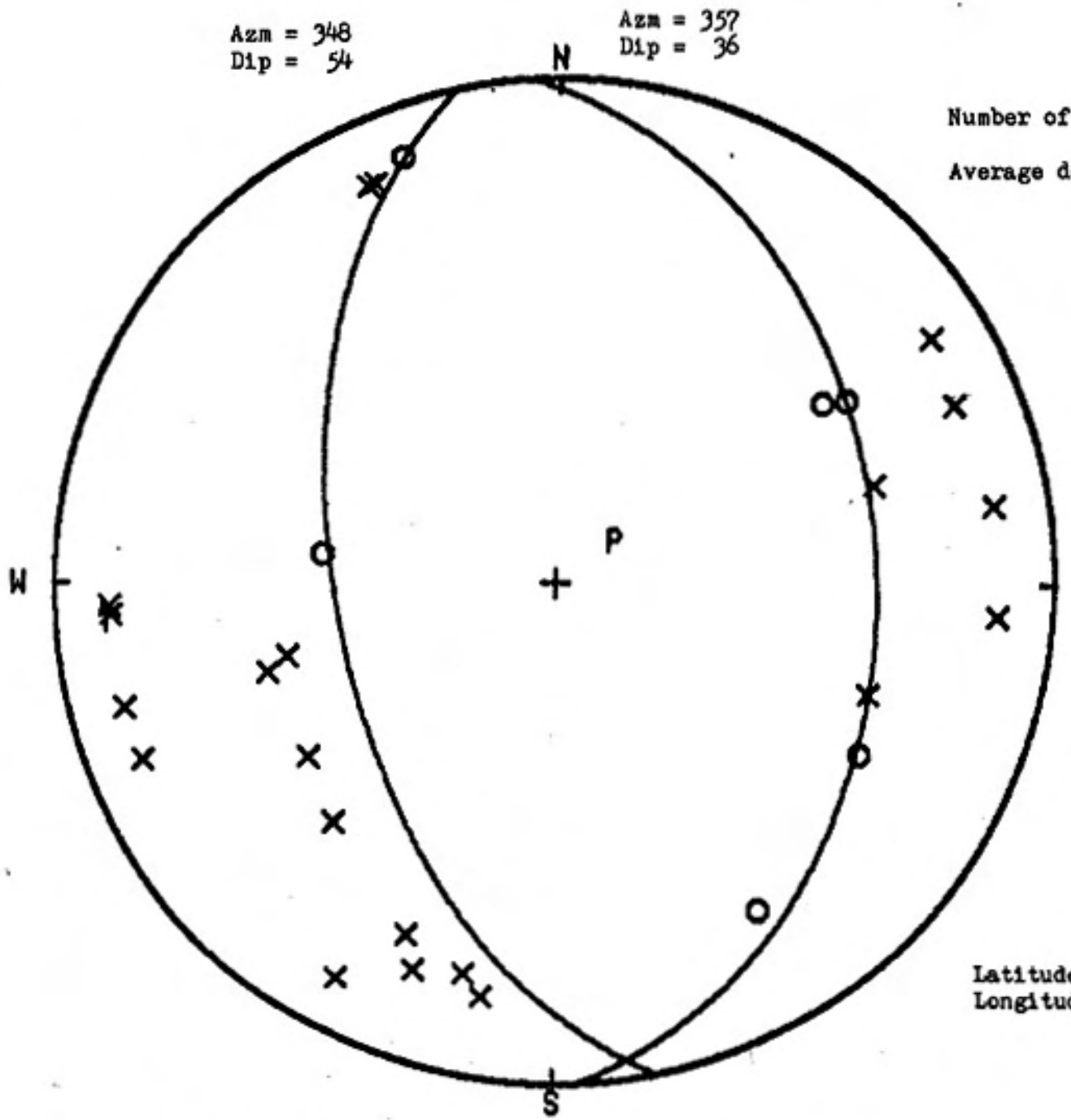


Figure 14. Composite fault-plane solution (upper focal sphere) for area 6. Circles are P wave dilatations and x's represent P wave compressions. P is the maximum principal stress, and T is the minimum principal stress.



Number of events: ?

Average depth: 6.47 ± 0.48 (s.d.) km

Boundaries of composite

Latitude: 34.13300-34.30000
7.99 18.00

Longitude: 106.90100-106.93100
54.06 55.86

Figure 15. Composite fault-plane solution (upper focal sphere) for area 11. Circles are P wave dilatations and x's represent P wave compressions. P is the maximum principal stress, and T is the minimum principal stress.

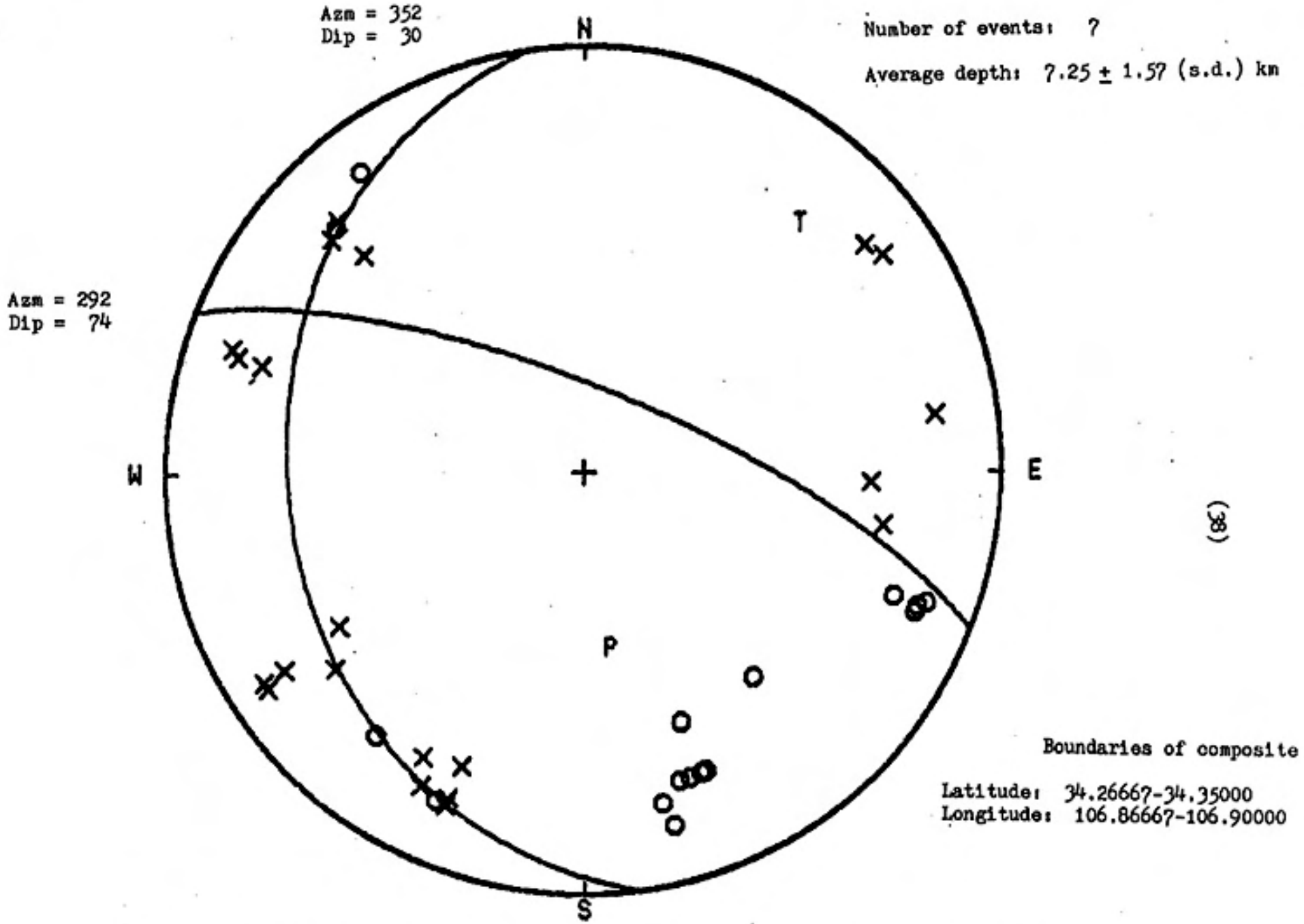


Figure 16. Composite fault-plane solution (upper focal sphere) for area 7. Circles are P wave dilatations and x's represent P wave compressions. P is the maximum principal stress, and T is the minimum principal stress.

believed to be the fault plane. Seven events with an average focal depth of 7.25 ±1.57 (s.d.) km were utilized for the composite solution.

Area 8 is located to the south of Socorro in the Chupadera Mountains. The structural geology in this area is complex (Chapin et al., 1978; Plate 1) with both east and west dipping normal faults present. However, the east dipping nodal plane is believed to be the actual fault plane based on the dip of 60 degrees which is in agreement with the dip observed for normal faulting. Twenty-three events with an average focal depth of 8.68 ±1.84 (s.d.) km were used for the composite solution.

The T axes for these seven well-constrained solutions are shown in figure 18. The orientation of the T axes varies from 222 to 264 degrees with dips between 5 and 26 degrees. All the T axes indicate approximately east-west horizontal crustal extension, in agreement with previous studies (Shuleski, 1976; Sanford et al., 1979).

The extreme nodal plane orientations for areas 12, 4, 10, 9, and 5 are shown in figures 19, 21, 23, 25, and 27, respectively. Note that there is a great deal of latitude in the placement of the nodal planes on the basis of first motion data. The preferred composite solutions for these areas are given in figures 20, 22, 24, 26 and 28. The preferred solutions were selected according to the P and T

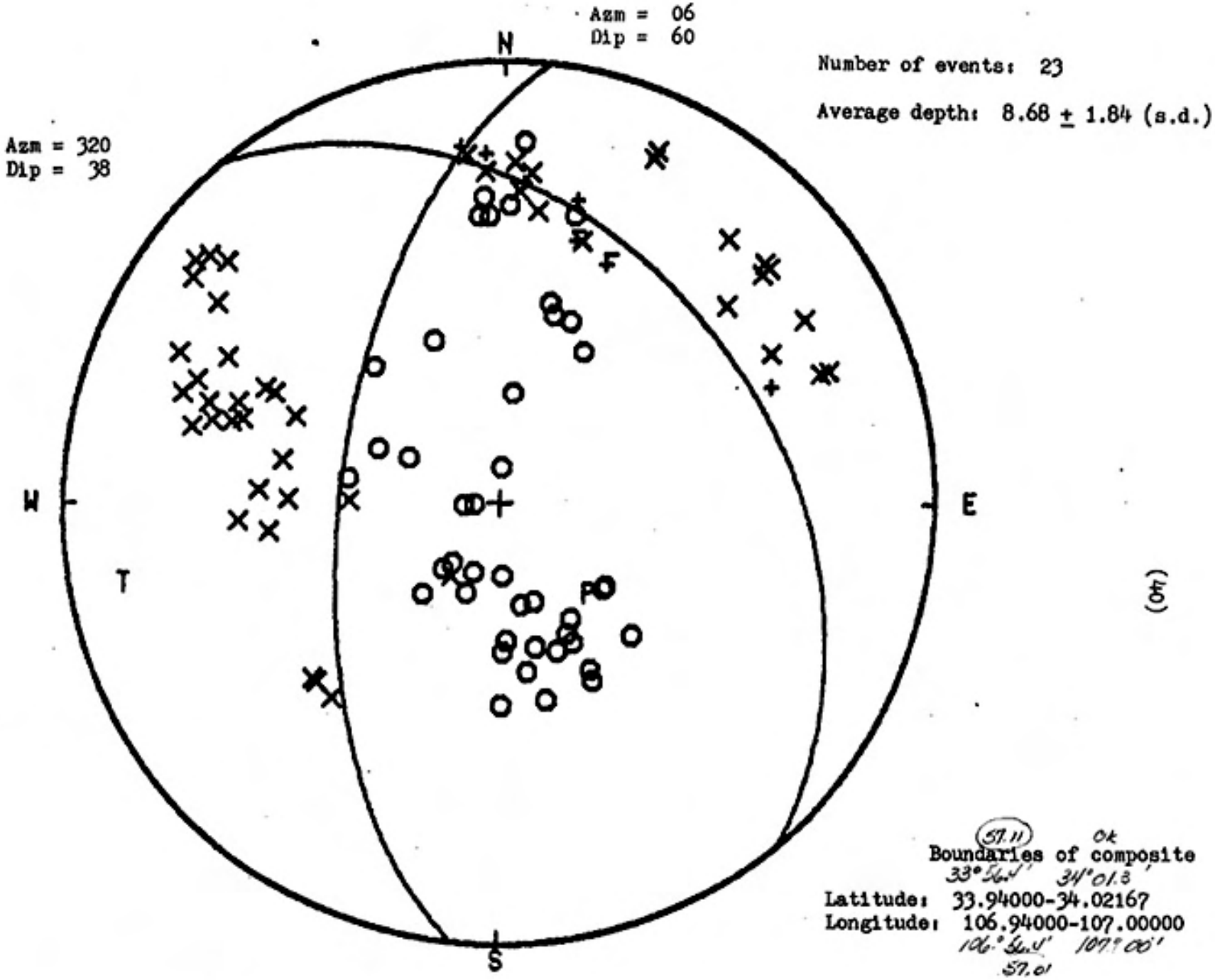


Figure 17. Composite fault-plane solution (upper focal sphere) for area 8. Circles are P wave dilatations and x's represent P wave compressions. P is the maximum principal stress, and T is the minimum principal stress.

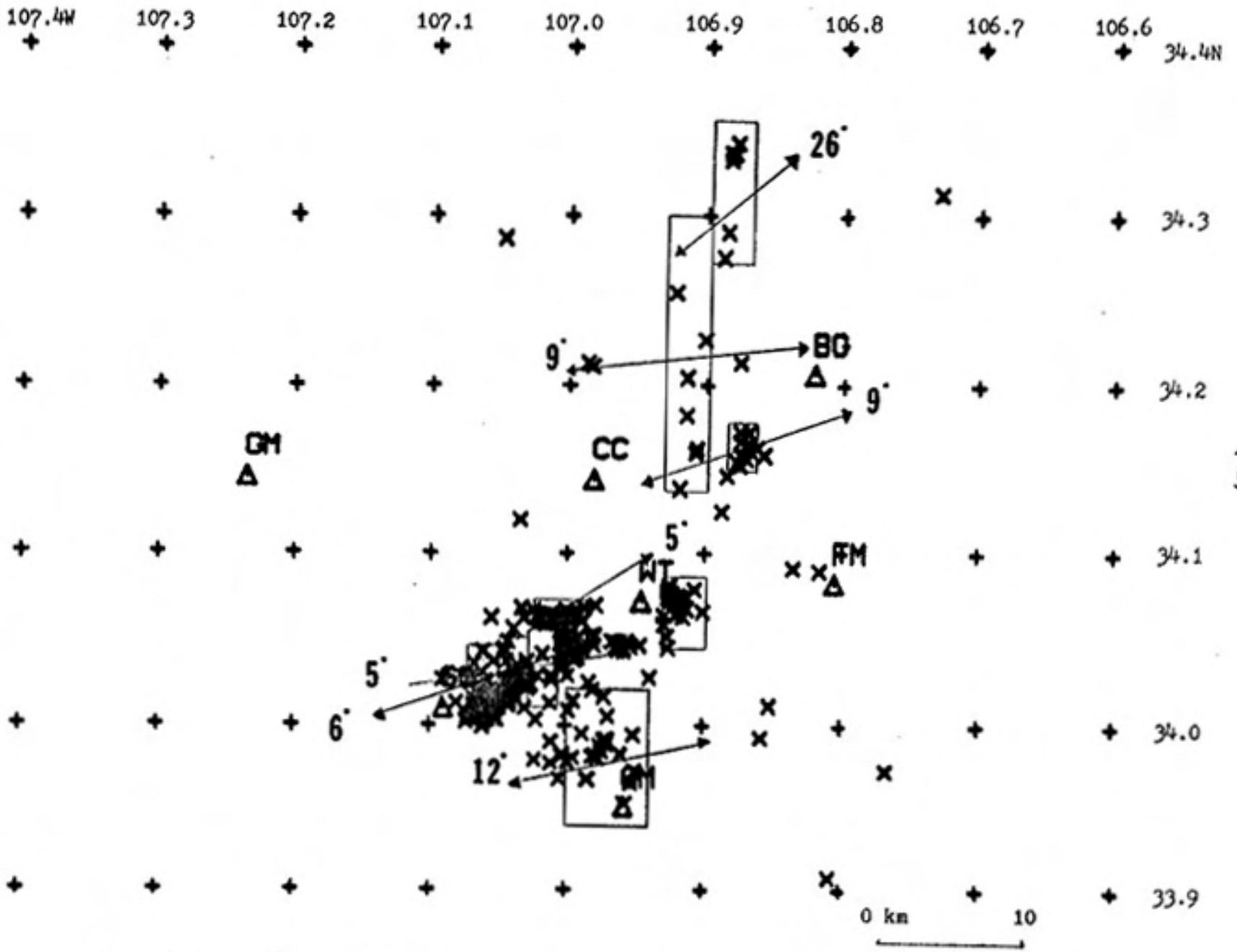


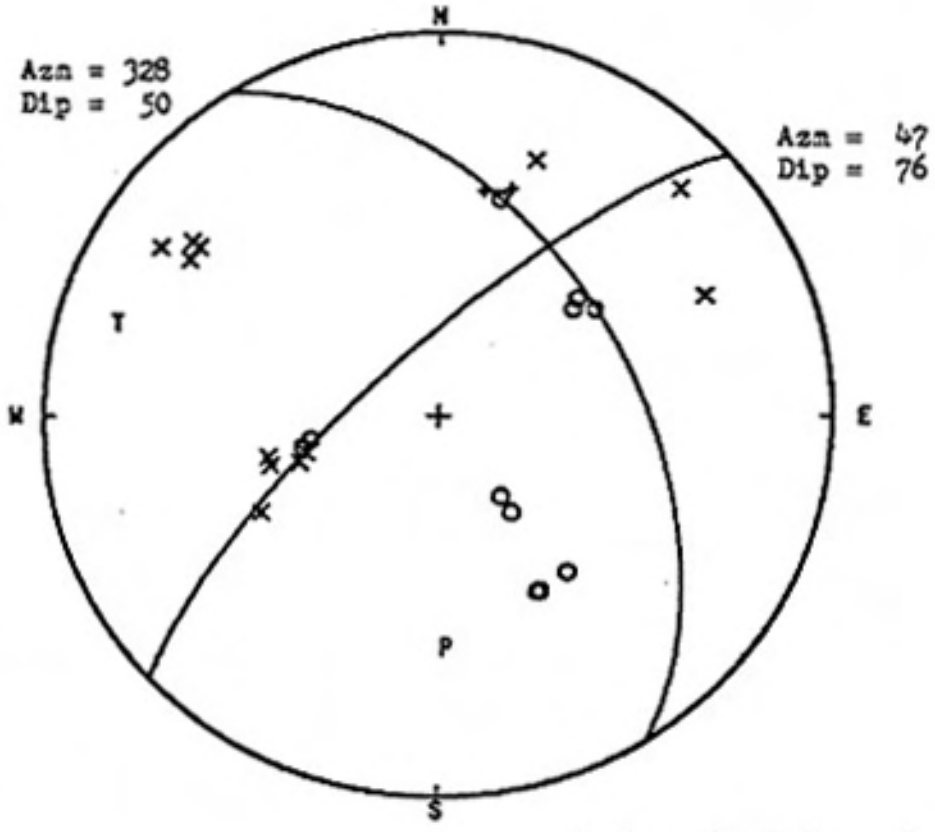
Figure 18. Azimuth and dip of T axes for the seven well-constrained composite solutions.

axes for the composite solutions in the adjacent areas (figure 18) on the assumption that the local stress patterns did not change abruptly from one region to the next.

The preferred composite solution for area 12 is shown in figure 20. Eight events with an average focal depth of 8.92 $\pm$3.86 (s.d.) km were used for the solution. The strike of the nodal planes is 309 and 9 degrees. Based on the dip of the nodal planes, the east dipping nodal plane is believed to be the fault plane.

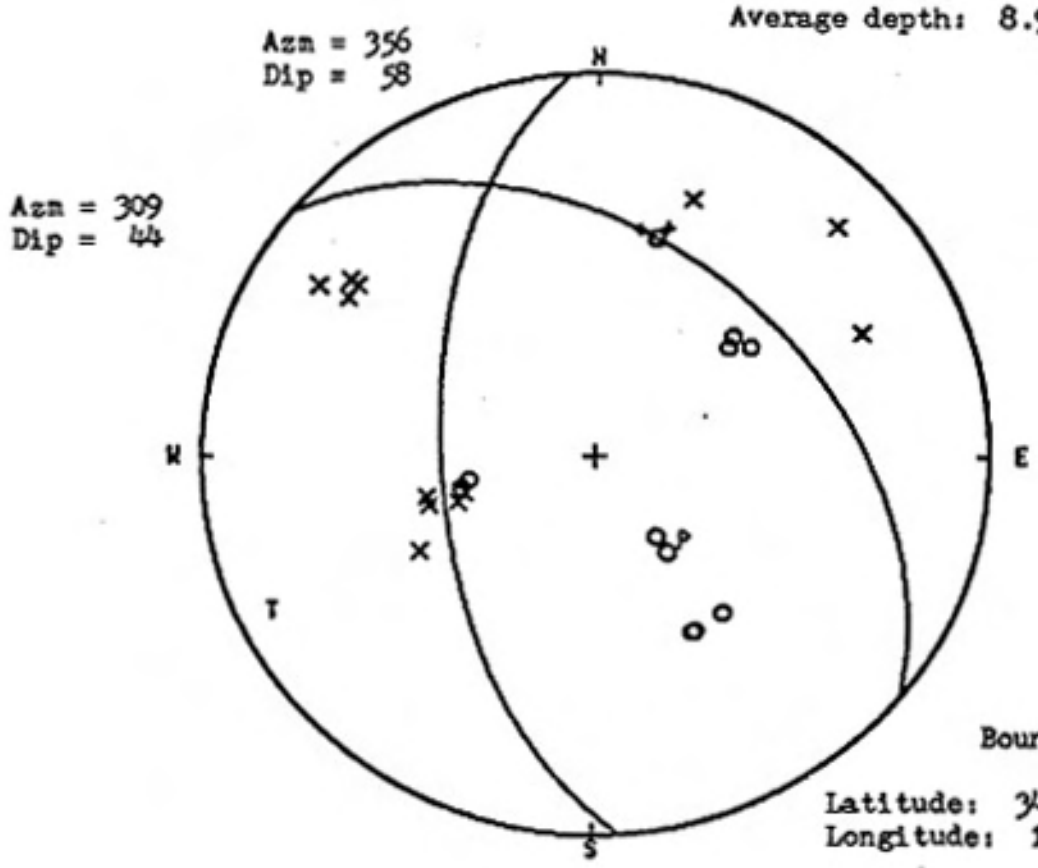
The preferred composite fault-plane solution for area 4 is shown in figure 22. First motion data from 39 events appear in this solution. The east dipping nodal plane is believed to be the fault plane based on both the strike (346) and the dip (54) which agrees with the dominant mode throughout the study area. The average focal depth for area 4 was determined to be 10.41 $\pm$0.62 (s.d.) km.

The preferred solutions for areas 10 and 9 are based on 4 and 9 earthquakes, respectively. The average focal depth for area 10 is 10.87 $\pm$1.03 (s.d.) km, and 9.69 $\pm$0.93 (s.d.) km for area 9. The nodal planes strike 320 and 346 degrees for area 10, and 312 and 7 degrees for area 9. The east dipping nodal plane was selected as the fault plane in both composite solutions based on the orientation and dip.



Number of events: 8

Average depth: 8.92 ± 3.86 (s.d.) km



Boundaries of composite

Latitude: 34.01017-34.05500
Longitude: 107.006-107.02932

Figure 19. Extreme P wave nodal plane orientations for area 12. The P and T axes for each solution are also shown. Circles are dilatations and x's represent compressions.

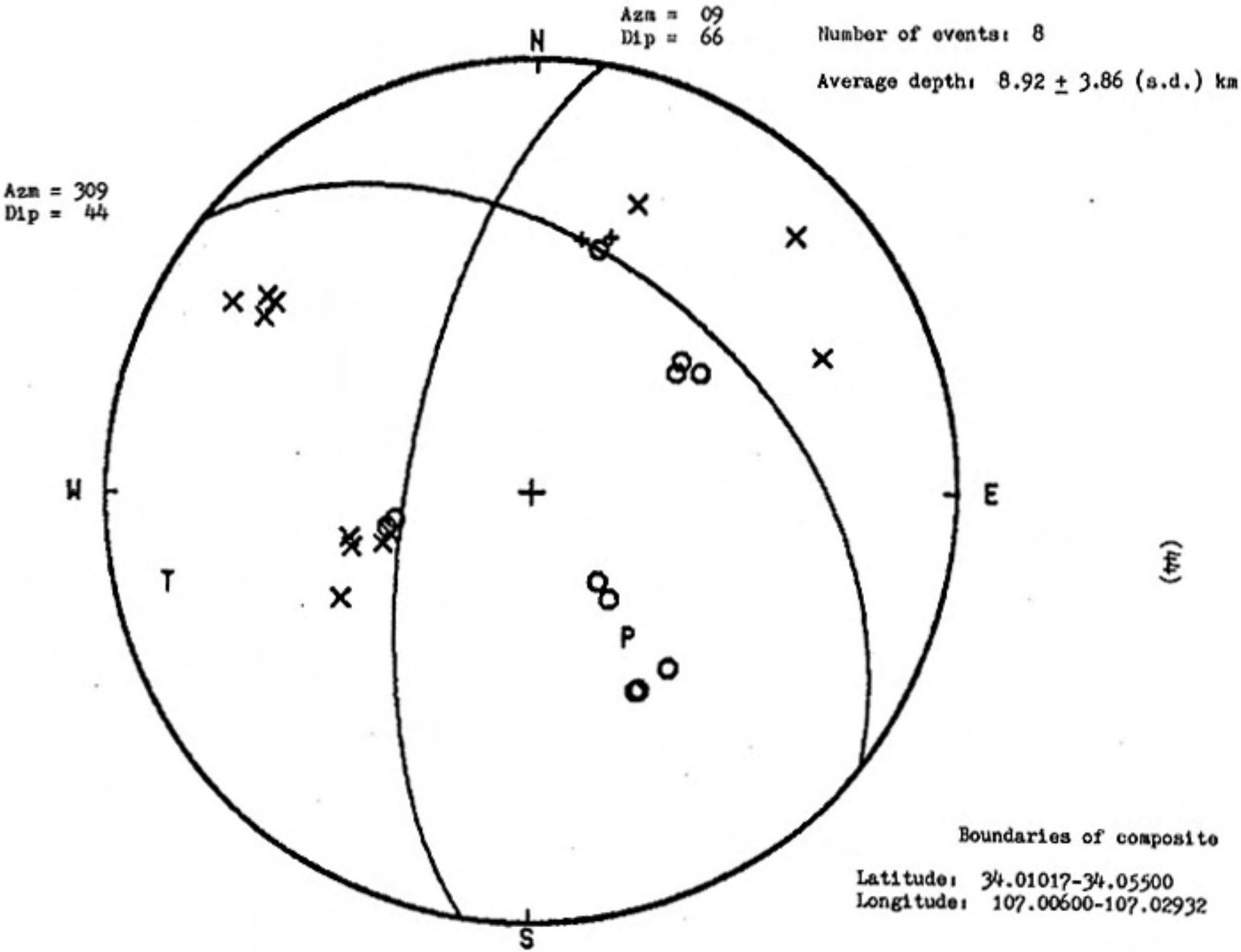
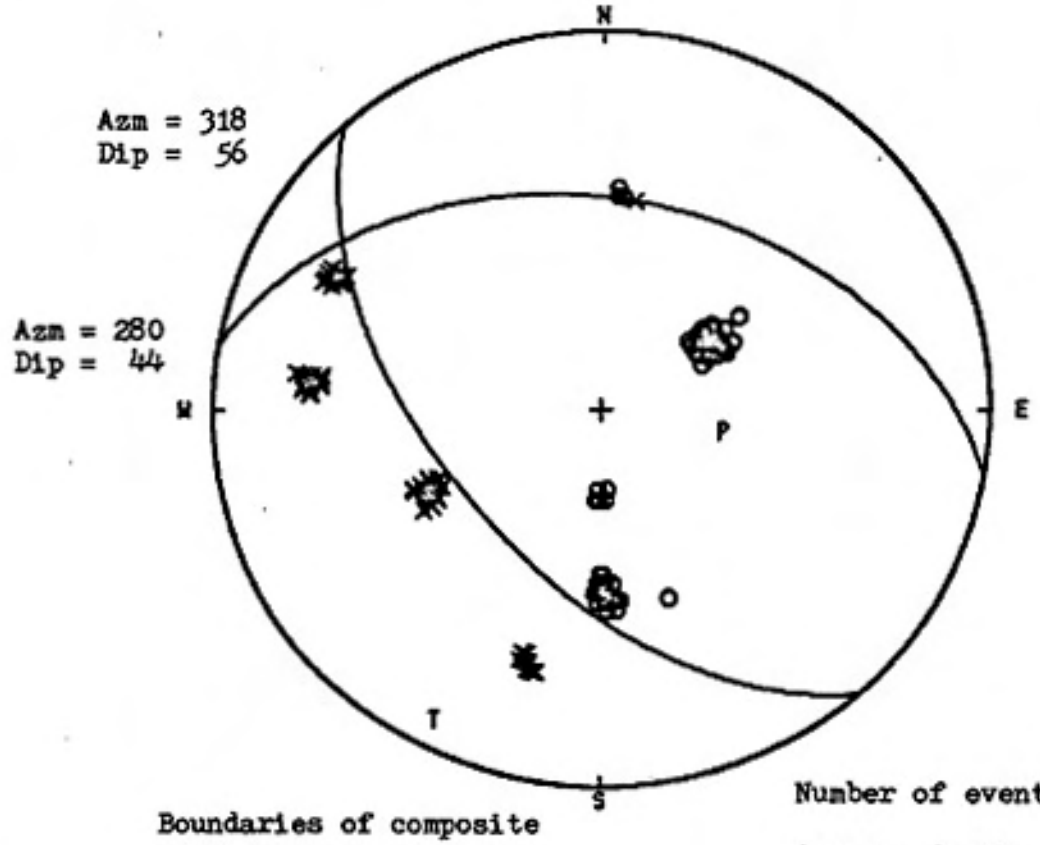


Figure 20. Preferred P wave nodal plane orientations for area 12. Circles represent dilatations and x's represent compressions. P is the maximum principal stress, and T is the minimum principal stress.



Boundaries of composite

Latitude: 34.04000-34.05500
Longitude: 106.99167-107.00500

Number of events: 39

Average depth: 10.41 ± 0.62 (s.d.) km

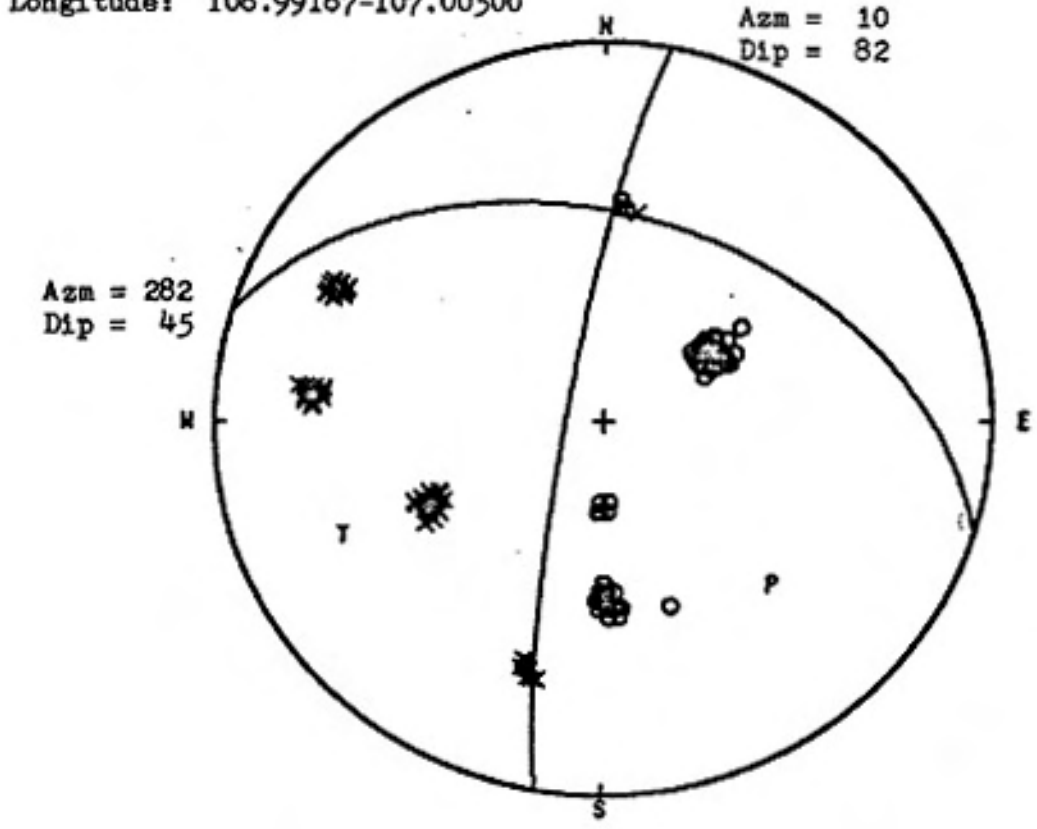


Figure 21. Extreme P wave nodal plane orientations for area 4. The P and T axes for each solution are also shown. Circles are dilatations and x's represent compressions.

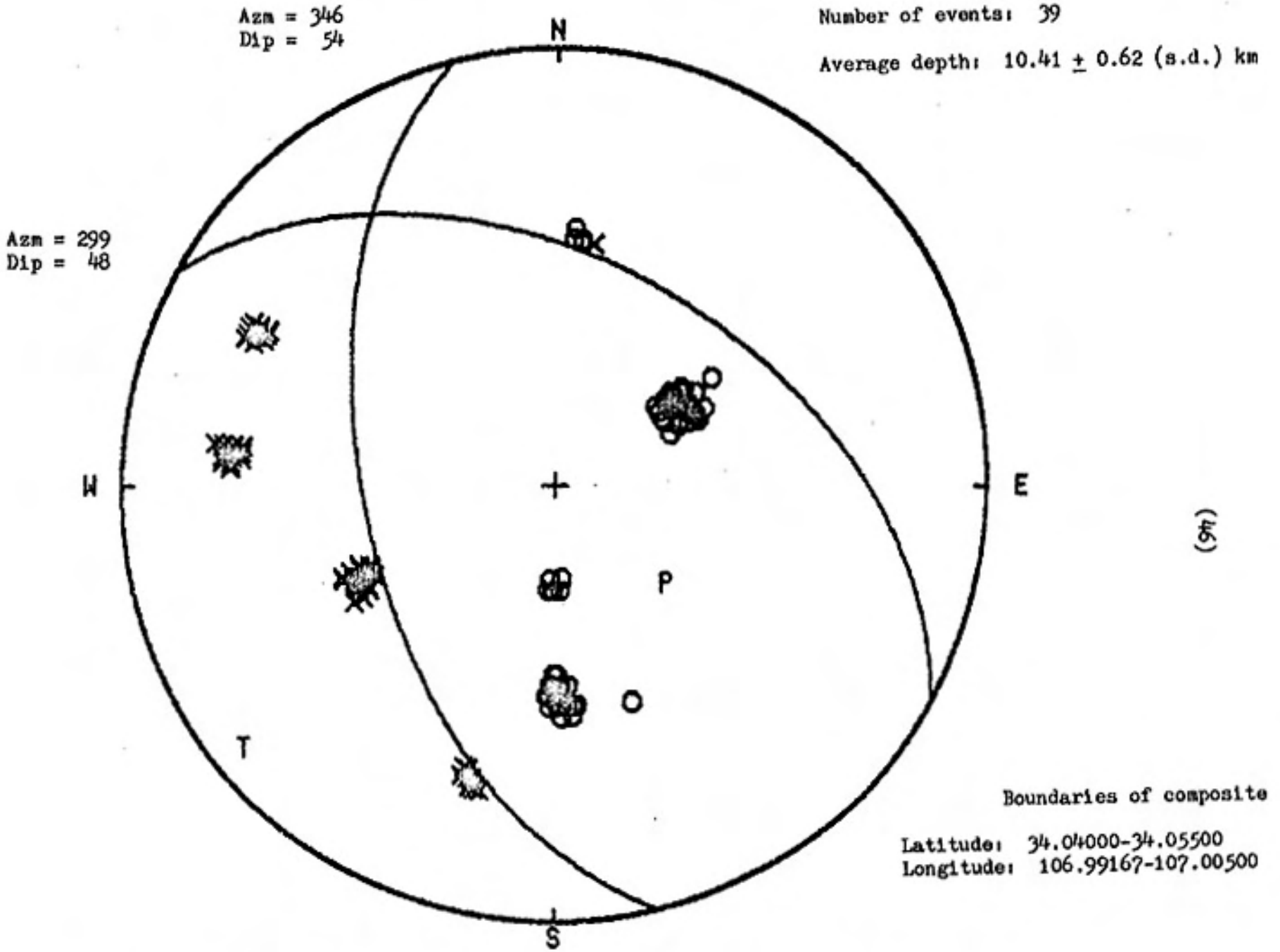
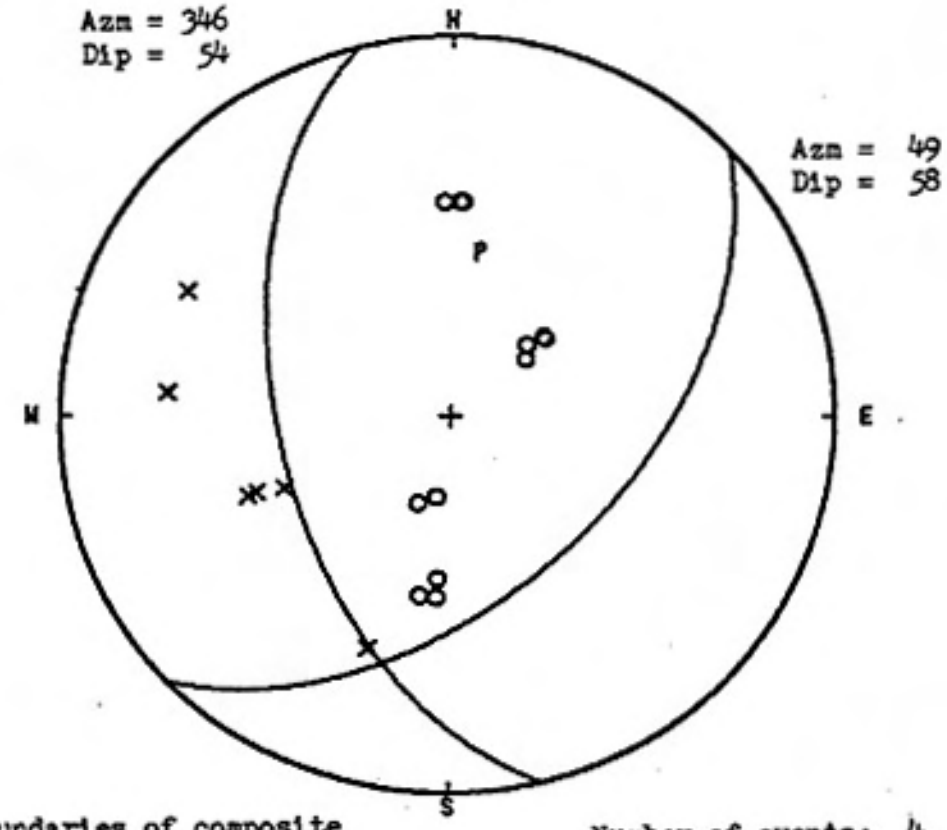


Figure 22. Preferred P wave nodal plane orientations for area 4. Circles represent dilatations and x's represent compressions. P is the maximum principal stress, and T is the minimum principal stress.



Boundaries of composite

Latitude: 34.04335-34.05000
Longitude: 106.96700-106.99165

Number of events: 4

Average depth: 10.87 ± 1.03 (s.d.) km

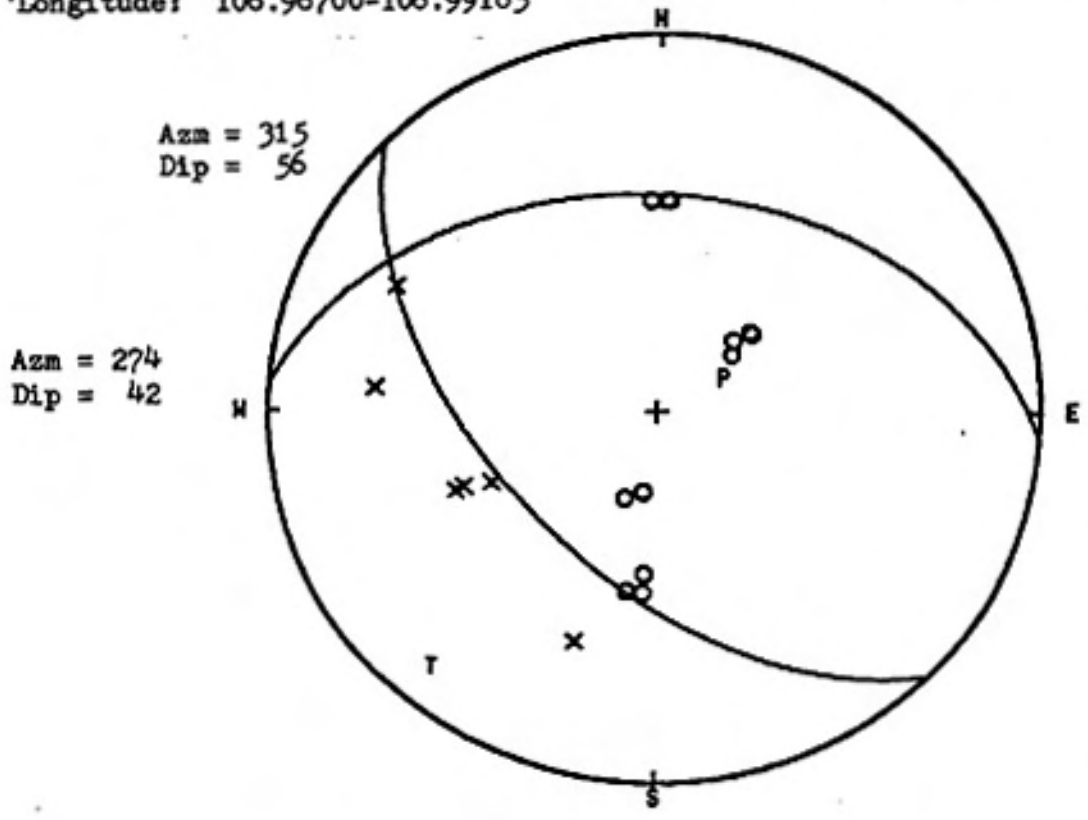


Figure 23. Extreme P wave nodal plane orientations for area 10. The P and T axes for each solution are also shown. Circles are dilatations and x's represent compressions.

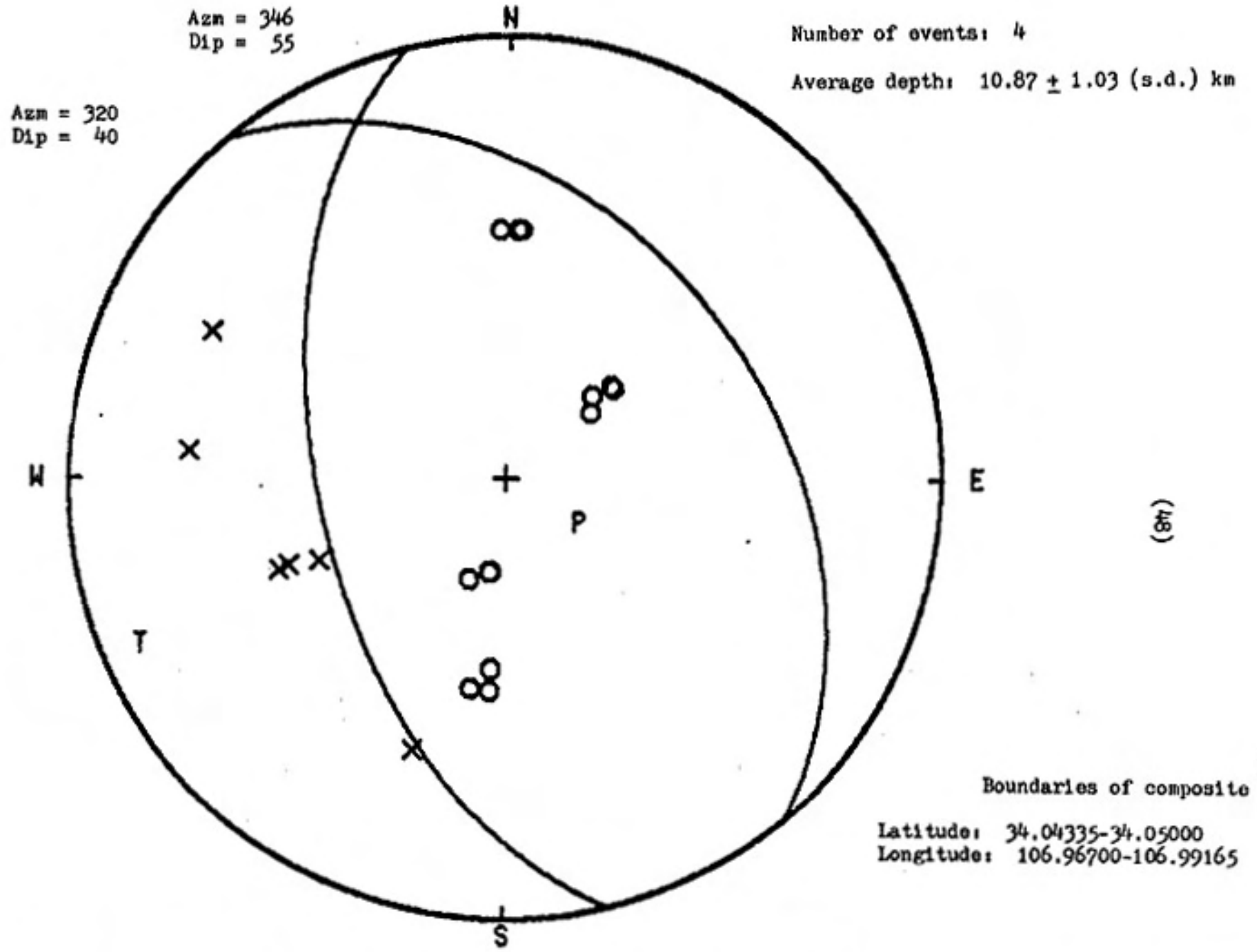
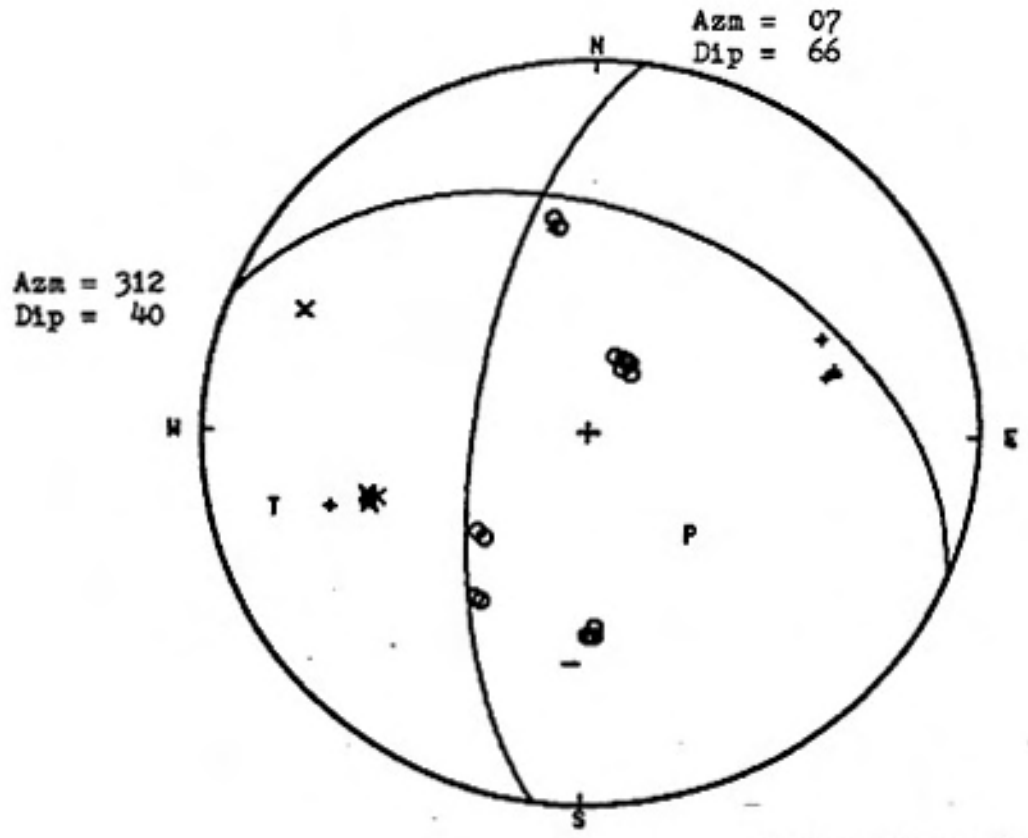
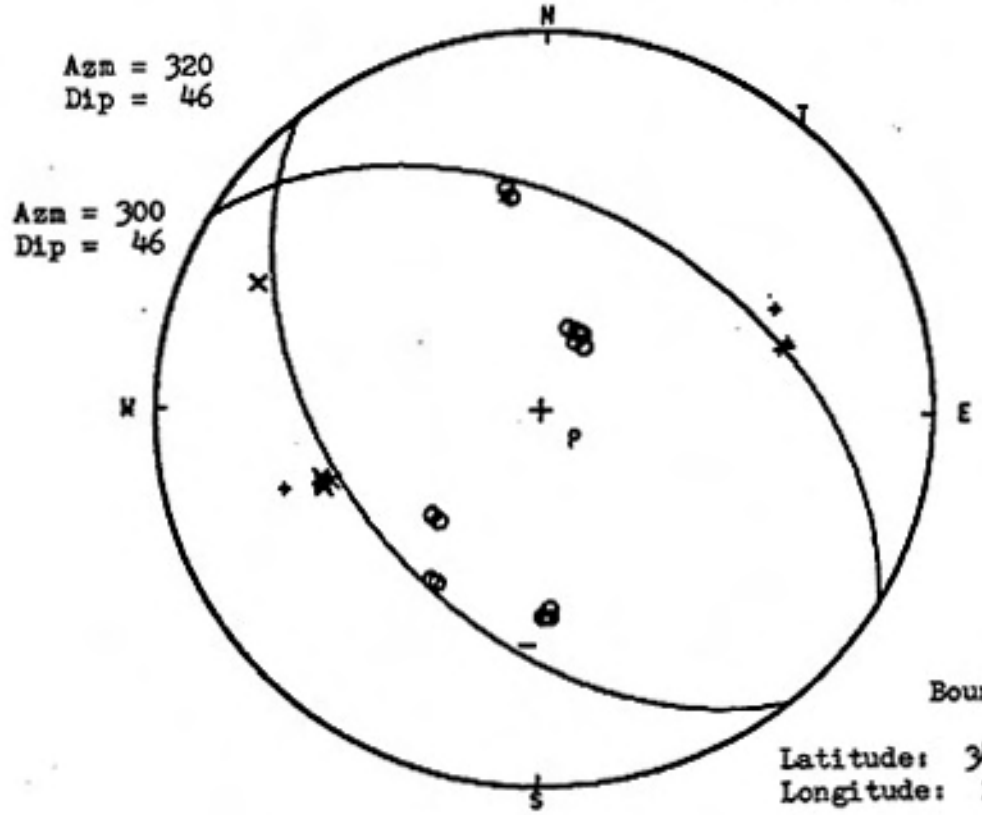


Figure 24. Preferred P wave nodal plane orientations for area 10. Circles represent dilatations and x's represent compressions. P is the maximum principal stress, and T is the minimum principal stress.



Number of events: 9

Average depth: 9.69 ± 0.93 (s.d.) km



Boundaries of composite

Latitude: 34.04333-34.05000
Longitude: 106.95333-106.96667

Figure 25. Extreme P wave nodal plane orientations for area 9. The P and T axes for each solution are also shown. Circles are dilatations and x's represent compressions.

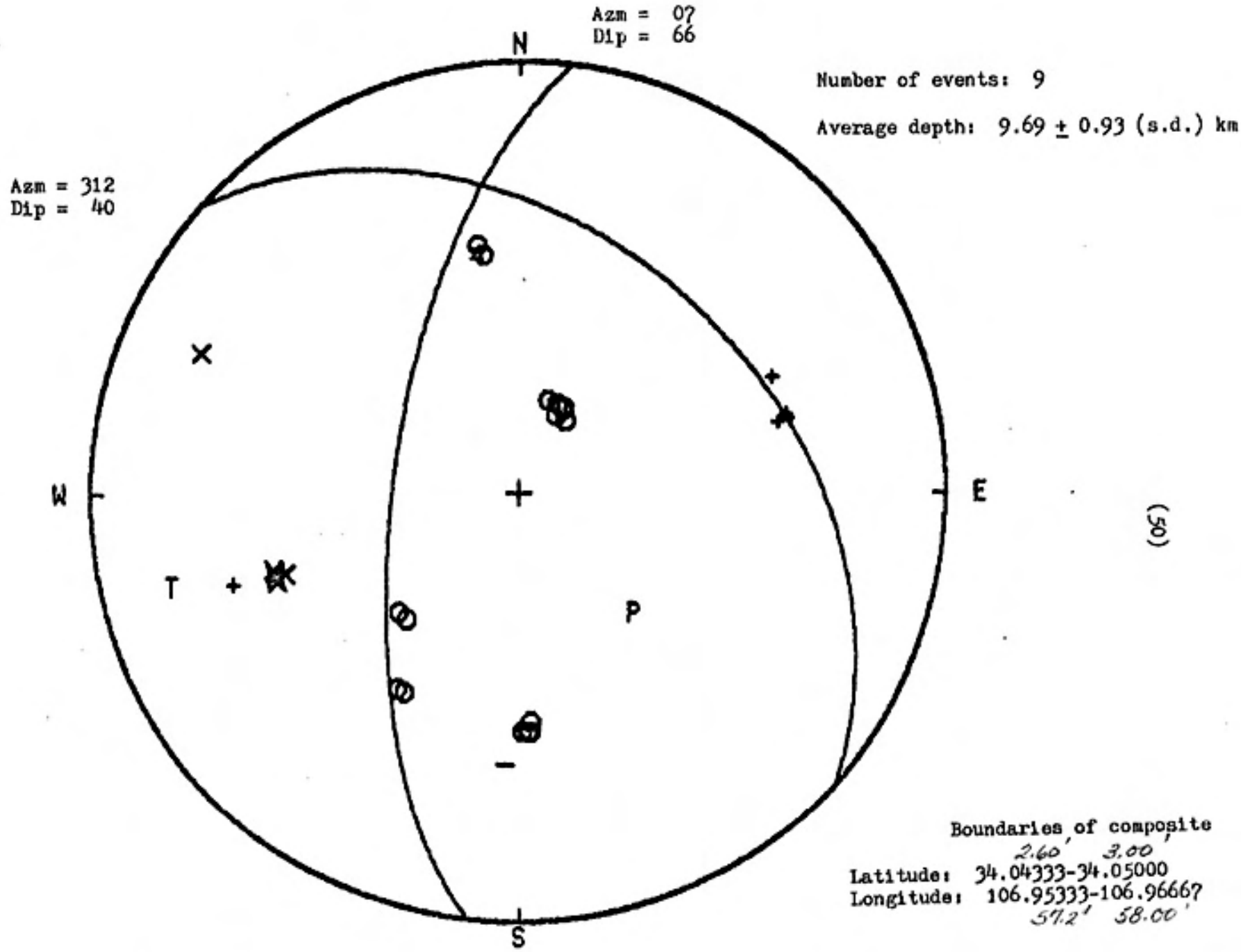
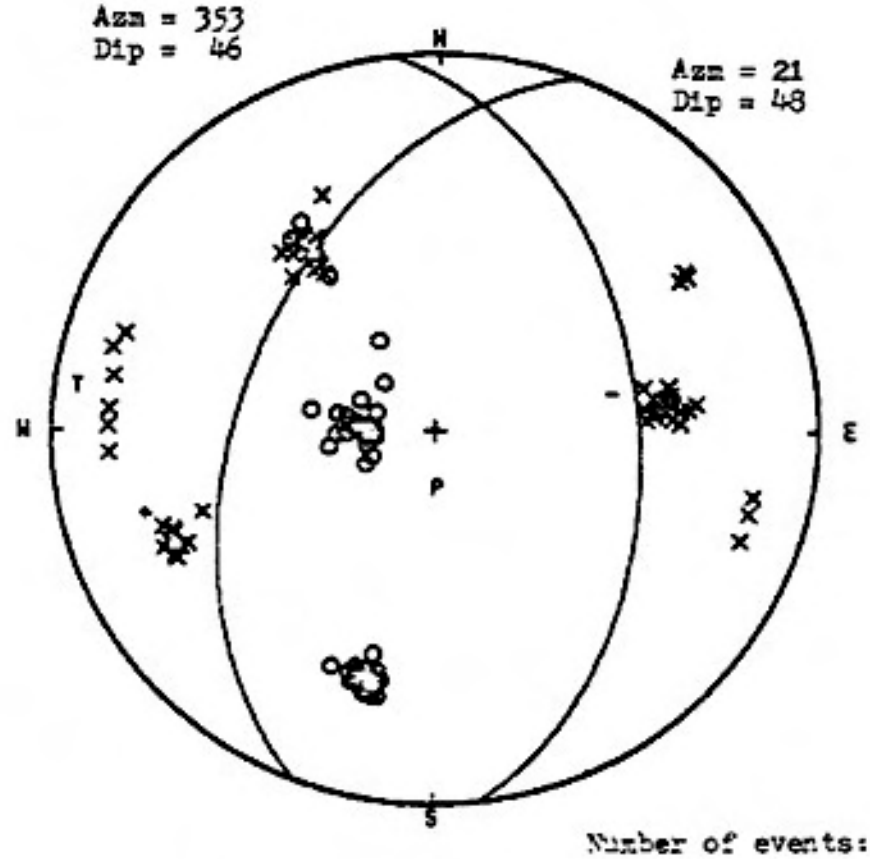


Figure 26. Preferred P wave nodal plane orientations for area 9. Circles represent dilatations and x's represent compressions. P is the maximum principal stress, and T is the minimum principal stress.

Thirty-three events with an average focal depth of 8.59 ±1.01 (s.d.) km were used in the composite solution for area 5 shown in figure 28. The strikes of the nodal planes are 353 and 21 degrees with dips of 46 and 48 degrees, respectively. The east dipping nodal plane is believed to be the fault plane based on the mapped east dipping fault west of the area (Chapin et al., 1978).

Minor discrepancies in first motions near the nodal planes are observed in the composite solutions. Because the fault plane surface is irregular, small changes in orientaion of the fault plane as the rupture propagates is the probable explanation for these minor discrepancies in first motions. Changes in directions of first motions may also result from small errors associated with the depths of focus. A small error in focal depth may reverse the direction of first motion depending on the location of the station with respect to the nodal planes (figure 8).



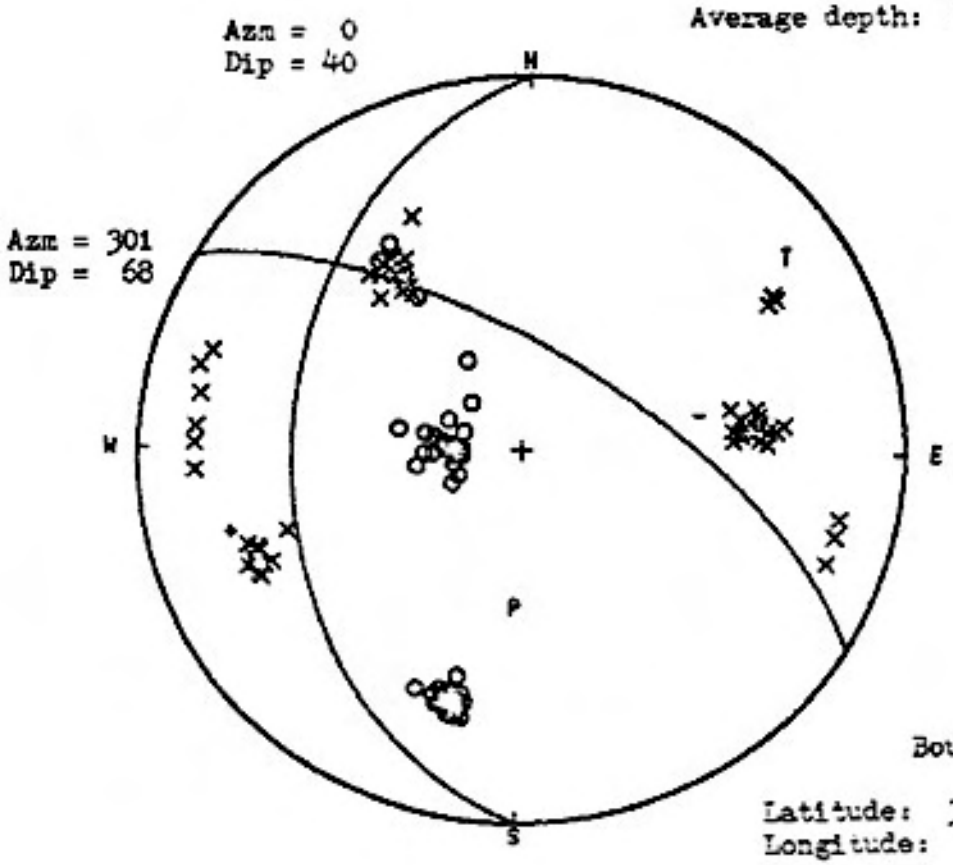
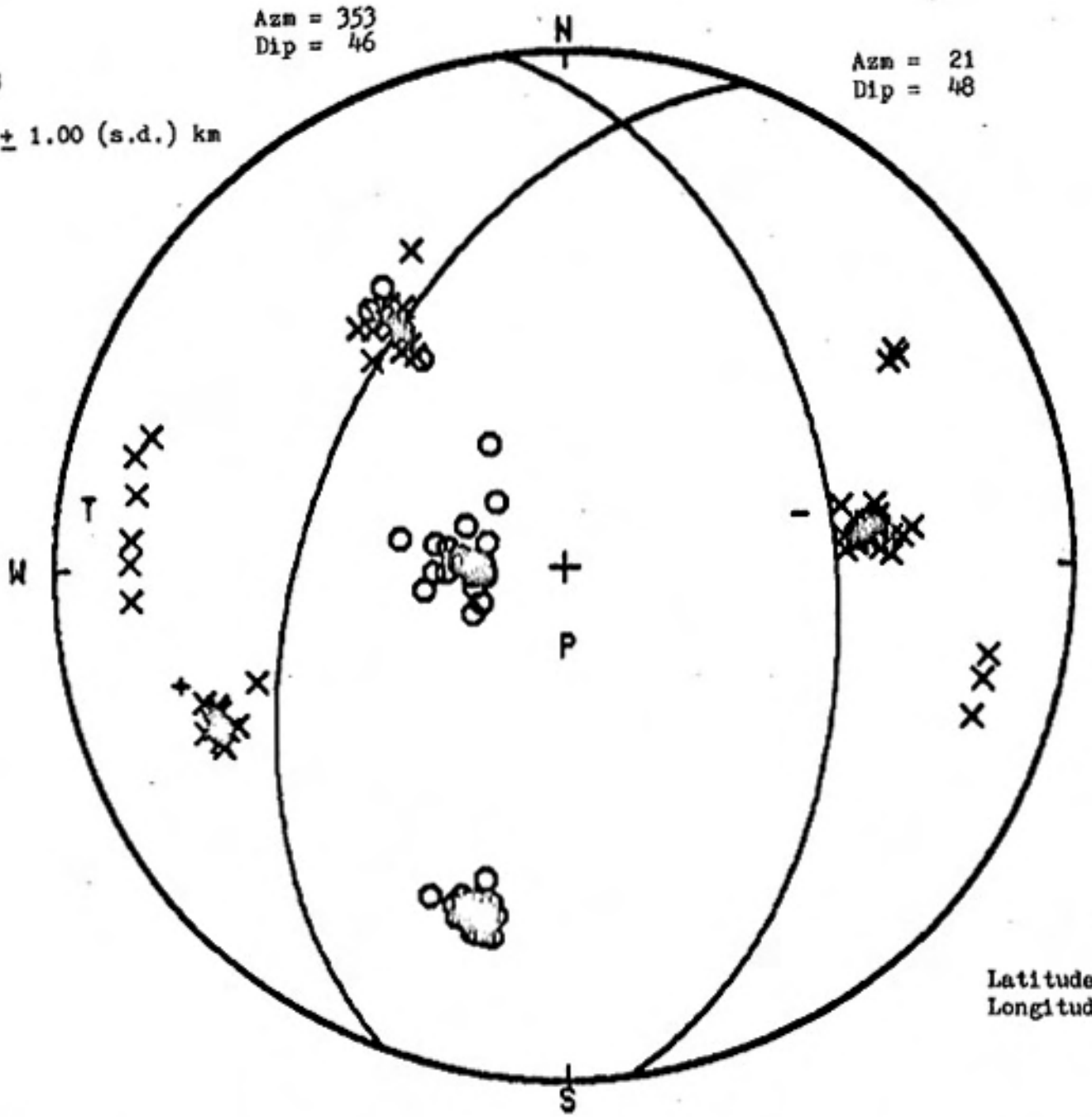


Figure 27. Extreme P wave nodal plane orientations for area 5. The P and T axes for each solution are also shown. Circles are dilatations and x's represent compressions.



Number of events: 33

Average depth: 8.59 ± 1.00 (s.d.) km

Boundaries of composite
260
Latitude: 34.04333-34.08333
Longitude: 106.90000-106.93000

(53)

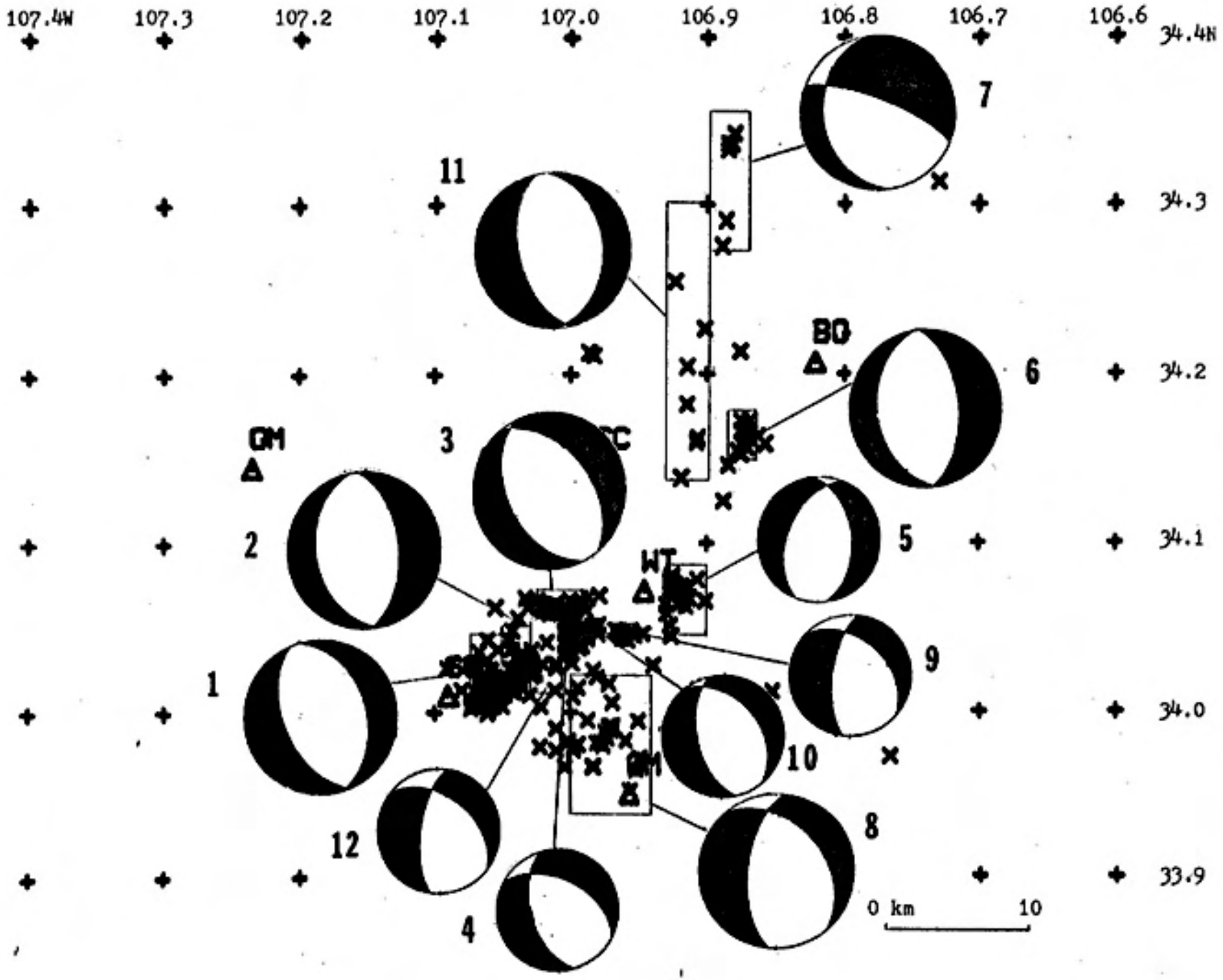
Figure 28. Preferred P wave nodal plane orientations for area 5. Circles represent dilatations and x's represent compressions. P is the maximum principal stress, and T is the minimum principal stress.

DISCUSSION

All of the composite fault plane solutions are shown on the seismicity map in Figure 29. The well-constrained solutions are presented as larger circles and the solutions based on stress orientations from well-constrained solutions are shown as small circles. All solutions (with the exception of area 7) demonstrate predominantly normal dip-slip motion. The strike of the fault planes is predominantly north to north-northwest in general agreement with the major mapped faults of the Rio Grande rift. Many microearthquakes appear to correlate with these mapped faults. In particular, composite fault-plane solutions for events located within the fault-bounded Rio Grande valley, indicate that seismic activity could be occurring on the major boundary faults. In addition, microearthquakes located in the southern end of the La Jencia basin appear to originate along buried active faults that have similar orientations to mapped faults. The composite fault plane solution for area 5 east of station 'WT' suggests that microearthquakes are most likely associated with an east dipping fault zone in that area (Sanford, 1968; Chapin et al., 1978).

All composite fault plane solutions have T axes approximately perpendicular to the dominant direction of the major mapped faults. The average T axis for the study area

Figure 29. Composite fault-plane solutions for all 12 areas. The well-constrained solutions are designated by large circles and the solutions based on the P and T axes of the well-constrained solutions are denoted by smaller circles. The shaded areas represent regions of compressions and the white areas are regions of dilatations.


107.4W
107.3
107.2
107.1
107.0
106.9
106.8
106.7
106.6
34.4N
34.3
34.2
34.1
34.0
33.9
1
2
3
4
5
6
7
8
9
10
11
12
GM
CC
BO
WT
0 km
10

indicates predominantly east-west crustal extension. Because extension of the entire crust has not been observed in recent years (Prescott et al., 1979), doming of the crust due to upward intrusion of magma, as previously suggested (Sanford et al., 1977; Sanford et al., 1981), appears to be the source for crustal extension in the vicinity of Socorro. Thus, the local stress patterns caused by upward intrusion of magma, within this section of the Rio Grande rift, are producing swarms of microearthquakes along mapped and unmapped pre-existing fractures.

Chapin et al. (1978) have proposed a northeast-southwest transverse shear zone that transects the study area (figure 10). Plate 1 in Chapin et al. (1978) indicates that the shear zone exhibits right lateral movement. The composite fault-plane solutions show no evidence of movement along this shear zone because nodal planes from the composites are approximately at right angles to the shear zone. In addition, all nodal planes have substantial dip which is contrary to the nearly vertical dip expected for faults in a transverse shear zone.

Shuleski (1976) used different areas to construct composite fault plane solutions, however, several comparisons can be made with composites in this study. In general, the composite solutions constructed here are in minor disagreement with those determined by Shuleski (1976).

The different volumes of crust used in the composite solutions appears to account for these minor differences. Another reason for the small differences between studies is probably related to the microearthquake first motion data that have been added to the data set since the Shuleski study. In addition, the locations of the microearthquakes in this investigation are more clustered spatially than the events used by Shuleski. The orientations of the nodal planes in this study are more constrained and correlate better with the trend of mapped faults throughout the area than those of Shuleski.

The composite solution for the events in area 6 indicates a slightly more north-south orientation than solution C from Sanford et al. (1979, figure 2). This north-south orientation correlates with the eastern margin of the Rio Grande valley. The events in area 6 are also more tightly clustered spatially in this study than those used by Sanford et al. (1979, solution C, figure 2).

Solution B in Sanford et al. (1979, figure 2) indicates a slightly more northwest trend of the nodal planes than for the composite fault plane solutions investigated here. In addition, a minor amount of strike-slip movement is also indicated in solution B whereas the composites for areas 1 and 2 in this study show nearly total normal faulting. The orientation of the nodal planes for areas 1 and 2 also

correlate with the orientations of mapped faults in the La Jencia basin. Thus, the composite fault plane solutions from this, in comparison with previous studies (Shuleski, 1976; Sanford et al., 1979, figure 2) indicate a better correlation with the major mapped faults of the area.

LISTRIC FAULTING

The degree that normal faults flatten at depth has been a fundamental and controversial topic of rift tectonics. Wright and Troxel (1973) review the different geometries proposed for rift faulting. One proposal is that faults extend deep into the crust with relatively little change in dip (Thompson, 1966; Thompson and Burke, 1974). The other fundamental idea is, the fault planes are curved, i.e. the faults flatten at depth (Moore, 1960; Anderson, 1971). Evidence for these curved faults, commonly referred to as listric faulting, is derived primarily from observed tilting of near surface strata indicating substantial rotation of these units along curved faults. Woodward (1977) suggests the Albuquerque Belen basin, within the rift, is bounded by listric faults. Chapin and Seager (1975) propose listric faulting based on substantial rotation of strata near the Socorro area. However, several recent observations disagree with the listric fault model for the rift.

Brown et al. (1980a) disagree with the listric fault model based on interpretation of COCORP reflection profiles across the rift. The most important evidence from these data is the lack of tilting of the floor of the Albuquerque-Belen basin. If listric faulting occurs, then the floor of the basin should be tilted due to rotation along these curved faults. In addition, other COCORP

profiles across the rift do not show a reflection that can be identified with the subhorizontal zone of a listric fault.

The individual composite fault-plane solutions in this study also show no evidence for listric faulting. Assuming that faulting might have occurred on any of the nodal planes found in this study, the shallowest dip is 30 degrees. Thus, no listric faulting bottoming at a depth of 13 kilometers is observed from the composite solutions. Using those solutions for which it is possible to select a fault plane on the basis of the geologic mapping, further evidence for non-listric faulting of the rift was obtained. The fault planes for areas 1, 3, 6, and 11 were rotated into a common north-south strike position with the fault planes dipping eastward. These fault planes, which cover the majority of the focal depths for the data set, were combined to compare the dips of the fault planes as a function of focal depth (figure 30). The fault planes increase slightly in dip with depth indicating that listric faulting is not observed to an average depth of 9.9 kilometers.

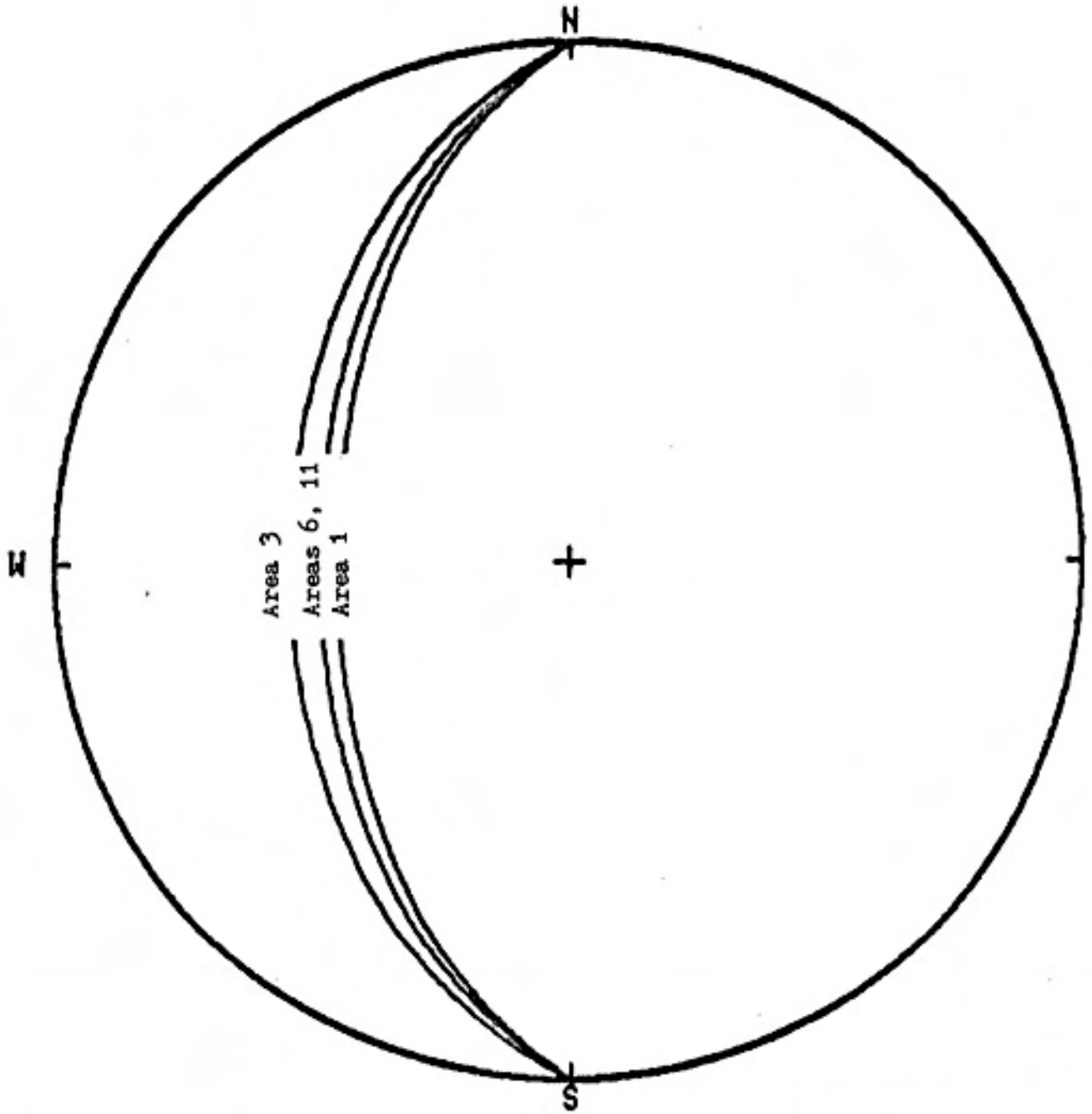


Figure 30. Fault-planes from area 1 (average depth, 9.9 km.), area 3 (average depth, 8.0 km.) and areas 6 and 11 (average depth, 6.7 km.) rotated to a north-south orientation with east dip.

SUMMARY

Nearly all the seismic activity in the Rio Grande rift near Socorro occurs in swarms of microearthquakes. The depths of focus for these earthquakes are less than 13 kilometers which possibly indicates abnormally high temperatures below 13 kilometers. The major part of the seismicity occurs southwest of Socorro in the southern end of the La Jencia basin.

Composite fault plane solutions indicate predominantly dip-slip fault motion with the strike of the fault planes in general agreement with the major mapped faults in the area. The orientations of the nodal planes from the composites are in minor disagreement with the solutions obtained from Shuleski (1976) and Sanford et al. (1979). Unlike these previous studies, many earthquakes can be correlated with the mapped faults. In particular, earthquakes within the fault bounded Rio Grande valley appear to correlate with mapped faults on both margins. In addition, events in the southern end of the La Jencia basin can be correlated with unmapped faults exhibiting the same orientation as mapped faults in the region. Events occurring east of station 'WT' can be correlated with a major east dipping fault zone in the area (Sanford, 1968). The nodal planes from the composite solutions are approximately at right angles to a northeast-southwest transverse shear zone that transects the

study area. The orientation of these nodal planes indicates that microearthquake activity does not occur along this shear zone. In addition, the composite solutions indicate that seismic activity near Socorro is not occurring on listric faults that bottom at a depth of less than 13 kilometers.

The T axes from the composite solutions indicate approximately east-west horizontal extension of the upper crust. Doming of the crust related to upward intrusion of magma, is believed to be responsible for the extension.

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APPENDIX 1

This appendix lists the seismic stations, their coordinates in latitude and longitude, and their elevations in kilometers above mean sea level.

STATION	LATITUDE (° NORTH)	LONGITUDE (° WEST)	ELEVATION (KM)	DELAY (SEC)
BB	34.4090	106.6818	1.615	-0.04
BG	34.2068	106.8205	1.516	-0.01
CC	34.1442	106.9812	1.649	-0.15
CK	34.2725	106.7702	1.578	-0.04
CM	33.9501	106.9576	1.640	0.13
CT1	34.0702	106.9435	1.510	-0.11
CT2	34.0707	106.9418	1.510	-0.11
CU	34.1573	106.7785	1.585	-0.10
DM	34.1075	106.8079	1.536	-0.01
FC	33.8950	107.0504	1.850	0.26
FM	34.0829	106.8047	1.537	0.00
FR	33.8747	106.7270	1.558	0.09
GM	34.1454	107.2345	1.945	-0.06
HC	34.0658	107.2361	2.240	0.16
IC	33.9870	106.9967	1.730	0.08
LAD	34.4583	107.0375	1.768	-0.25
LPM	34.3076	106.6336	1.737	-0.24
MG	34.1305	107.2425	2.024	-0.06
MY	34.1667	106.7459	1.645	-0.09
NG	33.9648	106.9933	1.730	0.14
NJ	33.9924	106.6253	1.644	0.09
RH	33.9002	107.1135	2.080	0.26
RI	34.4234	107.2075	1.530	-0.01
RM	34.0812	107.0069	1.719	0.11
SC	34.0100	107.0894	2.073	0.15
SH	34.1570	106.7802	1.577	-0.09
SL	34.2234	106.9910	1.615	-0.11
TA	34.0498	106.7751	1.558	0.09
TD	34.2339	106.5778	1.850	-0.09
TS	33.9012	107.0662	1.860	0.28
WM	34.0120	106.9929	1.673	0.12
WT	34.0722	106.9459	1.555	-0.11
WV	34.0378	106.9632	1.650	0.12

APPENDIX 2

A listing of the 534 located microearthquakes used in this study. The origin time is given in universal time and depth is given in kilometers below the average elevation of the recording stations.

DATE MO,DAY,YR	ORIGIN TIME UT	LATITUDE NORTH	LONGITUDE WEST	DEPTH KM
5,20,75	4:25: 9.01	33.92069	106.94513	4.05
5,20,75	10:34:23.07	33.91910	106.94807	5.06
5,22,75	10:27: 8.20	34.07227	106.92142	10.53
5,22,75	11:36:28.80	33.91263	106.94995	4.45
5,22,75	13:19:41.06	33.91141	106.95350	4.68
5,26,75	23:45:51.28	34.06832	106.98731	8.94
5,29,75	7:14:12.29	33.91222	107.01356	7.34
6, 3,75	2:45: 9.31	34.07736	106.92740	8.54
6, 3,75	4:41:14.39	34.07522	106.91915	7.54
6, 3,75	4:48:18.08	34.07233	106.92470	7.00
6, 3,75	5:18:50.60	34.07365	106.91676	9.15
6, 3,75	5:40:40.98	34.07328	106.91790	8.77
6, 3,75	15:10:15.48	34.01787	107.03721	10.51
6, 4,75	4:20:14.41	34.02814	106.93960	11.19
6,16,75	23:43:20.82	34.02231	107.03733	10.64
6,17,75	15:38:44.69	34.06349	106.91581	12.20
6,17,75	18:50:33.45	34.06280	107.05522	7.72
6,24,75	20:47:35.37	34.27996	106.89347	8.11
6,26,75	2:56:45.25	34.05607	107.03815	5.73
7, 2,75	1: 0:18.68	34.25639	106.87597	6.62
7, 2,75	2:34:21.76	34.25110	106.87008	5.17
7, 9,75	2:12:24.86	34.05234	106.92734	6.91
7, 9,75	7:55:42.23	34.26620	106.87235	1.70
7, 9,75	9:16:47.82	34.07393	106.92057	11.09
7, 9,75	9:20:30.50	34.07473	106.92037	11.51
7, 9,75	11: 6:15.83	34.07948	106.92716	10.93
7,23,75	14:56:41.82	34.01167	107.04143	9.93
7,24,75	4:23:14.23	34.05222	106.99043	6.40
7,24,75	17:10:14.16	34.01167	107.04219	10.31
7,24,75	18:50:19.64	34.25000	106.88034	7.16

DATE MO,DAY,YR	ORIGIN TIME UT	LATITUDE NORTH	LONGITUDE WEST	DEPTH KM
7,30,75	15:54:15.41	34.07861	106.90706	9.23
7,30,75	21:44:42.06	34.07535	106.91939	9.60
8, 5,75	2:26: 2.30	34.02514	106.98367	9.70
8, 5,75	4:17:20.58	34.02114	106.98086	10.44
8, 5,75	14:19:22.36	34.01623	107.04254	10.06
8, 6,75	20:12:33.13	34.01724	106.97244	8.97
8, 7,75	9: 4:30.04	34.53709	107.09142	13.23
8, 8,75	10:53:57.82	34.06394	106.92095	8.67
8, 8,75	10:57:22.32	34.07258	106.92184	8.54
8,12,75	3:59:35.19	33.91154	106.98549	7.00
8,12,75	7: 9:10.67	34.01295	106.79248	2.62
8,12,75	15:25:28.56	34.03853	106.99426	7.10
8,13,75	3:38:51.07	34.07383	106.92292	8.95
8,13,75	3:46: 5.84	34.07121	106.92233	8.52
8,13,75	5:29:49.21	34.22213	107.08031	8.46
8,13,75	7:39:18.43	34.07244	106.92546	8.86
8,13,75	11:22:26.70	34.00552	106.97033	10.13
8,13,75	20:18:25.37	34.08084	107.04012	8.00
8,14,75	5:16:15.33	34.26048	106.88959	7.38
8,15,75	6:36:45.90	34.11143	106.88013	5.94
8,19,75	8:11:46.74	34.04791	106.96187	10.08
8,19,75	8:12:44.76	34.04634	106.96345	9.97
8,19,75	10: 0: 7.19	33.98247	107.00138	10.51
8,19,75	20:10:22.97	34.07122	106.91850	8.18
8,20,75	5:16:40.25	34.06623	106.90053	8.46
8,20,75	5:22:19.90	34.07383	106.92161	9.26
8,20,75	12:20:52.20	34.07383	106.91342	8.18
8,20,75	12:49:19.27	34.07015	106.91696	8.57
8,20,75	15:28:36.29	34.07544	106.92346	9.47
8,20,75	21:59:44.60	34.06800	106.91331	7.80

DATE MO.DAY.YR	ORIGIN TIME UT	LATITUDE NORTH	LONGITUDE WEST	DEPTH KM
8,21,75	0:40:22.93	34.07383	106.92449	7.45
8,21,75	3:44:48.60	34.01767	107.04154	10.08
8,21,75	7: 3:51.48	34.07206	106.91851	8.03
8,21,75	19: 4: 6.18	34.04422	106.96238	10.05
8,21,75	19: 9:11.54	34.04614	106.96490	10.67
8,21,75	19:18:42.12	34.04424	106.96282	9.82
8,25,75	19:37:40.85	34.06868	106.91517	9.03
8,26,75	8:40:15.73	34.07383	106.91971	9.45
8,28,75	1:26: 2.40	34.07383	106.91611	8.28
8,29,75	3:17:35.53	34.07706	106.92419	8.36
8,29,75	3:18: 9.46	34.07383	106.92719	8.35
8,29,75	8:52:18.85	34.08011	106.92643	7.80
8,29,75	8:56:38.42	34.10229	106.95345	5.05
9,16,75	13:30:52.46	34.08176	106.92548	7.74
9,19,75	8:42:57.01	34.01165	106.85200	8.78
9,23,75	23: 1:19.11	33.97380	106.94926	4.52
9,24,75	2:17: 9.44	34.04556	106.92626	8.28
9,24,75	10:54:17.99	34.30738	106.91401	17.45
9,24,75	13:16:40.52	34.05925	106.92996	7.70
9,24,75	13:24:38.41	34.06434	106.93018	7.52
10,29,75	7:21:35.33	34.05237	107.00002	4.48
10,29,75	20:50:49.26	33.98986	107.01041	6.91
10,30,75	0: 4:30.92	34.02913	106.99955	7.97
10,30,75	7: 9:38.56	34.02477	107.02914	10.88
10,31,75	4: 2:14.91	33.90475	106.74793	8.67
11, 4,75	16:30:11.68	34.03663	107.06697	9.77
11, 5,75	2:40:10.34	33.97208	106.76588	7.00
11, 5,75	14:35: 5.11	34.02995	107.06737	10.19
11, 5,75	22:28:26.32	34.03534	107.03211	8.81
11, 6,75	8:24:48.84	34.02685	107.01058	10.09

DATE MO.DAY.YR	ORIGIN TIME UT	LATITUDE NORTH	LONGITUDE WEST	DEPTH KM
11, 6,75	9:33:58.89	34.02966	107.01023	10.37
11, 6,75	11: 5:48.39	33.99290	106.85821	7.38
11, 7,75	8:27:35.95	34.03445	107.03341	9.17
11, 7,75	9:53:36.92	34.03103	107.04871	9.22
11, 7,75	13:52:34.93	34.02955	107.07352	7.99
1,21,76	5:34:40.60	34.06978	106.97813	8.33
1,21,76	14:18:28.39	33.97088	106.95020	7.60
1,22,76	12:16:10.08	34.33516	107.00790	7.00
1,22,76	15:58:46.92	34.01479	107.04170	13.14
1,22,76	16: 0:52.31	34.03613	107.03619	9.54
1,22,76	16: 5:11.00	34.02545	107.03770	11.52
1,22,76	22:14:30.42	34.03451	106.95813	3.61
1,22,76	22:50: 5.93	34.24385	106.86029	13.15
1,23,76	2:53:33.03	34.03016	107.03034	8.98
1,23,76	7:22:14.61	34.05771	107.03947	6.55
1,23,76	8:16:19.25	34.03044	107.03661	10.06
1,27,76	8:35:57.22	34.14412	106.79432	9.69
1,27,76	8:37:44.50	34.14315	106.79680	8.73
1,27,76	9: 4:17.81	34.13898	106.80300	10.24
1,27,76	10: 5:24.12	34.12822	106.79466	10.78
1,29,76	15: 6:40.19	33.98322	106.97445	7.00
1,29,76	18:12:45.78	33.98296	106.98369	7.12
1,29,76	18:24:27.51	33.98127	106.97827	7.52
1,30,76	9:16:35.44	33.98049	106.98137	8.35
1,30,76	13:56:23.78	34.05313	106.98021	6.94
2, 5,76	19:45:35.89	34.27318	106.98283	14.26
2, 6,76	9:20:58.19	34.33260	106.99943	7.00
2, 6,76	12:35:19.52	34.32587	107.00529	11.92
2,17,76	6:17:48.98	34.02528	107.05844	10.69
2,17,76	17:34: 5.15	34.04186	107.00000	10.82

DATE MO,DAY,YR	ORIGIN TIME UT	LATITUDE NORTH	LONGITUDE WEST	DEPTH KM
2,17,76	23:19:38.40	34.11033	107.01970	11.15
2,18,76	5:44:55.92	34.01167	107.05059	10.27
2,18,76	9:13:30.75	34.01367	107.01165	4.15
2,18,76	23:25:35.24	34.02884	107.06944	9.99
2,19,76	0:8:36.81	34.01578	107.05508	9.92
2,19,76	0:54:42.09	34.52357	107.10129	1.07
2,20,76	12:51:45.11	34.01367	107.04446	11.11
3,17,76	18:42:41.40	33.97464	106.71649	5.41
3,17,76	19:52:40.53	33.94354	106.73808	11.33
3,18,76	13:38:24.70	33.97529	106.72119	6.25
3,18,76	14:45:16.18	33.97229	106.72060	9.23
3,18,76	18:34:50.77	34.02602	107.07195	9.41
3,23,76	1:57:1.00	34.03767	107.07743	9.37
3,23,76	12:50:26.21	33.97112	106.70984	7.00
3,23,76	12:53:19.86	34.27070	106.82170	14.91
3,24,76	22:52:17.47	33.96915	106.71548	8.76
3,25,76	10:50:54.07	34.04883	106.96658	10.26
3,25,76	13:57:2.78	34.03673	107.08450	8.36
4,13,76	2:45:48.29	34.05808	107.00249	7.60
4,13,76	2:45:55.26	34.06022	107.00602	7.49
4,13,76	6:22:47.89	34.06091	107.01778	8.38
4,13,76	7:11:35.03	34.06405	106.99762	8.09
4,13,76	9:45:40.75	34.06472	107.01173	8.59
4,13,76	9:55:8.11	34.06157	107.01376	8.02
4,13,76	11:17:5.09	34.06168	107.01121	8.04
4,13,76	11:41:25.36	34.03126	107.06104	10.52
4,13,76	11:58:34.64	33.98251	106.95958	6.41
4,13,76	12:37:4.98	33.97907	106.97653	6.19
4,13,76	13:32:0.37	34.00678	106.99833	3.12
4,13,76	14:0:10.12	34.06487	107.04198	6.39

DATE MO.DAY.YR	ORIGIN TIME UT	LATITUDE NORTH	LONGITUDE WEST	DEPTH KM
4,13,76	18:52:13.76	34.06149	106.99063	9.03
4,13,76	23:15:15.04	34.02272	107.02662	4.71
4,14,76	1:50:28.88	33.97785	106.99033	9.80
4,14,76	5:55:54.10	33.97090	107.09100	5.17
4,14,76	9: 5:25.63	33.97628	107.00996	8.96
4,14,76	12:31:59.20	33.97654	106.99033	9.21
4,14,76	13: 6:27.92	34.06414	107.01571	7.24
4,14,76	13:12:21.04	34.06248	107.03413	7.38
4,15,76	3:41:48.76	34.06299	107.00481	9.40
4,15,76	6: 8:40.08	34.06221	107.01708	7.80
4,15,76	7: 3:59.12	34.06152	107.01090	7.44
4,15,76	8: 6: 0.45	34.06157	107.01767	7.79
4,15,76	8:45:52.51	34.06245	107.01257	8.58
4,15,76	8:51:50.64	34.06170	107.01533	7.72
4,15,76	9:36:10.53	34.06717	107.02490	7.19
4,15,76	9:39: 9.35	33.97795	106.74875	10.21
4,15,76	10:24:12.82	34.06351	107.01440	7.69
4,15,76	11:55:20.07	34.06147	107.01234	7.69
4,15,76	12:55:21.87	34.06155	107.00588	7.31
4,15,76	14:43:16.16	34.01339	107.07980	9.78
4,15,76	15:30:27.48	34.06419	107.01765	8.07
4,15,76	18:28:37.23	34.04633	106.95349	7.95
4,15,76	22:48:20.64	34.04937	106.95524	8.28
4,15,76	22:48:25.71	34.04740	106.94750	8.51
4,15,76	23:16:11.87	34.06343	107.01025	7.56
4,16,76	0:41:10.53	34.04513	107.01133	5.57
4,16,76	1:20:22.71	34.06319	107.01707	7.90
4,16,76	5:34:38.76	34.03321	107.04041	4.22
4,16,76	9:33:42.88	34.05965	107.00934	7.58
4,16,76	9:36: 7.88	34.06342	107.02176	6.65

DATE MO,DAY,YR	ORIGIN TIME UT	LATITUDE NORTH	LONGITUDE WEST	DEPTH KM
4,16,76	10:27:38.42	33.93870	106.89252	0.16
4,16,76	10:47:16.10	34.06479	106.99574	8.00
4,16,76	12:29:28.85	34.06347	106.99151	7.91
4,16,76	12:40:30.85	34.06081	106.98879	7.81
4,16,76	14: 7:33.22	34.06524	106.99060	8.97
4,16,76	14: 9:54.14	34.06314	107.02092	7.95
4,16,76	14:24:11.60	34.06367	107.02069	7.17
4,16,76	14:26:13.67	34.06345	107.00528	7.47
4,16,76	14:36: 6.85	34.06283	106.99701	7.80
4,16,76	15: 4:36.66	34.06158	107.01983	7.73
4,20,76	2:52:19.32	34.02998	107.07601	8.51
4,20,76	8:32:19.15	34.09175	106.83514	4.90
4,20,76	15:10:18.62	34.21375	106.87603	7.92
4,21,76	3:48:58.94	34.01197	107.02454	1.95
4,21,76	4:27:48.43	34.31233	106.84823	7.60
4,21,76	11:16:19.52	34.31249	106.84251	7.09
4,22,76	4:18: 6.86	33.95402	106.71023	6.34
4,23,76	0: 5: 3.27	34.29856	106.89895	8.43
4,23,76	5:58:59.24	34.02588	107.07673	8.36
4,23,76	8: 9: 8.87	34.03064	107.07299	7.20
5,24,76	21: 8:25.60	34.03034	107.04546	10.56
5,25,76	3: 0:23.24	34.03362	106.99156	5.96
5,25,76	3: 8:16.70	34.03826	107.02375	5.40
5,25,76	8:11:38.83	34.03071	107.06974	11.01
5,26,76	19:54:18.91	33.90807	106.80715	11.01
5,27,76	21:32:39.73	34.13201	106.66031	7.00
5,27,76	22:39:15.72	34.44818	107.00546	7.00
5,28,76	10:34:13.51	34.01318	107.03600	11.01
6, 1,76	8:38:47.74	34.01506	107.04912	9.86
6, 3,76	15:31:12.78	34.04312	107.01288	10.28

DATE MO,DAY,YR	ORIGIN TIME UT	LATITUDE NORTH	LONGITUDE WEST	DEPTH KM
6, 8,76	5:24:54.64	34.05195	106.98444	7.53
6, 8,76	6:16:12.41	34.04403	106.99676	10.37
6, 8,76	6:16:26.16	34.04575	106.99193	10.28
6, 8,76	6:24:40.91	34.04720	106.98013	10.46
6, 8,76	6:36: 9.95	34.04279	106.99666	10.56
6, 8,76	6:38:53.65	34.04071	106.99165	10.35
6, 8,76	6:41:14.28	34.04320	106.99338	9.68
6, 8,76	6:42:51.00	34.05213	106.98388	6.61
6, 8,76	7: 4:18.63	34.04391	106.98821	10.23
6, 8,76	7:22:19.08	34.04372	106.99277	10.13
6, 8,76	7:50:39.72	34.04401	106.98854	10.38
6, 8,76	11:31:48.87	34.04594	106.99611	10.34
6, 9,76	17:37:45.92	34.44368	106.96386	7.00
6, 9,76	17:42:21.39	34.44983	106.98283	9.29
6,11,76	9:15:45.49	34.41991	106.98283	17.58
6,15,76	6:53: 2.73	34.41921	106.98428	0.68
6,16,76	8:24:40.08	34.01454	106.72867	7.00
6,30,76	8:44: 1.50	34.01032	107.03044	10.61
7,14,76	21:22:54.95	34.00321	107.02159	10.21
7,15,76	10:58:34.21	34.01753	107.06327	10.02
7,15,76	16:43: 7.66	34.02091	107.05582	11.08
7,16,76	0: 2:55.56	34.01520	107.06605	10.55
7,28,76	12:14:48.10	34.45456	107.01282	7.00
7,28,76	12:38:59.14	34.12400	106.60877	11.32
7,30,76	11:11:39.56	34.46973	107.63957	7.00
8, 3,76	7:10:13.20	34.61192	106.94020	7.00
8, 3,76	10:42:56.41	34.02666	107.09100	9.51
8, 5,76	2:19: 6.48	34.05240	106.99970	9.92
8, 5,76	9:19:35.32	34.03570	107.00410	6.71
8, 9,76	18:40:17.60	34.04804	107.00499	9.58

DATE MO.DAY.YR	ORIGIN TIME UT	LATITUDE NORTH	LONGITUDE WEST	DEPTH KM
8, 9,76	22:27:39.19	34.04485	106.99886	10.89
8, 9,76	23: 8:17.20	34.31545	107.04970	3.40
8,10,76	2:53:11.52	34.04846	107.00494	10.26
8,10,76	4:38:25.39	34.02285	107.06255	9.90
8,10,76	12:18:41.77	34.05143	106.99323	11.09
8,11,76	3:15:18.94	34.16339	106.88160	4.47
8,11,76	6: 3:43.56	34.06036	106.99764	9.17
8,11,76	6:43: 6.74	33.97838	107.02266	11.26
8,11,76	10: 0:37.81	34.04991	107.00246	10.00
8,11,76	18: 8:27.25	34.04705	107.00109	10.16
8,12,76	0:56:36.11	34.04405	106.99269	11.18
8,12,76	0:59: 8.01	34.04220	106.99690	11.33
8,12,76	1: 3:14.26	34.04731	107.00379	10.13
8,12,76	1: 6: 7.45	34.04027	107.00036	10.72
8,12,76	1:24:36.46	34.04743	106.98884	12.40
8,12,76	1:45:41.53	34.04385	106.99351	10.88
8,12,76	1:52:20.10	34.05291	106.99875	10.39
8,12,76	1:54: 4.77	34.04327	107.00174	9.74
8,12,76	2:34:25.87	34.04432	106.99635	10.37
8,12,76	3:18: 5.67	34.04186	107.00061	11.07
8,12,76	4:56: 5.06	34.04507	106.99519	11.67
8,12,76	5: 8:59.07	34.04532	107.00192	10.63
8,12,76	5:20:48.69	34.04787	106.99715	10.24
8,12,76	7:52: 6.31	34.05184	107.00361	9.75
8,12,76	10:51:15.01	34.04470	106.99588	10.19
8,12,76	11:25:51.57	34.04133	106.99871	10.00
8,12,76	11:57:50.35	34.04273	106.99779	10.24
8,12,76	19:14:48.47	34.41397	106.99888	21.28
8,12,76	23: 7:12.52	34.04658	106.99621	10.60
8,13,76	0:22:46.93	34.04134	106.99470	10.49

DATE MO,DAY,YR	ORIGIN TIME UT	LATITUDE NORTH	LONGITUDE WEST	DEPTH KM
8,13,76	3: 7:42.23	34.04289	107.00157	9.38
8,13,76	9: 3:41.98	34.04142	107.00251	8.50
8,13,76	9:10:52.67	34.04371	106.99618	10.50
8,13,76	12:26: 0.31	34.04084	106.99812	10.30
8,20,76	7: 3:17.80	34.15721	106.85758	8.47
8,23,76	20:45:35.36	34.55905	106.87767	14.57
8,24,76	1:31:13.62	34.04232	107.01796	8.47
8,25,76	21: 4: 9.33	34.05497	106.99688	10.85
8,25,76	22:32:23.10	34.04750	106.99657	11.57
8,27,76	1:44:39.52	34.04291	106.99820	11.26
8,27,76	8:15:28.15	34.00793	107.05900	10.81
8,27,76	10:42:33.60	34.01167	107.05420	11.16
9, 2,76	12:15: 5.70	34.14417	106.87776	10.65
9, 2,76	12:51:37.57	34.14902	106.86447	9.23
9, 3,76	6:45:56.23	33.96650	106.98342	9.29
9, 3,76	6:46:29.32	33.96650	106.98396	9.60
9, 3,76	9:13: 2.69	34.12935	106.88762	7.05
9, 3,76	13:25:58.17	33.99139	106.97272	11.71
9, 3,76	15:29:26.66	34.07353	107.02780	12.63
10, 5,76	19:26: 8.65	34.04346	106.95855	10.14
10, 6,76	15:12:41.26	34.08986	106.81639	10.71
10, 7,76	8:31:42.91	34.05156	106.95201	9.29
10, 7,76	22:35:49.40	34.02143	107.02866	11.16
10, 7,76	22:37:37.66	34.03275	107.03072	10.36
10, 7,76	23:21: 9.59	34.02339	107.02926	10.24
1,21,77	0: 6:16.26	33.99932	107.06105	11.40
1,21,77	16:34:37.47	34.01205	107.05315	10.27
1,21,77	16:38:11.38	34.01116	107.05576	9.16
1,21,77	16:42:28.36	34.00925	107.05840	11.03
1,21,77	16:43:39.84	34.01243	107.05464	10.33

DATE MO.DAY.YR	ORIGIN TIME UT	LATITUDE NORTH	LONGITUDE WEST	DEPTH KM
1,22,77	4:24: 5.02	34.01167	107.05161	9.64
1,22,77	7:13: 8.80	34.13235	106.62553	2.41
1,22,77	7:42:57.07	34.10917	106.61928	1.42
2, 8,77	21:15:58.47	34.02556	107.04243	10.73
2, 9,77	1:36:16.12	34.02284	107.04179	10.70
2, 9,77	1:42:32.49	34.15366	106.93858	5.48
2, 9,77	8:38:47.31	33.98869	106.97081	8.03
2, 9,77	10:59:58.84	34.01501	106.99500	7.04
2, 9,77	11: 7:13.69	34.00892	106.99825	9.80
2, 9,77	11:33:43.66	33.96650	107.00391	11.01
2, 9,77	11:38:52.84	34.01197	106.99500	8.55
2, 9,77	12:26:35.17	34.02632	107.04464	10.59
2, 9,77	18:15:19.09	33.89795	106.95933	5.86
2,10,77	7:33:28.14	34.13892	106.91909	7.07
2,11,77	8:28: 3.38	33.99083	106.96957	12.11
2,11,77	8:31:45.49	33.98798	106.97480	12.13
2,11,77	10:33:43.21	33.98910	107.00153	9.70
2,11,77	11:31:40.05	34.26783	106.81311	12.93
2,11,77	11:54:45.41	34.27343	106.79842	11.01
2,11,77	12:10:18.77	34.26608	106.80950	13.76
2,11,77	12:23: 4.90	34.27204	106.80950	14.24
2,11,77	15:10:33.23	34.26438	106.80959	13.13
2,16,77	8:51:16.69	34.01892	107.05178	10.30
2,16,77	14:44:49.47	34.01167	107.05025	9.91
2,17,77	14:27:44.08	34.26231	106.80126	12.57
2,25,77	0: 7: 8.07	34.01449	107.04714	10.27
3, 8,77	4:30:41.64	34.00228	107.06019	10.40
3, 8,77	4:55: 6.07	34.01167	107.05444	9.71
3, 9,77	11:25:44.37	34.00860	107.05487	9.87
3, 9,77	11:49: 2.43	34.01167	107.05544	9.59

DATE MO,DAY,YR	ORIGIN TIME UT	LATITUDE NORTH	LONGITUDE WEST	DEPTH KM
3, 9,77	11:50:15.93	34.01167	107.05534	9.39
3, 9,77	12:27:55.97	34.01167	107.05016	10.00
3, 9,77	12:33:19.15	34.01167	107.05354	9.35
3, 9,77	12:39: 0.20	34.01041	107.05476	9.71
3,10,77	1:29:50.07	34.02564	107.07097	10.64
3,10,77	2: 3:42.59	34.00322	107.05766	10.18
3,10,77	2:19:39.57	33.95183	106.85711	6.94
3,10,77	13:27:33.40	33.99902	107.06082	10.55
4, 5,77	19:34:30.76	34.00376	107.05018	12.08
4,12,77	3:21:36.36	34.29237	106.92263	3.76
4,12,77	3:25: 3.15	34.06341	107.03552	7.00
4,13,77	12:39:51.70	34.02967	107.02110	11.58
4,13,77	19:15:23.72	34.06314	107.03100	6.80
4,13,77	19:39:36.47	34.06823	107.03291	6.33
4,15,77	6:35:36.81	34.04385	107.06065	10.44
4,19,77	16:40:20.11	33.99403	106.95071	4.23
4,26,77	2: 8:20.40	34.06375	107.02205	10.20
4,26,77	16:56: 7.84	34.04909	107.04264	9.48
4,27,77	8: 4:40.27	34.02428	107.02603	5.65
4,27,77	11:52:49.76	34.05929	107.01637	12.86
4,27,77	12:15:56.25	34.01464	107.05413	9.81
4,27,77	12:23:27.19	34.01681	107.05595	10.20
4,27,77	15:34:28.54	34.14583	107.08867	8.15
4,28,77	10:59:10.49	34.04395	107.04667	9.68
4,28,77	11: 3:30.92	34.03797	107.04399	9.76
5, 6,77	10:43:17.99	34.21604	106.91964	7.00
5,10,77	5:11:27.55	34.04672	106.99639	7.78
5,11,77	17:44:59.29	34.02766	107.06191	10.88
6, 1,77	6:40:44.85	34.00951	107.05848	9.53
6, 2,77	6:45:50.56	34.01167	107.06823	9.11

DATE MO,DAY,YR	ORIGIN TIME UT	LATITUDE NORTH	LONGITUDE WEST	DEPTH KM
6, 2,77	6:48:16.35	34.01624	107.05782	8.41
6, 2,77	6:50:24.36	34.00501	107.06204	8.99
6, 2,77	6:55:21.42	34.01167	107.05861	8.22
6, 2,77	8:11:47.68	34.01167	107.06056	7.00
6, 2,77	11:42: 0.47	34.01167	107.06031	7.73
6, 2,77	12: 7: 4.04	34.01167	107.06014	7.83
6, 2,77	14:29: 6.71	34.01167	107.05909	7.94
6, 2,77	17:30: 8.17	34.00877	107.05746	8.24
6, 3,77	0:10: 4.27	34.01321	107.05545	10.12
6, 3,77	3:49: 1.56	34.01365	107.05765	8.77
6, 3,77	6: 2:45.85	34.00698	107.05673	9.87
6, 3,77	19:33:30.49	34.21339	106.90454	6.71
6, 3,77	20:45: 3.28	34.22668	106.90249	7.00
6, 3,77	23: 1:19.03	33.98075	107.00274	9.71
6, 4,77	1: 7:54.42	34.06260	107.01044	6.57
6, 4,77	6:18:51.78	34.22672	106.90017	2.06
6, 8,77	3:32:23.37	34.22221	106.92960	8.36
6,10,77	4: 4:44.84	34.01737	107.05721	9.96
7,11,77	23:52:34.83	34.12004	107.03459	7.54
7,12,77	7:28:59.60	34.09888	106.79446	7.00
7,12,77	11:51: 3.32	33.99490	106.98776	6.93
7,14,77	1:28:56.48	34.15759	106.87482	5.78
7,14,77	2:34: 1.96	34.15871	106.87505	7.20
7,14,77	3:27:32.74	34.16690	106.87519	7.14
7,14,77	10: 0:32.75	34.16023	106.86706	7.09
7,14,77	11:31:51.10	34.15479	106.87791	7.38
7,14,77	13: 1:35.15	33.85931	106.67696	0.51
7,14,77	20:24:16.65	34.03806	107.05302	10.44
7,15,77	11: 3: 1.00	34.01059	106.99029	8.49
7,15,77	12:26:25.70	34.00723	107.06142	10.04

DATE MO,DAY,YR	ORIGIN TIME UT	LATITUDE NORTH	LONGITUDE WEST	DEPTH KM
7,15,77	12:31:13.28	34.01167	107.06069	9.69
7,19,77	3:42:18.91	33.93399	106.99953	6.45
7,19,77	5:51:28.98	33.95183	106.98640	7.00
7,19,77	6:16:54.73	34.17038	106.87348	6.97
7,19,77	10:12:18.70	34.01408	107.04852	11.04
7,20,77	3:56:12.54	34.10846	106.71155	7.00
7,21,77	3:12:27.33	34.04372	107.04420	10.40
7,21,77	17:40:14.11	34.01361	107.06019	10.41
7,22,77	7:19: 0.58	34.17265	106.86859	6.46
7,22,77	7:49:11.78	33.98446	106.88890	9.32
7,27,77	12: 7:30.52	33.96807	106.94656	6.33
7,27,77	15:53:15.04	34.00546	107.05988	10.93
7,27,77	17:17:29.51	34.16271	106.90716	5.93
7,27,77	18: 8:20.17	34.16011	106.90822	6.66
7,28,77	18:47: 3.77	34.15365	106.90862	5.68
7,29,77	4:23:36.59	34.23481	106.89731	0.92
7,29,77	12: 7:22.66	34.15432	106.90686	7.68
8,16,77	18:16: 8.50	33.92466	106.99592	7.05
8,17,77	2:20:20.64	34.28605	107.04864	9.34
8,17,77	6: 3:19.88	34.16302	106.86297	7.40
8,17,77	8: 5:15.64	34.00701	107.06784	11.50
8,17,77	8:53:34.78	33.91106	106.99888	7.25
8,17,77	14:14:21.43	34.33776	106.88307	8.39
8,17,77	15:37:22.04	34.26284	106.91898	6.34
8,17,77	15:52:58.71	34.25689	106.92487	5.08
8,18,77	5:26:39.09	34.22086	106.88950	6.28
8,18,77	5:31:13.72	34.01167	107.06768	9.62
8,18,77	5:31:57.92	34.00571	107.05994	9.58
8,18,77	7:33:24.48	34.16550	106.86940	6.98
8,18,77	8:11:19.60	34.33688	106.89003	8.53

DATE MO,DAY,YR	ORIGIN TIME UT	LATITUDE NORTH	LONGITUDE WEST	DEPTH KM
8,18,77	9:38:13.62	34.15790	106.87393	4.50
8,18,77	10:38:14.82	34.01810	107.05926	9.21
8,18,77	10:38:47.51	34.01167	107.06129	10.31
8,18,77	10:39: 9.87	34.00962	107.06476	10.57
8,18,77	12:16:45.02	34.00837	107.06342	10.33
8,18,77	12:32:47.68	34.16880	106.86390	9.26
8,18,77	15:42: 6.77	34.01125	107.06336	10.32
8,19,77	3:51: 0.22	34.01680	107.06032	8.52
8,19,77	9: 5:48.23	34.01167	107.06432	10.40
8,19,77	9:22: 4.93	34.00745	107.06296	10.18
8,19,77	9:26: 2.91	34.00447	107.07173	10.34
8,19,77	9:27: 7.49	34.00415	107.06754	10.84
8,19,77	9:28:22.66	34.00627	107.06928	11.39
8,19,77	9:49:51.09	34.01243	107.05915	10.04
8,19,77	10: 7: 1.86	34.00210	107.07286	9.97
8,19,77	10:24:42.59	34.00837	107.06176	10.22
8,24,77	11:21:34.69	34.01167	107.05710	9.58
8,24,77	11:22:35.67	34.00775	107.05511	10.57
8,25,77	4:52:32.76	33.95183	106.95677	8.15
8,25,77	6:26:26.99	34.00959	107.05940	9.77
8,26,77	6:12:59.57	34.01167	107.05984	9.59
8,26,77	10:22:30.12	34.01167	107.06277	10.60
8,26,77	10:25:44.17	34.00630	107.05910	9.82
8,26,77	10:32:57.84	34.00681	107.06369	10.69
8,26,77	10:33:27.50	34.00585	107.06251	10.34
8,26,77	10:35:11.41	34.01167	107.06057	10.85
8,26,77	10:35:46.64	33.96425	106.95290	6.61
8,26,77	10:38:10.67	34.00491	107.05947	9.91
8,30,77	18:37:28.74	34.03650	107.00371	7.55
9, 1,77	3:14:33.55	34.16571	106.87729	4.29

DATE MO,DAY,YR	ORIGIN TIME UT	LATITUDE NORTH	LONGITUDE WEST	DEPTH KM
9, 1,77	18:20: 2.40	34.06285	106.76484	8.20
9, 1,77	21:58:48.52	34.01022	107.04842	10.21
9, 1,77	22:30:41.31	34.13713	106.78914	10.22
9, 2,77	2:21:12.37	34.05592	106.75501	9.35
9, 2,77	3:49:18.72	34.00708	107.05213	10.36
9, 2,77	7:41:11.71	33.98032	106.99500	6.55
9, 2,77	10:18:24.95	33.97024	106.94806	7.14
9, 2,77	13:29:31.68	34.29756	106.80250	10.58
9,13,77	0:13:45.73	34.31154	107.06698	5.50
9,13,77	21:32:50.44	34.24355	106.91841	7.14
9,14,77	2:17: 8.87	34.05997	106.60416	7.00
9,14,77	4: 1:27.66	34.03810	107.02836	7.04
9,14,77	6:44:21.59	34.53405	106.89833	20.05
9,14,77	13: 9:23.52	34.51691	106.90446	15.40
9,14,77	17:41:16.41	34.34274	106.88287	5.33
9,15,77	0:53:35.23	34.02561	107.05922	10.06
9,15,77	1: 1:34.42	34.25468	106.92372	6.10
9,15,77	6:45:16.89	34.34494	106.87762	6.15
9,15,77	11:43:34.43	34.30776	106.92083	4.86
9,15,77	12:30: 4.71	34.34252	106.88011	7.00
9,16,77	7:34:53.42	34.06710	107.00028	6.81
9,16,77	8: 4: 8.18	34.06462	106.99100	7.00
9,16,77	8: 8:37.69	34.06660	107.00055	5.95
9,20,77	1: 9:50.09	34.16593	106.87970	7.97
9,20,77	1:20: 8.77	34.02805	107.04876	10.72
9,20,77	2:14: 8.63	34.15118	106.87262	5.97
9,20,77	2:26:55.34	34.15296	106.87471	6.42
9,20,77	8:19:23.18	34.15894	106.87306	7.21
9,21,77	6: 9: 8.76	34.16398	106.87231	3.13
9,21,77	19:21:55.16	34.39798	107.00594	3.49

DATE MO,DAY,YR	ORIGIN TIME UT	LATITUDE NORTH	LONGITUDE WEST	DEPTH KM
9,22,77	5:20:15.28	34.32926	106.88981	7.00
9,22,77	5:20:27.98	34.33217	106.88505	6.41
9,22,77	6:36:36.31	34.33631	106.88480	7.00
9,22,77	8:22:18.16	34.15591	106.87104	6.72
9,22,77	12: 7: 8.78	34.33151	107.05146	2.89
9,22,77	19:19:16.66	34.33562	106.88248	10.64
10, 4,77	22:38:18.10	34.53459	106.86719	16.00
10, 5,77	16: 3: 0.93	34.10812	106.89499	10.52
10,17,77	19:35:35.20	34.18266	106.91502	5.94
10,18,77	8:16:32.62	34.01472	107.05899	10.16
10,20,77	16:49:53.05	34.20452	106.91458	6.62
10,21,77	3: 9:26.64	34.34164	106.87220	7.00
10,26,77	16:37:47.36	34.02989	107.02397	11.07
10,28,77	13: 0:13.56	34.12544	106.88791	6.93
11,15,77	0:42:38.99	33.98558	106.78868	0.55
11,15,77	19: 2:41.60	34.14583	106.88426	7.17
11,16,77	1:16: 3.56	33.99320	106.97049	9.54
11,17,77	2:54:17.34	34.38667	107.06114	13.93
11,18,77	6:58:12.70	34.39608	107.06373	4.94
11,18,77	9: 9:38.46	34.03272	107.00343	6.68
11,18,77	12:42:49.41	34.39378	107.06655	0.85
11,18,77	14:22:17.91	34.07383	106.78554	13.94
12, 5,77	20:57:19.47	34.40889	107.08685	5.91
12,13,77	19:50: 7.86	34.45074	107.05773	10.00
12,14,77	7:55: 8.22	34.06958	106.97414	0.57
12,14,77	17:48:32.77	34.07477	107.04278	5.12
12,14,77	20:57:28.19	34.29035	106.88654	5.73
12,15,77	17:15:40.77	34.32198	107.04704	8.26
12,15,77	18:56:42.78	33.98924	107.01486	3.51
12,20,77	12:21:18.49	34.02459	107.08538	10.60

DATE MO.DAY.YR	ORIGIN TIME UT	LATITUDE NORTH	LONGITUDE WEST	DEPTH KM
12,21,77	2:59:38.96	34.26287	106.86006	5.66
12,22,77	12: 6:40.25	34.28711	106.87861	4.43
12,23,77	3:51:44.57	34.30611	107.11224	1.35
1, 5,78	7:10: 3.07	34.40145	106.98439	7.93
1, 5,78	12: 3:23.34	34.27555	106.88896	7.00
1, 5,78	13:27:47.42	34.22500	106.91988	7.54
1, 5,78	14:45: 8.53	34.28011	106.88410	7.00
1, 6,78	1:32:20.83	34.21120	106.98355	4.98
1, 6,78	1:49: 2.92	34.21331	106.98717	4.72
1, 6,78	5:16:16.69	34.07682	106.73202	7.00
1, 6,78	15:12:36.73	34.41758	107.07860	3.80
1, 7,78	15: 4:19.05	34.27393	106.89260	5.34
1,11,78	7:22:47.16	34.00806	107.07715	7.19
1,11,78	10:39:19.11	34.02722	107.01373	6.31
1,12,78	7:53:25.19	33.99294	107.00829	5.25
1,17,78	5: 5: 1.32	34.31302	106.72952	8.78
1,17,78	13:18:13.97	34.07463	106.87765	7.00
1,17,78	23:14:21.36	34.34803	106.87416	7.00
1,17,78	23:21:54.77	34.35243	106.87629	7.00
1,18,78	12:24:32.83	34.15859	106.85787	4.39
1,18,78	12:49:42.81	34.15285	106.85622	5.48
1,18,78	14:55:57.95	34.15354	106.85372	4.29
1,18,78	17:11: 2.42	34.32782	107.02881	1.70
1,20,78	10: 4:25.85	34.47760	106.87042	14.96

APPENDIX 3

This appendix lists the computer program used to plot the first motion data from the microearthquakes. The program was written for use with the DEC 20 computer at New Mexico Institute of Mining and Technology. The PLOT-10 library software package was utilized for the plots.

```
C     ************************************************************
C     * THIS PROGRAM PLOTS EARTHQUAKE FIRST MOTION DATA ON AN    *
C     * EQUAL-AREA (SCHMIDT) STEREONET.  THE FIRST MOTIONS ARE   *
C     * PLOTTED IN TERMS OF THE AZIMUTH AND TAKE OFF ANGLE.      *
C     * NODAL PLANES CAN ALSO BE DRAWN, HOWEVER, THE INTERPRETATION *
C     * OF THE LOCATION OF THESE NODAL PLANES IS LEFT TO THE     *
C     * USER.  BY ADJUSTING THE PLOT WINDOWS IN THIS PROGRAM, OR *
C     * BY USE OF A TEKTRONIX PLOTTER, THE PLOT CAN BE OVERLAIN  *
C     * ON A STEREONET TO DETERMINE THE NODAL PLANES.  IN ADDITION, *
C     * THE P AND T AXES CAN ALSO BE PLOTTED WITH THIS PROGRAM.  *
C     * THIS PROGRAM WAS WRITTEN FOR USE WITH INPUT DATA OBTAINED *
C     * FROM HYPO71 (LEE AND LAHR, 1975).                        *
C     ************************************************************
      DIMENSION AXIS1(2),AXIS2(2)
      REAL VFN*8
      IP=8.0
      IT=4
10    CALL INIT(4PC)
      TYPE 20
20    FORMAT(' TYPE INPUT FILE 's)
      READ(5,30)VFN
30    FORMAT(A10)
      TYPE 40
40    FORMAT(' DO YOU WISH TO PLOT FAULT PLANES ON THE STEREONET?
     1(Y OR N) 's)
      READ(5,320)PLANE
      IF(PLANE.NE.'Y')GO TO 80
      TYPE 50
50    FORMAT(' SPECIFY FIRST FAULT PLANE (GIVE AZIMUTH, MEASURED
     1 FROM NORTH, AND DIP, MEASURED FROM THE HORIZONTAL IN FREE
     2 FORMAT)')
      TYPE 60
60    FORMAT(' NOTE:  THE AZIMUTH CORRESPONDING TO THE NORTHERN END OF
     1 THE NODAL PLANE SHOULD BE GIVEN IF THE PLANE DIPS TO THE EAST.
     2OTHERWISE, THE AZIMUTH CORRESPONDING TO THE SOUTHERN END OF THE
     3 NODAL PLANE SHOULD BE GIVEN.')
      READ(5,*)AZM1,DIP1
      TYPE 70
70    FORMAT(' SPECIFY SECOND FAULT PLANE IN SAME FORMAT AS ABOVE')
      TYPE 60
      READ(5,*)AZM2,DIP2
80    TYPE 90
90    FORMAT(' DO YOU WISH TO PLOT THE P AND T AXES? ',8)
      READ(5,320)AXES
      IF(AXES.EQ.'N')GO TO 120
      CALL ERASE
      TYPE 100
100   FORMAT(' TYPE THE AZIMUTH AND ANGLE OF INCIDENCE FOR THE P AND T
     1 AXES IN FREE FORMAT')
      TYPE 110
110   FORMAT(' NOTE:  THE P AND T AXES ARE MEASURED FROM THE VERTICAL
     1, I.E. FROM THE CENTER OF THE STEREONET OUTWARDS.  IN ADDITION
     2, THE P AXIS AZIMUTH AND DIP SHOULD BE GIVEN FIRST AND THEN THE
     3 AZIMUTH AND DIP FOR THE T AXIS.')
```

```
      READ(5,*)AXIS1(1),AXIS2(1),AXIS1(2),AXIS2(2)
120   CALL ERASE
C
C     PLOT STEREONET BOUNDARY
C
C     THESE WINDOWS DETERMINE THE SIZE OF THE STEREONET.  BY
C     ADJUSTING THESE WINDOWS, THE PLOT CAN BE MADE TO
C     OVERLAY A STEREONET.
C
      CALL T*INDO(122,862,20,760)
      CALL D*INDO(-10.,10.,-10.,10.)
      THETA=0.
      R=10.
      X=R*COSD(THETA)
      Y=R*SIND(THETA)
      CALL MOVEA(X,Y)
130   THETA=THETA+0.01
      IF(THETA.GT.360.0)GO TO 140
      X=R*COSD(THETA)
      Y=R*SIND(THETA)
      CALL DRAWA(X,Y)
      GO TO 130
140   OPEN(UNIT=1,DEVICE='DSK',MODE='ASCII',ACCESS='SEQIN',FILE=
     1VFN)
      KOUNT=0
      NUMBER=0
C
C     READ STATION, DISTANCE FROM EPICENTER TO NEAREST STATION,
C     AZIMUTH, ANGLE OF INCIDENCE, AND FIRST MOTION OF P WAVE
C
      READ(1,170)
150   DO 160 I=1,3
160   READ(1,170)
170   FORMAT(1X)
180   READ(1,190,END=250)STA,DIST,IAZM,IANG,FM
190   FORMAT(A4,F6.1,1X,I3,1X,I3,3X,A1)
      IF(STA.EQ.'    ')GO TO 150
200   IF(IAZM.GE.180.AND.IAZM.LE.360)KAZM=IAZM-180
      IF(IAZM.GT.0.AND.IAZM.LT.180)KAZM=IAZM+180
      IANG=180-IANG
C
C     THIS EQUATION PLOTS THE DATA FOR A SCHMIDT STEREONET.
C     BY CHANGING THIS EQUATION, A DIFFERENT STEREONET MAY BE USED.
C
      DIP=SQRT(2.0)*R*SIND(FLOAT(IANG/2))
      IF(KAZM.GT.0.0.AND.KAZM.LT.180.)DIP=-DIP
      KAZM=FACT-90.
      X=DIP*ABS(COSD(FLOAT(KAZM)))
      Y=ABS(DIP)*SIGD(FLOAT(KAZM))
      CALL MOVEA(X,Y)
      KOUNT=KOUNT+1
      IF(FM.EQ.' '.OR.FM.EQ.'N')GO TO 180
      IF(FM.EQ.'U')GO TO 210
      IF(FM.EQ.'+')GO TO 220
```

```
      IF(FM.EQ.'-')GO TO 230
C
CC    PLOT AN OCTAGON FOR STRONG DILATATIONS
C
      CALL MOVREL(-10,6)
      CALL DRWREL(0,-6)
      CALL DRWREL(4,-4)
      CALL DRWREL(6,0)
      CALL DRWREL(4,4)
      CALL DRWREL(0,6)
      CALL DRWREL(-4,4)
      CALL DRWREL(-6,0)
      CALL DRWREL(-4,-4)
      GO TO 240
C
CC    PLOT AN 'X' FOR STRONG COMPRESSIONS
C
210   CALL MOVREL(-7,7)
      CALL DRWREL(14,-14)
      CALL MOVREL(-14,0)
      CALL DRWREL(14,14)
      GO TO 240
C
CC    PLOT A '+' IF THE FIRST MOTION IS A POOR COMPRESSION
C
220   CALL MOVREL(-10,0)
      CALL DRWREL(10,0)
      CALL MOVREL(-5,-5)
      CALL DRWREL(0,10)
      GO TO 240
C
CC    PLOT A '-' IF THE FIRST MOTION IS A POOR DILATATION
C
230   CALL MOVREL(-10,0)
      CALL DRWREL(10,0)
240   NUMBER=NUMBER+1
      GO TO 180
250   CLOSE(UNIT=1)
C
CC    LABEL THE NORTH,SOUTH,EAST, AND WEST
C        COORDINATES ON THE STEREONET
C
      CALL MOVEA(0.,0.)
      CALL MOVREL(0,10)
      CALL DRWREL(0,-20)
      CALL MOVEA(0.,0.)
      CALL MOVREL(-10,0)
      CALL DRWREL(20,0)
      CALL MOVEA(0.,10.)
      CALL DRWREL(0,-10)
      CALL MOVEA(10.,0.)
      CALL DRWREL(-10,0)
      CALL MOVEA(0.,-10.)
      CALL DRWREL(0,10)
```

```
      CALL MOVEA(-10.,0.)
      CALL DRAREL(10,0)
      IVAR=83
      CALL MOVEA(0.,-10.)
      CALL MOVREL(-5,-30)
      CALL ANSTR(1,IVAR)
      CALL MOVEA(-10.,0.)
      CALL MOVREL(-30,-7)
      JVAR=87
      CALL ANSTR(1,JVAR)
      CALL MOVEA(0.,10.)
      CALL MOVREL(-5,30)
      KVAR=78
      CALL ANSTR(1,KVAR)
      KVAR=69
      CALL MOVEA(10.,0.)
      CALL MOVREL(25,-7)
      CALL ANSTR(1,KVAR)
C
CC    PLOT FIRST NODAL PLANE
C
      IF(PLANE.EQ.'N')GO TO 290
      CALL RESET
      DIP=-DIP1
      IF(AZM1.GT.90.)AZM1=AZM1-360.
      ZZ=0.
      FI=0.
      DO 270 I=-90,90,1
      XI=I
      XX=COSD(XI)
      YY=SIND(XI)
      RSTRKE=ABS(AZM1-90)
      CALL ROTATE(FI,DIP,RSTRKE,XX,YY,ZZ,XP,YP,ZP)
      THETA=ABS(ASIN(ZP))
      THETA=THETA*57.2957795
      PHI=ATAN2(YP,XP)*57.2957795
      IF(PHI.LT.0)PHI=PHI+360.
      XAZM=PHI
      ANG=90-THETA
      IF(XAZM.GE.180.AND.XAZM.LT.360)AZM=XAZM-180
      IF(XAZM.GE.0.AND.XAZM.LT.180)AZM=XAZM+180
      ZDIP=SQRT(2.0)*R*SIND(ANG/2)
      IF(AZM.GE.0.0.AND.AZM.LT.180.)ZDIP=-ZDIP
      AZM=AZM-90.
      X=ZDIP*ABS(COSD(AZM))
      Y=ABS(ZDIP)*SIND(AZM)
      IF(I.NE.-90)GO TO 260
      CALL MOVEA(X,Y)
      GO TO 270
260   CALL DRAWA(X,Y)
270   CONTINUE
C
CC    PLOT SECOND NODAL PLANE
C
```

```
      DIP=-DIP2
      IF(AZM2.GT.90.)AZM2=AZM2-360.
      ZZ=0.
      FI=0.
      DO 290 I=-90,90,1
      XI=I
      XX=COSD(XI)
      YY=SIND(XI)
      RSTRKE=ABS(AZM2-90)
      CALL ROTATE(FI,DIP,RSTRKE,XX,YY,ZZ,XP,YP,ZP)
      THETA=ABS(ASIN(ZP))
      THETA=THETA*57.2957795
      PHI=ATAN2(YP,XP)*57.2957795
      IF(PHI.LT.0)PHI=PHI+360.
      XAZM=PHI
      ANG=90-THETA
      IF(XAZM.GE.180.AND.XAZM.LT.360)AZM=XAZM-180
      IF(XAZM.GE.0.AND.XAZM.LT.180)AZM=XAZM+180
      ZDIP=SQRT(2.0)*R*SIND(ANG/2)
      IF(AZM.GE.0.0.AND.AZM.LT.180.)ZDIP=-ZDIP
      AZM=AZM-90.
      X=ZDIP*ABS(COSD(AZM))
      Y=ABS(ZDIP)*SIND(AZM)
      IF(I.NE.-90)GO TO 280
      CALL MOVEA(X,Y)
280   CALL DRAWA(X,Y)
290   CONTINUE
      IF(AXES.EQ.'N')GO TO 310
C
C     PLOT P AND T AXES
C
      DO 300 I=1,2
      IAZM=AXIS1(I)
      IANG=AXIS2(I)
      IF(IAZM.GE.180.AND.IAZM.LE.360)KAZM=IAZM-180
      IF(IAZM.GT.0.AND.IAZM.LT.180)KAZM=IAZM+180
      DIP=SQRT(2.0)*R*SIND(FLOAT(IANG/2))
      IF(KAZM.GT.0.0.AND.KAZM.LT.180.)DIP=-DIP
      KAZM=KAZM-90.
      X=DIP*ABS(COSD(FLOAT(KAZM)))
      Y=ABS(DIP)*SIND(FLOAT(KAZM))
      CALL MOVEA(X,Y)
      IF(I.EQ.1)CALL PLOTP(1,IP)
      IF(I.EQ.2)CALL PLOTP(1,IP)
300   CONTINUE
310   CALL MOVABS(0,740)
      CALL ANMODE
C
C     THE NEXT READ STATEMENT IS A PAUSE SO THAT THE NUMBER OF
C     DATA POINTS PLOTTED IS NOT SUPERIMPOSED ON THE STEREONET.
C
      READ(5,320)A
320   FORMAT(A1)
      CALL ERASE
```

```
      WRITE(5,330)NUMBER,KOUNT
330   FORMAT(1X,I3,' DATA POINTS PLOTTED OUT OF A POSSIBLE ',I3)
      TYPE 340
340   FORMAT(' DO YOU WISH TO PLOT OTHER DATA ON A STEREONET?')
      READ(5,320)TEST
      IF(TEST.EQ.'Y')GO TO 10
      STOP
      END
C
C     ORTHOGONAL TRANSFORMATION TO CALCULATE DATA POINTS OF NODAL PLANE
C
      SUBROUTINE ROTATE(PHI,ANG,STRIKE,X,Y,Z,XP,YP,ZP)
      CS=COSD(STRIKE)
      CT=COSD(ANG)
      CP=COSD(PHI)
      SS=SIND(STRIKE)
      ST=SIND(ANG)
      SP=SIND(PHI)
      XP=((CS*CT*CP-SS*SP)*X+(CS*CT*SP+SS*CP)*Y-CS*ST*Z)
      YP=-(SS*CT*CP+CS*SP)*X-(SS*CT*SP-CS*CP)*Y+SS*ST*Z
      ZP=(ST*CP*X)
      CALL RESET
      RETURN
      END
```

APPENDIX 4

The data used for the composite fault-plane solutions are presented here. A sample of the output data is presented on the following page.

SAMPLE OUTPUT FOR FIRST MOTION DATA

MO,DAY,YR	HR,MIN,SEC (UT)	RMS
11, 4,75,	16,30,11.68	0.05

LATITUDE (NORTH)		LONGITUDE (WEST)				
DEGREES	MINUTES	DEGREES	MINUTES	ERH	DEPTH	ERZ
34	2.20	107	4.02	0.4	9.77	0.4

FRACTIONS OF A DEGREE (.03663)

FRACTIONS OF A DEGREE (.06697)

STATION	DISTANCE	AZIMUTH	ANGLE OF INCIDENCE	FIRST MOTION AND WEIGHT
SC	3.6	215	160	IPD0
WT	11.9	71	129	IPD0
CM	13.9	134	125	IPD0
CC	14.3	34	124	IPD0
MY	33.0	64	107	IPN0

NOTE: The following data are from HYPO71. The angle of incidence is measured with respect to the downward vertical. The reader is referred to the instruction manual for clarity of the definitions.

AREA 1

11, 4,75,							16,30,11.68	0.05	
34	2.20				107	4.02	0.4	9.77	0.4
(.03663)					(.06697)				
SC	3.6	215	160	IPD0					
WT	11.9	71	129	IPD0					
CM	13.9	134	125	IPD0					
CC	14.3	34	124	IPD0					
MY	33.0	64	107	IPN0					

11, 5,75,							14,35, 5.11	0.06	
34	1.80				107	4.04	0.7	10.19	0.7
(.02995)					(.06737)				
SC	3.0	223	164	IPD0					
WT	12.2	67	130	IPD0					
CM	13.5	131	127	IPD0					
MY	33.3	63	107	IP+0					

2,17,76,							6,17,48.98	0.04	
34	1.52				107	3.51	0.6	10.69	0.5
(.02528)					(.05844)				
SC	3.3	239	163	IPN0					
WM	6.2	104	150	IPD0					
IC	7.1	127	146	IPD0					
WT	11.6	63	133	IP-0					

2,18,76,							5,44,55.92	0.04	
34	0.70				107	3.04	0.5	10.27	0.4
(.01167)					(.05059)				
SC	3.6	267	161	IPD0					
WM	5.3	90	153	IPD0					
IC	5.7	119	151	IPD0					
CM	11.0	128	133	IPD0					
WT	11.8	55	131	IP-0					

2,18,76,							23,25,35.24	0.03	
34	1.73				107	4.17	0.3	9.99	0.3
(.02884)					(.06944)				
SC	2.8	221	164	IPD0					
WM	7.3	105	144	IPN1					
IC	8.2	125	141	IPD0					
WT	12.4	67	129	IP-0					
CM	13.5	130	126	IPN1					
CC	15.2	32	123	IPD0					

AREA 1

2,19,76,						0, 8,36.81	0.05	
34	0.95			107	3.30	0.3	9.92	0.3
(.01578)				(.05508)				
SC	3.2	259	162	IPD0				
WM	5.8	94	150	IPD0				
IC	6.3	121	148	IPD0				
CM	11.6	129	131	IPD0				
WT	11.9	58	130	IP-0				
CC	15.8	26	122	IP+0				

4,13,76,						11,41,25.36	0.05	
34	1.88			107	3.66	0.4	10.52	0.5
(.03126)				(.06104)				
SC	3.5	228	161	IPD0				
WM	6.7	109	148	IPD0				
IC	7.7	130	144	IPD0				
WT	11.6	67	132	IPD0				
CM	13.1	133	129	IPD0				
CC	14.5	30	126	EP 0				

7,15,76,						10,58,34.21	0.03	
34	1.05			107	3.80	0.2	10.02	0.2
(.01753)				(.06327)				
SC	2.5	251	166	IPD0				
NG	8.7	132	139	IPD0				
RM	8.8	36	139	IPD0				
WT	12.4	61	129	IPD0				
HC	16.8	289	121	IPU0				
GM	21.2	312	115	IPU0				

7,15,76,						16,43, 7.66	0.06	
34	1.25			107	3.35	0.5	11.08	0.5
(.02091)				(.05582)				
SC	3.3	249	163	IPD0				
RM	8.1	34	144	IPD0				
NG	8.5	137	143	IPD0				
WT	11.6	61	134	IPD0				
HC	17.4	287	122	IPU0				
GM	21.5	310	117	IPU0				

7,16,76,						0, 2,55.56	0.02	
34	0.91			107	3.96	0.2	10.55	0.3
(.01520)				(.06605)				
NG	8.7	130	140	IPD0				
RM	9.1	37	139	IPN0				
WT	12.8	60	130	IPD0				
HC	16.7	290	122	IPU0				

AREA 1

8,10,76,							4,38,25.39	0.08	
34	1.37				107	3.75	0.7	9.90	0.8
(.02285)					(.06255)				
SC	2.9	240	164	IPN0					
NG	9.1	135	138	IPN0					
WT	12.1	63	129	IPD0					
HC	16.7	287	121	IPU0					

8,27,76,							8,15,28.15	0.07	
34	0.48				107	3.54	0.6	10.81	0.6
(.00793)					(.05900)				
SC	2.8	275	165	IPD0					
NG	7.7	128	144	IPD0					
WT	12.7	56	131	IPU0					
HC	17.6	291	122	EP 0					
GM	22.2	313	116	IPD0					

8,27,76,							10,42,33.60	0.06	
34	0.70				107	3.25	0.6	11.16	0.6
(.01167)					(.05420)				
SC	3.3	267	164	IPD0					
NG	7.7	133	146	IPD0					
WT	12.1	56	133	IPU0					
HC	17.9	290	122	EP 0					

1,21,77,							16,34,37.47	0.08	
34	0.72				107	3.19	0.5	10.27	0.9
(.01205)					(.05315)				
CM	11.2	128	133	IPD0					
WT	11.9	56	131	IPU0					
CC	16.1	24	123	IPU0					
GM	22.3	311	115	IPN0					
DM	25.0	65	112	IPU0					

1,21,77,							16,38,11.38	0.06	
34	0.67				107	3.35	0.4	9.16	0.7
(.01116)					(.05576)				
CM	11.3	127	129	IPD0					
WT	12.2	56	127	IPU0					
CC	16.3	25	119	IPU0					
GM	22.2	312	112	IPU0					
DM	25.3	65	110	IPU0					

1,21,77,							16,42,28.36	0.09	
34	0.56				107	3.50	0.5	11.03	0.7
(.00925)					(.05840)				
SC	2.9	272	165	IPN0					
CM	11.4	125	134	EP 0					
WT	12.5	56	131	IPU0					
CC	16.6	25	124	IPN0					
GM	22.2	313	116	IPN0					
DM	25.6	65	113	IPN0					

AREA 1

```
 1,21,77,                                  16,43,39.84    0.05
34     0.75                107     3.28    0.4            10.33    0.7
(.01243)                   (.05464)
CM       11.3 128 132 IPD0
WT       12.0  57 131 IPU0
GM       22.2 312 115 IPU0
DM       25.1  65 112 IPU0

 1,22,77,                                   4,24, 5.02    0.07
34     0.70                107     3.10    0.4             9.64    0.5
(.01167)                   (.05161)
SC        3.5 267 160 IPD0
CM       11.0 128 131 IPD0
CC       16.1  24 121 IPU0
GM       22.5 311 113 IPU0
DM       24.9  65 111 IPU0

 2,16,77,                                   8,51,16.69    0.04
34     1.14                107     3.11    0.2            10.30    0.2
(.01892)                   (.05178)
SC        3.6 254 161 IPD0
IC        6.2 125 149 IPD0
WT       11.4  59 132 IPU0
CM       11.6 131 132 IPD0
CC       15.3  25 124 IPU0
DM       24.6  66 113 IPU0

 2,16,77,                                  14,44,49.47    0.06
34     0.70                107     3.02    0.4             9.91    0.5
(.01167)                   (.05025)
SC        3.6 267 160 IPD0
IC        5.7 119 150 IPD0
CM       10.9 129 132 IPD0
WT       11.8  55 130 EP 0
CC       16.0  23 122 IP+0
DM       24.8  65 112 IPU0

 3, 8,77,                                   4,30,41.64    0.04
34     0.14                107     3.61    0.4            10.40    0.4
(.00228)                   (.06019)
SC        2.8 288 165 IPD0
CM       11.1 121 133 IPD0
WT       13.1  54 128 IPU0
GM       22.6 315 115 IPU0
DM       26.0  63 112 IPU0
```

AREA 1

```
 3, 8,77,                                 4,55, 6.07   0.06
34    0.70              107     3.27   0.6          9.71     0.6
(.01167)                (.05444)
SC      3.2 267 162 IPD0
CM     11.2 127 131 IPD0
WT     12.1  56 129 IPU0
GM     22.3 312 114 IPU0
DM     25.1  65 111 IPU0

 3, 9,77,                                11,25,44.37   0.05
34    0.52              107     3.29   0.3          9.87     0.3
(.00860)                (.05487)
SC      3.2 273 162 IPD0
CM     11.1 126 132 IPD0
WT     12.3  55 129 IPU0
GM     22.5 312 114 IPU0
DM     25.3  64 111 IPU0

 3, 9,77,                                11,49, 2.43   0.04
34    0.70              107     3.33   0.3          9.59     0.3
(.01167)                (.05544)
SC      3.1 267 162 IPD0
CM     11.3 127 130 IPD0
WT     12.1  56 128 IPU0
GM     22.2 312 113 IPU0
DM     25.2  65 111 IPU0

 3, 9,77,                                11,50,15.93   0.05
34    0.70              107     3.32   0.3          9.39     0.3
(.01167)                (.05534)
SC      3.1 267 161 IPD0
CM     11.3 127 130 IPD0
WT     12.1  56 128 IPU0
GM     22.2 312 113 IPU0
DM     25.2  65 110 IPU0

 3, 9,77,                                12,27,55.97   0.06
34    0.70              107     3.01   0.4         10.00     0.5
(.01167)                (.05016)
SC      3.6 267 160 IPD0
CM     10.9 129 132 IPD0
WT     11.7  55 130 IPU0
GM     22.6 311 114 IPU0
DM     24.8  65 112 IPU0
```

AREA 1

```
 3, 9,77,                                   12,33,19.15    0.05
34    0.70               107     3.21    0.3         9.35      0.4
(.01167)                 (.05354)
SC       3.3 267 160 IPD0
CM      11.2 128 130 IPD0
WT      12.0  56 128 IPU0
GM      22.3 312 113 IPU0
DM      25.0  65 110 IPU0

 3, 9,77,                                   12,39, 0.20    0.03
34    0.62               107     3.29    0.2         9.71      0.3
(.01041)                 (.05476)
SC       3.2 269 162 IPD0
CM      11.2 127 131 IPD0
WT      12.2  56 129 IPU0
GM      22.3 312 113 IPU0
DM      25.2  65 111 IPU0

 3,10,77,                                    1,29,50.07    0.01
34    1.54               107     4.26    0.1        10.64      0.1
(.02564)                 (.07097)
SC       2.4 224 167 IPN0
WT      12.7  66 130 IPD0
CM      13.4 129 128 IPD0
GM      20.1 311 118 IPU0

 3,10,77,                                    2, 3,42.59    0.02
34    0.19               107     3.46    0.2        10.18      0.2
(.00322)                 (.05766)
SC       3.0 284 163 IPD0
CM      11.0 122 133 IPD0
WT      12.9  53 128 IPU0
GM      22.7 314 114 IPN0
DM      25.8  63 112 IPU0

 4, 5,77,                                   19,34,30.76    0.04
34    0.23               107     3.01    0.4        12.08      0.4
(.00376)                 (.05018)
SC       3.7 281 163 IPN0
CM      10.4 125 139 IPD0
CC      16.8  22 126 IPU0
DM      25.2  63 116 EP 0

 4,27,77,                                   12,15,56.25    0.05
34    0.88               107     3.25    0.3         9.81      0.4
(.01464)                 (.05413)
SC       3.3 261 161 IPD0
CM      11.4 129 131 IPD0
WT      11.9  57 130 IPN0
CC      15.9  25 122 IPU0
GM      22.1 311 114 IPN0
DM      25.0  66 111 IPD0
```

AREA 1

```
 4,27,77,                                      12,23,27.19    0.04
34     1.01                   107      3.36     0.2           10.20      0.3
(.01681)                      (.05595)
SC       3.2  256  163  IPD0
CM      11.7  129  131  IPD0
WT      11.9   59  131  IP+0
CC      15.7   26  123  IPU0
GM      21.8  311  115  IPU0
DM      25.0   66  112  IPU0

 6, 1,77,                                       6,40,44.85    0.06
34     0.57                   107      3.51     0.5            9.53      0.5
(.00951)                      (.05848)
SC       2.9  271  163  IPD0
CM      11.4  125  130  IPD0
WT      12.5   56  127  IPU0
GM      22.2  313  113  IPU0

 6, 2,77,                                       6,45,50.56    0.04
34     0.70                   107      4.09     0.5            9.11      0.5
(.01167)                      (.06823)
SC       2.0  265  168  IPD0
CM      12.3  124  127  IPD0
WT      13.1   59  125  IPN0
DM      26.3   66  109  IPU0

 6, 2,77,                                       6,48,16.35    0.07
34     0.97                   107      3.47     0.4            8.41      0.5
(.01624)                      (.05782)
SC       3.0  257  160  IPD0
CM      11.8  128  125  IPD0
WT      12.1   59  125  IPU0
GM      21.7  311  111  IPU0
DM      25.2   66  108  IPU0
LAD     49.1    2  100  IPD0
LPM     50.7   50   99  IPU0

 6, 2,77,                                       6,50,24.36    0.06
34     0.30                   107      3.72     0.3            8.99      0.4
(.00501)                      (.06204)
SC       2.6  282  164  IPD0
CM      11.4  122  128  IPD0
WT      13.1   55  125  IPU0
GM      22.3  314  112  IPU0
DM      26.1   64  109  IPU0
LPM     51.8   50  100  IPU0
```

AREA 1

6, 2,77, 6,55,21.42 0.07
34 0.70 107 3.52 0.4 8.22 0.5
(.01167) (.05861)
SC 2.8 266 161 IPD0
CM 11.6 126 125 IPD0
WT 12.4 57 124 IPU0
GM 22.0 312 111 IPU0
DM 25.5 65 108 IPU0

6, 2,77, 8,11,47.68 0.08
34 0.70 107 3.63 0.8 7.00 0.9
(.01167) (.06056)
SC 2.7 266 159 IPD0
CM 11.7 126 121 IPN0
WT 12.5 58 119 IPN0
GM 21.9 313 108 IPU0
DM 25.6 65 105 EP 0

6, 2,77, 11,42, 0.47 0.09
34 0.70 107 3.62 0.9 7.73 0.9
(.01167) (.06031)
SC 2.7 266 161 IPD0
CM 11.7 126 124 IPD0
WT 12.5 58 122 IPN0
GM 21.9 313 109 IPU0
DM 25.6 65 107 EP 0

6, 2,77, 12, 7, 4.04 0.07
34 0.70 107 3.61 0.5 7.83 0.5
(.01167) (.06014)
SC 2.7 266 161 IPD0
CM 11.7 126 124 IPD0
WT 12.5 58 122 IP-0
GM 21.9 313 110 IPU0
DM 25.6 65 107 EP 0

6, 2,77, 14,29, 6.71 0.08
34 0.70 107 3.55 0.7 7.94 0.7
(.01167) (.05909)
SC 2.8 266 161 IPD0
CM 11.6 126 124 IPD0
GM 22.0 312 110 IPU0
DM 25.5 65 107 IPU0

6, 2,77, 17,30, 8.17 0.03
34 0.53 107 3.45 0.2 8.24 0.2
(.00877) (.05746)
SC 2.9 273 160 IPD0
CM 11.3 125 126 EP 0
WT 12.5 56 123 IPU0
GM 22.3 313 110 IPD0
DM 25.5 65 108 IPU0

AREA 1

```
 6, 3,77,                                      0,10, 4.27   0.00
34    0.79                  107      3.33   0.0           10.12     0.0
(.01321)                    (.05545)
CM      11.4 128 132  IPD0
WT      12.1  57 130  EP 0
GM      22.1 312 115  IPN0
DM      25.1  65 112  IPU0

 6, 3,77,                                      3,49, 1.56   0.03
34    0.82                  107      3.46   0.2            8.77     0.2
(.01365)                    (.05765)
SC       3.0 262 161  IPD0
CM      11.6 127 127  IPD0
WT      12.2  58 126  IPU0
GM      21.9 312 112  IPU0
DM      25.3  66 109  IPU0

 6, 3,77,                                      6, 2,45.85   0.02
34    0.42                  107      3.40   0.3            9.87     0.4
(.00698)                    (.05673)
CM      11.1 125 132  IPD0
WT      12.5  55 128  EP 0
GM      22.5 313 114  IPU0
DM      25.5  64 111  IPU0

 6,10,77,                                      4, 4,44.84   0.04
34    1.04                  107      3.43   0.3            9.96     0.3
(.01737)                    (.05721)
SC       3.1 255 163  IPD0
CM      11.8 129 130  IPD0
WT      12.0  59 130  IPD0
GM      21.7 311 115  IPU0
DM      25.1  67 112  IPU0

 7,14,77,                                     20,24,16.65   0.08
34    2.28                  107      3.18   0.4           10.44     0.6
(.03806)                    (.05302)
SC       4.6 227 156  IPN0
WT      10.6  69 135  IPU0
CM      13.1 138 128  IPD0
CC      13.5  29 128  IPN0
GM      20.5 305 117  IPU0
BG      28.5  49 110  IPU0
```

AREA 1

7,15,77,							12,26,25.70		0.03	
34	0.43			107	3.69	0.2		10.04		0.2
(.00723)				(.06142)						
SC	2.6	277	165	IPD0						
CM	11.5	123	131	IPD0						
WT	12.9	56	128	IPU0						
CC	16.9	26	121	IPU0						
GM	22.1	314	114	IPU0						
BG	31.4	45	108	IPU0						
7,15,77,							12,31,13.28		0.05	
34	0.70			107	3.64	0.4		9.69		0.4
(.01167)				(.06069)						
SC	2.7	266	165	IPD0						
CM	11.7	126	130	IPD0						
CC	16.4	27	121	IPN0						
GM	21.8	313	114	IPU0						
7,21,77,							17,40,14.11		0.05	
34	0.82			107	3.61	0.3		10.41		0.4
(.01361)				(.06019)						
SC	2.7	262	165	IPD0						
CM	11.8	127	131	IPD0						
CC	16.2	27	123	IPN0						
GM	21.7	312	116	IPU0						
7,27,77,							15,53,15.04		0.02	
34	0.33			107	3.59	0.3		10.93		0.3
(.00546)				(.05988)						
SC	2.8	280	166	IPD0						
CM	11.3	123	134	IPD0						
CC	17.0	25	123	EPD0						
GM	22.4	314	116	IPU0						
BG	31.4	45	109	IPN0						
8,17,77,							8, 5,15.64		0.08	
34	0.42			107	4.07	0.6		11.50		1.1
(.00701)				(.06784)						
CM	12.0	122	134	IPD0						
GM	21.7	315	118	IPU0						
DM	26.5	65	113	IPU0						
BG	31.8	46	110	IPU0						
8,18,77,							5,31,13.72		0.10	
34	0.70			107	4.06	0.7		9.62		0.8
(.01167)				(.06768)						
SC	2.0	265	168	IPN0						
CM	12.2	124	128	IPN0						
GM	21.4	314	114	IPU0						
DM	26.2	66	110	IPU0						
BG	31.4	46	107	IPN0						

AREA 1

8,18,77,						5,31,57.92	0.04	
34	0.34			107	3.60	0.8	9.58	0.6
(.00571)				(.05994)				
SC	2.8	280	164	IPN0				
GM	22.3	314	113	IPU0				
DM	25.9	64	110	IPU0				
BG	31.4	45	107	IPU0				

8,18,77,						10,38,14.82	0.08	
34	1.09			107	3.56	0.5	9.21	0.8
(.01810)				(.05926)				
SC	2.9	252	162	IPD0				
CM	12.0	129	127	IPD0				
WT	12.1	60	127	IPU0				
CC	15.7	27	120	IPU0				
GM	21.5	311	113	IPU0				
DM	25.2	67	110	IPU0				
BG	30.4	46	107	IPU0				

8,18,77,						10,38,47.51	0.09	
34	0.70			107	3.68	0.6	10.31	0.6
(.01167)				(.06129)				
SC	2.6	266	166	IPD0				
CM	11.8	125	131	IPN0				
WT	12.6	58	129	IPD0				
GM	21.8	313	115	IPU0				
DM	25.7	66	112	IPU0				
BG	31.0	46	108	IPU0				

8,18,77,						10,39, 9.87	0.05	
34	0.58			107	3.89	0.3	10.57	0.3
(.00962)				(.06476)				
SC	2.3	271	168	IPD0				
CM	11.9	124	132	IPD0				
GM	21.7	314	116	IPU0				
DM	26.1	65	112	IPU0				
BG	31.4	46	109	IPU0				
LAD	49.8	3	102	IPD0				

8,18,77,						12,16,45.02	0.04	
34	0.50			107	3.81	0.3	10.33	0.3
(.00837)				(.06342)				
SC	2.4	274	167	IPD0				
CM	11.7	123	131	IPD0				
GM	21.9	314	115	IPU0				
DM	26.0	65	112	IPU0				
BG	31.4	46	108	IPU0				

AREA 1

```
 8,18,77,                              15,42, 6.77    0.07
34     0.67               107     3.80    0.5         10.32     0.5
(.01125)                  (.06336)
SC       2.4 267 167 IPD0
CM      11.9 125 131 IPN0
GM      21.7 313 115 IPU0
DM      25.9  66 112 IPN0
BG      31.2  46 108 IP-0

 8,19,77,                               3,51, 0.22    0.10
34     1.01               107     3.62    0.5          8.52     0.6
(.01680)                  (.06032)
SC       2.8 254 162 IPD0
CM      12.0 128 125 IPD0
WT      12.2  60 125 IPU0
GM      21.5 312 112 IPU0
DM      25.4  67 109 IPU0
BG      30.6  46 106 IPN0
LAD     49.0   2 100 IPN0

 8,19,77,                               9, 5,48.23    0.05
34     0.70               107     3.86    0.4         10.40     0.4
(.01167)                  (.06432)
SC       2.3 265 167 IPD0
CM      12.0 125 131 IPD0
GM      21.6 313 116 IPU0
DM      25.9  66 112 IPU0
BG      31.2  46 108 IPU0

 8,19,77,                               9,22, 4.93    0.07
34     0.45               107     3.78    0.6         10.18     0.6
(.00745)                  (.06296)
SC       2.5 277 166 IPD0
CM      11.6 123 131 IPD0
GM      22.0 314 115 IPU0
DM      26.0  65 111 IPU0
BG      31.5  45 108 IPU0

 8,19,77,                               9,27, 7.49    0.07
34     0.25               107     4.05    0.6         10.84     0.6
(.00415)                  (.06754)
SC       2.1 288 169 IPD0
CM      11.8 121 133 EP 0
GM      22.0 315 116 IPD0
BG      32.0  45 109 IPN0
```

AREA 1

```
 8,19,77,                                      9,28,22.66    0.04
34     0.38                107     4.16    0.3             11.39       0.3
(.00627)                   (.06928)
SC      1.9 283 171 IPD0
CM     12.0 121 133 EP 0
GM     21.7 315 118 IPD0
DM     26.6  65 113 IPN0
BG     32.0  46 110 IPU0
LAD    50.2   3 103 EP 0

 8,19,77,                                      9,49,51.09    0.04
34     0.75                107     3.55    0.3             10.04       0.4
(.01243)                   (.05915)
SC      2.8 264 164 IPD0
CM     11.6 126 131 EPN0
GM     21.9 312 115 IPU0
DM     25.5  66 112 IPN0
BG     30.8  46 108 IPU0

 8,19,77,                                     10,24,42.59    0.05
34     0.50                107     3.71    0.3             10.22       0.4
(.00837)                   (.06176)
SC      2.6 274 166 IPD0
CM     11.6 124 131 IPN0
GM     22.0 314 115 IPN0
DM     25.9  65 112 IPU0
BG     31.3  45 108 IPU0

 8,24,77,                                     11,21,34.69    0.08
34     0.70                107     3.43    0.4              9.58       0.5
(.01167)                   (.05710)
SC      3.0 266 163 IPD0
NG      7.9 131 141 IPD0
CM     11.4 127 130 IPD0
CC     16.3  25 120 IPU0
GM     22.1 312 113 IPU0
BG     30.7  45 107 IPU0

 8,24,77,                                     11,22,35.67    0.06
34     0.46                107     3.31    0.3             10.57       0.4
(.00775)                   (.05511)
SC      3.2 275 163 IPD0
NG      7.4 130 145 IPD0
CM     11.0 125 134 IPD0
CC     16.6  24 122 IPU0
GM     22.5 313 115 IPU0
BG     30.9  44 109 IPU0
```

AREA 1

```
 8,25,77,                                      6,26,26.99    0.05
34     0.58                107     3.56    0.2              9.77     0.3
(.00959)                   (.05940)
SC      2.8 271 164 IPD0
NG      7.9 129 141 IPD0
CM     11.5 125 130 IPD0
WT     12.6  57 128 IPU0
CC     16.6  26 121 IPU0
GM     22.1 313 114 IPU0
BG     31.1  45 107 IPU0
LAD    49.8   2 101 IPD0

 8,26,77,                                      6,12,59.57    0.07
34     0.70                107     3.59    0.4              9.59     0.5
(.01167)                   (.05984)
SC      2.7 266 164 IPN0
NG      8.0 130 140 IPD0
CC     16.4  26 120 EPN0
GM     21.9 313 114 IPU0
BG     30.9  46 107 IPU0

 8,26,77,                                     10,22,30.12    0.10
34     0.70                107     3.77    0.7             10.60     0.8
(.01167)                   (.06277)
SC      2.5 266 167 IPD0
NG      8.3 129 142 IPD0
CM     11.9 125 132 IPN0
CC     16.5  27 123 IPD0
GM     21.7 313 116 IPU0

 8,26,77,                                     10,25,44.17    0.06
34     0.38                107     3.55    0.3              9.82     0.4
(.00630)                   (.05910)
SC      2.8 278 164 IPD0
NG      7.6 127 142 IPD0
CM     11.3 124 131 IPD0
CC     16.9  25 120 IPN0
GM     22.4 314 114 IPU0
BG     31.3  45 107 IPU0

 8,26,77,                                     10,32,57.84    0.09
34     0.41                107     3.82    0.4             10.69     0.5
(.00681)                   (.06369)
SC      2.4 278 167 IPD0
NG      8.0 126 143 IPD0
CM     11.6 123 133 IPN0
WT     13.1  56 129 IPN0
CC     17.0  27 122 IPN0
GM     22.0 314 116 IPU0
DM     26.1  65 112 IPU0
BG     31.6  45 109 IPU0
LAD    50.1   3 102 EP 0
```

AREA 1

```
 8,26,77,                                  10,33,27.50    0.10
34    0.35               107      3.75    0.5        10.34      0.7
(.00585)                 (.06251)
SC       2.5 281 166 IPD0
NG       7.8 125 143 IPD0
CM      11.5 123 132 IPD0
CC      17.1  26 121 IPN0
GM      22.2 314 115 IPU0
BG      31.6  45 108 IPU0

 8,26,77,                                  10,35,11.41    0.09
34    0.70               107      3.63    0.5        10.85      0.6
(.01167)                 (.06057)
SC       2.7 266 166 IPD0
NG       8.1 130 143 IPU0
CM      11.7 126 133 IPD0
CC      16.4  26 123 IPD0
GM      21.8 313 116 IPU0
BG      31.0  46 109 IPU0

 8,26,77,                                  10,38,10.67    0.10
34    0.29               107      3.57    0.4         9.91      0.6
(.00491)                 (.05947)
SC       2.8 282 164 IPD0
NG       7.6 126 143 IPD0
CM      11.2 123 132 IPD0
WT      12.9  55 128 IPU0
CC      17.1  25 120 IPN0
GM      22.4 314 114 IPU0
BG      31.4  45 107 IPU0

 9, 2,77,                                   3,49,18.72    0.09
34    0.42               107      3.13    0.5        10.36      0.6
(.00708)                 (.05213)
SC       3.5 275 162 IPD0
NG       7.2 131 145 IPD0
CM      10.8 126 134 IPN0
CC      16.6  23 122 EP 0
GM      22.8 312 114 IPN0
BG      30.8  44 109 IPN0

 9,15,77,                                   0,53,35.23    0.07
34    1.54               107      3.55    0.5        10.06      0.5
(.02561)                 (.05922)
SC       3.3 238 162 IPD0
CC      15.0  29 124 IPU0
GM      20.9 309 116 IPU0
BG      29.8  48 109 IPN0
RI      46.2 343 102 EPN0
TD      50.1  63 101 IPN0
```

AREA 1

10,18,77, 8,16,32.62 0.08
34 0.88 107 3.54 0.6 10.16 0.5
(.01472) (.05899)

SC	2.9	259	164	IPD0
CC	16.1	27	122	IPU0
GM	21.7	312	115	IPU0
BG	30.6	46	108	IPU0
RI	47.3	343	102	EP 0
TD	50.6	61	101	IPN0
LPM	50.9	50	101	EP 0

AREA 2

```
 6, 3,75,                                15,10,15.48   0.08
34    1.07               107    2.23    0.6           10.51     0.7
(.01787)                 (.03721)
SC      4.9 260 155 IPD0
CM     10.5 136 135 IPD0
CT2    10.6  56 135 IPU0
CC     14.9  20 125 IPU0
FM     22.6  71 115 IPN0

 6,16,75,                                23,43,20.82   0.08
34    1.34               107    2.24    0.6           10.64     0.7
(.02231)                 (.03733)
SC      5.0 254 155 IPD0
CT2    10.3  59 136 IPU0
CM     10.9 137 134 IPD0
CC     14.5  21 126 IPU0
FM     22.5  73 115 IPU0

 7,23,75,                                14,56,41.82   0.05
34    0.70               107    2.49    0.5            9.93     0.7
(.01167)                 (.04143)
SC      4.4 268 156 IPD0
CM     10.3 131 134 IPU0
CC     15.7  21 122 IPU0
FM     23.3  70 113 IPU0

 7,24,75,                                17,10,14.16   0.05
34    0.70               107    2.53    0.6           10.31     0.6
(.01167)                 (.04219)
SC      4.4 268 157 IPD0
CT2    11.3  55 132 IPN0
CC     15.7  21 123 IPU0
FM     23.3  70 114 IPU0

 8, 5,75,                                14,19,22.36   0.04
34    0.97               107    2.55    0.4           10.06     0.5
(.01623)                 (.04254)
SC      4.4 261 156 IPD0
CM     10.7 133 133 IPD0
WT     10.9  55 133 IPU0
CC     15.3  22 123 IPU0
FM     23.2  71 113 IPU0

 8,21,75,                                 3,44,48.60   0.02
34    1.06               107    2.49    0.2           10.08     0.3
(.01767)                 (.04154)
SC      4.5 259 156 IPD0
WT     10.7  56 133 IPU0
CM     10.8 134 133 IPD0
CC     15.1  22 124 IPU0
FM     23.0  72 114 IPU0
```

AREA 2

```
 1,22,76,                                 15,58,46.92   0.04
34    0.89              107    2.50    0.5          13.14     0.7
(.01479)                (.04170)
SC      4.4  263  161  IPD0
CM     10.6  133  141  IPD0
DM     23.9   65  119  IPU0
TA     24.9   81  118  IPU0

 1,22,76,                                 16, 0,52.31   0.06
34    2.17              107    2.17    0.6           9.54     0.8
(.03613)                (.03619)
SC      5.7  239  149  IPD0
WT      9.2   64  136  IPU0
CM     12.0  143  129  IPD0
TA     24.2   86  112  IPU0

 1,22,76,                                 16, 5,11.00   0.05
34    1.53              107    2.26    0.6          11.52     0.6
(.02545)                (.03770)
SC      5.1  250  156  IPD0
WT      9.9   59  139  IPU0
CM     11.2  138  136  IPU0
TA     24.4   84  115  IPU0

 1,23,76,                                  2,53,33.03   0.08
34    1.81              107    1.82    0.5           8.98     0.7
(.03016)                (.03034)
SC      5.9  248  147  IPD0
WT      9.1   59  135  IPU0
CM     11.1  143  129  IPD0
DM     22.3   67  112  IPU0
TA     23.7   85  111  IPU0

 1,23,76,                                  8,16,19.25   0.05
34    1.83              107    2.20    0.5          10.06     0.6
(.03044)                (.03661)
SC      5.4  245  152  IPD0
CM     11.5  141  131  IPD0
DM     22.8   68  114  IPN0
TA     24.3   85  113  IPU0

 2,20,76,                                 12,51,45.11   0.01
34    0.82              107    2.67    0.1          11.11     0.1
(.01367)                (.04446)
SC      4.2  264  159  IPD0
WM      4.8   92  157  IPD0
IC      5.3  124  154  IPD0
CM     10.7  131  136  IPD0
WT     11.2   55  135  IP-0
```

AREA 2

```
 6,30,76,                                         8,44, 1.50   0.07
34    0.62                   107     1.83   0.4                10.61      0.5
(.01032)                     (.03044)
SC       5.4 270 153 IPD0
NG       6.1 146 150 IPD0
RM       8.2  16 142 IPN0
WT      10.4  49 136 IPU0
HC      20.0 288 118 IPN0

10, 7,76,                                         22,37,37.66  0.05
34    1.97                   107     1.84   0.3                10.36      0.4
(.03275)                     (.03072)
IC       6.0 148 150 IPD0
SC       6.0 245 150 IPD0
WT       9.0  61 139 IPN0
DM      22.2  68 115 IPU0
GM      22.6 304 115 IPU0

 2, 8,77,                                         21,15,58.47  0.03
34    1.53                   107     2.55   0.3                10.73      0.4
(.02556)                     (.04243)
SC       4.7 248 157 IPD0
NG       8.1 146 143 IPD0
CC      14.3  23 127 IPU0
DM      23.5  67 115 IPU0

 2, 9,77,                                         1,36,16.12   0.07
34    1.37                   107     2.51   0.5                10.70      0.6
(.02284)                     (.04179)
SC       4.6 252 157 IPD0
NG       7.8 145 144 IPD0
CM      11.2 136 134 EP 0
CC      14.6  23 126 IPU0
DM      23.5  66 114 IPU0

 2, 9,77,                                         12,26,35.17  0.04
34    1.58                   107     2.68   0.3                10.59      0.4
(.02632)                     (.04464)
SC       4.5 246 157 IPD0
NG       8.3 145 142 IPD0
CC      14.3  24 126 IPU0
DM      23.6  68 114 IPU0

 2,25,77,                                         0, 7, 8.07   0.05
34    0.87                   107     2.83   0.4                10.27      0.4
(.01449)                     (.04714)
SC       3.9 263 159 IPD0
IC       5.6 123 152 IPD0
CM      10.9 131 133 IPN0
WT      11.3  56 132 IPU0
CC      15.6  23 123 IPU0
```

AREA 2

4,26,77,							16,56, 7.84	0.02	
34	2.95				107	2.56	0.3	9.48	0.7
(.04909)					(.04264)				
WT	9.3	74	136	EP 0					
CC	12.0	28	128	IPD0					
CM	13.5	144	125	IPD0					
GM	20.7	301	115	IPU0					

4,28,77,							10,59,10.49	0.04	
34	2.64				107	2.80	0.3	9.68	0.4
(.04395)					(.04667)				
SC	5.5	226	151	IPD0					
WT	9.8	71	135	IP+0					
CC	12.7	29	127	IPU0					
GM	20.7	303	115	IPU0					
DM	23.1	72	113	IPU0					

4,28,77,							11, 3,30.92	0.04	
34	2.28				107	2.64	0.3	9.76	0.4
(.03797)					(.04399)				
SC	5.2	233	152	IPD0					
WT	9.8	67	135	IP-0					
CC	13.1	26	127	IP+0					
GM	21.2	304	115	IPU0					
DM	23.1	71	113	IPU0					

7,21,77,							3,12,27.33	0.02	
34	2.62				107	2.65	0.1	10.40	0.2
(.04372)					(.04420)				
SC	5.6	228	152	EP 0					
CC	12.6	28	130	IPD0					
CM	13.1	142	128	IPD0					
GM	20.9	303	116	IPU0					

9, 1,77,							21,58,48.52	0.05	
34	0.61				107	2.91	0.3	10.21	0.3
(.01022)					(.04842)				
SC	3.8	270	160	IPD0					
NG	7.2	135	145	IPD0					
CM	10.7	128	134	IPU0					
WT	11.7	54	131	IPU0					
CC	16.1	23	122	IPU0					
GM	22.8	311	114	IPD0					
BG	30.3	44	109	IPU0					

AREA 3

```
 5,26,75,                                    23,45,51.28    0.02
34     4.10                  106    59.24    0.2            8.94     0.3
(.06832)                     (.98731)
CC      8.4    4 137 IPU0
SC     11.4  236 128 EP 0
CM     13.4  168 124 IP-0
FM     16.9   85 118 IPU0

 4,13,76,                                     2,45,48.29    0.03
34     3.48                  107     0.15    0.3            7.60     0.4
(.05808)                     (.00249)
WM      5.2  170 146 IPD0
WT      5.5   73 144 IPD0
SC      9.6  236 128 IPN0
CC      9.7   12 128 EP+0

 4,13,76,                                     2,45,55.26    0.03
34     3.61                  107     0.36    0.3            7.49     0.4
(.06022)                     (.00602)
WM      5.5  167 144 IPD0
WT      5.7   77 143 IPD0
SC      9.5  234 128 EP 0
CC      9.6   14 128 EP+0

 4,13,76,                                     7,11,35.03    0.07
34     3.84                  106    59.86    1.0            8.09     0.8
(.06405)                     (.99762)
WT      4.9   79 149 IPD0
WM      5.8  176 144 IPD0
IC      8.5  179 133 EP 0
CC      9.0   10 132 EP 0

 4,13,76,                                     9,45,40.75    0.05
34     3.88                  107     0.70    0.4            8.59     0.6
(.06472)                     (.01173)
WM      6.1  163 145 IPD0
WT      6.1   82 144 IPD0
IC      8.7  171 135 IPD0
CC      9.3   18 133 IP+0
SC      9.4  230 132 IPU0
CM     13.7  159 122 IPD0

 4,13,76,                                     9,55, 8.11    0.05
34     3.69                  107     0.83    0.4            8.02     0.5
(.06157)                     (.01376)
WM      5.8  161 144 IPD0
WT      6.4   79 142 IPD0
IC      8.4  169 134 IPD0
SC      9.0  231 132 IPN0
CC      9.6   18 130 IP+0
```

AREA 3

```
 4,13,76,                                    11,17, 5.09    0.02
34     3.70                 107     0.67    0.1            8.04     0.2
(.06168)                    (.01121)
WM      5.8 163 144 IPD0
WT      6.1  79 143 IPD0
IC      8.4 171 134 IPD0
SC      9.2 232 131 IPN0
CC      9.6  17 130 EP 0

 4,13,76,                                   18,52,13.76    0.08
34     3.69                 106    59.92    0.6            9.03     0.7
(.06149)                    (.99863)
WT      5.0  76 151 IPD0
WM      5.5 174 149 IPD0
IC      8.3 179 138 IPN0
CC      9.3  10 134 IP+0
SC     10.1 236 132 IPN0

 4,15,76,                                    3,41,48.76    0.09
34     3.78                 107     0.29    0.7            9.40     0.8
(.06299)                    (.00481)
WT      5.5  79 149 IPD0
WM      5.8 169 148 IPD0
IC      8.5 175 138 IPD0
CC      9.3  14 135 IP+0
SC      9.8 233 134 IPU0

 4,15,76,                                    6, 8,40.08    0.05
34     3.73                 107     1.03    0.3            7.80     0.5
(.06221)                    (.01708)
WM      6.0 158 142 IPD0
WT      6.7  80 139 IPD0
IC      8.6 167 132 IP-0
SC      8.8 229 131 IPU0
CC      9.7  20 129 IP+0

 4,15,76,                                    7, 3,59.12    0.07
34     3.69                 107     0.65    0.5            7.44     0.7
(.06152)                    (.01090)
WM      5.7 163 142 IPD0
WT      6.1  79 141 IPD0
IC      8.4 171 132 IP-0
SC      9.2 232 129 IPU0
CC      9.6  17 128 IPD0

 4,15,76,                                    8, 6, 0.45    0.05
34     3.69                 107     1.06    0.4            7.79     0.6
(.06157)                    (.01767)
WM      6.0 157 143 IPD0
IC      8.5 167 133 IPD0
SC      8.7 229 132 IP-0
CC      9.8  20 129 IP-0
```

AREA 3

4,15,76,							8,45,52.51	0.05	
34	3.75				107	0.75	0.3	8.58	0.4
(.06245)					(.01257)				
WM	5.9	162	146	IPD0					
WT	6.3	80	144	IPD0					
IC	8.5	170	135	IPD0					
SC	9.2	231	133	IP+0					
CC	9.5	18	132	IP+0					
CM	13.4	158	123	IP-0					

4,15,76,							8,51,50.64	0.06	
34	3.70				107	0.92	0.4	7.72	0.6
(.06170)					(.01533)				
WM	5.9	159	143	IPD0					
WT	6.5	80	140	IPD0					
IC	8.5	168	132	IP-0					
SC	8.9	230	131	IP+0					
CC	9.7	19	129	IP+0					

4,15,76,							9,36,10.53	0.07	
34	4.03				107	1.49	0.5	7.19	0.9
(.06717)					(.02490)				
WM	6.8	154	137	IPD0					
SC	8.7	223	130	IP-0					
IC	9.3	164	128	IPN0					
CC	9.4	25	127	IPN0					

4,15,76,							10,24,12.82	0.06	
34	3.81				107	0.86	0.3	7.69	0.4
(.06351)					(.01440)				
WM	6.1	161	142	IPD0					
WT	6.4	81	140	IPD0					
IC	8.6	169	132	IPD0					
SC	9.1	229	130	IP+0					
CC	9.5	19	129	IP+0					
CM	13.6	157	119	IP-0					

4,15,76,							11,55,20.07	0.06	
34	3.69				107	0.74	0.4	7.69	0.5
(.06147)					(.01234)				
WM	5.8	162	143	IPD0					
WT	6.3	79	141	IPD0					
IC	8.4	170	133	IPD0					
SC	9.1	231	130	IP+0					
CC	9.6	17	129	IP+0					
CM	13.3	158	120	IP-0					

AREA 3

```
 4,15,76,                                    15,30,27.48    0.10
34     3.85                  107     1.06    0.6            8.07     1.0
(.06419)                     (.01765)
WM      6.2 158 142 IPD0
WT      6.7  82 140 IPD0
IC      8.8 167 133 IPD0
SC      8.9 228 132 IP+0
CC      9.5  21 130 IP+0

 4,15,76,                                    23,16,11.87    0.08
34     3.81                  107     0.61    0.6            7.56     0.8
(.06343)                     (.01025)
WM      5.9 164 142 IPD0
WT      6.0  81 141 IPD0
IC      8.6 172 131 IPD0
CC      9.3  17 129 IPD0
SC      9.4 231 129 EP 0

 4,16,76,                                     1,20,22.71    0.09
34     3.79                  107     1.07    0.5            7.90     0.7
(.06319)                     (.01787)
WM      6.1 158 142 IPN0
WT      6.7  81 140 IPD0
IC      8.7 167 132 IPD0
SC      8.9 228 132 IP+0
CC      9.6  21 129 IP+0
CM     13.7 156 120 IP-0

 4,16,76,                                     9,33,42.88    0.06
34     3.58                  107     0.56    0.3            7.58     0.5
(.05965)                     (.00934)
WM      5.5 164 144 IPD0
WT      6.0  77 142 IPD0
IC      8.1 172 133 IPD0
SC      9.2 233 129 IPN0
CC      9.7  16 128 IPU0
CM     13.0 159 120 IPD0

 4,16,76,                                     9,36, 7.88    0.09
34     3.80                  107     1.31    0.5            6.65     0.9
(.06342)                     (.02176)
WM      6.3 155 137 IPD0
WT      7.1  82 133 IPD0
SC      8.6 226 128 IPN0
IC      8.8 165 127 IPD0
CC      9.7  23 124 IPU0
```

AREA 3

```
 4,16,76,                                  10,47,16.10    0.02
 34    3.89               106    59.74    0.3          8.00      0.3
(.06479)                  (.99574)
WT      4.7   80 150 IPD0
WM      5.9  177 144 IP-0
IC      8.6  181 133 IPN0
CC      8.9    9 132 IP-0

 4,16,76,                                  12,40,30.85    0.03
 34    3.65               106    59.33    0.4          7.81      0.3
(.06081)                  (.98879)
WT      4.2   72 152 IP+0
WM      5.4  184 145 IPD0
IC      8.2  185 134 IPN0
CC      9.3    4 130 IP-0

 4,16,76,                                  14, 7,33.22    0.07
 34    3.91               106    59.44    0.4          8.97      0.6
(.06524)                  (.99060)
WT      4.2   79 155 IPD0
WM      5.9  182 147 IPD0
IC      8.7  184 136 IPD0
CC      8.8    6 136 IPD0
SC     11.0  236 129 IPU0
CM     13.1  167 124 IPD0

 4,16,76,                                  14, 9,54.14    0.09
 34    3.79               107     1.26    0.6          7.95      0.8
(.06314)                  (.02092)
WM      6.2  155 142 IPD0
WT      7.0   82 139 IPN0
SC      8.6  227 133 IPN0
IC      8.7  165 132 IPN0
CC      9.7   22 129 IP+0

 4,16,76,                                  14,24,11.60    0.09
 34    3.82               107     1.24    0.5          7.17      0.9
(.06367)                  (.02069)
WM      6.3  156 139 IPD0
WT      7.0   82 136 IPD0
SC      8.7  227 129 IPN0
IC      8.8  165 129 IPN0
CC      9.6   22 127 IP+0

 4,16,76,                                  14,36, 6.05    0.06
 34    3.77               106    59.82    0.9          7.80      0.7
(.06283)                  (.99701)
WT      4.8   78 148 IPU0
WM      5.7  176 144 IPN0
IC      8.4  180 133 IPN0
CC      9.1    9 130 IPN0
```

AREA 3

```
 4,16,76,                               15, 4,36.66   0.09
34     3.69             107    1.19    0.6          7.73     1.0
(.06158)                (.01983)
WM       6.0 156 142 IPD0
WT       6.9  80 138 IPD0
IC       8.5 165 132 IPN0
SC       8.6 228 132 IPU0
CC       9.8  21 128 IPD0

 8,11,76,                                6, 3,43.56   0.07
34     3.62             106   59.86    0.5          9.17     0.7
(.06036)                (.99764)
WT       5.0  75 152 IPD0
SC      10.1 237 132 IPU0
NG      10.6 178 131 IPD0
FC      19.0 195 116 IPN0
HC      22.0 272 113 IPU0

 4,26,77,                                2, 8,20.40   0.08
34     3.83             107    1.32    0.5         10.20     0.8
(.06375)                (.02205)
WT       7.1  82 145 IPD0
CC       9.7  23 136 IPD0
CM      13.9 155 126 IPD0
DM      20.4  76 117 IPN0
GM      21.6 295 115 IPU0

 4,27,77,                               11,52,49.76   0.03
34     3.56             107    0.98    0.2         12.86     0.3
(.05929)                (.01637)
WT       6.7  78 153 IP+0
SC       8.7 231 146 IPN0
CC      10.0  19 142 IPD0
GM      22.3 295 120 IPU0

 6, 4,77,                                1, 7,54.42   0.03
34     3.76             107    0.63    0.5          6.57     1.1
(.06260)                (.01044)
WT       6.1  80 137 IPU0
CM      13.4 159 116 IPD0
DM      19.3  75 109 IPU0
GM      22.6 294 106 IPU0

 9,16,77,                                7,34,53.42   0.04
34     4.03             107    0.02    0.3          6.01     0.6
(.06710)                (.00028)
CC       8.7  12 125 IPU0
SC      10.4 232 120 IPN0
BG      22.7  47 105 EPN0
GM      23.3 292 104 EPN0
```

AREA 3

```
 9,16,77,                                    8, 4, 8.18    0.05
34     3.88                 106    59.46    0.3           7.00     0.5
(.06462)                    (.99100)
CC      8.9    6 128 IPU0
SC     10.9  236 123 EPN0
BG     22.3   45 107 IPU0
GM     24.2  292 106 IPU0
TD     42.5   64  99 IPN0

 9,16,77,                                    8, 8,37.69    0.05
34     4.00                 107     0.03    0.4           5.95     0.6
(.06660)                    (.00055)
CC      8.8   12 124 IPU0
SC     10.3  233 120 IPN0
BG     22.8   47 105 IPN0
GM     23.3  292 104 IPU0
```

AREA 4

2,17,76,							17,34, 5.15	0.03	
34	2.51				107	0.00	0.3	10.82	0.2
(.04186)					(.00000)				
WM	3.4	169	163	IPN0					
WT	6.0	56	151	IPU0					
IC	6.1	177	151	IPN0					
CM	10.9	159	135	IPD0					
CC	11.5	9	133	IPU0					
6, 8,76,							6,16,12.41	0.05	
34	2.64				106	59.81	0.4	10.37	0.4
(.04403)					(.99676)				
WM	3.6	174	161	IPD0					
WT	5.6	56	151	IPD0					
NG	8.8	178	140	IPD0					
SC	9.3	246	138	IPU0					
CC	11.2	7	133	IPD0					
6, 8,76,							6,16,26.16	0.05	
34	2.74				106	59.52	0.4	10.28	0.4
(.04575)					(.99193)				
WM	3.7	181	160	IPD0					
WT	5.2	55	153	IPD0					
NG	9.0	181	139	IPD0					
SC	9.8	246	136	IPU0					
CC	11.0	5	133	IPD0					
6, 8,76,							6,36, 9.95	0.06	
34	2.57				106	59.80	0.5	10.56	0.5
(.04279)					(.99666)				
WM	3.4	174	162	EP 0					
WT	5.7	55	152	IPD0					
NG	8.7	178	141	EPD0					
SC	9.3	247	139	IPU0					
CC	11.3	7	133	IPD0					
6, 8,76,							6,41,14.28	0.06	
34	2.59				106	59.60	0.4	9.68	0.5
(.04320)					(.99338)				
WM	3.5	179	160	IPD0					
WT	5.4	54	151	IPD0					
NG	8.7	180	138	IPD0					
SC	9.6	247	135	IPU0					
CC	11.3	6	131	EP 0					

AREA 4

```
 6, 8,76,                                    7,22,19.08    0.05
34     2.62                 106    59.57    0.4          10.13     0.4
(.04372)                    (.99277)
WM      3.5 180 161 IPD0
WT      5.4  54 152 IPD0
NG      8.8 180 139 IPD0
SC      9.7 247 136 IPU0
CC     11.2   5 132 IPD0

 6, 8,76,                                   11,31,48.87    0.03
34     2.76                 106    59.77    0.2          10.34     0.2
(.04594)                    (.99611)
WM      3.8 175 160 IPD0
WT      5.5  58 152 IPD0
NG      9.0 178 139 IPD0
SC      9.5 245 137 IPU0
CC     11.0   7 133 IPD0

 8, 5,76,                                    2,19, 6.48    0.05
34     3.14                 106    59.98    0.3           9.92     0.4
(.05240)                    (.99970)
WT      5.4  66 151 IPD0
SC      9.5 240 136 IPU0
NG      9.7 177 136 IPD0
HC     21.9 274 114 IPU0
GM     24.0 295 112 IPU0

 8, 9,76,                                   18,40,17.60    0.06
34     2.88                 107     0.30    0.4           9.58     0.5
(.04804)                    (.00499)
WT      6.1  64 148 IPD0
SC      8.9 242 137 IPU0
FC     17.5 194 119 IPN0
HC     21.4 275 114 IPU0
GM     23.8 297 112 IPU0

 8, 9,76,                                   22,27,39.19    0.05
34     2.69                 106    59.93    0.4          10.89     0.5
(.04485)                    (.99886)
WT      5.8  58 152 IPD0
NG      8.9 177 141 IPD0
SC      9.2 245 140 IPU0
HC     22.0 276 116 IPU0

 8,10,76,                                    2,53,11.52    0.05
34     2.91                 107     0.30    0.3          10.26     0.4
(.04846)                    (.00494)
WT      6.1  64 149 IPN0
SC      8.9 241 139 IPU0
NG      9.3 173 138 IPD0
FC     17.5 194 120 IPU0
HC     21.4 275 116 IPU0
```

AREA 4

```
 8,10,76,                              12,18,41.77   0.09
34    3.09              106    59.59    0.6          11.09      0.7
(.05143)                (.99323)
WT      4.9  62 156 IPD0
NG      9.6 180 139 IPD0
SC     10.0 243 138 IPU0
FC     18.1 197 121 IPU0
HC     22.5 274 116 IPU0

 8,11,76,                              10, 0,37.81   0.04
34    2.99              107     0.15    0.2          10.00      0.3
(.04991)                (.00246)
WT      5.8  65 150 IPD0
SC      9.2 241 137 IPN0
NG      9.5 175 137 IPD0
FC     17.7 194 119 IPU0
HC     21.6 275 115 IPU0

 8,11,76,                              18, 8,27.25   0.07
34    2.82              107     0.07    0.4          10.16      0.5
(.04705)                (.00109)
WT      5.8  61 150 IPD0
SC      9.1 243 138 IPU0
FC     17.5 195 120 IPN0
HC     21.8 275 115 IPU0
GM     24.1 297 113 IPU0

 8,12,76,                               0,56,36.11   0.04
34    2.64              106    59.56    0.2          11.18      0.3
(.04405)                (.99269)
WT      5.3  54 155 IPD0
NG      8.8 180 142 IPD0
SC      9.7 247 139 IPU0
FC     17.4 198 123 IPU0
HC     22.6 276 116 IPU0
GM     25.0 297 114 IPU0

 8,12,76,                               0,59, 8.01   0.04
34    2.53              106    59.81    0.3          11.33      0.3
(.04220)                (.99690)
WT      5.8  55 153 IPD0
NG      8.6 178 143 IPD0
SC      9.3 247 141 IPU0
FC     17.1 197 124 IPU0
HC     22.2 277 117 IPU0
GM     24.7 298 115 IPU0
```

AREA 4

8,12,76,				1, 3,14.26	0.06	
34	2.84		107	0.23	0.4	10.13	0.5
(.04731)			(.00379)			
WT	6.0	63 149 IPD0				
SC	8.9	242 139 IPU0				
NG	9.2	174 138 IPD0				
HC	21.5	275 115 IPU0				
GM	23.9	297 113 IPU0				

8,12,76,				1, 6, 7.45	0.05	
34	2.42		107	0.02	0.4	10.72	0.5
(.04027)			(.00036)			
WT	6.2	55 150 IPD0				
NG	8.4	176 142 IPN0				
SC	8.9	248 140 IPU0				
GM	24.5	298 114 IPN0				

8,12,76,				1,45,41.53	0.07	
34	2.63		106	59.61	0.4	10.88	0.5
(.04385)			(.99351)			
WT	5.4	54 154 IPD0				
NG	8.8	180 141 IPD0				
SC	9.6	247 139 IPU0				
FC	17.3	198 122 IPU0				
HC	22.5	276 116 IPU0				
GM	24.9	297 114 IPU0				

8,12,76,				1,52,20.10	0.03	
34	3.17		106	59.92	0.3	10.39	0.3
(.05291)			(.99875)			
WT	5.3	66 153 IPD0				
SC	9.6	240 137 IPU0				
NG	9.8	177 137 IPD0				
HC	22.0	274 115 IPU0				

8,12,76,				1,54, 4.77	0.04	
34	2.60		107	0.10	0.2	9.74	0.3
(.04327)			(.00174)			
WT	6.1	58 148 IPD0				
NG	8.7	175 138 IPD0				
SC	8.9	245 138 IPU0				
FC	17.0	195 120 IPU0				
HC	21.8	277 114 IPU0				
GM	24.3	298 112 IPU0				

AREA 4

```
 8,12,76,                                    2,34,25.87    0.05
34     2.66                  106    59.78    0.3           10.37     0.4
(.04432)                     (.99635)
WT      5.6   56 152 IPD0
NG      8.8  178 140 IPD0
SC      9.4  246 138 IPU0
FC     17.3  197 121 IPU0
HC     22.3  276 115 IPU0
GM     24.7  297 113 IPU0

 8,12,76,                                    3,18, 5.67    0.07
34     2.51                  107     0.04    0.5           11.07     0.6
(.04186)                     (.00061)
WT      6.1   56 151 IPD0
NG      8.6  175 142 IPD0
SC      8.9  247 141 IPU0
HC     21.9  277 117 IPU0
GM     24.4  298 114 IP+0

 8,12,76,                                    4,56, 5.06    0.07
34     2.70                  106    59.71    0.4           11.67     0.5
(.04507)                     (.99519)
WT      5.5   57 155 IPD0
NG      8.9  179 143 IPD0
SC      9.5  246 141 IPU0
FC     17.4  197 124 IPU0
HC     22.4  276 118 IPU0
GM     24.7  297 115 IPU0

 8,12,76,                                    5, 8,59.07    0.08
34     2.72                  107     0.12    0.4           10.63     0.6
(.04532)                     (.00192)
WT      6.0   60 151 IPN0
NG      9.0  175 140 IPN0
SC      9.0  244 140 IPU0
FC     17.3  195 122 EP 0
HC     21.7  276 116 IPU0
GM     24.2  297 114 IPU0

 8,12,76,                                    5,20,48.69    0.06
34     2.87                  106    59.83    0.3           10.24     0.4
(.04787)                     (.99715)
WT      5.4   60 152 IPD0
NG      9.2  178 138 IPD0
SC      9.5  244 137 IPU0
FC     17.7  196 120 IPU0
HC     22.1  275 115 IPU0
GM     24.4  296 113 IPU0
```

AREA 4

```
 8,12,76,                                    7,52, 6.31    0.07
34     3.11                 107     0.22    0.3          9.75     0.5
(.05184)                    (.00361)
WT      5.8  67 149 IPD0
SC      9.2 240 137 IPU0
NG      9.7 174 135 IPD0
FC     17.9 194 119 IPU0
HC     21.5 274 114 IPU0
GM     23.7 296 112 IPU0

 8,12,76,                                   10,51,15.01    0.05
34     2.68                 106    59.75    0.3          10.19     0.5
(.04470)                    (.99588)
WT      5.5  57 152 IPD0
NG      8.9 178 139 IPD0
SC      9.5 246 137 IPU0
GM     24.7 297 112 IPU0

 8,12,76,                                   11,25,51.57    0.04
34     2.48                 106    59.92    0.2          10.00     0.3
(.04133)                    (.99871)
WT      6.0  55 149 IPD0
NG      8.5 177 140 IPD0
SC      9.1 247 138 IPU0
FC     16.9 196 121 IPU0
HC     22.1 277 114 IPU0
GM     24.6 298 112 IPU0

 8,12,76,                                   11,57,50.35    0.03
34     2.56                 106    59.87    0.2          10.24     0.3
(.04273)                    (.99779)
WT      5.8  56 150 IPD0
NG      8.7 177 140 IPD0
SC      9.2 247 138 IPU0
HC     22.1 277 115 IPU0
GM     24.6 298 113 IPN0

 8,12,76,                                   23, 7,12.52    0.04
34     2.79                 106    59.77    0.3          10.60     0.4
(.04658)                    (.99621)
WT      5.4  59 153 IPD0
NG      9.1 178 139 IPD0
FC     17.5 197 121 IPU0
HC     22.2 276 115 IPU0
GM     24.6 296 113 IPU0
```

AREA 4

```
 8,13,76,                                0,22,46.93    0.09
34     2.48                106    59.68    0.6         10.49     0.8
(.04134)                   (.99470)
WT      5.7   53 152 IPD0
NG      8.5  179 141 IPD0
FC     17.0  198 122 IPU0
HC     22.4  277 115 IPU0
GM     25.0  298 113 IPU0

 8,13,76,                                3, 7,42.23    0.03
34     2.57                107     0.09    0.2          9.38     0.4
(.04289)                   (.00157)
WT      6.1   58 147 IPD0
NG      8.7  175 137 IPD0
HC     21.8  277 113 IPU0
GM     24.3  298 111 IPU0

 8,13,76,                                9, 3,41.98    0.07
34     2.49                107     0.15    0.5          8.50     0.9
(.04142)                   (.00251)
WT      6.2   57 144 IPD0
NG      8.5  174 135 IPN0
HC     21.7  277 111 IPU0
GM     24.3  298 109 IPN0

 8,13,76,                                9,10,52.67    0.05
34     2.62                106    59.77    0.4         10.50     0.6
(.04371)                   (.99618)
WT      5.6   56 152 IPD0
NG      8.8  178 140 IPD0
HC     22.3  276 115 IPN0
GM     24.7  297 113 IPN0

 8,13,76,                               12,26, 0.31    0.02
34     2.45                106    59.89    0.2         10.30     0.2
(.04084)                   (.99812)
WT      5.9   54 150 IPD0
NG      8.4  177 141 IPD0
HC     22.1  277 115 IPU0
GM     24.7  298 113 EP-0

 8,25,76,                               21, 4, 9.33    0.04
34     3.30                106    59.81    0.4         10.85     0.4
(.05497)                   (.99688)
WT      5.1   68 155 IPD0
SC      9.9  240 138 IPU0
FC     18.4  196 121 IPU0
HC     22.1  273 116 IPU0
GM     24.1  295 114 IPU0
```

AREA 4

```
 8,25,76,                                   22,32,23.10    0.05
34    2.85                106    59.79    0.4           11.57     0.5
(.04750)                  (.99657)
WT      5.4  60 155 IPDO
NG      9.2 178 142 IPDO
SC      9.5 244 141 IPUO
HC     22.2 275 118 IPUO
GM     24.5 296 115 IPUO

 8,27,76,                                    1,44,39.52    0.05
34    2.57                106    59.89    0.4           11.26     0.5
(.04291)                  (.99820)
WT      5.8  56 153 IPDO
NG      8.7 177 142 IPDO
SC      9.2 247 141 IPUO
HC     22.1 277 117 IPUO
GM     24.6 298 115 IPUO
```

AREA 5

```
 5,22,75,                                    10,27, 8.28    0.05
34     4.34                 106    55.29    0.3            10.53     0.6
(.07227)                    (.92142)
CC      9.7  325 137 IPU0
FM     10.8   84 134 IPU0
CM     14.0  194 127 IPD0
SC     17.0  246 122 IPN0

 6,  3,75,                                    2,45, 9.31    0.07
34     4.64                 106    55.64    0.4             8.54     1.0
(.07736)                    (.92740)
CC      8.9  326 134 IPD0
FM     11.3   87 127 IPU0
CM     14.4  191 121 IPD0
SC     16.7  243 117 IPN0

 6,  3,75,                                    4,41,14.39    0.06
34     4.51                 106    55.15    0.3             7.54     0.8
(.07522)                    (.91915)
CC      9.6  323 128 IPD0
FM     10.6   85 125 IPU0
CM     14.3  194 118 IPD0
SC     17.3  245 114 EPN0

 6,  3,75,                                    4,48,18.08    0.08
34     4.34                 106    55.48    0.4             7.00     1.0
(.07233)                    (.92470)
CT2     1.6  263 167 IPD0
CC      9.5  327 126 IPD0
FM     11.1   84 122 IPU0
CM     13.9  193 117 IPD0
SC     16.7  246 113 IPU0

 6,  3,75,                                    5,18,50.60    0.03
34     4.42                 106    55.01    0.2             9.15     0.5
(.07365)                    (.91676)
CC      9.8  323 133 IPN0
FM     10.4   84 131 IPU0
CM     14.2  195 123 IPD0
SC     17.4  246 118 EP 0

 6,  3,75,                                    5,40,40.98    0.05
34     4.40                 106    55.07    0.3             8.77     0.7
(.07328)                    (.91790)
CC      9.8  323 132 EP 0
FM     10.5   84 130 IPU0
CM     14.1  195 122 EPD0
SC     17.3  246 117 EP 0
```

AREA 5

6,17,75, 15,30,44.69 0.08
34 3.81 106 54.95 0.7 12.20 0.7
(.06349) (.91581)
CT1 2.7 286 168 IPD0
FM 10.5 78 139 IP-0
CC 10.8 326 139 IPD0
SC 17.1 250 126 IPU0

7, 9,75, 2,12,24.86 0.00
34 3.14 106 55.64 0.0 6.91 0.0
(.05234) (.92734)
CC 11.3 334 121 IPU0
CM 11.7 194 121 IP+0
FM 11.8 73 120 IPN0
SC 15.7 253 114 EP+1

7,30,75, 15,54,15.41 0.09
34 4.72 106 54.42 0.6 9.23 0.8
(.07861) (.90706)
WT 3.6 259 158 IPD0
FM 9.5 87 134 IPU0
CC 10.0 317 133 IPU0
CM 15.0 198 122 IPD0

7,30,75, 21,44,42.06 0.02
34 4.52 106 55.16 0.2 9.60 0.2
(.07535) (.91939)
WT 2.5 262 166 IPD0
CC 9.5 323 135 IPU0
FM 10.6 86 132 IPU0
CM 14.3 194 124 IPD0
SC 17.3 245 119 EP+1

8, 8,75, 10,53,57.82 0.10
34 3.84 106 55.26 0.8 8.67 0.9
(.06394) (.92095)
WT 2.5 292 164 IPD0
CC 10.5 328 130 IPU0
FM 10.9 79 128 IPU0
CM 13.1 195 124 IPD0
SC 16.7 249 117 IPU0

8, 8,75, 10,57,22.32 0.03
34 4.35 106 55.31 0.3 8.54 0.3
(.07258) (.92184)
WT 2.2 269 165 IPD0
CC 9.6 325 132 IPN0
FM 10.9 84 128 IPU0
CM 14.0 194 121 IPD0
SC 17.0 246 117 IP-0

AREA 5

8,13,75,							3,38,51.07	0.07	
34	4.43				106	55.38	0.3	8.95	0.4
(.07383)					(.92292)				
WT	2.1	265	167	IPD0					
CC	9.5	325	133	IPU0					
FM	11.0	85	129	IPU0					
CM	14.1	193	122	IPD0					
SC	16.9	245	118	IPU0					
MY	19.3	58	115	IPU0					

8,13,75,							3,46, 5.84	0.03	
34	4.27				106	55.34	0.2	8.52	0.2
(.07121)					(.92233)				
WT	2.2	273	166	IPD0					
CC	9.7	326	131	IP+0					
FM	10.9	83	128	IPU0					
CM	13.8	194	122	IPD0					
SC	16.9	246	117	EP+0					
MY	19.4	57	114	IPU0					

8,13,75,							7,39,18.43	0.03	
34	4.35				106	55.53	0.2	8.86	0.2
(.07244)					(.92546)				
WT	1.9	269	168	IPD0					
CC	9.5	327	133	IP+0					
FM	11.2	84	128	IPU0					
CM	13.9	192	123	IPD0					
SC	16.6	245	118	IP+1					
MY	19.6	58	114	IPU0					

8,19,75,							20,10,22.97	0.05	
34	4.27				106	55.11	0.4	8.18	0.5
(.07122)					(.91850)				
WT	2.5	272	163	IPD0					
CC	9.9	324	129	EP 0					
FM	10.6	83	128	IPU0					
CM	13.9	195	120	IPD0					
SC	17.2	247	115	EP 0					

8,20,75,							5,16,40.25	0.10	
34	3.97				106	54.03	0.5	8.46	0.8
(.06623)					(.90053)				
WT	4.2	279	153	IPD0					
FM	9.0	78	133	IPU0					
CC	11.4	319	127	IPU0					
CM	13.9	202	121	IPD0					
SC	18.5	250	115	IPU0					

AREA 5

8,20,75, 5,22,19.90 0.09
34 4.43 106 55.30 0.5 9.26 0.6
(.07383) (.92161)
WT 2.2 265 166 IPD0
CC 9.5 325 134 IPU0
FM 10.8 85 131 IPU0
CM 14.1 194 123 IPD0
SC 17.0 245 119 IPU0

8,20,75, 12,20,52.20 0.09
34 4.43 106 54.81 0.5 8.18 0.7
(.07383) (.91342)
WT 3.0 266 160 IPD0
CC 10.0 321 129 IPU0
FM 10.1 84 129 IPU0
CM 14.3 197 120 IPD0
SC 17.7 246 115 EPU0

8,20,75, 12,49,19.27 0.04
34 4.21 106 55.02 0.2 8.57 0.3
(.07015) (.91696)
WT 2.7 275 163 IPD0
CC 10.1 324 130 IPU0
FM 10.5 82 129 IPU0
CM 13.8 196 122 IPD0
SC 17.3 247 116 IPU0

8,20,75, 15,28,36.29 0.04
34 4.53 106 55.41 0.2 9.47 0.3
(.07544) (.92346)
WT 2.1 260 168 IPD0
CC 9.3 325 136 IPU0
FM 11.0 86 131 IPU0
CM 14.2 193 124 IPN0
SC 17.0 245 119 IPU0

8,20,75, 21,59,44.60 0.04
34 4.08 106 54.80 0.5 7.80 0.5
(.06800) (.91331)
WT 3.0 279 159 IPD0
FM 10.2 81 128 IPU0
CC 10.5 323 127 IPU0
CM 13.7 197 120 IPD0

8,21,75, 0,40,22.93 0.06
34 4.43 106 55.47 0.3 7.45 0.5
(.07383) (.92449)
WT 2.0 265 165 IPD0
CC 9.4 326 128 IPU0
FM 11.1 85 124 IPU0
CM 14.1 193 118 IPD0
SC 16.8 245 114 EP 0

AREA 5

```
 8,21,75,                                   7, 3,51.48    0.04
34    4.32                  106    55.11    0.2           8.03      0.3
(.07206)                    (.91851)
WT      2.5 270 163 IPD0
CC      9.9 324 129 IPU0
FM     10.6  84 127 IPU0
CM     14.0 195 120 IPD0
SC     17.2 246 115 IPU0

 8,25,75,                                  19,37,40.85    0.03
34    4.12                  106    54.91    0.2           9.03      0.2
(.06868)                    (.91517)
WT      2.9 278 162 IPD0
FM     10.3  81 131 IPU0
CC     10.4 324 131 IPU0
CM     13.7 197 123 IPD0
SC     17.4 248 117 EPU0

 8,26,75,                                   8,40,15.73    0.08
34    4.43                  106    55.18    0.6           9.45      0.7
(.07383)                    (.91971)
WT      2.4 266 166 IPD0
CC      9.6 324 134 IPN0
FM     10.7  85 132 IPU0
CM     14.2 194 124 IP-0

 8,28,75,                                   1,26, 2.40    0.07
34    4.43                  106    54.97    0.7           8.28      0.7
(.07383)                    (.91611)
WT      2.7 266 162 IPD0
FM     10.3  84 129 IPU0
CM     14.2 196 120 IPD0
SC     17.5 246 115 IP-0

 8,29,75,                                   3,17,35.53    0.05
34    4.62                  106    55.45    0.5           8.36      0.5
(.07706)                    (.92419)
WT      2.1 255 166 IPD0
FM     11.0  87 127 IPU0
CM     14.4 192 120 IPD0
SC     17.0 244 116 EPU0

 8,29,75,                                   3,18, 9.46    0.05
34    4.43                  106    55.63    0.4           8.35      0.4
(.07383)                    (.92719)
WT      1.7 264 168 IPD0
FM     11.3  85 126 IPU0
CM     14.0 192 121 IPD0
SC     16.6 245 117 EPU0
```

AREA 5

```
 8,29,75,                                 8,52,18.85   0.05
34    4.81                106   55.59   0.4            7.80     0.4
(.08011)                  (.92643)
WT      2.0 244 166 IPD0
FM     11.2  88 125 IPU0
CM     14.7 191 118 IPD0
SC     16.9 243 115 EPU0

 9,16,75,                                13,30,52.46   0.04
34    4.91                106   55.53   0.4            7.74     0.3
(.08176)                  (.92548)
WT      2.2 240 164 IPD0
CM     14.9 192 117 IPD0
HC     28.7 266 105 IPU0
NJ     29.5 110 105 IPU0
MG     29.8 280 105 IPU0

 9,24,75,                                 2,17, 9.44   0.02
34    2.73                106   55.58   0.8            8.28     0.4
(.04556)                  (.92626)
WT      3.5 329 157 IPD0
NJ     28.4 102 106 IPU0
HC     28.7 274 106 IPU0
MG     30.7 288 105 IPU0

 9,24,75,                                13,16,40.52   0.02
34    3.56                106   55.80   0.6            7.70     0.2
(.05925)                  (.92996)
WT      2.0 314 165 IPD0
HC     28.3 271 105 IPU0
NJ     29.1 105 105 IPU0
MG     29.9 285 104 IPU0
```

AREA 6

```
 7,14,77,                                   2,34, 1.96    0.08
34    9.52              106    52.50    0.6            7.20      1.0
(.15871)                (.87505)
BG       7.3   43 134 IPD0
DM       8.4 132  131 IPU0
CC       9.9 261  126 IPU0
CM      24.4 198  106 EP 0
SC      25.8 230  106 EP 0
GM      33.2 267  102 IPU0

 7,14,77,                                   3,27,32.74    0.10
34   10.01              106    52.51    1.1            7.14      1.0
(.16690)                (.87519)
BG       6.7   49 137 IPU0
CC      10.1 256  125 IPD0
SC      26.3 229  105 IPN0
GM      33.2 266  102 IPN0

 7,14,77,                                  10, 0,32.75    0.06
34    9.61              106    52.02    0.3            7.09      0.5
(.16023)                (.86706)
BG       6.7   40 137 IPU0
DM       8.0 137  132 IPU0
CC      10.7 260  124 IPU0
CM      24.8 200  106 IPU0
SC      26.4 231  105 IPU0
LPM     27.0   53 105 EP 0
GM      33.9 267  102 IPU0
LAD     36.6 335  101 IPN0

 7,14,77,                                  11,31,51.10    0.10
34    9.29              106    52.67    0.6            7.38      0.9
(.15479)                (.87791)
BG       7.8   43 133 IPD0
DM       8.3 129  132 IPU0
CC       9.6 263  128 IPU0
CM      23.9 198  107 EPD0
SC      25.3 231  106 EP 0
GM      32.9 268  103 IPU0
LAD     36.7 336  101 EP 0

 7,19,77,                                   6,16,54.73    0.07
34   10.22              106    52.41    0.6            6.97      0.8
(.17038)                (.87348)
BG       6.3   50 138 IPU0
CC      10.3 254  124 IPU0
CM      25.6 198  105 IPD0
GM      33.4 265  102 IPU0
```

AREA 6

7,22,77, 7,19, 0.58 0.05
34 10.36 106 52.12 0.3 6.46 0.5
(.17265) (.86859)

BG	5.8	49	138	IPU0
CC	10.8	253	121	IPU0
CM	26.0	198	104	IPD0
SC	27.2	228	103	IPN0
GM	33.9	265	101	EP 0

8,17,77, 6, 3,19.88 0.08
34 9.78 106 51.78 0.6 7.40 1.0
(.16302) (.86297)

BG	6.2	39	140	IPU0
CC	11.1	259	124	IPU0
WT	12.7	217	120	IPU0
CM	25.2	200	106	IPU0
GM	34.3	267	102	IPU0
LAD	36.5	334	101	IPN0

8,18,77, 7,33,24.48 0.06
34 9.93 106 52.16 0.4 6.98 0.7
(.16550) (.86940)

BG	6.4	45	137	IPU0
DM	8.6	139	129	IPD0
CM	25.2	199	105	IPN0
SC	26.6	230	105	IPN0
GM	33.7	266	102	IPN0

9,20,77, 2,26,55.34 0.08
34 9.18 106 52.48 0.5 6.42 1.0
(.15296) (.87471)

BG	7.8	40	129	IPU0
CC	9.9	264	123	IPU0
FM	10.1	140	122	IPU0
TD	28.8	72	103	IPU0

9,20,77, 8,19,23.18 0.10
34 9.54 106 52.38 0.5 7.21 0.8
(.15894) (.87306)

BG	7.2	42	135	IPU0
CC	10.1	261	126	IPU0
FM	10.5	143	124	IPU0
WT	11.7	215	122	IPU0
TD	28.5	73	104	IPU0
GM	33.3	267	102	IPU0
RI	42.5	314	100	IP+0

AREA 6

9,22,77,						8,22,18.16	0.07	
34	9.35				106	52.26	0.5	6.72	0.9
(.15591)					(.87104)			
BG	7.3	40	133	IPU0				
FM	10.2	143	123	IPD0				
CC	10.2	263	123	IPU0				
TD	28.4	72	103	IPU0				
RI	42.9	314	99	IPN0				

AREA 7

```
 9,15,77,                                12,30, 4.71   0.06
34   20.55                106   52.81   0.3           7.00     0.9
(.34252)                  (.88011)
BG     16.0 160 114 IPD0
LAD    19.4 312 110 IPU0
CC     23.9 203 106 IPU0
TD     30.3 113 103 IPD0
GM     39.3 236 100 IPU0
SC     41.6 208 100 IPN0

 9,22,77,                                 5,20,27.98   0.06
34   19.93                106   53.10   0.3           6.41     1.0
(.33217)                  (.88505)
BG     15.1 157 113 IPD0
LAD    19.8 315 108 IPU0
CC     22.7 203 106 IPU0
FM     28.6 165 103 IPD0
TD     30.3 111 102 IPD0
RI     31.3 289 102 IPU0
GM     38.3 237 100 IPU0

 9,22,77,                                 6,36,36.31   0.04
34   20.18                106   53.09   0.3           7.00     1.0
(.33631)                  (.88480)
BG     15.5 158 114 IPD0
LAD    19.5 314 110 IPD0
CC     23.1 203 107 IPU0
TD     30.5 112 103 IPD0
RI     31.2 288 103 IPU0
GM     38.6 237 100 IPU0

 9,22,77,                                19,19,16.66   0.08
34   20.14                106   52.95   0.4          10.64     0.8
(.33562)                  (.88248)
BG     15.4 158 125 IPD0
LAD    19.7 314 118 IPU0
CC     23.1 203 115 IPU0
FM     28.9 166 110 IPD0
TD     30.2 112 109 IPD0
RI     31.4 288 109 IPU0
GM     38.7 237 105 IPU0

12,14,77,                                20,57,28.19   0.07
34   17.42                106   53.19   0.3           5.73     1.1
(.29035)                  (.88654)
CK     11.0 100 117 IPU0
BG     11.1 147 117 EP 0
SL     12.2 232 115 IPU0
CC     18.4 208 107 IPU0
BB     23.0  55 104 IPU0
LAD    23.2 323 104 IPD0
```

AREA 7

1, 5,78, 12, 3,23.34 0.09
34 16.53 106 53.34 0.4 7.00 1.1
(.27555) (.88896)

BG	9.9	140	125	IPD0
SL	11.0	238	122	IPU0
CK	11.1	92	122	IPU0
CC	16.9	210	113	IPU0
LPM	23.8	81	106	IPU0
BB	24.1	52	106	IPU0
LAD	24.4	326	106	IPN0

1,17,78, 23,14,21.36 0.04
34 20.88 106 52.45 0.3 7.00 1.1
(.34803) (.87416)

CK	12.8	131	119	EP 0
BG	16.4	162	113	IPD0
SL	17.5	218	112	IPD0
BB	18.9	69	110	EP 0
LAD	19.4	309	110	IPN0
LPM	22.6	101	107	EP 0
CC	24.7	204	106	IPD0

AREA 8

```
 8, 5,75,                                     4,17,20.58    0.06
34    1.27                  106    58.85    0.3            10.44      0.5
(.02114)                    (.98086)
WT       6.5   30 148 IPD0
CM       8.2  165 142 IPD0
SC      10.1  263 136 IPU0
CC      13.6  360 127 IPN0
FM      17.6   67 121 IP+0

 8, 6,75,                                    20,12,33.13    0.08
34    1.03                  106    58.35    0.9             8.97      1.0
(.01724)                    (.97244)
WT       6.6   22 144 IPD0
SC      10.8  266 130 IPU0
CC      14.1  357 122 IPD0
FM      17.1   65 118 EP 0

 8,13,75,                                    11,22,26.70    0.05
34    0.33                  106    58.22    0.3            10.13      0.4
(.00552)                    (.97033)
CM       6.3  169 148 IPD0
WT       7.7   17 143 IPD0
SC      11.0  273 133 IPU0
CC      15.4  356 123 EP 0
FM      17.5   61 120 IPU0
MY      27.4   49 110 IPU0

 1,21,76,                                    14,18,28.39    0.02
33   58.25                  106    57.01    0.2             7.60      0.2
(.97088)                    (.95020)
CM       2.4  197 162 IPD0
WT      11.2    2 124 IPD0
SC      13.6  289 119 IPU0
DM      20.1   41 111 IPU0

 1,29,76,                                    15, 6,40.19    0.05
33   58.99                  106    58.47    0.3             7.00      0.6
(.98322)                    (.97445)
CM       4.0  157 150 IPD0
WT      10.2   15 124 IPD0
SC      11.0  286 122 IPU0
CC      17.9  358 111 IP+0
TA      19.8   68 109 IPU0
DM      20.7   48 109 IPU0
```

AREA 8

1,29,76, 18,24,27.51 0.04
33 58.88 106 58.70 0.2 7.52 0.3
(.98127) (.97827)
CM 3.9 151 152 IPD0
WT 10.5 17 126 IP-0
SC 10.7 287 125 IPU0
CC 18.1 359 113 EP 0
TA 20.2 68 110 IPU0
DM 21.1 48 110 IPU0

1,30,76, 9,16,35.44 0.03
33 58.83 106 58.88 0.2 8.35 0.3
(.98049) (.98137)
CM 4.0 147 154 IPD0
SC 10.5 288 128 IPU0
WT 10.7 18 128 EP 0
TA 20.5 68 112 IPU0
DM 21.3 49 111 IPU0

4,13,76, 11,58,34.64 0.07
33 58.95 106 57.57 0.4 6.41 0.4
(.98251) (.95958)
IC 3.5 278 152 IPD0
CM 3.6 177 151 IPD0
WM 4.5 317 145 IPD0
WT 10.0 7 123 IPU0
SC 12.4 284 117 IPU0
CC 18.0 354 110 IP+0
,bl
4,13,76, 12,37, 4.98 0.05
33 58.74 106 58.59 0.5 6.19 0.4
(.97907) (.97653)
IC 2.1 295 162 IPD0
CM 3.6 151 149 IPD0
WM 4.0 338 147 IPD0
WT 10.7 15 120 IP+0

4,14,76, 1,50,28.88 0.05
33 58.67 106 59.90 0.4 9.80 0.3
(.97785) (.99833)
IC 1.0 9 174 IPD0
WM 3.8 8 159 IPD0
CM 4.9 129 154 IPD0
SC 9.1 293 137 IPU0
WT 11.5 25 130 EP+1
CC 18.5 5 118 IP+0

AREA 8

4,14,76, 12,31,59.20 0.03
33 58.59 106 59.90 0.4 9.21 0.2
(.97654) (.99833)
IC 1.2 8 173 IPD0
WM 4.0 7 157 IPN0
CM 4.8 128 153 IPD0
WT 11.7 25 128 IP-0

9, 3,76, 6,45,56.23 0.05
33 57.99 106 59.01 0.3 9.29 0.3
(.96650) (.98342)
NG 0.9 259 174 IPD0
TS 10.5 227 131 IPU0
SC 10.9 296 130 IPU0
WT 12.2 17 127 IP+0
HC 25.8 295 110 IPU0
GM 30.5 311 107 IPU0

9, 3,76, 6,46,29.32 0.06
33 57.99 106 59.04 0.4 9.60 0.4
(.96650) (.98396)
NG 0.9 258 175 IPD0
TS 10.5 226 132 IPU0
SC 10.9 296 131 IPU0
WT 12.2 17 128 IPU0
HC 25.8 295 110 IPU0
GM 30.5 311 107 IPU0

9, 3,76, 13,25,58.17 0.06
33 59.48 106 58.36 0.4 11.71 0.4
(.99139) (.97272)
NG 3.5 213 163 IPU0
WT 9.3 15 142 IPD0
SC 11.0 281 137 IPU0
TS 13.2 221 132 IPU0
HC 25.7 289 114 IPU0
GM 29.6 305 112 IPU0

2, 9,77, 8,38,47.31 0.05
33 59.32 106 58.25 0.4 8.03 0.5
(.98869) (.97081)
NG 3.4 218 157 IPD0
CM 4.4 164 151 IPD0
SC 11.2 282 126 IPN0
CC 17.3 357 115 IPU0
DM 20.0 49 112 IPU0

AREA 8

```
 2, 9,77,                                10,59,58.84    0.04
34    0.90                  106    59.70    0.2          7.04      0.4
(.01501)                    (.99500)
NG       5.6 178 142 IPD0
CM       8.0 154 131 IPN0
SC       8.7 266 129 IPN0
CC      14.4   5 116 IPU0
DM      20.1  59 109 IPU0

 2, 9,77,                                11, 7,13.69    0.05
34    0.54                  106    59.90    0.4          9.80      0.6
(.00892)                    (.99825)
NG       4.9 175 153 IPD0
CM       7.5 150 143 IPD0
SC       8.4 271 139 IPU0
CC      15.1   6 123 EP 0
DM      20.7  58 115 IPN0

 2,11,77,                                 8,28, 3.38    0.05
33   59.45                  106    58.17    0.5         12.11      0.5
(.99083)                    (.96957)
NG       3.6 217 163 IPD0
CM       4.6 166 159 IPD0
CC      17.0 356 125 IPD0
DM      19.8  49 121 IPU0

 2,11,77,                                 8,31,45.49    0.09
33   59.28                  106    58.49    0.9         12.13      0.9
(.98798)                    (.97480)
NG       3.1 214 166 IPD0
CM       4.5 159 160 IPD0
CC      17.3 358 125 IPD0
DM      20.3  49 121 IPU0

 7,12,77,                                11,51, 3.32    0.04
33   59.69                  106    59.27    0.3          6.93      0.5
(.99490)                    (.98776)
CM       5.7 151 141 IPD0
SC       9.5 280 126 EP 0
CC      16.6   2 113 IPU0
GM      28.2 306 104 IPU0

 8,25,77,                                 4,52,32.76    0.06
33   57.11                  106    57.41    0.4          8.15      0.3
(.95183)                    (.95677)
CM       0.2 204 179 IPN0
NG       3.7 293 156 IPD0
SC      13.8 298 120 IPU0
CC      21.5 354 111 IPU0
BG      31.0  24 105 IPU0
GM      33.5 310 104 IPU0
```

AREA 8

```
 8,26,77,                                        10,35,46.64    0.08
33   57.85                 106    57.17    0.5         6.61     0.5
(.96425)                   (.95290)
CM       1.6 196 166 IPD0
NG       3.7 271 151 IPU0
WT      12.0   3 119 IPU0
SC      13.6 292 116 IPU0
CC      20.1 353 108 IPN0
BG      29.6  24 103 IPU0
GM      32.8 308 101 IPU0

 9, 2,77,                                         7,41,11.71    0.09
33   58.82                 106    59.70    0.6         6.55     0.7
(.98032)                   (.99500)
NG       1.7 175 165 IPD0
CM       4.8 134 144 IPD0
SC       9.3 291 125 IPU0
CC      18.2   4 110 IPD0
GM      28.7 310 103 IPU0
```

AREA 9

```
 8,19,75,                                8,11,46.74   0.04
 34    2.87                106    57.71    0.4        10.08      0.4
(.04791)                  (.96187)
WT       3.1   29 163 IPD0
CC      10.8  351 133 IP-0
CM      10.8  178 133 IPD0
SC      12.5  250 129 IPU0
FM      15.0   75 124 EP-1

 8,19,75,                                8,12,44.76   0.05
 34    2.78                106    57.81    0.4         9.97      0.4
(.04634)                  (.96345)
WT       3.3   30 162 IPD0
CM      10.7  177 133 IPD0
CC      11.0  351 132 EP-0
SC      12.3  251 129 IPU0
FM      15.2   75 123 EP 0

 8,21,75,                               19, 4, 6.18   0.03
 34    2.65                106    57.74    0.2        10.05      0.2
(.04422)                  (.96238)
WT       3.5   26 161 IPD0
CM      10.4  178 134 IPD0
CC      11.2  351 132 IPD0
SC      12.3  252 129 IPU0
FM      15.2   74 124 IP+0

 8,21,75,                               19, 9,11.54   0.05
 34    2.77                106    57.89    0.3        10.67      0.4
(.04614)                  (.96490)
WT       3.4   31 162 IPD0
CM      10.7  176 135 IPD0
CC      11.0  352 134 IPD0
SC      12.2  251 131 IPU0
FM      15.3   75 125 IP+0

 8,21,75,                               19,18,42.12   0.04
 34    2.65                106    57.77    0.3         9.82      0.3
(.04424)                  (.96282)
WT       3.5   27 161 IPD0
CM      10.4  177 133 IPD0
CC      11.2  351 131 IPD0
SC      12.3  252 129 IPU0
FM      15.2   74 123 IP-0
```

AREA 9

```
 3,25,76,                                10,50,54.07    0.03
34     2.93                  106    57.99    0.3         10.26     0.2
(.04883)                     (.96658)
WT       3.2   36  163 IPD0
IC       7.4  202  144 IPN0
CM      11.0  176  133 IPD0
DM      16.0   66  123 IP+0
TA      17.7   90  120 EP 0
FR      29.4  131  109 EP 0

 4,15,76,                                18,28,37.23    0.04
34     2.78                  106    57.21    0.3          7.95     0.3
(.04633)                     (.95349)
WT       3.0   14  160 IPN0
WM       5.3  224  147 IPD0
IC       7.7  211  136 IPD0
CM      10.7  182  127 IP-0
SC      13.2  252  121 IP+0

 4,15,76,                                22,48,20.64    0.10
34     2.96                  106    57.31    0.8          8.28     0.7
(.04937)                     (.95524)
WT       2.7   19  162 IPN0
WM       5.4  220  147 IPD0
IC       7.9  209  136 IPD0
CM      11.0  181  127 IP-0
SC      13.1  251  122 IPN0

10, 5,76,                                19,26, 8.65    0.03
34     2.61                  106    57.51    0.3         10.14     0.3
(.04346)                     (.95855)
WT       3.4   20  161 IPD0
IC       7.2  209  145 IPN0
SC      12.6  253  129 IPU0
GM      27.9  294  110 IPU0
```

AREA 10

```
 6, 8,76,                                6,24,40.91    0.04
34    2.83               106    58.81    0.4           10.46      0.4
(.04720)                 (.98013)
WM      4.1 197 159 IPD0
WT      4.2  49 158 IPD0
NG      9.2 188 139 IPD0
CC     10.8 359 134 IPD0
SC     10.9 248 134 IPU0

 6, 8,76,                                7, 4,18.63    0.03
34    2.63               106    59.29    0.2           10.23      0.2
(.04391)                 (.98821)
WM      3.6 187 161 IPD0
WT      5.0  51 154 IPD0
NG      8.8 183 139 EP 0
SC     10.1 248 135 IPU0
CC     11.1   3 133 IPD0

 6, 8,76,                                7,50,39.72    0.02
34    2.64               106    59.31    0.2           10.38      0.2
(.04401)                 (.98854)
WM      3.6 186 161 IPD0
WT      5.0  52 154 IPD0
NG      8.8 183 140 IPD0
SC     10.0 248 136 IPU0
CC     11.1   4 133 IPD0

 8,12,76,                                1,24,36.46    0.10
34    2.85               106    59.33    0.6           12.40      0.7
(.04743)                 (.98884)
WT      4.8  55 159 IPD0
NG      9.2 183 144 IPD0
SC     10.2 246 141 IPU0
FC     17.8 199 125 IPU0
HC     22.9 275 118 IPU0
GM     25.1 296 116 IPU0
```

AREA 11

2,10,77,							7,33,28.14		0.05	
34	8.34			106	55.15	0.4		7.07		0.6
(.13892)				(.91909)						
CC	5.8	276	141	IPD0						
DM	10.8	109	123	IPU0						
NG	20.5	200	109	IPU0						
CM	21.2	190	108	IPU0						
SC	21.2	228	108	IPN0						
6, 3,77,							20,45, 3.28		0.04	
34	13.60			106	54.15	0.3		7.00		0.9
(.22668)				(.90249)						
DM	15.8	147	114	IPD0						
WT	17.6	193	112	IPU0						
LAD	28.5	334	104	IPU0						
CM	31.1	189	103	IPN0						
GM	31.9	254	102	IPU0						
7,27,77,							17,17,29.51		0.04	
34	9.76			106	54.43	0.6		5.93		0.5
(.16271)				(.90716)						
CC	7.1	253	130	IPU0						
BG	9.4	59	122	IPD0						
SC	23.9	225	104	EP 0						
GM	30.2	266	101	IPU0						
7,27,77,							18, 8,20.17		0.07	
34	9.61			106	54.49	0.4		6.66		0.5
(.16011)				(.90822)						
CC	7.0	255	134	IPU0						
BG	9.6	57	125	IPD0						
SC	23.6	225	106	EP 0						
GM	30.1	267	102	IPU0						
LPM	30.1	57	102	IPU0						
LAD	35.2	340	101	IPD0						
9,15,77,							1, 1,34.42		0.08	
34	15.28			106	55.42	0.3		6.10		0.9
(.25460)				(.92372)						
BG	10.9	119	119	IPD0						
CC	13.3	203	115	IPU0						
LAD	24.9	335	104	IPU0						
GM	31.1	247	101	IPU0						
SC	31.1	209	101	IPU0						
TD	32.0	94	101	IPU0						
RI	32.1	306	101	IPN0						

AREA 11

10,17,77, 19,35,35.20 0.09
34 10.96 106 54.90 0.7 5.94 1.1
(.18266) (.91502)

CC	7.4	235	129	IPU0
BG	9.1	73	123	IPU0
TD	31.6	80	101	IPU0
RI	37.9	315	99	IPN0

10,20,77, 16,49,53.05 0.05
34 12.27 106 54.88 0.3 6.62 0.7
(.20452) (.91458)

BG	8.7	88	127	IPN0
CC	9.1	223	126	IPU0
LPM	28.3	66	103	IPU0
LAD	30.3	338	102	EP 0

AREA 12

```
10,30,75,                          7, 9,38.56   0.04
34    1.49             107    1.75   0.3        10.88     0.5
(.02477)               (.02914)
SC      5.8 254 152 IPU0
WT      9.3  56 139 IPD0
CM     10.6 141 136 IPD0
CC     14.0  18 128 IP+0

11, 6,75,                          8,24,48.04   0.04
34    1.61             107    0.63   0.3        10.09     0.4
(.02685)               (.01058)
SC      7.5 256 143 IPU0
WT      7.8  50 142 IPD0
CM      9.8 150 136 IPD0
CC     13.3  12 127 IPN0

11, 6,75,                          9,33,58.89   0.03
34    1.78             107    0.61   0.2        10.37     0.3
(.02966)               (.01023)
WT      7.6  52 144 IPD0
SC      7.6 253 144 IPU0
CM     10.1 151 136 IPD0
CC     13.0  12 129 IP+0

10, 7,76,                         22,35,49.40   0.08
34    1.29             107    1.72   0.7        11.16     0.8
(.02143)               (.02866)
IC      4.8 142 157 IPD0
SC      5.7 257 153 IPD0
WT      9.5  54 140 EP 0
DM     22.5  65 116 IPU0
GM     23.4 306 115 IPU0

10, 7,76,                         23,21, 9.59   0.06
34    1.40             107    1.76   0.4        10.24     0.5
(.02339)               (.02926)
IC      5.0 143 154 IPD0
SC      5.7 255 151 IPD0
WT      9.4  55 137 IPN0
DM     22.5  65 115 IPU0
GM     23.3 306 114 IPU0

 4,13,77,                         12,39,51.70   0.06
34    1.78             107    1.27   0.8        11.58     0.8
(.02967)               (.02118)
SC      6.7 251 150 IPU0
CC     13.2  16 131 IPD0
DM     21.5  66 118 EP 0
GM     23.5 303 116 IPU0
```

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9,14,77,						4, 1,27.66	0.07		
34	2.29				107	1.70	0.6	7.04	0.8
(.03810)					(.02836)				
SC	6.4	241	138	IPU0					
CC	12.5	20	119	IPU0					
GM	22.4	302	107	IPU0					
BG	26.8	46	105	EPU0					

APPENDIX 5

The P,T,B,X, and Y axes for each of the composite fault-plane solutions are presented in this appendix.

Well-constrained fault-plane solutions

Area		P	T	B	X	Y
1	Azimuth	32	251	159	254	77
	Plunge	84	6	4	50	40
2	Azimuth	287	80	168	77	264
	Plunge	82	5	3	52	37
3	Azimuth	154	57	327	63	232
	Plunge	84	5	6	46	44
6	Azimuth	266	81	86	266	175
	Plunge	81	9	36	36	0
7	Azimuth	173	42	301	84	202
	Plunge	54	26	25	60	16
8	Azimuth	139	257	352	234	95
	Plunge	66	12	22	52	30
11	Azimuth	59	264	172	268	80
	Plunge	80	9	4	54	36

Solutions based on the P and T axes from the well-constrained solutions

Area		P	T	B	X	Y
4	Azimuth	104	208	301	182	48
	Plunge	63	6	26	46	34
	Azimuth	136	245	2	197	99
	Plunge	38	25	43	46	8
(Preferred Solution)						
	Azimuth	134	230	326	206	76
	Plunge	62	6	24	42	36
5	Azimuth	183	276	7	263	112
	Plunge	76	5	16	44	42
	Azimuth	163	60	321	210	100
	Plunge	54	10	42	21	40
(Preferred Solution)						
	Azimuth	183	276	7	263	112
	Plunge	76	5	16	44	42
9	Azimuth	139	254	354	222	98
	Plunge	57	16	29	52	14
	Azimuth	140	40	310	208	52
	Plunge	80	0	11	38	44
(Preferred Solution)						
	Azimuth	139	254	354	222	98
	Plunge	57	16	29	52	14
10	Azimuth	67	220	301	211	46
	Plunge	76	10	21	55	34
	Azimuth	9	287	327	212	76
	Plunge	56	0	24	44	36
(Preferred Solution)						
	Azimuth	131	245	336	229	76
	Plunge	73	8	14	50	36
12	Azimuth	138	243	337	219	87
	Plunge	63	8	24	47	33
	Azimuth	179	285	32	238	137
	Plunge	38	16	47	40	14
(Preferred Solution)						
	Azimuth	146	255	354	218	99
	Plunge	55	12	32	47	24