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# Observation of Gravity to Reveal a Buried Fault Associated with the Fukui Earthquake

By Fumiaki TAKEUCHI, Norio HIRANO, Mikio SATOMURA and Yoshiteru KONO

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**Abstract**

Gravity observation was carried out in and around the Fukui plain to locate a buried fault associated with the Fukui Earthquake on June 28, 1948.

By a two-dimentional analysis of the Bouguer anomaly, a fault with a vertical offset of 200 m was revealed beneath the fissure zone that was formed at the time of the Fukui Earthquake. This offset value suggests that the Fukui Earthquakes other than the event in 1948 took place repeatedly in the past and were associated with the present fault.

## 1. Introduction

The Fukui Earthquake occurred on June 28, 1948 with a magnitude of 7.3 in Fukui prefecture[1]. The number of persons killed was 3769 and more than twenty thousand persons were injured[2]. Houses collapsed and railway tracks and roads seriously damaged, especially near the epicentral area, where 100% of the houses totally collapsed[2].

No active fault was found in and around the Fukui plain by eye witness, whereas many cracks and fissures were found in the plain, and some of them formed fissure zones of a few kilometers long.[1] The existence of an underground fault associated with the event was pointed out by precise leveling surveys soon after the earthquake.[1] The results show a subsidence of the ground in the western part of the plain, and an uplift in the eastern part[1]. A deformation boundary that separates these two parts strikes north to slightly west, about 3 km west of Maruoka town. The maximum value of the relative vertical movement between the neighboring leveling points across the boundary was 70 cm[1]. A focal mechanism study of this event shows that the earthquake was of a strike-slip type, one of the nodal lines trending N 10°E[3]. This mechanism agrees well with the strike of the boundary mentioned above. Kanamori (1973)[4] showed a fault model by comparing synthetic seismograms with the records obtained at the Abuyama Seismological Observatory. He stated that the fault plane was vertical with an area of $30 \times 13$ km$^2$. But he also pointed out the possibility of the fault dipping steeply to the east.

The recurrence intervals of large earthquakes in the Japanese islands might be between 1000 and 10000 years[5,6], so it is possible that the previous Fukui Earthquakes took place repeatedly associated with the same fault as the present event in

1948. If so, the accumulated dislocation of the vertical component would exceed some 100 m in these one million years or so, and the offset is enough to be detected by a sensitive gravimeter. Kono et al. (1982)[7] and Kono et al. (1982)[8] have revealed a Bouguer anomaly map over the northern part of central Japan by compiling their own data and others'. Kono et al. (1981)[9] showed a possible underground structure in the region of the Fukui Earthquake. But their observation points were not distributed densely enough to conclude the accumulation of vertical dislocations by repeated earthquakes. The aims of the present work are to find out the location of the fault and to estimate the accumulated dislocation by gravity observations at densely distributed points.

## 2. Observation and Data Processing

Observations were carried out twice at the points in **Fig. 1.** The first one was in August 1980 to find a rough image of the plain and the buried fault. The other was in July 1982 to delineate a more detailed structure. Observation points are grouped into O, E, K, S and F lines symbolizing Oono city, Eiheiji-temple, Katsuyama city, Sabae city and the fault itself, respectively. Observations along

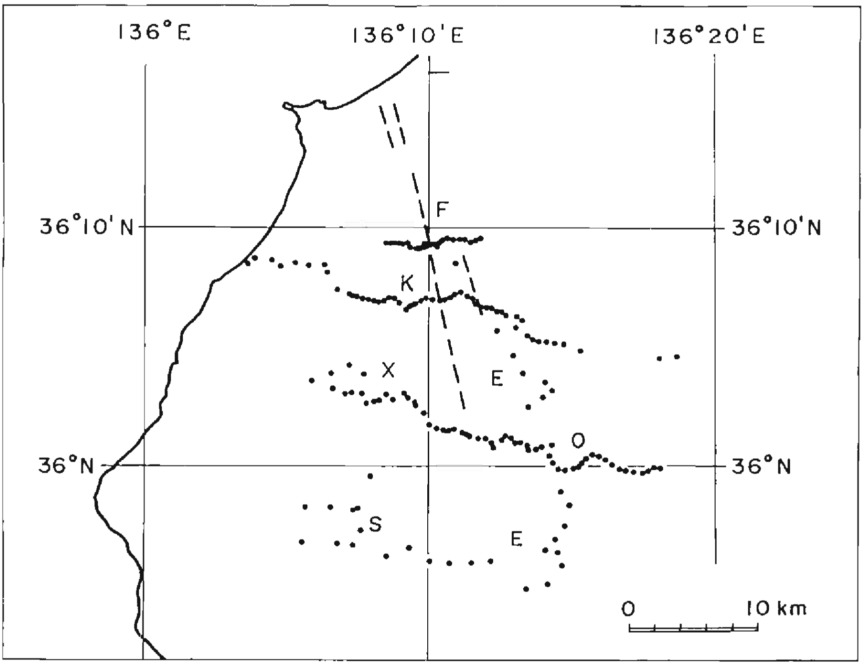


Fig. 1. Map of observation points. They are grouped into F, K, E, O, S and X lines. Dashed lines indicate the locations of earthquake faults after the Research Group for Active Faults[10]. These are recognized as active faults by the distribution of cracks and fissures and by the results of the precise leveling surveys soon after the Fukui Earthquake.

F line alone were carried out in 1982, and the others in 1980.

The complete Bouguer anomalies at the observation points are listed in **Table 1**, together with their locations, heights and correction terms. The line of X is also shown in **Fig. 1** as the westward extended route of O line, but their values are omitted from the table, since the results have already been treated with in another paper[7]. K line and X-O lines traverse over the fault, and E and S lines are additional routes to study the general features of the region. The observation points were chosen from the bench marks, leveling points, and spot heights in precise topographic maps, such as the Topographic maps of 1:25000 issued by the Geographical Survey Institute (GSI) and Town planning maps of the town offices. The distance from one observation point to another was settled on 500 m, if possible. The heights of the observation points are presented in these maps with a precision of 10 cm. But the accuracy which can be expected for the leveling points and spot heights may actually be 1 m or so, since at the time of observation it was often hard for us to find the very points which were plotted in the maps. In such cases, we chose a point that might be very near the plotted place, and used the value in the map as the height of the observation point.

Two LaCoste & Romberg gravimeters (Model G) were employed. One is G–348 of Kanazawa University, and the other G–210 of University of Tokyo. A series of observations for G–348 started from the room 166 in the Department of Earth Sciences, Faculty of Science, Kanazawa University, where the gravity value had been determined as

$$g = 979\ 857.990\ \text{(mgal)}.$$

And for G–210, it started from the First Order Gravity Station at the Fukui Local Meteorological Observatory, and its gravity value was listed in JGSN 75[11] as

$$g = 979\ 838.10\ \text{(mgal)}.$$

The observation was closed everyday at a bench mark near the observation lines. The whole series was terminated at the starting point and the observation was closed. The Normal Gravity was calculated using the formula by the Geodetic Reference System 1967[12]:

$$\gamma = 979\ 031.85\ (1 + 0.005\ 278\ 895\ \sin^2\psi + 0.000\ 023\ 462\ \sin^4\psi)\ \text{(mgal)},$$

where $\psi$ is the geographical latitude. The atmospheric correction term ($Atm$) was calculated by the following equation,

$$Atm = 0.87 - 0.00965 \times 10^{-3}\, h\ \text{(mgal)},$$

where $h$ is the height of the observation point in meters.

The vertical gradient of gravity was assumed to be 0.3086 mgal/m, and the Bouguer correction was made by assuming 2.67 g/cm$^3$ for the mean density. The complete Bouguer anomaly was carried out by a computer program developed in

Kanazawa University (Kubo, 1980[13] and Kono & Kubo, 1983[14]), which basically referred to Hagiwara (1967)[15]. Thus the complete Bouguer anomaly is represented by

$$\Delta g_0'' = g - \gamma + Atm + 0.3086h - 2\pi G\rho h + Tr,$$

where $G$, $\rho$ and $Tr$ denote the Gravitational constant, assumed density for the Bouguer correction and the terrain correction term, respectively. The gravity values measured by the two gravimeters at the same points showed 0.1 mgal or less difference, which might be caused from the differences of the scale values. But we neglected this since the differences were less than the accuracy of terrain correction terms.

## 3. Results and Discussions

In **Fig. 2**, the east-west profiles of the Bouguer Anomaly for K and X-O lines

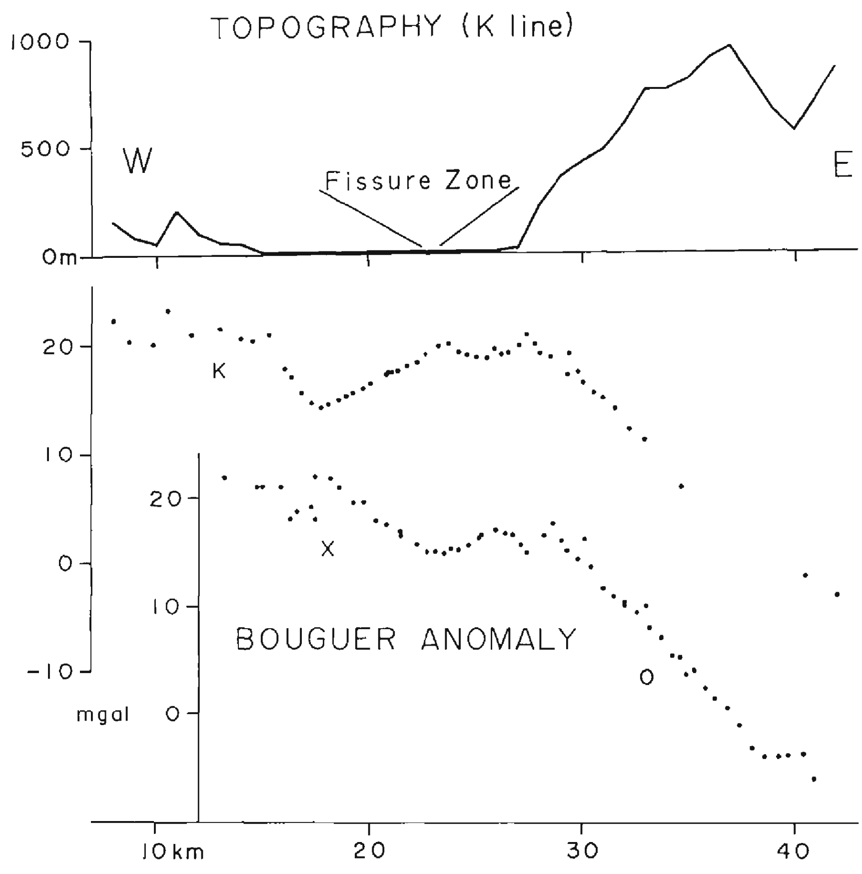


Fig. 2. The Bouguer anomalies along K line and X-O lines with topographic profile along K line. A fault should exist beneath the fissure zone rather than at the east end of the plain.

are plotted. The horizontal axis is the distance from 136°E. The topographic cross section along K line is also shown in **Fig. 2**. A common pattern can be seen in the two profiles; in the western half, the values of the Bouguer anomaly are positive, slightly decreasing towards the east and abruptly descending to negative values at a ratio of 1.6 to 1.9 mgal/km in the eastern part. These patterns can be explained by the undulation of the Moho or Conrad discontinuity or of the upper boundary of the granitic layer, as is mentioned by Furuse & Kono (1982)[16]. A trough of the Bouguer anomaly can be seen in the western half of the K and X-O profiles, with a magnitude of several mgals. The minimum value in the trough are observed in the midst of the Fukui plain, where Tertiary bed rocks are thickly covered by alluvial, diluvial and Tertiary sediments. The maximum thickness of the alluvium, however, is estimated to be about 30 m, which brings about only an 0.5 mgal change to the Bouguer anomaly, so the main part of the trough is due to deeper structures. The ascending Bouguer anomaly, which is seen between 17 to 27 km in the eastern part of the trough along K line, suggests the existence of a fault. This fault should be

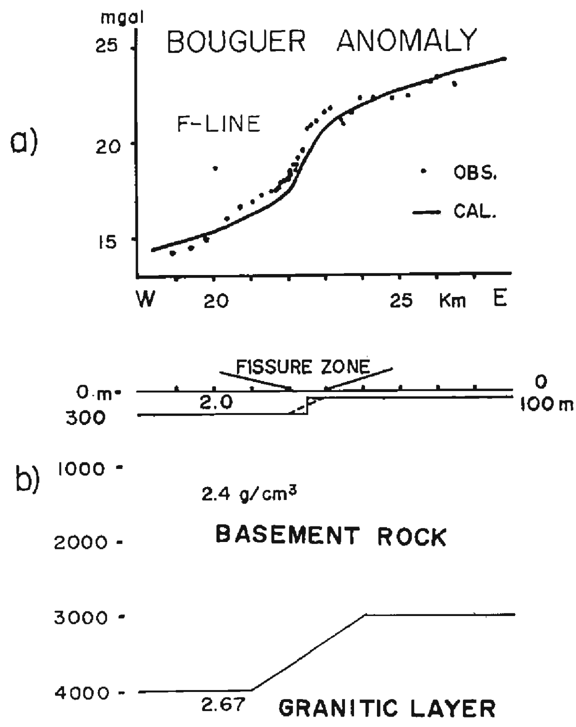


Fig. 3. a) Plots of the observed Bouguer anomalies along F line with synthetic ones calculated on the underground structure shown in b).
b) A possible underground structure as a two-dimensional solution for the observed Bouguer anomalies. Beneath the fissure zone there exists a fault with a vertical offset of 200 m. Although the dashed line is a possible structure (other structures are also possible), some abrupt change at the boundary between the basement rock and sediment is needed to explain the observed data for any one of the solutions.

located at a distance of 22 or 23 km, rather than at 27 or 28 km where the active fault of Matsuoka lies.

Our second observation in 1982 was intended to find a more precise location of the fault and to estimate its vertical offset. Forty observation points were chosen and they formed F line at an average interval of 200 m, about 4 km north to the K line. This line lies mainly in the Fukui plain, and the difference of heights between F1 and F35 which are surrounded by rice fields is within 5 m. The Bouguer anomaly is shown in **Fig. 3(a)**, in which we can find a larger gradient at the distance range of 22 to 23 km than in the plots of K line. This must be attributed to a shallow structure like the boundary shape of sediments, which could not be revealed without observations along F line. A possible underground structure is shown in **Fig. 3(b)**, and the synthetic Bouguer anomaly curve is presented in the upper figure, calculated by a two-dimensional method after Talwani et al. (1959)[17]. The model structure is derived as follows. A ramp shape structure associated with the granitic layer was taken to explain the increase of the Bouguer anomaly towards the east. The high gradient is supposed to be due to a fault which appeared as a step in the Tertiary bed rocks. The shallow sediments are assumed to consist of one layer with a density of 2.0 g/cm$^3$, although they consist of the alluvial, diluvial and Tertiary deposits. This treatment is justified because the effect of thickness of the alluvium to the gravity field was very small. Furthermore the boundary between the diluvial and Tertiary sediments has not been clearly shown by boring data. The depth to the upper surface of the granitic layer was fixed at 3 to 4 km, the values of which are often used in the hypocenter determination of microearthquakes in and around the present region. But this boundary can be shifted vertically without yielding significant modifications on the calculated gravity. Thus, we assumed a three-layer model with densities of 2.0, 2.4 and 2.67 after Furuse & Kono (1982)[16], and looked for a suitable model by trial and error. A solution was found as is shown by the solid lines in **Fig. 3(b)**, by which the calculated Bouguer anomaly agrees well with observed data.

The solution, however, is not unique as is often the case in underground structure analysis. For example, the step in the basement rock and sediments—that is the fault we are now seeking for—can be replaced by a slope as is drawn by the dashed line in **Fig. 3**. This replacement merely requires adding 0.3 mgal to the synthetic curves near the fault and smaller values elsewhere. The vertical offset was obtained as 200 m on the above assumption of densities, but it can be reduced to 100 m when the density assumptions are changed within possible ranges.

Another possible case is that the surface of the granitic layer is perfectly flat, and that the Bouguer anomaly is fully caused by the upper boundary shape of the basement rock. Then the resultant offset would be greater than in the case shown in the figure. We have, so far, not taken into account the general tendency of 0.5 to 1.0 mgal/km decreasing towards the east, which may be due to the Conrad or Moho discontinuity. The correction for this tendency, however, can be explained by increasing the amount of offset. After all, the model proposed here is a typical solution and it states that a fault with 200 m offset exists beneath the fissure zone that was found soon after the Fukui Earthquake.

The fact has not yet been considered that the gradient in the problem is highest in F line and is smaller in K or X-O lines. This is left for further studies.

## 4. Conclusions

A gravity survey was carried out in and around the Fukui plain, and the Bouguer anomalies were calculated to complete the gravity map over the northern part of central Japan. A fault was revealed by analyzing the anomalies, which may have been formed by a series of Fukui Earthquakes. The accumulated vertical displacement of this fault is estimated to be 200 m with an ambiguity of factor 2. We may evaluate the recurrence interval of the earthquakes by the following assumptions:

a) The earthquake sequence started within a million year span of time, and they have occurred repeatedly with equal intervals since then.

b) Each event was generated from the present fault with the same vertical dislocation ($\sim$1 m).

c) Only the earthquakes assumed here have attributed to the vertical displacement accumulation of this fault.

A simple calculation leads to the conclusion that the recurrence interval of the Fukui Earthquakes associated with the present fault is 5000 years. We must, however, be very careful when using this value since it is a rough estimation derived only from the fault presently under discussion.

## Acknowledgements

We thank the staff of the Earthquake Research Institute, University of Tokyo, who kindly allowed us to use their gravimeter. We also thank the graduate students at the time of this investigation, N. Furuse and M. Sunami for helpful suggestions and assistances in data processing. Thanks are also due to S. Kishi, a student of Kanazawa University at the time for cooperation in observation. We are thankful to N. Hurukawa of Kyoto University and other members of the Group for Surveying the Fukui Earthquake Fault for discussions and encouragements.

Computations were carried out at the Data Processing Center of Kanazawa University (FACOM M-170), and also at the Computer Center of Shizuoka University (HITAC 8250).

Table 1. Lists of the Bouguer anomalies. Locations of the observation points with their heights, correction terms and some memos are also represented.

| LOCATION (NO.) | (NAME) | LATITUDE (DEG.) | LONGITUDE (DEG.) | HEIGHT (M) | GRAVITY OBSERVE 979000. | GRAVITY NORMAL 979000. | GRAVITY ANOMALY OB-NOR | GRAVITY ANOMALY FREE-AIR | GRAVITY ANOMALY BOUGUER | CORRECTIONS FREE-AIR | CORRECTIONS BOUGUER | CORRECTIONS EARTH TIDE | CORRECTIONS TERRAIN | CORRECTIONS ATMOS | DATE Y M D H M | * FRC (*10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | S-01 (BM910-1) | 35.9377 | 136.2115 | 19.60 | 823.131 | 812.983 | 10.148 | 17.065 | 16.589 | 6.049 | -2.194 | -0.067 | 1.719 | .868 | 80. 8. 9.16.38. | 0 |
| 2 | S-02 (BM008-424) | 35.9447 | 136.1843 | 19.50 | 820.822 | 813.584 | 7.238 | 14.124 | 12.430 | 6.018 | -2.183 | -0.074 | 0.489 | .868 | 80. 8. 9.16.54. | 0 |
| 3 | S-03 (BM008-421) | 35.9700 | 136.1838 | 23.10 | 827.111 | 815.758 | 11.353 | 19.349 | 17.209 | 7.129 | -2.586 | -0.082 | 0.446 | .868 | 80. 8. 9.17.14. | 0 |
| 4 | S-04 (BM008-418) | 35.9940 | 136.1977 | 10.10 | 835.686 | 817.821 | 17.865 | 21.851 | 21.239 | 3.117 | -1.131 | -0.088 | 0.518 | .869 | 80. 8. 9.17.42. | 0 |
| 5 | S-05 | 35.9725 | 136.1872 | 17.10 | 830.956 | 815.973 | 14.983 | 21.128 | 19.668 | 5.277 | -1.914 | -0.089 | 0.454 | .868 | 80. 8. 9.17.57. | 0 |
| 6 | S-06 | 35.9548 | 136.1819 | 18.70 | 827.625 | 814.452 | 13.173 | 19.812 | 18.204 | 5.771 | -2.093 | -0.089 | 0.486 | .868 | 80. 8 .9 18.12. | 0 |
| 7 | O-01 (SHIMOSHIN BR.) | 36.0180 | 136.3137 | 41.10 | 824.124 | 819.884 | 4.240 | 17.789 | 16.617 | 12.683 | -4.601 | 0.127 | 3.429 | .866 | 80. 8.10.10.13. | 0 |
| 8 | O-02 | 36.0212 | 136.3177 | 41.90 | 824.237 | 820.159 | 4.078 | 17.874 | 17.706 | 12.930 | -4.691 | 0.131 | 4.523 | .866 | 80. 8.10.10.20. | 0 |
| 9 | O-03 (TAKADA BR.) | 36.0193 | 136.3228 | 44.10 | 823.633 | 819.996 | 3.637 | 18.112 | 16.143 | 13.609 | -4.937 | 0.135 | 2.968 | .866 | 80. 8.10.10.27. | 0 |
| 10 | O-04 | 36.0162 | 136.3253 | 47.50 | 822.081 | 819.729 | 2.352 | 17.876 | 15.195 | 14.658 | -5.318 | 0.139 | 2.637 | .865 | 80. 8.10.10.37. | 0 |
| 11 | O-05 | 36.0163 | 136.3313 | 49.70 | 820.697 | 819.738 | 0.959 | 17.162 | 14.390 | 15.337 | -5.564 | 0.143 | 2.792 | .865 | 80. 8.10.10.46. | 0 |
| 12 | O-06 | 36.0142 | 136.3353 | 68.70 | 818.773 | 819.557 | -0.784 | 21.280 | 16.251 | 21.201 | -7.691 | 0.146 | 2.662 | .863 | 80. 8.10.10.56. | 0 |
| 13 | O-07 | 36.0115 | 136.3377 | 59.70 | 816.569 | 819.325 | -2.756 | 16.532 | 13.698 | 18.423 | -6.683 | 0.149 | 3.850 | .864 | 80. 8.10.11. 5. | 0 |
| 14 | O-08 (OHKUBO BR.) | 36.0112 | 136.3442 | 55.40 | 813.771 | 819.299 | -5.528 | 12.433 | 11.685 | 17.096 | -6.202 | 0.150 | 5.454 | .865 | 80. 8.10.11.13. | 0 |
| 15 | O-09 | 36.0132 | 136.3497 | 57.40 | 813.231 | 819.471 | -6.240 | 12.338 | 10.994 | 17.714 | -6.426 | 0.151 | 5.082 | .864 | 80. 8.10.11.21. | 0 |
| 16 | O-10 | 36.0138 | 136.3565 | 65.70 | 811.122 | 819.523 | -8.401 | 12.738 | 10.402 | 20.275 | -7.355 | 0.152 | 5.019 | .864 | 80. 8.10.11.33. | 0 |
| 17 | O-11 (KAMI SHIN BR.) | 36.0045 | 136.3562 | 72.80 | 807.300 | 818.723 | -11.423 | 11.906 | 10.160 | 22.466 | -8.150 | 0.152 | 6.404 | .863 | 80. 8.10.11.47. | 0 |
| 18 | O-12 | 35.9997 | 136.3667 | 75.90 | 806.501 | 818.311 | -11.810 | 12.476 | 10.091 | 23.423 | -8.497 | 0.150 | 6.112 | .863 | 80. 8.10.12. 1. | 0 |
| 19 | O-13 | 35.9960 | 136.3627 | 79.50 | 806.399 | 817.993 | -11.594 | 13.802 | 9.531 | 24.534 | -8.900 | 0.149 | 4.629 | .862 | 80. 8.10.12. 8. | 0 |
| 20 | O-14 (MIYAMA ST.) | 35.9958 | 136.3685 | 82.60 | 804.616 | 817.975 | -13.359 | 12.993 | 8.116 | 25.490 | -9.247 | 0.138 | 4.370 | .862 | 80. 8 10.12.40. | 0 |

Table 1. Continued.

| LOCATION (NO.) | (NAME) | LATITUDE (DEG.) | LONGITUDE (DEG.) | HEIGHT (M) | ----GRAVITY--- OBSERVE | NORMAL | ---GRAVITY ANOMALY---- OB-NOR | FREE-AIR | BOUGUER | ------------CORRECTIONS------------ FREE-AIR | BOUGUER | EARTH TIDE | TERRAIN | ATMOS | Y | DATE M D H M | * FRC (*10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 979000. | 979000. | | | | | | | | | | | |
| 21 | 0-15 (SAKAI TERA BR.) | 35.9965 | 136.3745 | 84.90 | 802.356 | 818.036 | -15.680 | 11.382 | 7.188 | 26.200 | -9.505 | 0.134 | 5.310 | .862 | 80. | 8.10.12.49. | 0 |
| 22 | 0-16 | 35.9977 | 136.3800 | 88.90 | 799.675 | 818.139 | -18.464 | 9.832 | 5.549 | 27.435 | -9.952 | 0.127 | 5.669 | .861 | 80. | 8.10.13. 1. | 0 |
| 23 | 0-17 | 36.0010 | 136.3840 | 96.30 | 797.370 | 818.423 | -21.053 | 9.526 | 5.290 | 29.718 | -10.781 | 0.122 | 6.544 | .861 | 80. | 8.10.13.10. | 0 |
| 24 | 0-18 (YAKUSHI STN.) | 36.0025 | 136.3870 | 94.10 | 796.429 | 818.551 | -22.122 | 7.778 | 3.733 | 29.039 | -10.535 | 0.116 | 6.490 | .861 | 80. | 8.10.13.19. | 0 |
| 25 | 0-19 | 36.0055 | 136.3915 | 100.50 | 795.510 | 818.809 | -23.299 | 8.575 | 4.113 | 31.014 | -11.251 | 0.108 | 6.789 | .860 | 80. | 8.10.13.30. | 0 |
| 26 | 0-20 | 36.0052 | 136.3975 | 105.60 | 794.058 | 818.784 | -24.726 | 8.722 | 2.415 | 32.588 | -11.822 | 0.101 | 5.515 | .860 | 80. | 8.10.13.40. | 0 |
| 27 | 0-21 | 36.0028 | 136.4023 | 108.50 | 792.946 | 818.577 | -25.631 | 8.712 | 1.499 | 33.483 | -12.147 | 0.094 | 4.934 | .860 | 80. | 8.10.13.48. | 0 |
| 28 | 0-22 | 35.9985 | 136.4088 | 117.10 | 790.166 | 818.208 | -28.042 | 8.954 | 0.619 | 36.137 | -13.109 | 0.087 | 4.774 | .859 | 80. | 8.10.13.57. | 0 |
| 29 | 0-23 | 35.9975 | 136.4148 | 122.30 | 787.996 | 818.122 | -30.126 | 8.474 | -1.193 | 37.742 | -13.692 | 0.080 | 4.024 | .858 | 80. | 8.10.14. 5. | 0 |
| 30 | 0-24 | 35.9967 | 136.4217 | 129.40 | 784.531 | 818.053 | -33.522 | 7.268 | -3.231 | 39.933 | -14.486 | 0.072 | 3.987 | .858 | 80. | 8.10.14.15. | 0 |
| 31 | 0-25 | 35.9957 | 136.4277 | 136.50 | 782.569 | 817.967 | -35.398 | 7.583 | -3.907 | 42.124 | -15.281 | 0.063 | 3.791 | .857 | 80. | 8.10.14.24. | 0 |
| 32 | 0-26 | 35.9942 | 136.4350 | 146.90 | 780.628 | 817.838 | -37.210 | 8.979 | -3.994 | 45.333 | -16.445 | 0.054 | 3.472 | .856 | 80. | 8.10.14.34. | 0 |
| 33 | 0-27 | 35.9957 | 136.4405 | 157.00 | 778.988 | 817.967 | -38.979 | 10.326 | -3.811 | 48.450 | -17.576 | 0.048 | 3.439 | .855 | 80. | 8.10.14.41. | 0 |
| 34 | 0-28 | 35.9982 | 136.4485 | 182.50 | 773.780 | 818.182 | -44.402 | 12.770 | -3.663 | 56.319 | -20.431 | 0.038 | 3.998 | .852 | 80. | 8.10.14.52. | 0 |
| 35 | 0-29 (R158 TUNNEL) | 35.9973 | 136.4540 | 199.60 | 768.602 | 818.105 | -49.503 | 12.945 | -6.073 | 61.597 | -22.345 | 0.030 | 3.328 | .851 | 80. | 8.10.15. 0. | 0 |
| 36 | K-01 (BM5246) | 36.0768 | 136.4670 | 100.10 | 797.914 | 824.942 | -27.028 | 4.724 | -2.826 | 30.891 | -11.206 | -0.058 | 3.657 | .860 | 80. | 8.10.16.49. | 0 |
| 37 | K-02 (BM5247) | 36.0743 | 136.4495 | 90.60 | 800.935 | 824.726 | -23.791 | 5.029 | -1.191 | 27.959 | -10.143 | -0.066 | 3.923 | .861 | 80. | 8.10.17. 2. | 0 |
| 38 | K-03 (BM5250) | 36.0797 | 136.3855 | 60.50 | 815.821 | 825.191 | -9.370 | 10.165 | 7.077 | 18.670 | -6.773 | -0.080 | 3.685 | .864 | 80. | 8.10.17.34. | 0 |
| 39 | K-04 (BM5251) | 36.0850 | 136.3658 | 52.20 | 822.659 | 825.647 | -2.988 | 13.986 | 11.428 | 16.109 | -5.844 | -0.085 | 3.286 | .865 | 80. | 8.10.17.52. | 0 |
| 40 | K-05 | 36.0853 | 136.3585 | 48.40 | 824.089 | 825.673 | -1.584 | 14.218 | 12.381 | 14.936 | -5.418 | -0.088 | 3.582 | .865 | 80. | 8.10.18. 4. | 0 |

Table 1. Continued.

| LOCATION (NO.) | (NAME) | LATITUDE (DEG.) | LONGITUDE (DEG.) | HEIGHT (M) | ----GRAVITY--- OBSERVE | NORMAL | ---GRAVITY ANOMALY----- OB-NOR | FREE-AIR | BOUGUER | ------------CORRECTIONS------------ FREE-AIR | BOUGUER | EARTH TIDE | TERRAIN | ATMOS | DATE Y | M D H M | * FRC (*10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 979000. | 979000. | | | | | | | | | | | |
| 41 | K-06 | 36.0867 | 136.3500 | 48.40 | 826.294 | 825.793 | 0.501 | 16.303 | 14.302 | 14.936 | -5.418 | -0.089 | 3.418 | .865 | 80. | 8.10.18.12. | 0 |
| 42 | K-07 (BM5252) | 36.0868 | 136.3442 | 54.90 | 826.456 | 825.802 | 0.654 | 18.461 | 15.286 | 16.942 | -6.146 | -0.090 | 2.971 | .865 | 80. | 8.10.18.22. | 0 |
| 43 | K-08 (BM5253) | 36.0890 | 136.3393 | 49.30 | 828.683 | 825.991 | 2.692 | 18.771 | 15.794 | 15.214 | -5.519 | -0.090 | 2.542 | .865 | 80. | 8.10.18.33. | 0 |
| 44 | K-09 | 36.0918 | 136.3338 | 45.80 | 830.881 | 826.232 | 4.649 | 19.648 | 16.692 | 14.134 | -5.127 | -0.090 | 2.171 | .866 | 80. | 8.10.18.44. | 0 |
| 45 | K-10 | 36.0957 | 136.3262 | 42.90 | 832.813 | 826.568 | 6.245 | 20.350 | 17.442 | 13.239 | -4.803 | -0.086 | 1.895 | .866 | 80. | 8.10.19.11. | 0 |
| 46 | FKGS | 36.0525 | 136.2253 | 9.71 | 838.162 | 822.851 | 15.311 | 19.177 | 18.529 | 2.997 | -1.087 | 0.071 | 0.439 | .869 | 80. | 8.11. 9.39. | 0 |
| 47 | K-10 | 36.0957 | 136.3262 | 42.90 | 832.803 | 826.568 | 6.235 | 20.340 | 17.432 | 13.239 | -4.803 | 0.141 | 1.895 | .866 | 80. | 8.11.11.39. | 0 |
| 48 | K-11 (NARUKA BR.) | 36.1008 | 136.3308 | 46.20 | 831.814 | 827.007 | 4.807 | 19.930 | 17.629 | 14.257 | -5.172 | 0.143 | 2.871 | .866 | 80. | 8.11.12.24. | 0 |
| 49 | K-12 | 36.1037 | 136.3262 | 39.00 | 835.395 | 827.256 | 8.139 | 21.040 | 19.327 | 12.035 | -4.366 | 0.142 | 2.653 | .866 | 80. | 8.11.12.35. | 0 |
| 50 | K-13 | 36.1043 | 136.3175 | 32.80 | 837.072 | 827.308 | 9.764 | 20.753 | 19.021 | 10.122 | -3.672 | 0.140 | 1.940 | .867 | 80. | 8.11.12.44. | 0 |
| 51 | K-14 | 36.1067 | 136.3120 | 27.60 | 838.913 | 827.515 | 11.398 | 20.783 | 19.394 | 8.517 | -3.090 | 0.138 | 1.701 | .867 | 80. | 8.11.12.51. | 0 |
| 52 | K-15 | 36.1068 | 136.3085 | 26.00 | 840.303 | 827.523 | 12.780 | 21.671 | 20.271 | 8.024 | -2.911 | 0.131 | 1.511 | .867 | 80. | 8.11.13. 9. | 0 |
| 53 | K-16 | 36.1077 | 136.3040 | 26.30 | 841.384 | 827.600 | 13.784 | 22.767 | 21.139 | 8.116 | -2.944 | 0.127 | 1.316 | .867 | 80. | 8.11.13.19. | 0 |
| 54 | K-17 | 36.1082 | 136.3000 | 24.30 | 840.997 | 827.644 | 13.353 | 21.720 | 20.186 | 7.499 | -2.720 | 0.120 | 1.186 | .868 | 80. | 8.11.13.32. | 0 |
| 55 | K-18 | 36.1090 | 136.2947 | 22.00 | 840.913 | 827.712 | 13.201 | 20.858 | 19.443 | 6.789 | -2.463 | 0.116 | 1.048 | .868 | 80. | 8.11.13.40. | 0 |
| 56 | K-19 | 36.1110 | 136.2892 | 20.90 | 841.309 | 827.885 | 13.424 | 20.742 | 19.335 | 6.450 | -2.340 | 0.110 | 0.933 | .868 | 80. | 8.11.13.49. | 0 |
| 57 | K-20 | 36.1177 | 136.2878 | 20.50 | 842.406 | 828.461 | 13.945 | 21.139 | 19.790 | 6.326 | -2.295 | 0.102 | 0.946 | .868 | 80. | 8.11.14. 0. | 0 |
| 58 | K-21 | 36.1182 | 136.2833 | 18.70 | 842.080 | 828.504 | 13.576 | 20.215 | 18.977 | 5.771 | -2.093 | 0.095 | 0.856 | .868 | 80. | 8.11.14.11. | 0 |
| 59 | K-22 | 36.1197 | 136.2778 | 16.50 | 842.702 | 828.633 | 14.069 | 20.029 | 18.951 | 5.092 | -1.847 | 0.081 | 0.769 | .868 | 80. | 8.11.14.28. | 0 |
| 60 | K-23 | 36.1185 | 136.2727 | 15.60 | 843.141 | 828.530 | 14.611 | 20.294 | 19.245 | 4.814 | -1.746 | 0.073 | 0.698 | .868 | 80. | 8.11.14.38. | 0 |

Table 1. Continued.

| LOCATION (NO.) | (NAME) | LATITUDE (DEG.) | LONGITUDE (DEG.) | HEIGHT (M) | ----GRAVITY--- OBSERVE | NORMAL | ---GRAVITY ANOMALY----- OB-NOR | FREE-AIR | BOUGUER | ------------CORRECTIONS------------ FREE-AIR | BOUGUER | EARTH TIDE | TERRAIN | ATMOS | DATE Y | M D H M | * FRC (*10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 979000. | 979000. | | | | | | | | | | | |
| 61 | K-24 | 36.1172 | 136.2690 | 13.90 | 843.664 | 828.418 | 15.246 | 20.404 | 19.501 | 4.290 | -1.556 | 0.066 | 0.653 | .869 | 80. | 8.11.14.46. | 0 |
| 62 | K-25 | 36.1148 | 136.2635 | 13.50 | 844.318 | 828.212 | 16.106 | 21.141 | 20.225 | 4.166 | -1.511 | 0.058 | 0.595 | .869 | 80. | 8.11.14.56. | 0 |
| 63 | K-26 | 36.1130 | 136.2580 | 11.80 | 844.370 | 828.057 | 16.313 | 20.824 | 20.052 | 3.641 | -1.321 | 0.011 | 0.549 | .869 | 80. | 8.11.15.48. | 0 |
| 64 | K-27 | 36.1137 | 136.2510 | 10.00 | 844.106 | 828.117 | 15.989 | 19.944 | 19.326 | 3.086 | -1.120 | 0.003 | 0.502 | .869 | 80. | 8.11.15.57. | 0 |
| 65 | K-28 | 36.1152 | 136.2465 | 10.30 | 843.438 | 828.246 | 15.192 | 19.239 | 18.557 | 3.179 | -1.153 | -0.004 | 0.471 | .869 | 80. | 8.11.16. 5. | 0 |
| 66 | K-29 | 36.1132 | 136.2412 | 9.10 | 843.157 | 828.074 | 15.083 | 18.761 | 18.190 | 2.808 | -1.019 | -0.017 | 0.448 | .869 | 80. | 8.11.16.20. | 0 |
| 67 | K-30 | 36.1120 | 136.2367 | 8.80 | 842.654 | 827.970 | 14.684 | 18.268 | 17.708 | 2.716 | -0.985 | -0.022 | 0.425 | .869 | 80. | 8.11.16.27. | 0 |
| 68 | K-31 | 36.1110 | 136.2335 | 8.50 | 842.469 | 827.885 | 14.584 | 18.077 | 17.537 | 2.623 | -0.952 | -0.026 | 0.412 | .869 | 80. | 8.11.16.32. | 0 |
| 69 | K-32 (BM008-404) | 36.1105 | 136.2318 | 8.30 | 842.374 | 827.842 | 14.532 | 17.963 | 17.441 | 2.561 | -0.929 | -0.031 | 0.407 | .869 | 80. | 8.11.16.38. | 0 |
| 70 | K-33 (BM900) | 36.1085 | 136.2308 | 8.40 | 842.123 | 827.669 | 14.454 | 17.915 | 17.379 | 2.592 | -0.940 | -0.038 | 0.404 | .869 | 80. | 8.11.16.47. | 0 |
| 71 | K-34 | 36.1120 | 136.2223 | 7.00 | 841.925 | 827.970 | 13.955 | 16.984 | 16.576 | 2.160 | -0.784 | -0.052 | 0.376 | .869 | 80. | 8.11.17. 8. | 0 |
| 72 | K-35 | 36.1148 | 136.2183 | 6.10 | 841.874 | 828.212 | 13.662 | 16.414 | 16.095 | 1.882 | -0.683 | -0.060 | 0.364 | .869 | 80. | 8.11.17.21. | 0 |
| 73 | K-36 | 36.1153 | 136.2130 | 6.50 | 841.525 | 828.255 | 13.270 | 16.146 | 15.769 | 2.006 | -0.728 | -0.064 | 0.351 | .869 | 80. | 8.11.17.29. | 0 |
| 74 | K-37 | 36.1137 | 136.2092 | 5.90 | 841.119 | 828.117 | 13.002 | 15.692 | 15.383 | 1.821 | -0.661 | -0.070 | 0.351 | .869 | 80. | 8.11.17.40. | 0 |
| 75 | K-38 | 36.1133 | 136.2053 | 5.80 | 840.773 | 828.082 | 12.691 | 15.350 | 15.049 | 1.790 | -0.649 | -0.074 | 0.348 | .869 | 80. | 8.11.17.49. | 0 |
| 76 | K-39 | 36.1145 | 136.2003 | 5.30 | 840.500 | 828.186 | 12.314 | 14.819 | 14.573 | 1.636 | -0.593 | -0.077 | 0.347 | .869 | 80. | 8.11.17.57. | 0 |
| 77 | K-40 | 36.1152 | 136.1967 | 4.50 | 840.526 | 828.246 | 12.280 | 14.538 | 14.386 | 1.389 | -0.504 | -0.080 | 0.352 | .870 | 80. | 8.11.19. 4. | 0 |
| 78 | K-41 | 36.1158 | 136.1912 | 4.30 | 840.968 | 828.298 | 12.670 | 14.867 | 14.750 | 1.327 | -0.481 | -0.082 | 0.364 | .870 | 80. | 8.11.18.11. | 0 |
| 79 | K-42 | 36.1165 | 136.1863 | 4.30 | 841.871 | 828.358 | 13.513 | 15.710 | 15.612 | 1.327 | -0.481 | -0.084 | 0.384 | .870 | 80. | 8.11.18.19. | 0 |
| 80 | K-43 | 36.1182 | 136.1808 | 4.90 | 843.362 | 828.504 | 14.858 | 17.239 | 17.118 | 1.512 | -0.549 | -0.086 | 0.427 | .870 | 80. | 8.11.18.27. | 0 |

Table 1. Continued.

| LOCATION (NO.) | (NAME) | LATITUDE (DEG.) | LONGITUDE (DEG.) | HEIGHT (M) | ----GRAVITY--- OBSERVE | NORMAL | ---GRAVITY ANOMALY----- OB-NOR | FREE-AIR | BOUGUER | ------------CORRECTIONS------------ FREE-AIR | BOUGUER | EARTH TIDE | TERRAIN | ATMOS | DATE Y | M D H M | * FRC (*10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 979000. | 979000. | | | | | | | | | | | |
| 81 | K-44 | 36.1195 | 136.1772 | 5.60 | 844.016 | 828.616 | 15.400 | 17.998 | 17.847 | 1.728 | -0.627 | -0.087 | 0.476 | .869 | 80. | 8.11.18.35. | 0 |
| 82 | K-44 | 36.1222 | 136.1692 | 7.00 | 846.741 | 828.849 | 17.892 | 20.922 | 20.958 | 2.160 | -0.784 | 0.130 | 0.820 | .869 | 80. | 8.12.12.23. | 0 |
| 83 | K-45 | 36.1322 | 136.1613 | 5.10 | 847.784 | 829.710 | 18.074 | 20.518 | 20.410 | 1.574 | -0.571 | 0.131 | 0.463 | .870 | 80. | 8.12.12.32. | 0 |
| 84 | K-46 | 36.1372 | 136.1552 | 4.70 | 848.562 | 830.140 | 18.422 | 20.742 | 20.629 | 1.450 | -0.526 | 0.131 | 0.413 | .870 | 80. | 8.12.12.42. | 0 |
| 85 | K-47 | 36.1362 | 136.1443 | 8.10 | 848.780 | 830.054 | 18.726 | 22.095 | 21.651 | 2.500 | -0.907 | 0.130 | 0.463 | .869 | 80. | 8.12.12.52. | 0 |
| 86 | K-48 | 36.1383 | 136.1298 | 11.90 | 847.574 | 830.235 | 17.339 | 21.881 | 21.090 | 3.672 | -1.332 | 0.129 | 0.542 | .869 | 80. | 8.12.13. 4. | 0 |
| 87 | K-50 | 36.1368 | 136.1175 | 8.40 | 849.489 | 830.105 | 19.384 | 22.845 | 23.285 | 2.592 | -0.940 | 0.127 | 1.380 | .869 | 80. | 8.12.13.15. | 0 |
| 88 | K-51 | 36.1413 | 136.1095 | 38.70 | 842.627 | 830.493 | 12.134 | 24.943 | 21.081 | 11.943 | -4.332 | 0.124 | 0.470 | .866 | 80. | 8.12.13.25. | 0 |
| 89 | K-52 | 36.1430 | 136.0977 | 7.60 | 848.059 | 830.639 | 17.420 | 20.634 | 20.260 | 2.345 | -0.851 | 0.120 | 0.476 | .869 | 80. | 8.12.13.37. | 0 |
| 90 | K-53 (OHMICHI BR.) | 36.1393 | 136.0895 | 6.30 | 850.004 | 830.321 | 19.683 | 22.497 | 22.337 | 1.944 | -0.705 | 0.116 | 0.545 | .869 | 80. | 8.12.13.47. | 0 |
| 91 | E-01 (BM5254) | 36.0935 | 136.3082 | 43.10 | 835.050 | 826.379 | 8.671 | 22.838 | 19.412 | 13.301 | -4.825 | 0.051 | 1.399 | .866 | 80. | 8.12.15.23. | 0 |
| 92 | E-02 | 36.0790 | 136.3202 | 67.80 | 825.110 | 825.131 | -0.021 | 21.766 | 16.403 | 20.923 | -7.590 | 0.038 | 2.228 | .863 | 80. | 8.12.15.39. | 0 |
| 93 | E-03 | 36.0650 | 136.3325 | 106.00 | 815.416 | 823.926 | -8.510 | 25.061 | 16.419 | 32.712 | -11.867 | 0.031 | 3.225 | .860 | 80. | 8.12.15.47. | 0 |
| 94 | E-04 | 36.0578 | 136.3503 | 150.00 | 802.476 | 823.307 | -20.831 | 26.315 | 14.843 | 46.290 | -16.793 | 0.023 | 5.321 | .856 | 80. | 8.12.15.57. | 0 |
| 95 | E-05 (EIHEIJI) | 36.0520 | 136.3573 | 186.00 | 792.874 | 822.808 | -29.934 | 28.318 | 13.654 | 57.400 | -20.823 | 0.015 | 6.159 | .852 | 80. | 8.12.16. 6. | 0 |
| 96 | E-06 (USAKA TUNNEL) | 36.0473 | 136.3477 | 276.30 | 777.742 | 822.404 | -44.662 | 41.448 | 13.101 | 85.266 | -30.932 | 0.002 | 2.585 | .843 | 80. | 8.12.16.21. | 0 |
| 97 | E-07 | 36.0352 | 136.3350 | 119.00 | 805.683 | 821.363 | -15.680 | 21.902 | 16.180 | 36.723 | -13.322 | -0.009 | 7.600 | .859 | 80. | 8.12.16.34. | 0 |
| 98 | E-08 (TSURUMI BR.) | 35.9817 | 136.3665 | 104.90 | 799.547 | 816.764 | -17.217 | 16.015 | 9.450 | 32.372 | -11.744 | -0.025 | 5.178 | .860 | 80. | 8.12.16.55. | 0 |
| 99 | E-09 | 35.9722 | 136.3742 | 112.80 | 794.225 | 815.947 | -21.722 | 13.947 | 8.396 | 34.810 | -12.628 | -0.031 | 7.077 | .859 | 80. | 8.12.17. 3. | 0 |
| 100 | E-10 | 35.9597 | 136.3703 | 123.70 | 789.003 | 814.873 | -25.870 | 13.162 | 6.162 | 38.174 | -13.848 | -0.039 | 6.848 | .858 | 80. | 8.12.17.14. | 0 |

Table 1. Continued.

| LOCATION (NO.) | (NAME) | LATITUDE (DEG.) | LONGITUDE (DEG.) | HEIGHT (M) | ----GRAVITY--- OBSERVE | NORMAL | ---GRAVITY ANOMALY----- OB-NOR | FREE-AIR | BOUGUER | ------------CORRECTIONS------------- FREE-AIR | BOUGUER | EARTH TIDE | TERRAIN | ATMOS | Y | DATE M D H M | * FRC (*10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 979000. | 979000. | | | | | | | | | | | |
| 101 | E-11 | 35.9485 | 136.3602 | 137.70 | 785.875 | 813.911 | -28.036 | 15.315 | 5.186 | 42.494 | -15.416 | -0.044 | 5.286 | .857 | 80. | 8.12.17.22. | 0 |
| 102 | E-12 | 35.9418 | 136.3518 | 199.50 | 771.770 | 813.335 | -41.565 | 20.851 | 4.262 | 61.566 | -22.334 | -0.053 | 5.745 | .851 | 80. | 8.12.17.36. | 0 |
| 103 | E-13 | 35.9402 | 136.3628 | 155.50 | 781.296 | 813.198 | -31.902 | 16.940 | 3.467 | 47.987 | -17.408 | -0.067 | 3.935 | .855 | 80. | 8.12.18. 2. | 0 |
| 104 | E-14 (SHIRAWA BR.) | 35.9305 | 136.3662 | 162.30 | 777.020 | 812.364 | -35.344 | 15.596 | 3.550 | 50.086 | -18.170 | -0.070 | 6.124 | .854 | 80. | 8.12.18. 9. | 0 |
| 105 | E-15 | 35.9168 | 136.3547 | 195.90 | 768.830 | 811.188 | -42.358 | 18.948 | 2.116 | 60.455 | -21.931 | -0.074 | 5.099 | .851 | 80. | 8.12.18.19. | 0 |
| 106 | E-16 | 35.9128 | 136.3327 | 243.00 | 761.197 | 810.845 | -49.648 | 26.189 | 4.440 | 74.990 | -27.204 | -0.078 | 5.455 | .847 | 80. | 8.12.18.30. | 0 |
| 107 | E-17 | 35.9330 | 136.3038 | 78.00 | 799.995 | 812.579 | -12.584 | 12.349 | 8.144 | 24.071 | -8.732 | -0.082 | 4.527 | .862 | 80. | 8.12.18.48. | 0 |
| 108 | E-18 | 35.9327 | 136.2865 | 52.30 | 807.896 | 812.554 | -4.658 | 12.347 | 10.689 | 16.140 | -5.855 | -0.084 | 4.197 | .865 | 80. | 8.12.18.56. | 0 |
| 109 | E-19 | 35.9313 | 136.2673 | 32.20 | 815.934 | 812.433 | 3.501 | 14.304 | 12.718 | 9.937 | -3.605 | 0.028 | 2.018 | .867 | 80. | 8.13.10. 8. | 0 |
| 110 | E-20 (II BM3267) | 35.9327 | 136.2503 | 21.70 | 819.590 | 812.554 | 7.036 | 14.601 | 13.404 | 6.697 | -2.429 | 0.045 | 1.233 | .868 | 80. | 8.13.10.30. | 0 |
| 111 | E-21 | 35.9433 | 136.2323 | 15.10 | 822.445 | 813.464 | 8.981 | 14.509 | 15.018 | 4.660 | -1.690 | 0.059 | 2.199 | .869 | 80. | 8.13.10.49. | 0 |
| 112 | S-07 | 35.9453 | 136.1680 | 18.30 | 817.195 | 813.636 | 3.559 | 10.075 | 8.479 | 5.647 | -2.049 | 0.074 | 0.453 | .868 | 80. | 8.13.11.12. | 0 |
| 113 | S-08 | 35.9450 | 136.1412 | 19.50 | 817.036 | 813.610 | 3.426 | 10.312 | 8.955 | 6.018 | -2.183 | 0.083 | 0.826 | .868 | 80. | 8.13.11.27. | 0 |
| 114 | S-09 | 35.9695 | 136.1408 | 12.40 | 824.186 | 815.715 | 8.471 | 13.166 | 12.239 | 3.827 | -1.388 | 0.094 | 0.461 | .869 | 80. | 8.13.11.48. | 0 |
| 115 | S-10 | 35.9700 | 136.1617 | 13.00 | 823.239 | 815.758 | 7.481 | 12.361 | 11.323 | 4.012 | -1.455 | 0.109 | 0.417 | .869 | 80. | 8.13.12.28. | 0 |

Table 1. Continued.

| LOCATION (NO.) | (NAME) | LATITUDE (DEG.) | LONGITUDE (DEG.) | HEIGHT (M) | ----GRAVITY--- OBSERVE | NORMAL | ---GRAVITY ANOMALY----- OB-NOR | FREE-AIR | BOUGUER | ------------CORRECTIONS------------ FREE-AIR | BOUGUER | EARTH TIDE | TERRAIN | ATMOS | DATE Y | M D H M | * FRC (*10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 979000. | 979000. | | | | | | | | | | | |
| 10KUFS166 | | 36.5649 | 136.6613 | 33.79 | 857.990 | 867.053 | -9.063 | 2.231 | -1.060 | 10.428 | -3.783 | -0.035 | 0.491 | .867 | 82. | 7.12. 9.15. | A0 2 |
| 180MARU | F 0 | 36.1334 | 136.2695 | 11.50 | 846.544 | 829.810 | 16.735 | 21.152 | 20.553 | 3.549 | -1.287 | -0.013 | 0.688 | .869 | 82. | 7.12.10.44. | C1 0 |
| 181 | F 1 | 36.1473 | 136.2547 | 8.80 | 849.326 | 831.006 | 18.320 | 21.905 | 21.452 | 2.716 | -0.985 | 0.014 | 0.533 | .869 | 82. | 7.12.11.49. | D2 0 |
| 182 | F 2 | 36.1472 | 136.2531 | 8.80 | 848.888 | 830.999 | 17.889 | 21.474 | 21.009 | 2.716 | -0.985 | 0.019 | 0.520 | .869 | 82. | 7.12.11.58. | C2 0 |
| 183 | F 3 | 36.1470 | 136.2510 | 8.70 | 848.797 | 830.989 | 17.808 | 21.362 | 20.887 | 2.685 | -0.974 | 0.023 | 0.499 | .869 | 82. | 7.12.12. 8. | D2 0 |
| 184 | F 4 | 36.1470 | 136.2500 | 8.70 | 848.586 | 830.989 | 17.598 | 21.152 | 20.669 | 2.685 | -0.974 | 0.027 | 0.491 | .869 | 82. | 7.12.12.17. | D2 0 |
| 185 | F 5 | 36.1537 | 136.2487 | 7.90 | 848.238 | 831.565 | 16.673 | 19.981 | 19.577 | 2.438 | -0.884 | 0.034 | 0.481 | .869 | 82. | 7.12.12.31. | D2 0 |
| 186 | F 6 | 36.1524 | 136.2470 | 7.60 | 847.492 | 831.449 | 16.043 | 19.257 | 18.877 | 2.345 | -0.851 | 0.067 | 0.470 | .869 | 82. | 7.12.13.56. | D2 0 |
| 187 | F 7 | 36.1524 | 136.2460 | 7.60 | 847.189 | 831.448 | 15.741 | 18.956 | 18.564 | 2.345 | -0.851 | 0.069 | 0.459 | .869 | 82. | 7.12.14. 4. | D2 0 |
| 188 | F 8 | 36.1524 | 136.2449 | 7.70 | 846.879 | 831.449 | 15.429 | 18.675 | 18.265 | 2.376 | -0.862 | 0.071 | 0.452 | .869 | 82. | 7.12.14. 9. | D2 0 |
| 189 | F 9 | 36.1524 | 136.2441 | 7.70 | 846.776 | 831.448 | 15.328 | 18.574 | 18.159 | 2.376 | -0.862 | 0.072 | 0.447 | .869 | 82. | 7.12.14.14. | D2 0 |
| 190 | F10 | 36.1524 | 136.2434 | 7.70 | 846.646 | 831.450 | 15.196 | 18.442 | 18.022 | 2.376 | -0.862 | 0.073 | 0.442 | .869 | 82. | 7.12.14.18. | D2 0 |
| 191 | F11 | 36.1524 | 136.2427 | 7.70 | 846.529 | 831.451 | 15.078 | 18.324 | 17.900 | 2.376 | -0.862 | 0.075 | 0.438 | .869 | 82. | 7.12.14.28. | D2 0 |
| 192 | F12 | 36.1528 | 136.2421 | 8.20 | 846.234 | 831.480 | 14.754 | 18.154 | 17.670 | 2.531 | -0.918 | 0.077 | 0.434 | .869 | 82. | 7.12.14.38. | C2 0 |
| 193 | F13 | 36.1523 | 136.2412 | 7.00 | 846.413 | 831.443 | 14.970 | 17.999 | 17.647 | 2.160 | -0.784 | 0.078 | 0.431 | .869 | 82. | 7.12.14.45. | C2 0 |
| 194 | F14 | 36.1523 | 136.2406 | 7.00 | 846.341 | 831.445 | 14.897 | 17.926 | 17.570 | 2.160 | -0.784 | 0.079 | 0.428 | .869 | 82. | 7.12.14.52. | D2 0 |
| 195 | F15 | 36.1523 | 136.2399 | 6.70 | 846.377 | 831.442 | 14.935 | 17.872 | 17.542 | 2.068 | -0.750 | 0.079 | 0.420 | .869 | 82. | 7.12.15. 0. | D2 0 |
| 196 | F16 | 36.1523 | 136.2393 | 6.70 | 846.296 | 831.445 | 14.852 | 17.789 | 17.456 | 2.068 | -0.750 | 0.080 | 0.417 | .869 | 82. | 7.12.15. 7. | D2 0 |
| 197 | F17 | 36.1523 | 136.2369 | 6.70 | 846.047 | 831.443 | 14.604 | 17.541 | 17.195 | 2.068 | -0.750 | 0.080 | 0.404 | .869 | 82. | 7.12.15.17. | C2 0 |
| 198 | F18 | 36.1541 | 136.2472 | 7.60 | 847.970 | 831.593 | 16.378 | 19.592 | 19.212 | 2.345 | -0.851 | 0.079 | 0.471 | .869 | 82. | 7.12.15.48. | D2 0 |
| 199 | F19 | 36.1541 | 136.2449 | 7.60 | 847.237 | 831.593 | 15.643 | 18.858 | 18.458 | 2.345 | -0.851 | 0.078 | 0.451 | .869 | 82. | 7.12.15.54. | D2 0 |

Table 1. Continued.

| LOCATION (NO.) | (NAME) | LATITUDE (DEG.) | LONGITUDE (DEG.) | HEIGHT (M) | ----GRAVITY--- OBSERVE 979000. | NORMAL 979000. | ---GRAVITY ANOMALY----- OB-NOR | FREE-AIR | BOUGUER | ------------CORRECTIONS------------ FREE-AIR | BOUGUER | EARTH TIDE | TERRAIN | ATMOS | 'Y | DATE M D H M | * | FRC (*10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 200 | F20 | 36.1541 | 136.2460 | 7.60 | 847.606 | 831.593 | 16.012 | 19.227 | 18.834 | 2.345 | -0.851 | 0.075 | 0.458 | .869 | 82. | 7.12.16.15. | D2 | 0 |
| 201 | F21 | 36.1516 | 136.2338 | 5.40 | 845.895 | 831.378 | 14.517 | 17.053 | 16.838 | 1.666 | -0.605 | 0.071 | 0.389 | .869 | 82. | 7.12.16.31. | C2 | 0 |
| 202 | F22 | 36.1522 | 136.2302 | 5.30 | 845.724 | 831.432 | 14.293 | 16.798 | 16.576 | 1.636 | -0.593 | 0.068 | 0.373 | .869 | 82. | 7.12.16.42. | D2 | 0 |
| 203 | F23 | 36.1523 | 136.2264 | 5.50 | 845.076 | 831.443 | 13.633 | 16.200 | 15.937 | 1.697 | -0.616 | 0.066 | 0.353 | .869 | 82. | 7.12.16.49. | D2 | 0 |
| 204 | F24 | 36.1528 | 136.2237 | 5.10 | 847.971 | 831.482 | 16.489 | 18.932 | 18.705 | 1.574 | -0.571 | 0.063 | 0.344 | .870 | 82. | 7.12.16.58. | D2 | 2 |
| 205 | F25 | 36.1525 | 136.2199 | 4.70 | 844.264 | 831.455 | 12.809 | 15.129 | 14.932 | 1.450 | -0.526 | 0.059 | 0.329 | .870 | 82. | 7.12.17. 8. | D2 | 0 |
| 206 | F26 | 36.1526 | 136.2157 | 4.50 | 843.855 | 831.469 | 12.387 | 14.645 | 14.457 | 1.389 | -0.504 | 0.056 | 0.316 | .870 | 82. | 7.12.17.16. | D2 | 0 |
| 207 | F27 | 36.1530 | 136.2099 | 4.60 | 843.599 | 831.505 | 12.093 | 14.382 | 14.166 | 1.420 | -0.515 | 0.051 | 0.298 | .870 | 82. | 7.12.17.28. | D2 | 0 |
| 208 | F28 | 36.1473 | 136.2560 | 8.80 | 849.610 | 831.011 | 18.598 | 22.183 | 21.743 | 2.716 | -0.985 | 0.042 | 0.545 | .869 | 82. | 7.12.17.48. | D2 | 0 |
| 209 | F29 | 36.1465 | 136.2587 | 7.60 | 849.048 | 830.937 | 18.111 | 21.326 | 21.048 | 2.345 | -0.851 | 0.037 | 0.573 | .869 | 82. | 7.12.17.58. | D2 | 0 |
| 210 | F30 | 36.1479 | 136.2588 | 7.70 | 849.042 | 831.064 | 17.978 | 21.223 | 20.935 | 2.376 | -0.862 | 0.032 | 0.574 | .869 | 82. | 7.12.18. 7. | C2 | 0 |
| 211 | F31 | 36.1491 | 136.2610 | 7.80 | 849.674 | 831.168 | 18.505 | 21.782 | 21.511 | 2.407 | -0.873 | 0.027 | 0.602 | .869 | 82. | 7.12.18.17. | C2 | 0 |
| 212 | F32 | 36.1496 | 136.2632 | 8.40 | 850.395 | 831.211 | 19.184 | 22.645 | 22.331 | 2.592 | -0.940 | 0.022 | 0.626 | .869 | 82. | 7.12.18.26. | C2 | 0 |
| 213 | F33 | 36.1494 | 136.2665 | 8.40 | 850.293 | 831.189 | 19.104 | 22.565 | 22.299 | 2.592 | -0.940 | 0.017 | 0.674 | .869 | 82. | 7.12.18.35. | C2 | 0 |
| 214 | F34 | 36.1495 | 136.2713 | 8.50 | 850.246 | 831.197 | 19.048 | 22.541 | 22.337 | 2.623 | -0.952 | 0.013 | 0.748 | .869 | 82. | 7.12.18.43. | C2 | 0 |
| 215 | F35 | 36.1495 | 136.2754 | 8.80 | 850.206 | 831.200 | 19.006 | 22.590 | 22.439 | 2.716 | -0.985 | 0.009 | 0.834 | .869 | 82. | 7.12.18.50. | C2 | 0 |
| 216 | F36 | 36.1484 | 136.2806 | 10.30 | 850.389 | 831.108 | 19.281 | 23.329 | 23.143 | 3.179 | -1.153 | 0.004 | 0.968 | .869 | 82. | 7.12.19. 0. | D2 | 0 |
| 217 | F37 | 36.1487 | 136.2825 | 14.10 | 849.871 | 831.127 | 18.743 | 23.963 | 23.396 | 4.351 | -1.578 | -0.001 | 1.011 | .869 | 82. | 7.12.19. 8. | C2 | 0 |
| 218 | F38 | 36.1491 | 136.2866 | 25.90 | 847.107 | 831.162 | 15.946 | 24.806 | 23.041 | 7.993 | -2.900 | -0.004 | 1.135 | .868 | 82. | 7.12.19.14. | C2 | 0 |
| 180 | F39 | 36.1334 | 136.2695 | 11.50 | 846.569 | 829.810 | 16.759 | 21.177 | 20.577 | 3.549 | -1.287 | -0.012 | 0.688 | .869 | 82. | 7.12.19.29. | C1 | 0 |
| 10 | KUFS166 | 36.5649 | 136.6613 | 33.79 | 857.990 | 867.053 | -9.063 | 2.231 | -1.060 | 10.428 | -3.783 | -0.067 | 0.491 | .867 | 82. | 7.12.21.42. | A0 | 0 |

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