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Hawaiian Volcano Observatory Seismic Data, January to March 2009

By Jennifer S. Nakata and Paul G. Okubo

Open-File Report 2010–1079

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Introduction

This U.S. Geological Survey (USGS), Hawaiian Volcano Observatory (HVO) summary presents seismic data gathered during January–March 2009. The seismic summary offers earthquake hypocenters without interpretation as a source of preliminary data and is complete in that most data for events of M≥1.5 are included. All latitude and longitude references in this report are stated in Old Hawaiian Datum.

The HVO summaries have been published in various forms since 1956. Summaries prior to 1974 were issued quarterly, but cost, convenience of preparation and distribution, and the large quantities of data necessitated an annual publication, beginning with Summary 74 for the year 1974. Since 2004, summaries have been identified simply by year, rather than by summary number.

Summaries originally issued as administrative reports were republished in 2007 as Open-File Reports. All the summaries since 1956 are available at http://pubs.usgs.gov/of/2007/1316-1345/ (last accessed 02/24/2010).

In January 1986, HVO adopted CUSP (California Institute of Technology USGS Seismic Processing). Summary 86, available at http://pubs.er.usgs.gov/usgspubs/ofr/ofr92301 (last accessed 02/24/2010), includes a description of the seismic instrumentation, calibration, and processing used in recent years. The present summary includes background information about the seismic network to provide the end user with an understanding of the processing parameters and how the data were gathered.

Earthworm software, documentation available at http://folkworm.ceri.memphis.edu/ew-doc/ (last accessed 02/24/2010), was first installed at HVO in 1999 as part of an upgrade to tsunami warning capabilities in the Pacific region. This improved and expanded data exchange with the Pacific Tsunami Warning Center in Ewa Beach, Oahu, that included not only seismic waveforms, but also parametric earthquake data. Although Earthworm does included modules for earthquake triggering and earthquake location, this software was never used to generate catalog hypocenter locations at HVO.

During 2009, HVO migrated from CUSP to seismic processing software developed by the California Integrated Seismic Network or CISN. This software is now referred to as AQMS, for Advanced National Seismic System Quake Management System. Summary data for this year will be presented in two reports; the first report includes earthquakes processed on the CUSP platform for January–March; earthquakes for the last three quarters, processed on the AQMS platform, will be published in a separate summary with a description of AQMS production parameters.

A report by Klein and Koyanagi (1980)[1] tabulates instrumentation, calibration, and recording history of each seismic station in the network. It is designed as a reference for users of seismograms and phase data and includes and augments the information in the station table in this summary.

Figures 11–14 are maps showing computer-located hypocenters. The maps were generated using the Generic Mapping Tools (GMT), found at http://gmt.soest.hawaii.edu/ (last accessed 01/22/2010), in place of traditional QPLOT maps.

[1] Klein, F.W., and Koyanagi, R.Y., 1980, Hawaiian Volcano Observatory seismic network history, 1950–1979: U.S. Geological Survey Open-File Report 80–302, 84 p.

Seismic Instrumentation

The Network

The Hawaiian Volcano Observatory maintains an extensive short-period (SP), telemetered seismic network on the Island of Hawai‘i. Opportunities to augment the analog SP network according to specific monitoring or research interests have resulted in the installation and operation of a smaller number and focused deployments of digital broadband instruments. Data from the broadband instruments are not yet routinely used in catalog production, and the summary data are derived from the analog data streams.

The standard HVO SP field sensors, 1-Hz geophones, are deployed as single-component, vertical-only units or as three-component combinations of one vertical and two orthogonal horizontal units. The 2009 SP network consisted of 42 SP station sites: 10 three-component, 2 four-component (Uwēkahuna included a low-gain vertical with a unity-gain setting; ‘Ainapō included a moderate-gain vertical with a 48-db setting), 2 two-component (each site included a moderate-gain vertical with a 48-db setting), and 28 vertical-component-only sites. The network coverage is most dense on and around Kīlauea Volcano. During 1999, HVO added to the network three vertical-component-only sites on the Island of Maui; these sites were not in operation during 2009. All seismic signals from the network are telemetered in real time to HVO for recording.

In 1994, initially viewed as a test deployment in collaboration with USGS, Menlo Park, California, stations equipped with USGS Digital Seismic Telemetry (DST) systems were installed to record volcanic seismic signals within Kīlauea Volcano’s summit caldera. A description by Dawson and others is available at http://pubs.er.usgs.gov/usgspubs/ofr/ofr98108 (last accessed 02/24/2010). These stations were first equipped with sensors of a few different types, but, over time, the stations have been standardized with Guralp CMG40T seismometers whose frequency responses have been extended to 50-second corner frequencies at their low-frequency operating range. Until the installation at HVO of Earthworm systems and subsequent modifications to the DST data acquisition footprint, the DST and analog data streams were recorded separately.

The National Ocean and Atmospheric Administration (NOAA), Pacific Tsunami Warning Center (PTWC), operates and maintains a network of SP stations on the islands of Hawai‘i, Maui, and O‘ahu. In 1999, radio links were established to share real-time data between PTWC and HVO. PTWC signals from one O‘ahu three-component station and one Maui and five Hawai‘i vertical-component-only stations were telemetered to HVO for recording. During 2009, telemetered signals were converted to real-time internet data streams between HVO and PTWC. In recent years, PTWC began replacing their SP sensors with broadband instruments.

Figure 1 is a map of selected geographic and geologic features. Figure 2 shows the sites of seismic stations operated by HVO and PTWC on the Island of Hawai‘i during 2008. Figure 3 indicates the analog telemetry scheme for the seismic stations on Hawai‘i Island using UHF or VHF frequencies, and figure 4 shows expanded views of the telemetry schemes at Kīlauea summit—4*A*, HVO seismic stations and 4*B*, a Kīlauea caldera broadband. Figure 5 indicates the telemetry scheme for the seismic stations on Maui Island that are no longer operational.

Table 1 lists SP seismic stations by site name, four-letter component codes, coordinates in degrees and minutes, (Old Hawaiian datum), elevation in meters, and other data, as described below, pertaining to each component. The list includes all SP station components operated by HVO during 2009 and reviewed in CUSP by the data analysts. All station names with field sensors installed at the site remained on the list, though operation may not have been continuous. SP seismic-station components operated by PTWC on the Islands of Hawai‘i, O‘ahu, and Maui are also listed. Phase readings from PTWC stations that are not telemetered to HVO are used to supplement data for local earthquakes and earthquakes that occur within the Hawaiian Archipelago but are distant from the Hawai‘i Island network. No earthquakes during this report period required additional PTWC phase readings.

Instrumentation and Recording

Each telemetered SP station’s sensor is connected to a voltage-controlled oscillator (VCO) for FM multiplex transmission to HVO by UHF or VHF radio. These telemetering stations are all of Type 1, Earthquake Hazards Team (EHT) standard system used in USGS seismic networks (see table 2 for details). After discrimination at the receiver, signals pass through an analog-to-digital converter as part of the routine computer location processing and archiving. Through July 2001, continuous signals from the telemetered network were saved on 4-mm digital-audio tape (DAT) recording units. Three DAT recorders ran in automatic rotation as each ~20-hr tape was filled. Optic recordings are coded in table 1 as follows: H, Helicorder paper, and I, ink paper. DAT and paper records are archived at HVO.

Beginning in April 2007, continuous signals digital records have been archived locally, as SAC files, to removable hard drives, though they were not accessible for viewing on the CUSP timing platform.

Seismograph Response and Calibration

The response curve for the short-period seismograph type in use is given in figure 6. The Type 1 curve gives the magnification of the standard EHT system from ground motion at the seismometer to the seismic trace, as would be seen on a 20x Develocorder film viewer. The curve plots the unit response, which is multiplied by CAL, a station's calibration factor, to get the response for that station. Individual CAL factors for Type 1 seismographs are Develocorder-equivalent peak-to-peak amplitudes, measured in millimeters, of a 100-microvolt 5- to 8-Hz signal introduced to the preamp/VCO in place of the geophone at the field station. The calibration process normally is performed each time a station is visited for other required maintenance. Though Develocorder operations have ceased, calculations continue to be based on Develocorder equivalents.

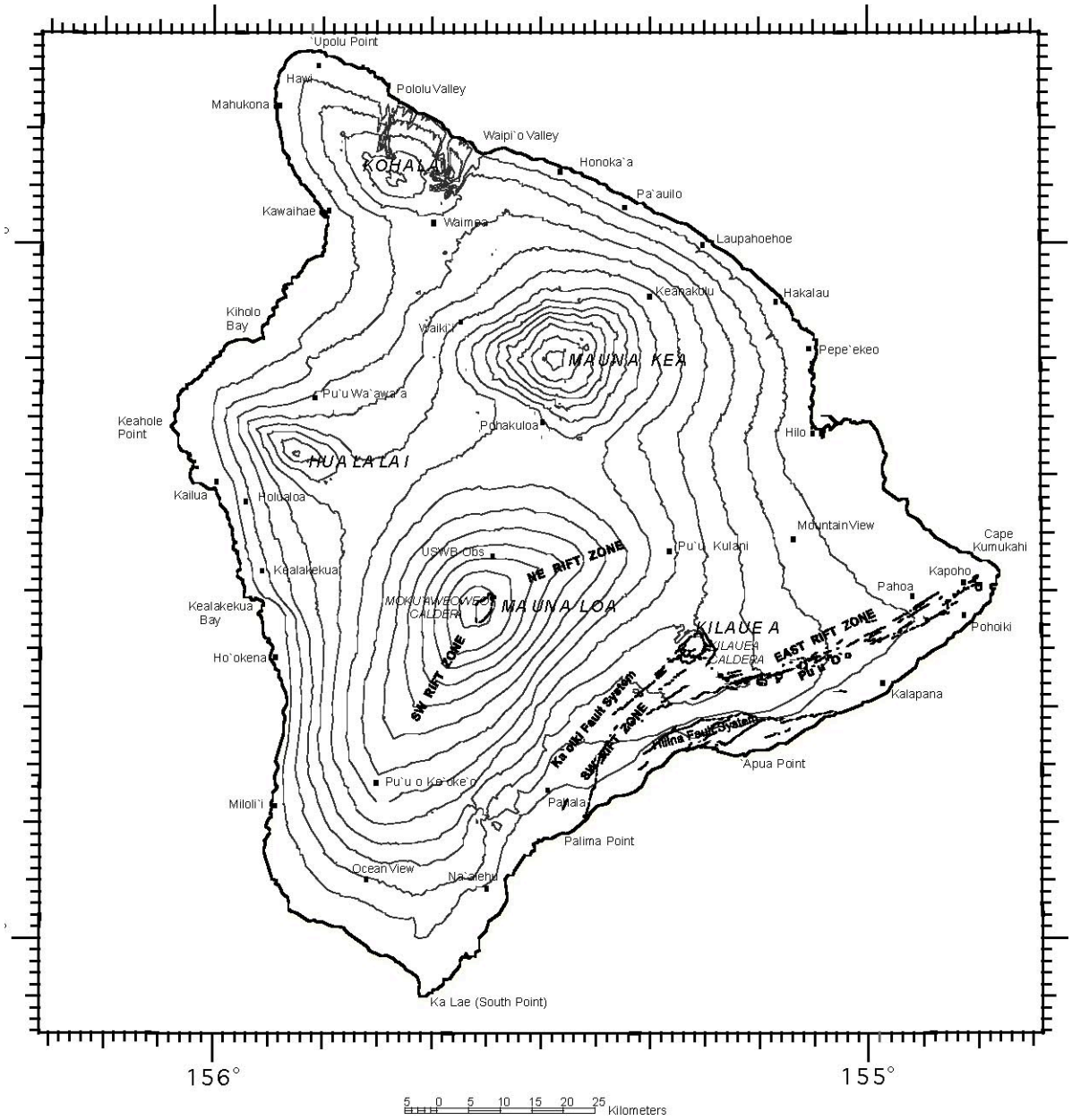

Figure 1. Map of Hawai‘i Island showing principal settlements and other selected geologic features. The contours are in 1,000-foot intervals.

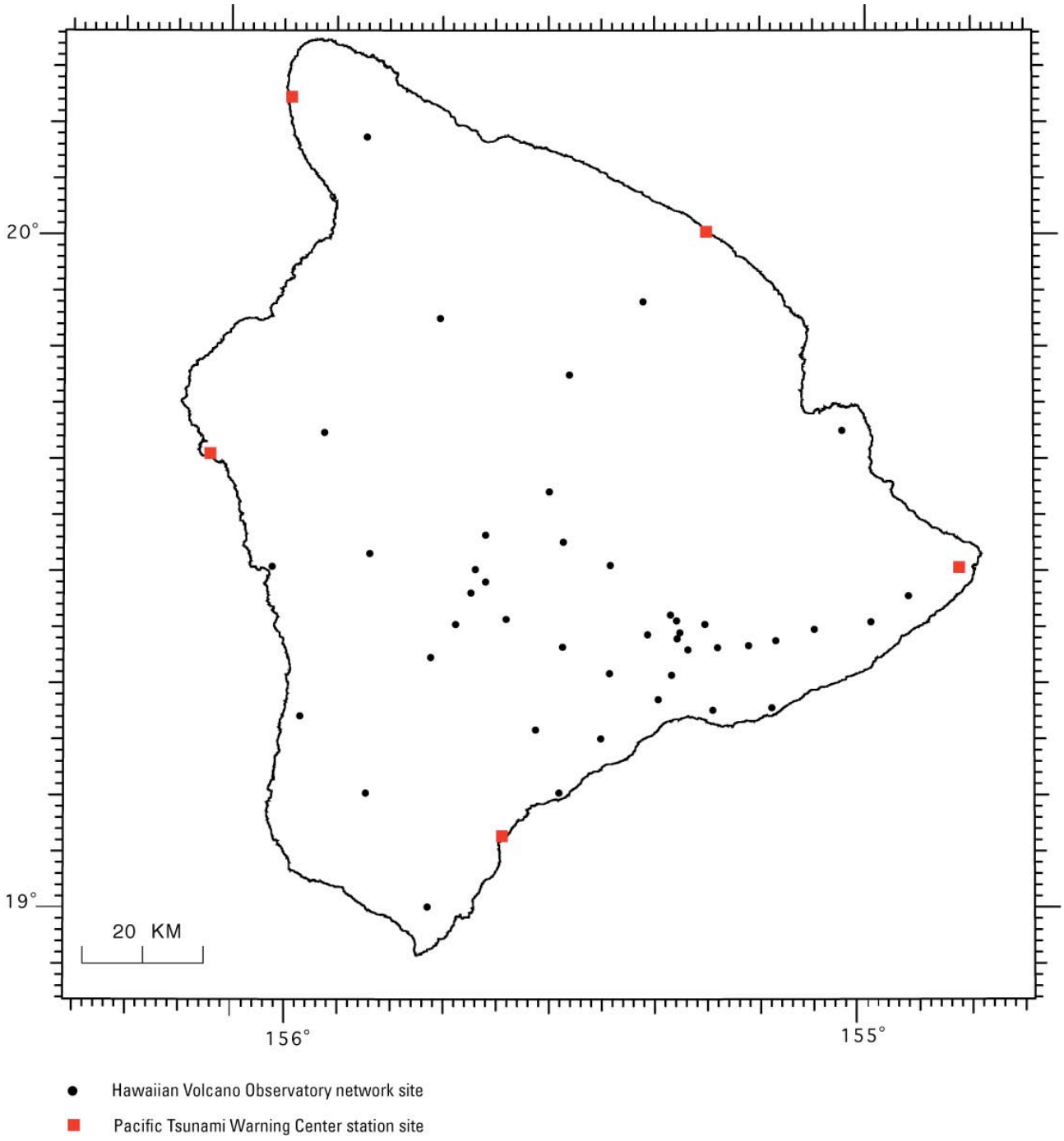

Figure 2. The 2009 Hawaiian Volcano Observatory and Pacific Tsunami Warning Center seismic network on Hawai‘i Island.

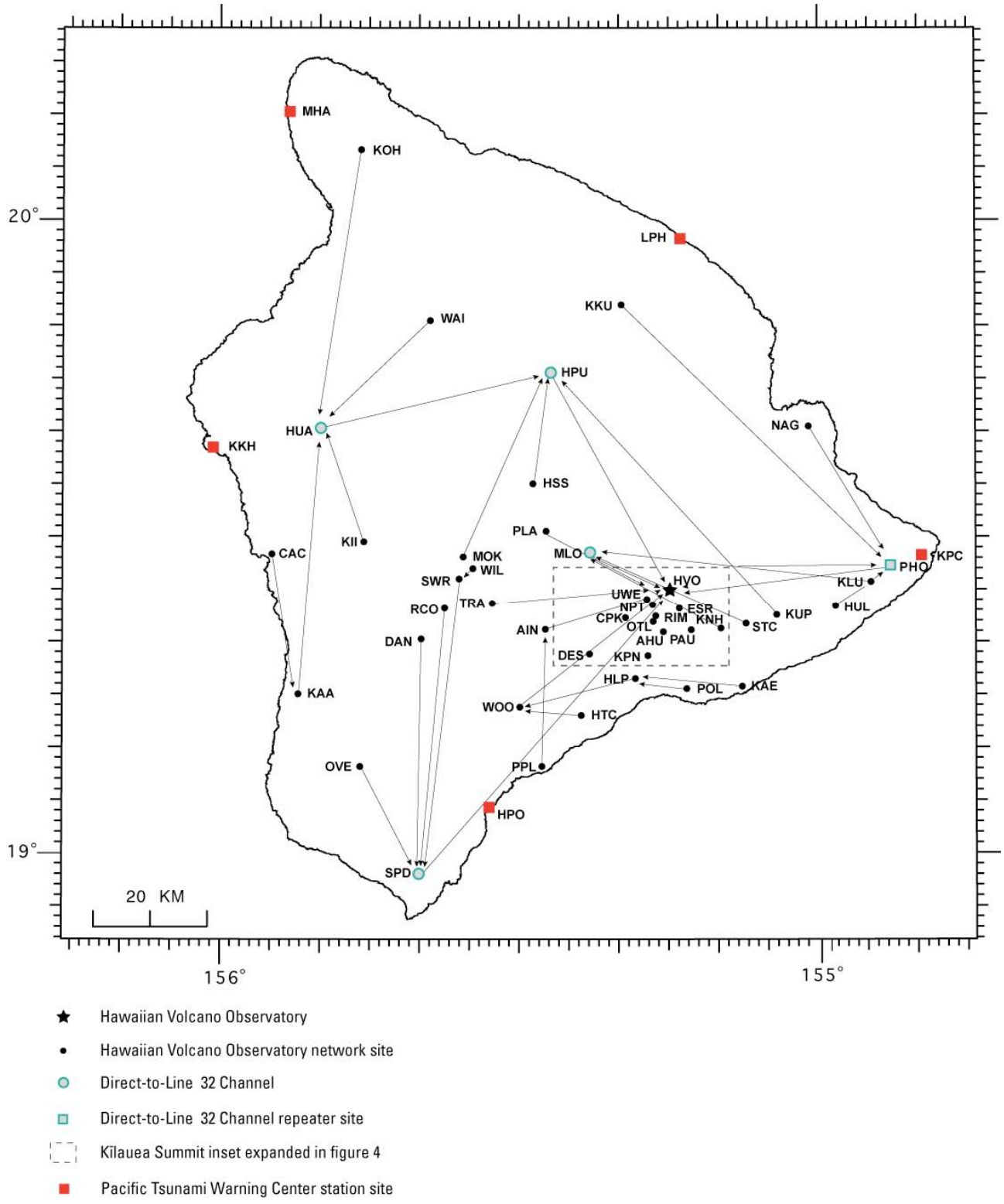

Figure 3. Telemetry scheme for the 2009 Hawaiian Volcano Observatory and Pacific Tsunami Warning Center seismic network on Hawai‘i Island. Figure 4 is an expanded view of Kīlauea summit, indicated by the broken line.

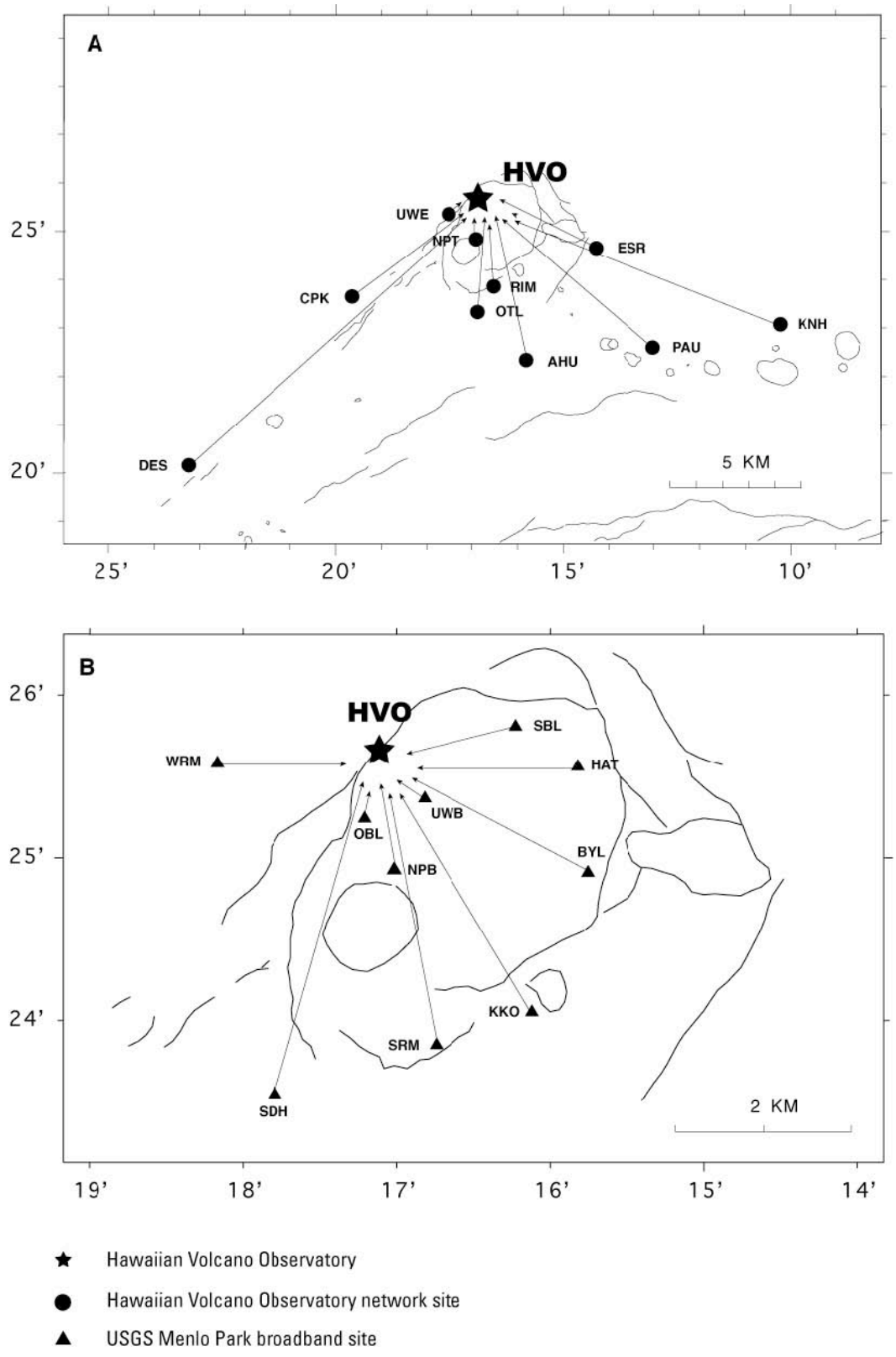

Figure 4. Expanded view of the Kīlauea summit inset in figure 3 showing the telemetry scheme for *A*, the 2009 Hawaiian Volcano Observatory seismic network sites and *B*, the 2009 U.S. Geological Survey Menlo Park broadband seismic network on Hawai‘i Island.

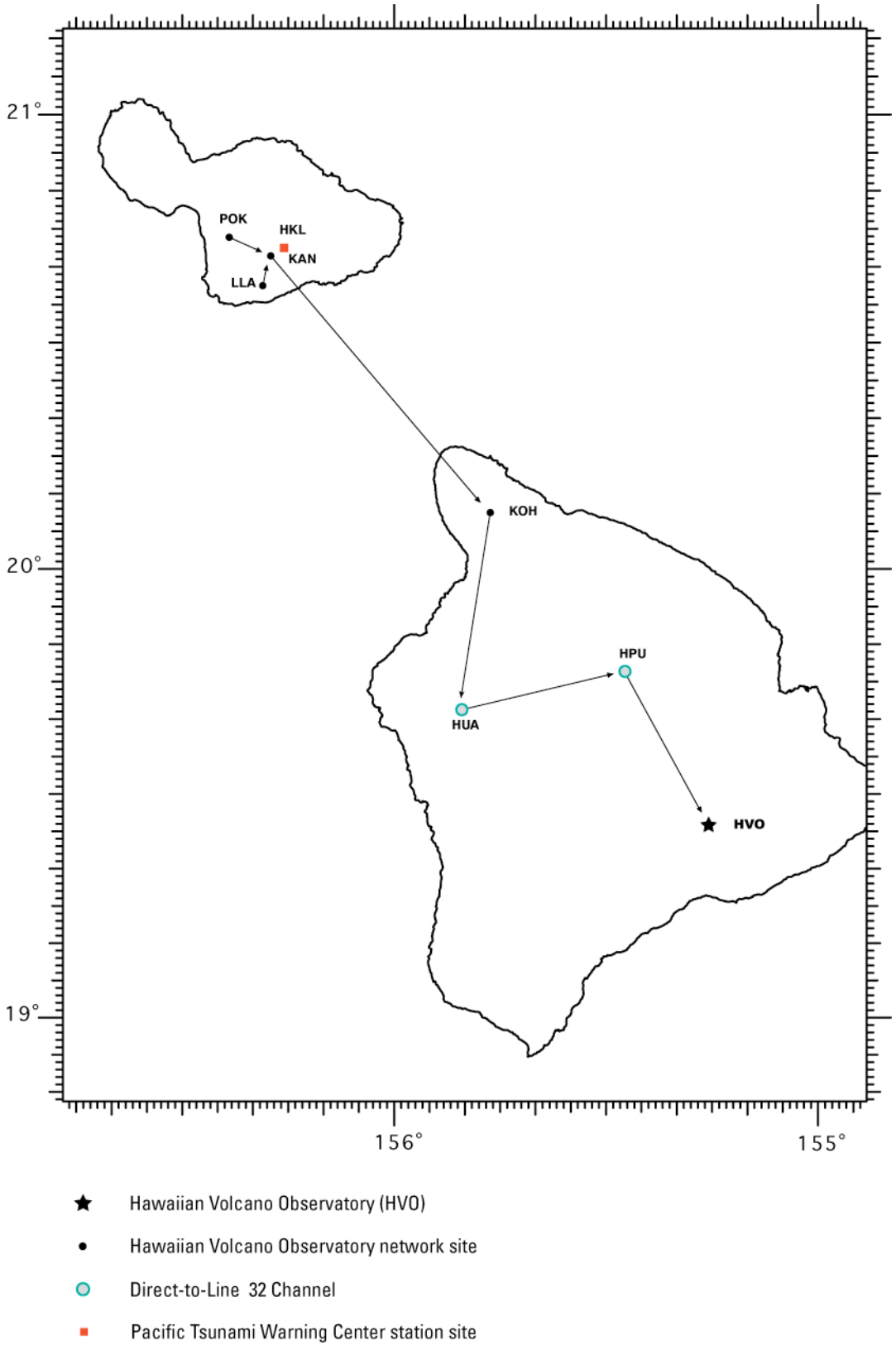

Figure 5. Telemetry scheme for the 2009 Hawaiian Volcano Observatory and Pacific Tsunami Warning Center seismic network on Maui Island, Hawai'i. The HVO stations were not in operation and, thus, produced no phase data for the January–March 2009 catalog.

Table 1. Short-period seismic-station sites and components operated by the U.S. Geological Survey on Hawai'i Island during 2009.

[During the year, there may have been outage periods that required station maintenance at certain sites.]

STATION NAME	CODE	--LAT--- D	M	---LON--- D	M	ELEV (M)	DELAY 1	DELAY 2	CAL	SEIS TYPE	OPTIC RECORD
AHUA	AHUV	19	22.40	155	15.90	1070	-0.10	-0.13	2.6	L5	I
AHUA	AHUE	19	22.40	155	15.90	1070	-0.10	-0.13	3.0	E5 MW	
AHUA	AHUN	19	22.40	155	15.90	1070	-0.10	-0.13	3.0	E5 MW	
AINAPO	AINV	19	22.50	155	27.62	1524	0.13	0.17	6.8	L5	
AINAPO	AINE	19	22.50	155	27.62	1524	0.13	0.17	3.0	L5 MW	
AINAPO	AINN	19	22.50	155	27.62	1524	0.13	0.17	3.0	L5 MW	
AINAPO	AINZ	19	22.50	155	27.62	1524	0.13	0.17	0.0	L5	
CAPTAIN COOK	CACV	19	29.29	155	55.09	323	0.00	-0.16	1.1	L5	
CONE PEAK	CPKV	19	23.70	155	19.70	1038	-0.26	-0.07	6.0	L5	
DANDELION	DANV	19	21.42	155	40.04	3003	-0.27	0.03	4.3	E5	
DESERT	DESV	19	20.20	155	23.30	815	-0.29	-0.13	4.5	L5	I
DIAMOND HEAD, OA	DHHZ	21	16.12	157	48.25	137	0.00	0.00	0.0	S13	
ESCAPE ROAD	ESRV	19	24.68	155	14.33	1177	-0.17	-0.19	1.2	L5	
HALEAKALA, MAUI	HKLZ	20	42.63	156	15.55	3051	0.00	0.00	0.0	S13	
HILINA PALI	HLPV	19	17.96	155	18.63	707	0.02	0.07	2.1	L5	
HONOLULU, OAHU	HONZ	21	19.30	158	0.50	2	0.00	0.00	0.0	S13	
HONOLULU, OAHU	HONE	21	19.30	158	0.50	2	0.00	0.00	0.0	S13	
HONOLULU, OAHU	HONN	21	19.30	158	0.50	2	0.00	0.00	0.0	S13	
HONUAPO	HPOZ	19	5.34	155	33.23	15	0.00	0.00	0.0	S13	
HALE POHAKU	HPUV	19	46.72	155	27.54	3396	0.31	0.17	3.3	L5	
HUMUULA SHEEP ST	HSSV	19	36.31	155	29.13	2445	0.20	0.35	4.0	L5	
HUMUULA SHEEP ST	HSSE	19	36.31	155	29.13	2445	0.20	0.35	3.0	L5 MW	
HUMUULA SHEEP ST	HSSN	19	36.31	155	29.13	2445	0.20	0.35	3.0	L5 MW	
HOT CAVES	HTCV	19	14.33	155	24.02	381	-0.16	-0.07	2.3	E4	
HUALALAI	HUAV	19	41.25	155	50.32	2189	0.67	0.38	2.8	L5	
HEIHEIAHULU	HULV	19	25.13	154	58.72	369	-0.17	-0.16	1.6	L5	H
HEIHEIAHULU	HULE	19	25.13	154	58.72	369	-0.17	-0.16	3.0	E5 MW	
HEIHEIAHULU	HULN	19	25.13	154	58.72	369	-0.17	-0.16	3.0	L5 MW	
KAAPUNA	KAAV	19	15.98	155	52.28	524	-0.12	-0.01	3.3	E5	
KAENA POINT	KAEV	19	17.35	155	7.95	37	-0.01	0.06	1.4	L5	
KANAHAU, MAUI	KANV	20	41.60	156	17.84	2745	0.00	0.00	0.0	L5	
KANEKII	KIIV	19	30.56	155	45.90	1841	0.15	0.37	3.0	L5	
KANEKII	KIIE	19	30.56	155	45.90	1841	0.15	0.37	3.0	L5 MW	
KANEKII	KIIN	19	30.56	155	45.90	1841	0.15	0.37	3.0	L5 MW	
KIPAPA, OAHU	KIPZ	21	25.40	158	0.90	2	0.00	0.00	0.0	S13	
KAILUA, KONA	KKHZ	19	39.40	156	1.12	1	0.00	0.00	0.0	S13	
KEANAKOLU	KKUV	19	53.39	155	20.58	1863	0.68	0.24	3.3	L5	
PUU KALIU	KLUV	19	27.48	154	55.26	271	-0.17	-0.30	3.4	L5	
KANE NUI O HAMO	KNHV	19	22.95	155	10.32	954	-0.17	-0.20	0.0	L5	I
KANE NUI O HAMO	KNHZ	19	22.95	155	10.32	954	-0.17	-0.20	0.0	L5	
KOHALA	KOHV	20	7.69	155	46.77	1166	-0.03	-0.17	6.3	L5	
KOHALA	KOHE	20	7.69	155	46.77	1166	-0.03	-0.17	3.0	L5 MW	
KOHALA	KOHN	20	7.69	155	46.77	1166	-0.03	-0.17	3.0	L5 MW	
KAPOHO CONE	KPCZ	19	30.02	154	50.51	134	0.00	0.00	0.0	S13	
KIPUKA NENE	KPNV	19	20.10	155	17.40	924	-0.11	-0.08	3.5	L5	
KUPAINAHA	KUPV	19	24.32	155	4.68	646	-0.25	-0.30	0.0	L5	
LUALAILUA, MAUI	LLAV	20	37.62	156	18.62	683	0.00	0.00	0.0	L5	
LAUPAHOEHOE	LPHZ	19	59.82	155	14.58	1	0.00	0.00	0.0	S13	
MAHUKONA	MHAZ	20	11.27	155	54.18	1	0.00	0.00	0.0	S13	
MAUNA LOA	MLOV	19	29.80	155	23.30	2010	0.03	0.08	5.6	L5	I
MAUNA LOA	MLOE	19	29.80	155	23.30	2010	0.03	0.08	3.0	L5 MW	
MAUNA LOA	MLON	19	29.80	155	23.30	2010	0.03	0.08	3.0	L5 MW	
MOKUAWEOWEO	MOKV	19	29.28	155	35.98	4104	0.15	0.16	4.2	L5	IH

STATION NAME	CODE	--LAT--- D	M	---LON--- D	M	ELEV (M)	DELAY 1	DELAY 2	CAL	SEIS TYPE	OPTIC RECORD
NATIONAL GUARD	NAGV	19	42.12	155	1.72	18	0.54	0.30	4.0	R5	
NATIONAL GUARD	NAGE	19	42.12	155	1.72	18	0.54	0.30	3.0	R5 MW	
NATIONAL GUARD	NAGN	19	42.12	155	1.72	18	0.54	0.30	3.0	R5 MW	
NORTH PIT	NPTV	19	24.90	155	17.00	1115	-0.30	-0.18	3.0	L5	IH
NORTH PIT	NPTE	19	24.90	155	17.00	1115	-0.30	-0.18	3.0	L5 MW	
NORTH PIT	NPTN	19	24.90	155	17.00	1115	-0.30	-0.18	3.0	L5 MW	
OPANA, OAHU	OPAZ	21	41.45	158	0.70	100	0.00	0.00	0.0	S13	
OUTLET	OTLV	19	23.38	155	16.94	1038	-0.19	-0.18	2.6	L5	
OUTLET	OTLZ	19	23.38	155	16.94	1038	-0.19	-0.18	0.0	L5	
OCEANVIEW ESTATE	OVEV	19	9.21	155	45.92	1378	0.00	0.00	0.0	L5	
PAUAHI	PAUV	19	22.62	155	13.10	994	-0.21	-0.24	2.9	L5	
PAUAHI	PAUE	19	22.62	155	13.10	994	-0.21	-0.24	3.0	L5 MW	
PAUAHI	PAUN	19	22.62	155	13.10	994	-0.21	-0.24	3.0	L5 MW	
PUU ULAULA	PLAV	19	32.00	155	27.67	2992	-0.03	0.13	6.3	L5	I
PUUOKALI, MAUI	POKV	20	44.00	156	23.32	511	0.00	0.00	0.0	L5	
POLIOKEAWE PALI	POLV	19	17.02	155	13.47	169	-0.02	0.03	3.4	E5	
PUU PILI	PPLV	19	9.50	155	27.87	35	-0.15	-0.15	1.4	E5	
RED CONE	RCOV	19	24.36	155	37.79	3601	0.00	0.00	0.0	L5	
RIM	RIMV	19	23.90	155	16.60	1128	-0.21	-0.13	0.0	L5	H
RAINSHED	RSDV	19	27.78	155	16.68	1270	0.06	0.15	0.0	L5	
SOUTH POINT	SPDV	18	58.94	155	40.24	250	-0.17	-0.22	0.0	L5	
SOUTH POINT	SPDE	18	58.94	155	40.24	250	-0.17	-0.22	0.0	L5 MW	
SOUTH POINT	SPDN	18	58.94	155	40.24	250	-0.17	-0.22	0.0	L5 MW	
STEAM CRACKS	STCV	19	23.30	155	7.67	765	-0.25	-0.30	3.4	L5	H
SOUTHWEST RIFT	SWRV	19	27.26	155	36.30	4048	0.01	0.04	5.6	E5	
TRAIL	TRAV	19	24.91	155	32.96	3207	0.00	0.00	0.0	L5	
UWEKAHUNA	URAV	19	25.40	155	17.60	1240	-0.21	0.00	0.0	R5	
UWEKAHUNA	URAE	19	25.40	155	17.60	1240	-0.21	0.00	3.0	R5 MW	
UWEKAHUNA	URAN	19	25.40	155	17.60	1240	-0.21	0.00	3.0	R5 MW	
UWEKAHUNA	UUGZ	19	25.40	155	17.60	1240	0.00	0.00	0.0	L0	
WAIKII	WAIV	19	51.58	155	39.60	1433	0.20	0.35	0.0	L5	
WILKES CAMP	WILV	19	28.15	155	35.02	4037	0.22	0.17	2.6	E5	
WILKES CAMP	WILE	19	28.15	155	35.02	4037	0.22	0.17	3.0	L5 MW	
WILKES CAMP	WILN	19	28.15	155	35.02	4037	0.22	0.17	3.0	L5 MW	
WAIMANALO RIDGE,	WMRZ	21	19.22	157	40.94	200	0.00	0.00	0.0	S13	
WEATHER OBSERVAT	WOBV	19	32.31	155	35.01	3396	0.00	0.00	0.0	E5	
WOOD VALLEY	WOOV	19	15.08	155	30.12	909	-0.15	-0.06	2.6	E5	

.**Table 2 Seismic instrument types, U.S. Geological Survey, Hawaiian Volcano Observatory (HVO).**

The codes in parentheses refer to the seismometer types listed in Table 1. Type 1 (Codes E, L, R, and 4, 5) consists of:

a) Geophone — Electrotech EV-17 (E), Mark Products L4C (L) or Kinemetric Ranger SS1 (R); (L) and (R) are 1.0-second period moving-magnet vertical- or horizontal- (E-W and N-S) component seismometers adjusted for an output of 0.5 volts/cm/sec and 0.8, critically damped.

b) Preamp/VCO — USGS/OEVE Model J502, J512 (5) voltage-controlled oscillator. Three db points for bandpass filter at 0.1 Hz and 30 Hz. Signals are transmitted on audio FM carrier over cable or FM-radio link to HVO.

Code (MW) Horizontal-component seismograph based on a Type 1 system and modified to 3x a Wood-Anderson response.

Code (S13) Geotech, 1-Hz seismometer with A1 VCO operated by the Pacific Tsunami Warning Center.

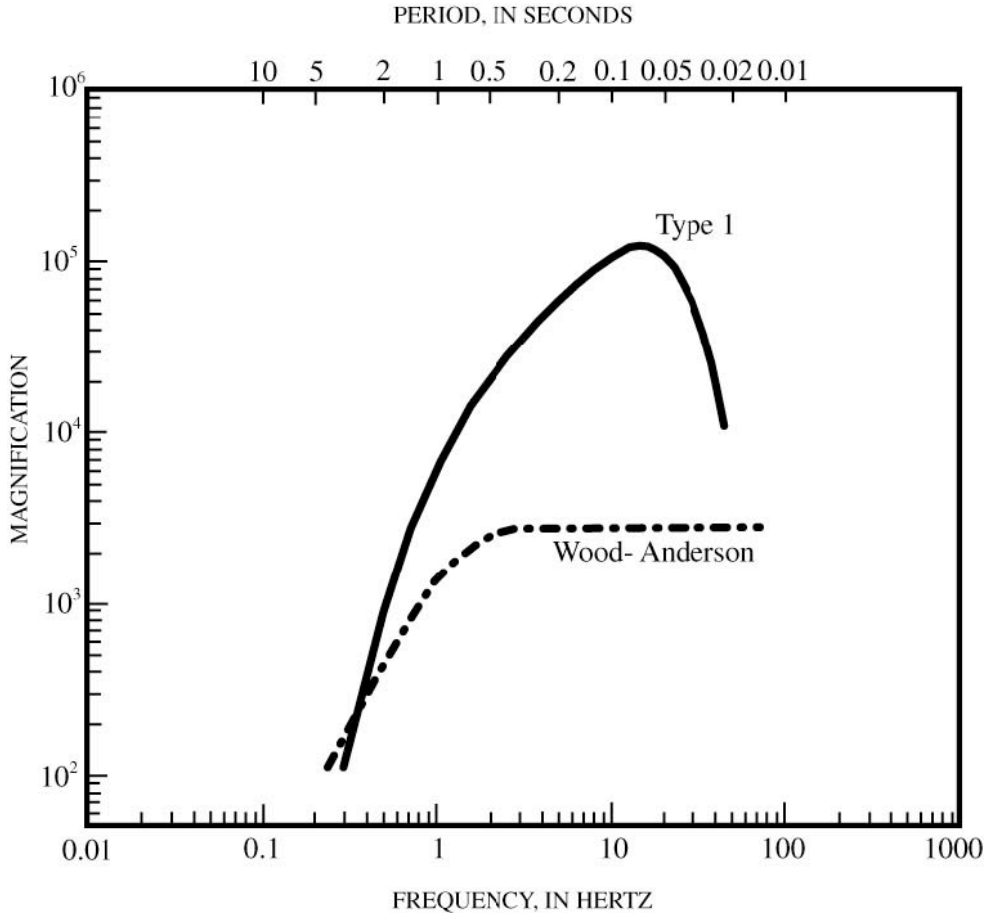

Figure 6. System-response curves for the Wood-Anderson torsion seismograph and for seismometers used by the Hawaiian Volcano Observatory. The Type 1 curve plots the unit response of the standard USGS microearthquake seismometer system as would be recorded on Develocorder film. This includes the geophone, all electronics, including telemetry, Develocorder galvanometer, and a 20x magnification film viewer. The curve plots the unit response, which is multiplied by CAL, a station's calibration factor, to get the response for that station.

Seismic Data Processing

Due to age and high cost of maintenance, Develocorder "A" was discontinued on August 1, 1997. Daily count of classified micoearthquakes from source regions around Kīlauea and Mauna Loa, and duration of tremor, were also discontinued. Coda duration, however, is measured in seconds from drum (ink or helicorder) records to determine a coda magnitude that is entered as an external magnitude in the final solution.

In 1986, HVO acquired a VAX 11-750 computer and adopted the CUSP routine. Discriminated signals pass through an analog-to-digital converter, and detected events are saved in real time. Detected events are then demultiplexed, and P-picks are made by the computer, producing a rough location. Events are examined by an analyst on a graphics terminal in order to refine computer P-picks and to time additional P- and S-phases for a preliminary location. Binary .mem files are translated into ASCII phase files. Locations and amplitude magnitudes are then determined by using the program HYPOINVERSE-2000 (Klein, 2002)[2]. Events are reworked and rerun, as needed, to produce a final solution.

Through May 2005, CUSP .grm and .mem files were archived directly onto magneto-optical media. Since June 2005, the binary files have been archived to a second Alpha node, then stored on a RAID system as UNIX executable files. Files stored on the magneto-optical media through May 2005 were transferred to the RAID storage.

In July 1992, HVO acquired VAX servers and workstations needed to run the upgraded version of CUSP. The servers are used for data acquisition, and the workstations are used for interactive earthquake timing. In addition to timing P and S arrival signals, the VAX workstations were then capable of measuring peak-to-peak amplitudes, along with the associated period. This capability allowed the renewal of amplitude magnitude determinations from the network seismic stations. Amplitude data gathered from July 1992 to July 1997 became part of a test set to determine magnitude corrections for network stations. Results of newly determined magnitude corrections are detailed by Nakata and Okubo (1997)[3].

In parallel with CUSP, HVO currently operates Earthworm software to record all HVO seismic data, including the exchange of seismic data with cooperating networks. HVO also utilizes the Earthworm processing system for rapid computation of earthquake products (locations, magnitude, spectrograms, helicorders, ShakeMaps, and recent earthquakes Web pages). Analysis of triggered events and seismic-catalog generation was accomplished by using CUSP and HYPOINVERSE processing platforms through March 2009.

Earthquake hypocenters are computed within a one-dimensional velocity model. The model is specified by velocities at four depth points, as listed below. Velocity at any depth above a homogeneous half-space is given by linear interpolation between points:

VELOCITY (km/sec)	DEPTH (km)
1.9	0.0
6.5	4.6
6.9	15.0
8.3	≥16.5

Two empirical sets of station delays or corrections are used in the HYPOINVERSE locations and are given in table 1. The delay models are separated by a circle of radius 34 km, centered at 19°22' N and 155°10' W. Delay model 1 is used for epicenters occurring within a circle of radius 31 km from the center. This region includes Kīlauea and its south flank. A combination of both delay models is used for epicenters that fall in a transition zone that is 6 km wide. Delay model 2 is applied to the rest of the island and to offshore earthquakes. For a detailed description, refer to HYPOINVERSE-2000 (Klein, 2002)[2].

Magnitudes for events are computed by using recorded amplitudes on selected network vertical, Modified Wood-Anderson (MW) horizontal, and/or moderate- and low-gain stations. Amplitude readings are corrected to an equivalent Wood-Anderson amplitude by using the curves shown in figure 6 and the CAL factors listed in table 1.

Duration magnitude is determined by the length of the signal, in seconds, read from drum recordings of Type 1 seismographs. This length of time is measured from the P arrival to the point where the earthquake signal has decayed to nearly the background noise level. Drum-recorded duration magnitude is calculated with a relationship equivalent to the develocorder viewer output.

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[2]Klein, F.W., 2002, User's guide to HYPOINVERSE-2000, a Fortran Program to solve for earthquake locations and magnitudes: U.S. Geological Survey Open-File Report 02–171, 116 p.

[3]Nakata, J., and Okubo, P., 1997, Determination of station amplitude magnitude corrections for the Hawaiian Volcano Observatory telemetered seismograph network–Data from 1992-1997: U.S. Geological Survey Open-File Report 97-863, 73 p.

Seismic Catalog

The emphasis of both station coverage and detailed data analysis is on the highly active southern half of the Island of Hawai‘i. The data set of well-recorded, located earthquakes in the Hawai‘i Island region is nearly complete above magnitude 2.0. Many smaller earthquakes in the Kīlauea region are locatable because of the dense instrumental coverage. Substantial effort is made to locate earthquakes elsewhere within the Hawaiian Archipelago, and although such coverage cannot be as complete as it is in south Hawai‘i, nearly all events above magnitude 4.0 are located with limited precision.

Data presented in the seismic catalog are in three parts: 1) Maps showing computer-located hypocenters are given in figures 11–24. The location maps are of different scales and provide hypocenters with magnitude thresholds set at 1.0, 2.0, 3.0, and 3.5, varying according to region. 2) The list of computer locations constitutes the bulk of this summary and is given in table 4. Each earthquake in the list is assigned a three-letter code based on its general location and depth. Figures 7–10 are maps of the regions used to assign the location codes. The latitude and longitude limits of rectangular regions are listed in table 3. When the listed coordinates overlap, boundaries are as shown in figures 7–10. 3) Table 5 re-lists the events in table 4 for which the preferred magnitude is 3.0 or larger. This list includes many of the earthquakes felt in Hawai‘i.

Table 3. Names and coordinates of regions used for classifying Hawaii earthquakes.

All earthquakes are HYPOINVERSE classified in one of the following groups, identified by a numerical class or three-letter code.

Shallow:

1	SNC	Shallow north caldera (0–5 km)
2	SSC	Shallow south caldera (0–5 km)
3	SEC	Shallow east caldera (0–5 km)
4	SER	Shallow east rift (0–5 km)
5	SME	Shallow middle east rift (0–5 km)
6	KOA	Koa‘e fault zone (0–5 km)
7	SSF	Shallow south flank (0–5 km)
8	SLE	Shallow lower east rift (0–5 km)

Intermediate depth:

9	SF1	Kīlauea south flank (5–13 km) (west end)
10	SF2	Kīlauea south flank (5–13 km)
11	SF3	Kīlauea south flank (5–13 km)
12	SF4	Kīlauea south flank (5–13 km)
13	SF5	Kīlauea south flank (5–13 km) (east end)
14	LER	Lower east rift (5–13 km)
15	MLO	Mauna Loa (0–13 km)
16	LSW	Lower southwest rift zones of Kīlauea and Mauna Loa (0–13 km)
17	GLN	Glenwood (0–13 km)
18	SWR	Southwest rift zone of Kīlauea (0–13 km)
19	INT	Intermediate caldera (5–13 km)
20	KAO	Ka‘ōiki (0–13 km)

Deep:

21	DEP	Deep Kīlauea (>13 km) (below regions 1–13, 17–19)
22	DLS	Deep lower southwest rift zone of Kīlauea and Mauna Loa (>13 km) (below region 16)
23	DML	Deep Mauna Loa (>13 km) (below regions 15, 20)

Outer regions, all depths:

24	LOI	Lō‘ihi
25	KON	South Kona
26	HUA	Hualālai
27	KOH	Kohala
28	KEA	Mauna Kea
29	HIL	Hilo
30	DIS	Distant, everywhere else

Table 3 (continued).
The latitude and longitude limits of the regions are given below. If the coordinates overlap, boundaries are as shown in figures 7–10.

No.	Code	N. Lat.	S. Lat.	W. Lon.	E. Lon.
1	SNC	19 28.0	19 24.5	155 19.0	155 14.0
2	SSC	19 24.5	19 22.0	155 19.0	155 16.5
3	SEC	19 24.5	19 22.0	155 16.5	155 14.0
4	SER	19 26.0	19 20.5	155 14.0	155 07.2
5	SME	19 26.0	19 21.75–19 20.0	155 07.2	155 00.0
6	KOA	19 22.0	19 20.5	155 17.0	155 14.0
7	SSF	19 20.6–19 24.0	19 10.0	155 17.0	155 00.0
8	SLE	19 32.0	19 16.0	155 00.0	154 40.0
9	SF1	19 22.0	19 10.0	155 17.0	155 14.5
10	SF2	19 26.0	19 10.0	155 14.5	155 12.3
11	SF3	19 26.0	19 10.0	155 12.3	155 09.1
12	SF4	19 26.0	19 10.0	155 09.1	155 05.3
13	SF5	19 26.0	19 10.0	155 05.3	155 00.0
14	LER	19 32.0	19 16.0	155 00.0	154 40.0
15	MLO	19 35.0	19 19.0	155 35.0	155 19.0
16	LSW	19 19.0	18 40.0	155 43.0	155 25.0
17	GLN	19 35.0	19 26.0	155 19.0	155 00.0
18	SWR	19 22.0	19 10.0	155 25.0	155 17.0
19	INT	19 28.0	19 22.0	155 19.0	155 14.0
20	KAO	19 30.0	19 19.0	155 32.0	155 19.0
21	DEP	19 35.0	19 10.0	155 25.0	155 00.0
22	DLS	19 19.0	18 40.0	155 43.0	155 25.0
23	DML	19 35.0	19 19.0	155 35.0	155 19.0
24	LOI	19 10.0	18 40.0	155 25.0	155 00.0
25	KON	19 39.0	19 00.0	156 20.0	155 43.0
26	HUA	19 55.0	19 39.0	156 20.0	155 43.0
27	KOH	20 25.0	19 55.0	156 20.0	155 34.0
28	KEA	20 25.0	19 35.0	155 34.0	154 40.0
29	HIL	19 47.0	19 32.0	155 09.0	154 40.0

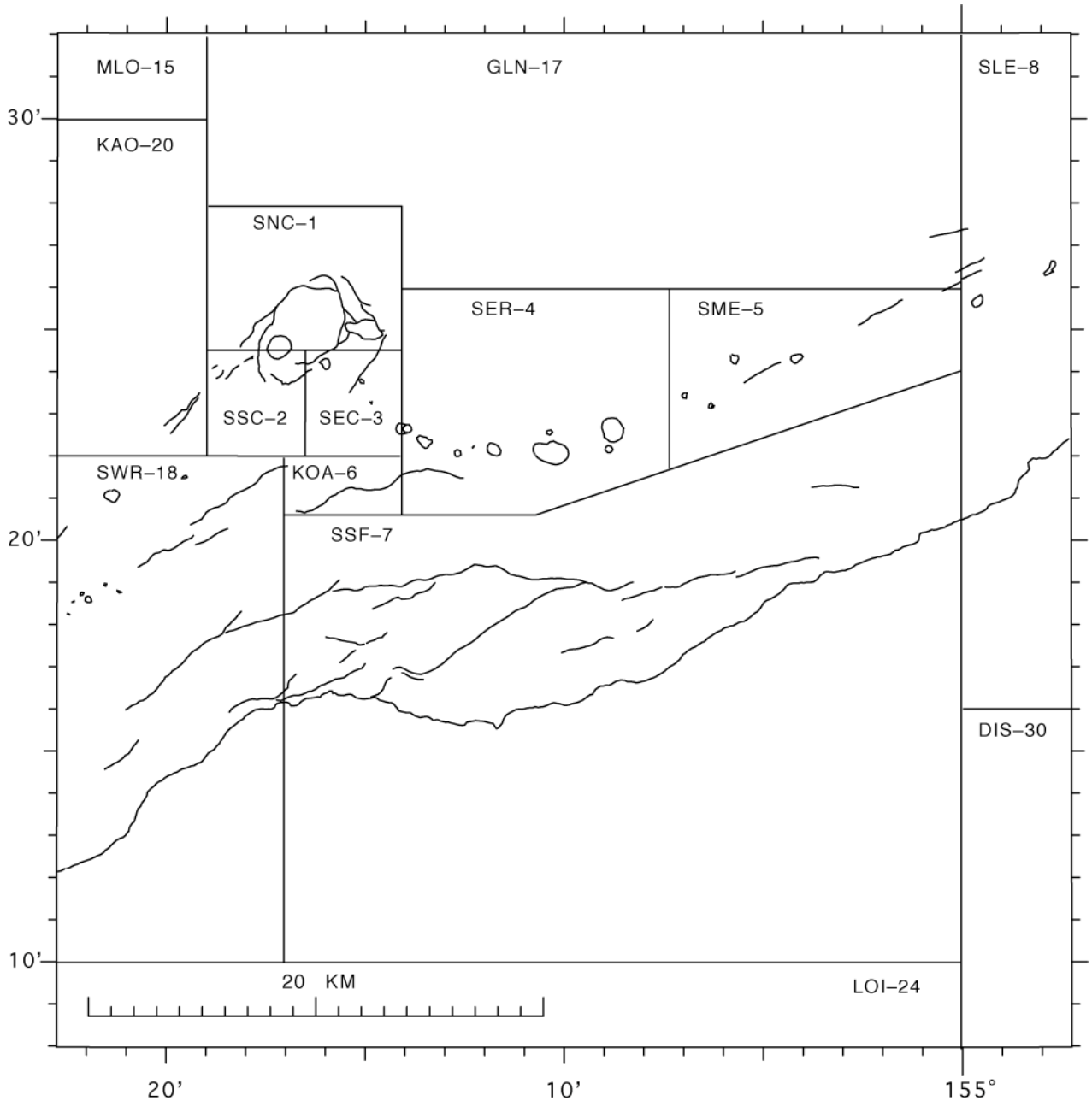


Figure 7. Regions for earthquake classification for Kīlauea and the east flank of Mauna Loa, Hawai‘i. Depth range and coordinate boundaries for each region are described in table 3.

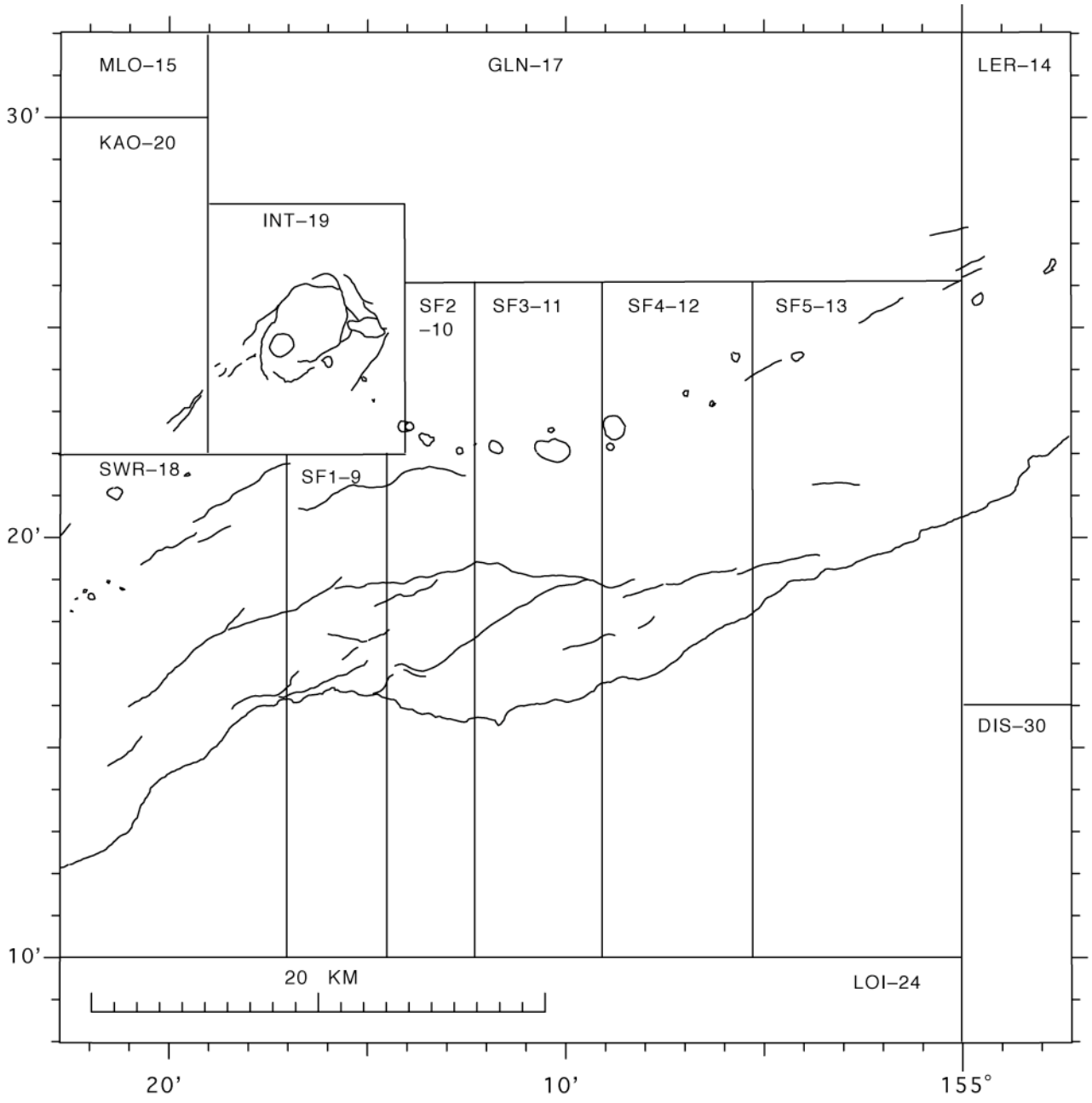


Figure 8. Regions for earthquake classification for Kīlauea and the east flank of Mauna Loa, Hawai‘i. Depth range and coordinate boundaries for each region are described in table 3.

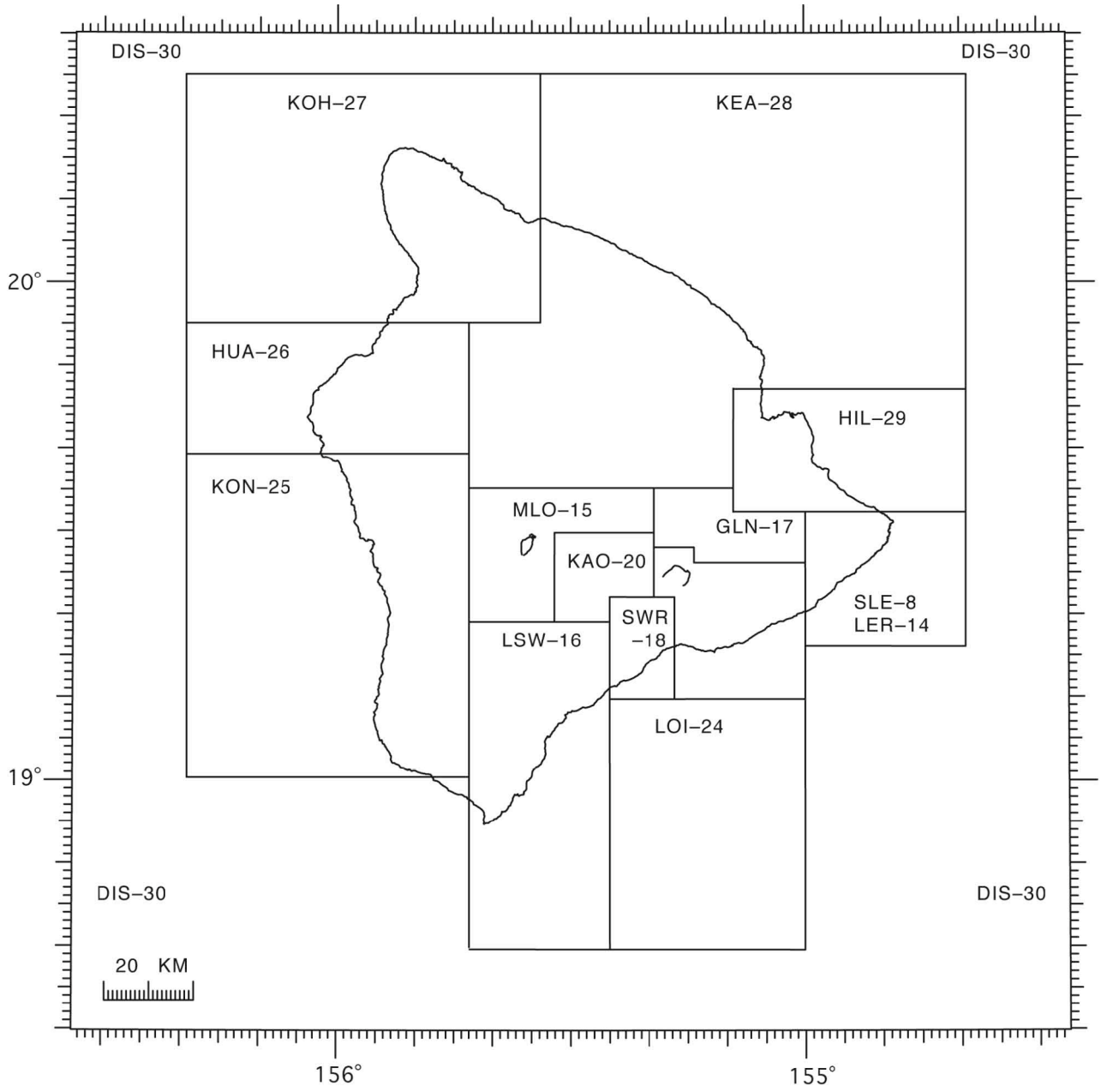


Figure 9. Regions for earthquake classification for Hawai‘i Island. Depth range and coordinate boundaries for each region are described in table 3.

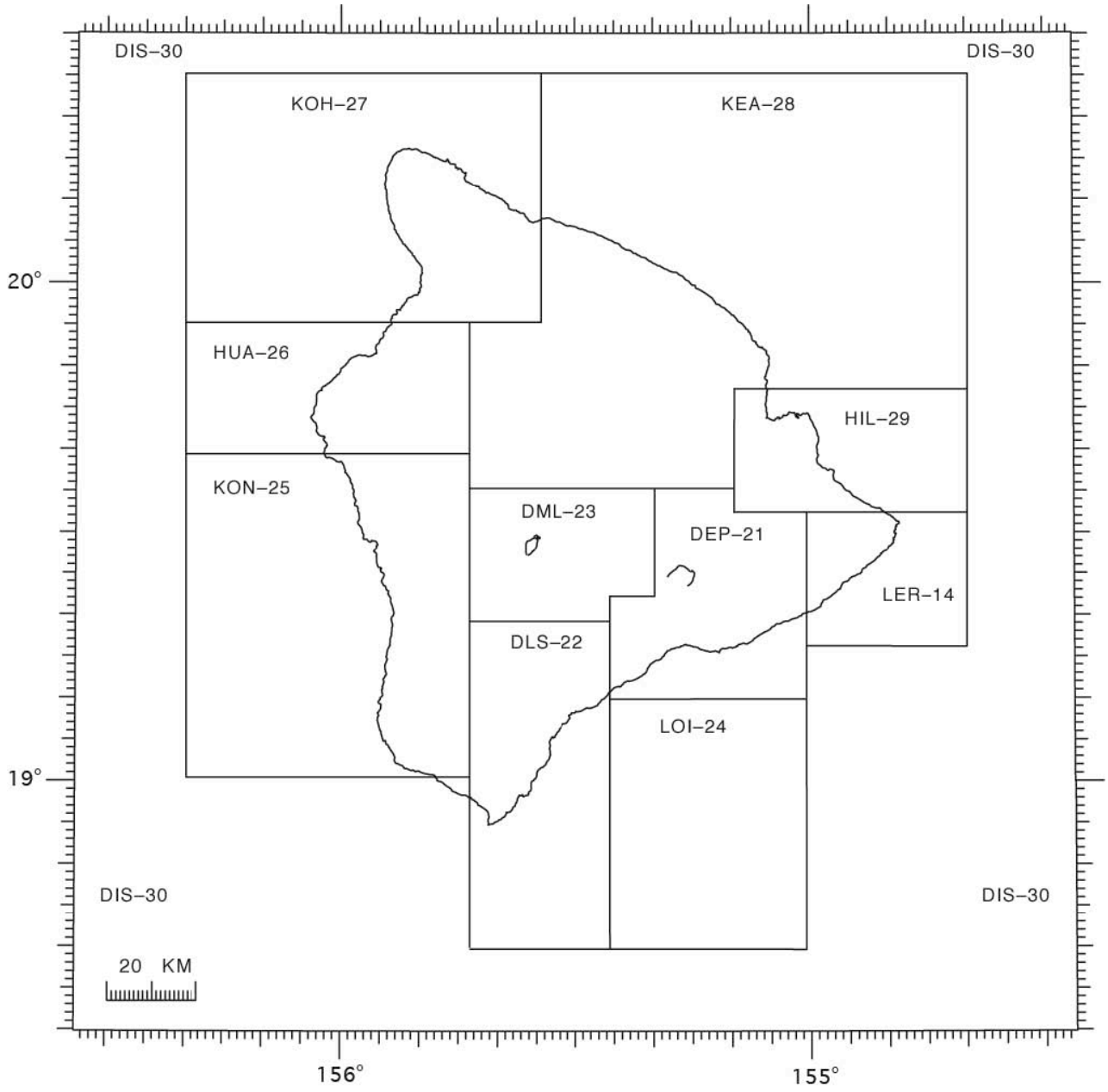


Figure 10. Regions for earthquake classification for Hawai‘i Island. Depth range and coordinate boundaries for each region are described in table 3.

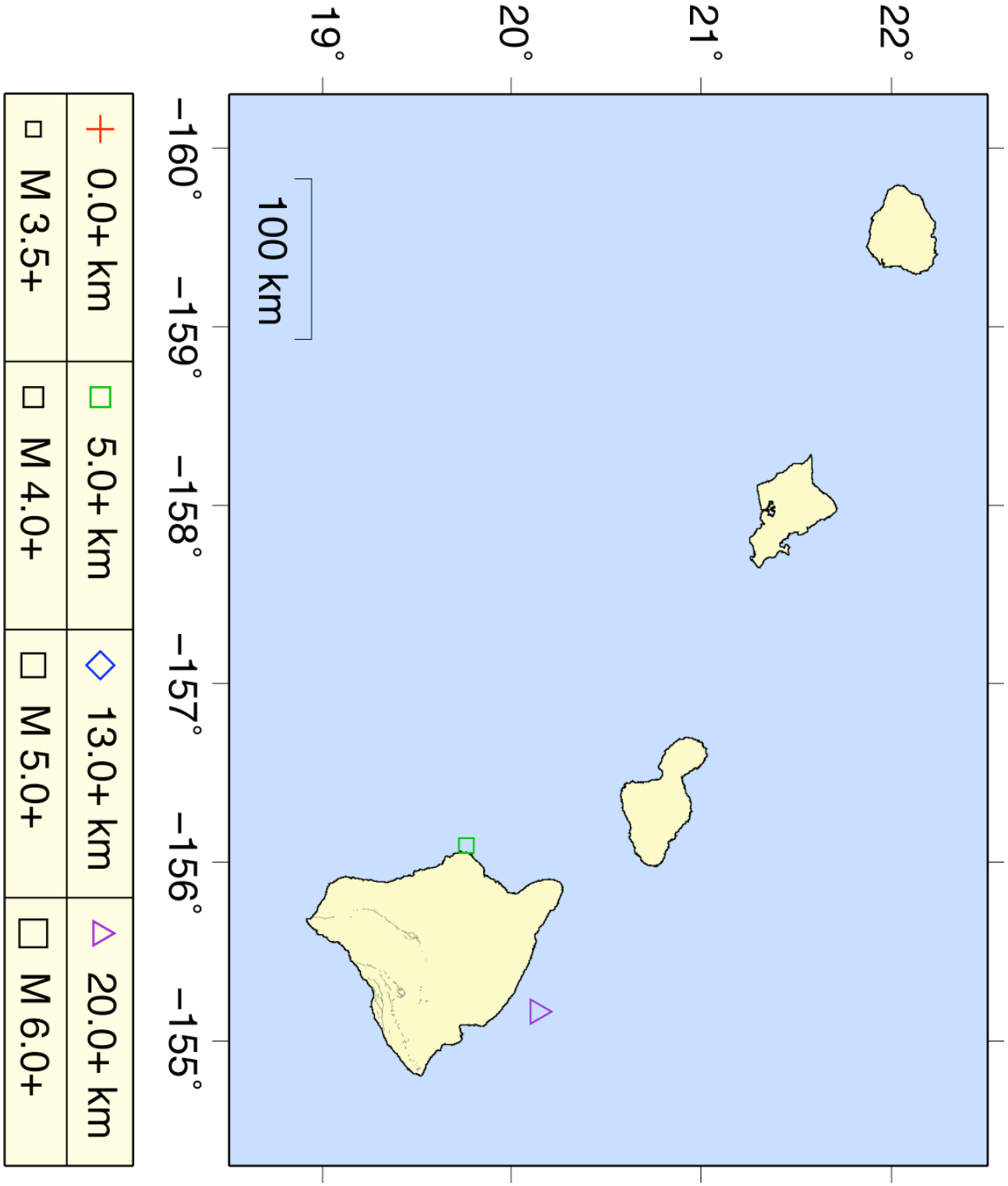


Figure 11. January–March 2009 earthquake locations, Hawaiian Islands, 0–60 km deep, M≥3.5.

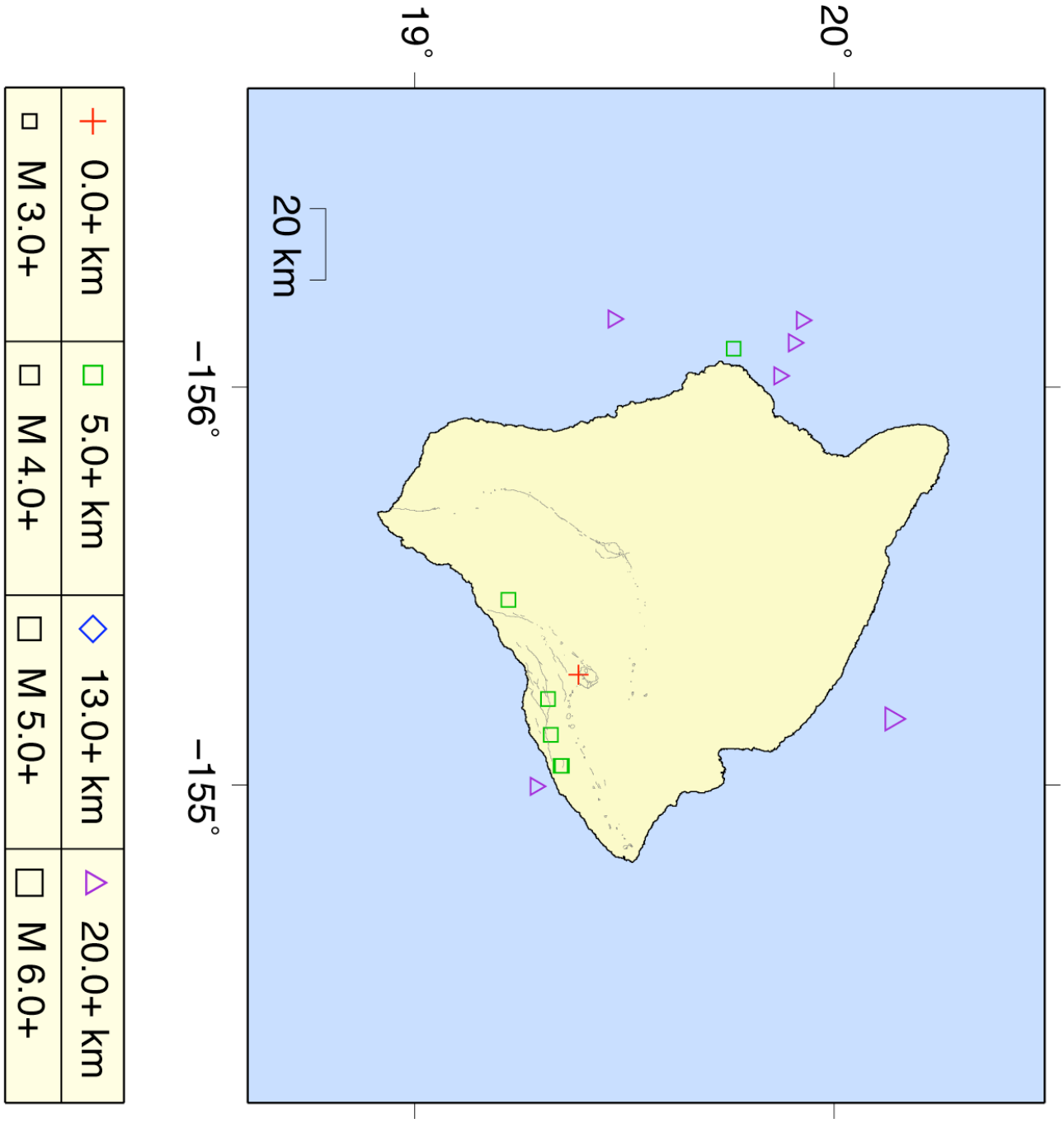


Figure 12. January–March 2009 earthquake locations, Hawai‘i Island, 0–60 km deep, M≥3.0.

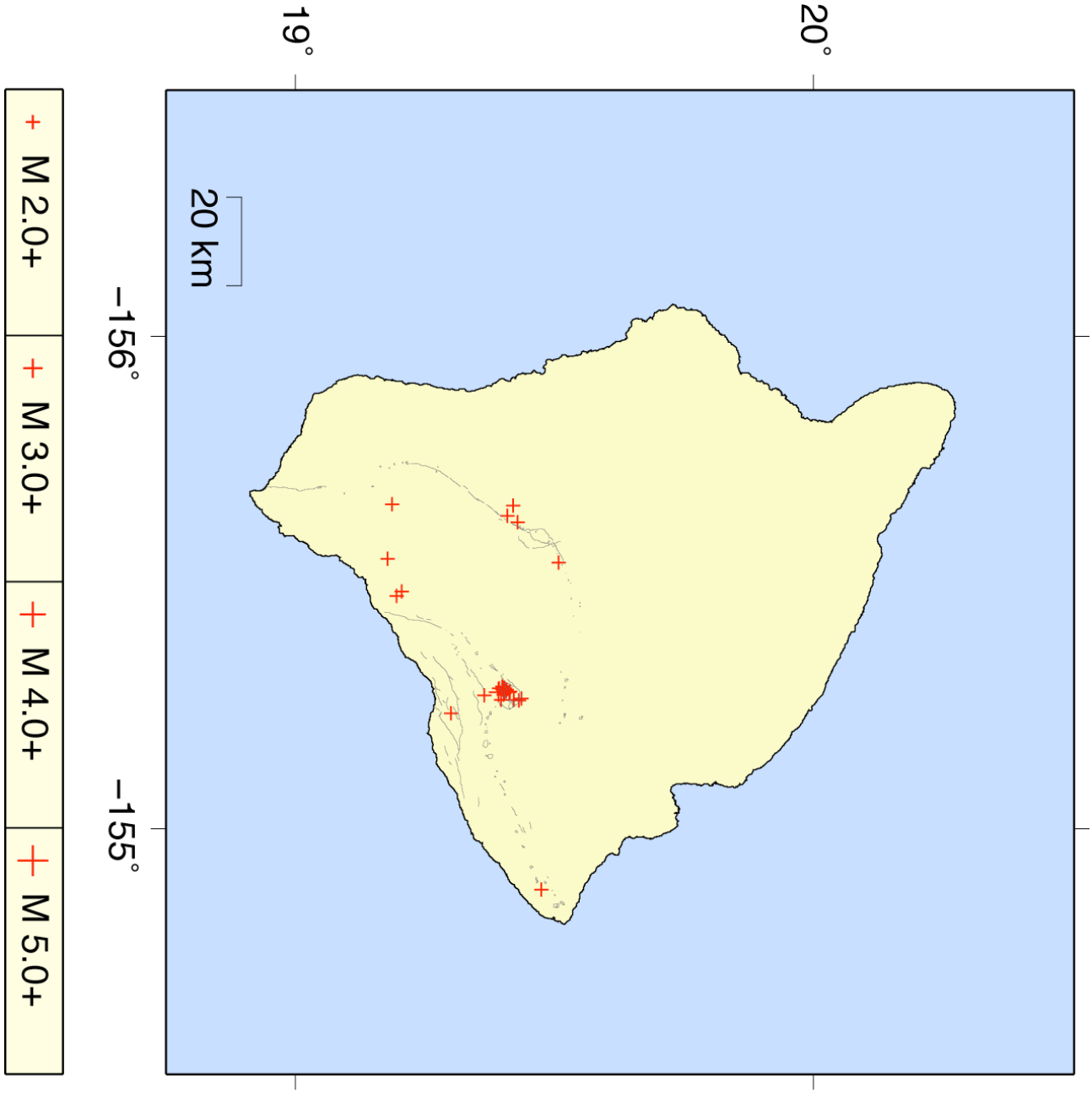


Figure 13. January–March 2009 earthquake locations, Hawai‘i Island, shallow (0–5.0 km deep), M≥2.0.

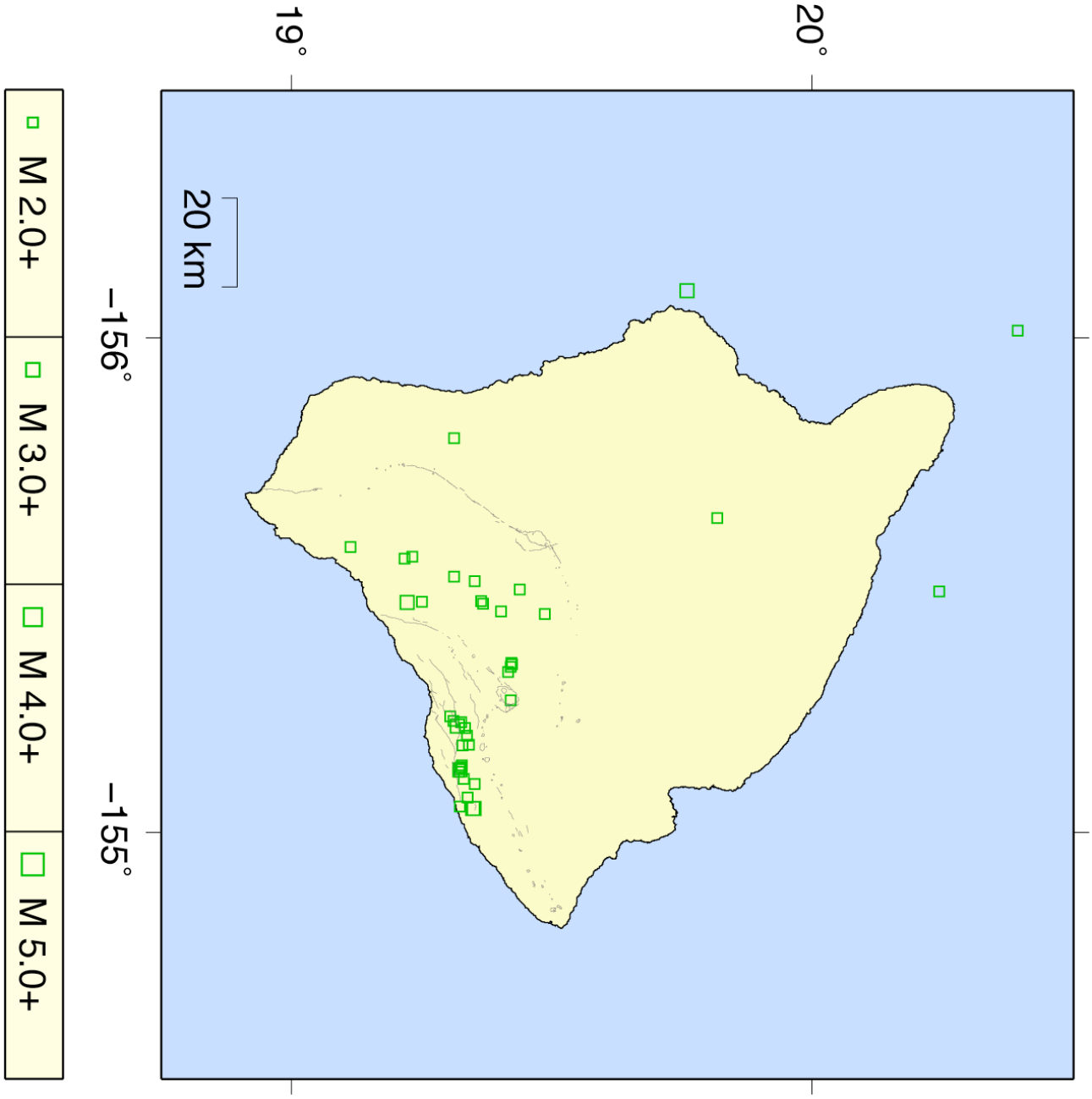


Figure 14. January–March 2009 earthquake locations, Hawai‘i Island, intermediate depth (5.1–13.0 km deep), M≥2.0.

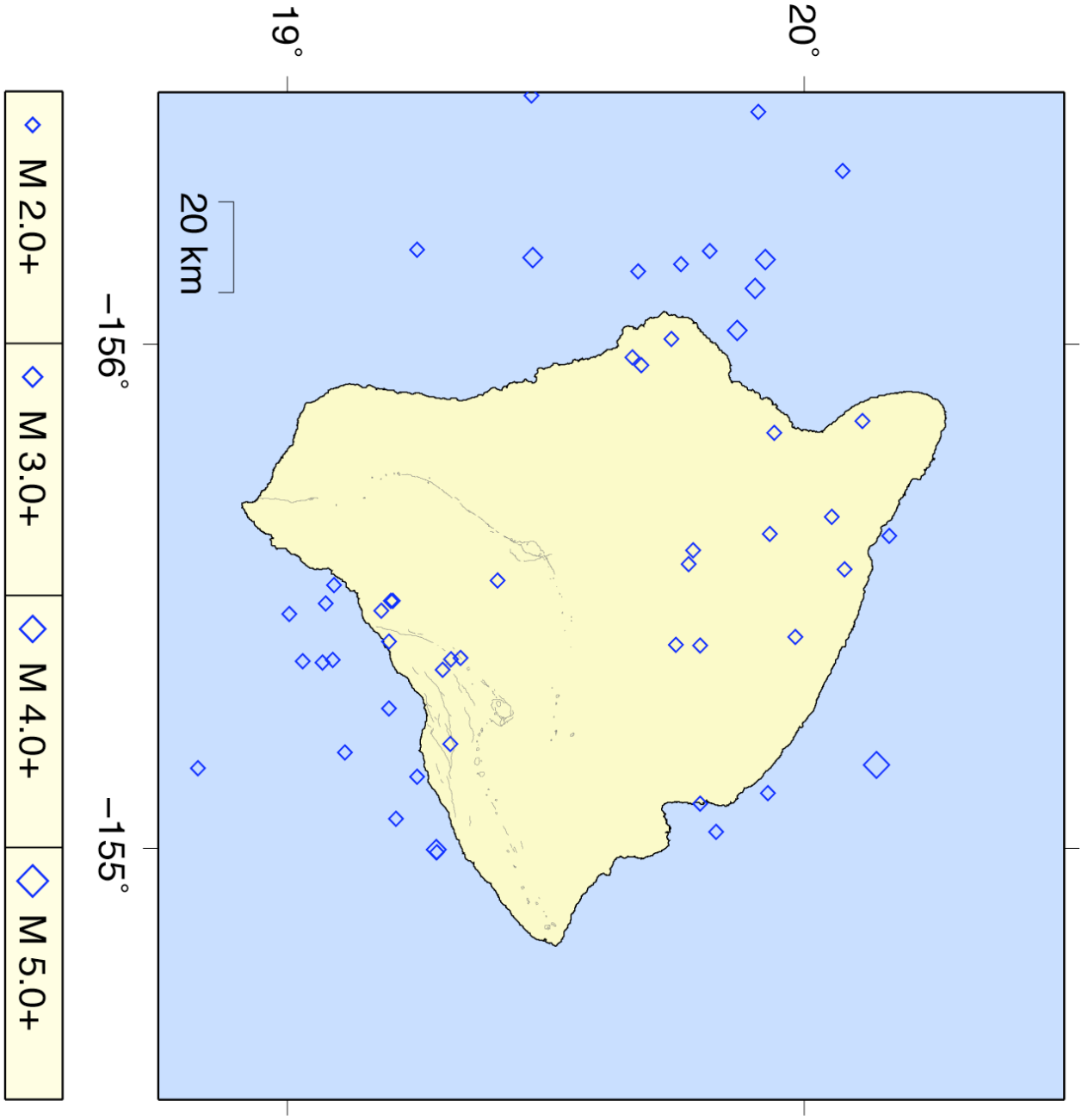


Figure 15. January–March 2009 earthquake locations, Hawai‘i Island, deep (13.1–60.0 km deep), M≥2.0.

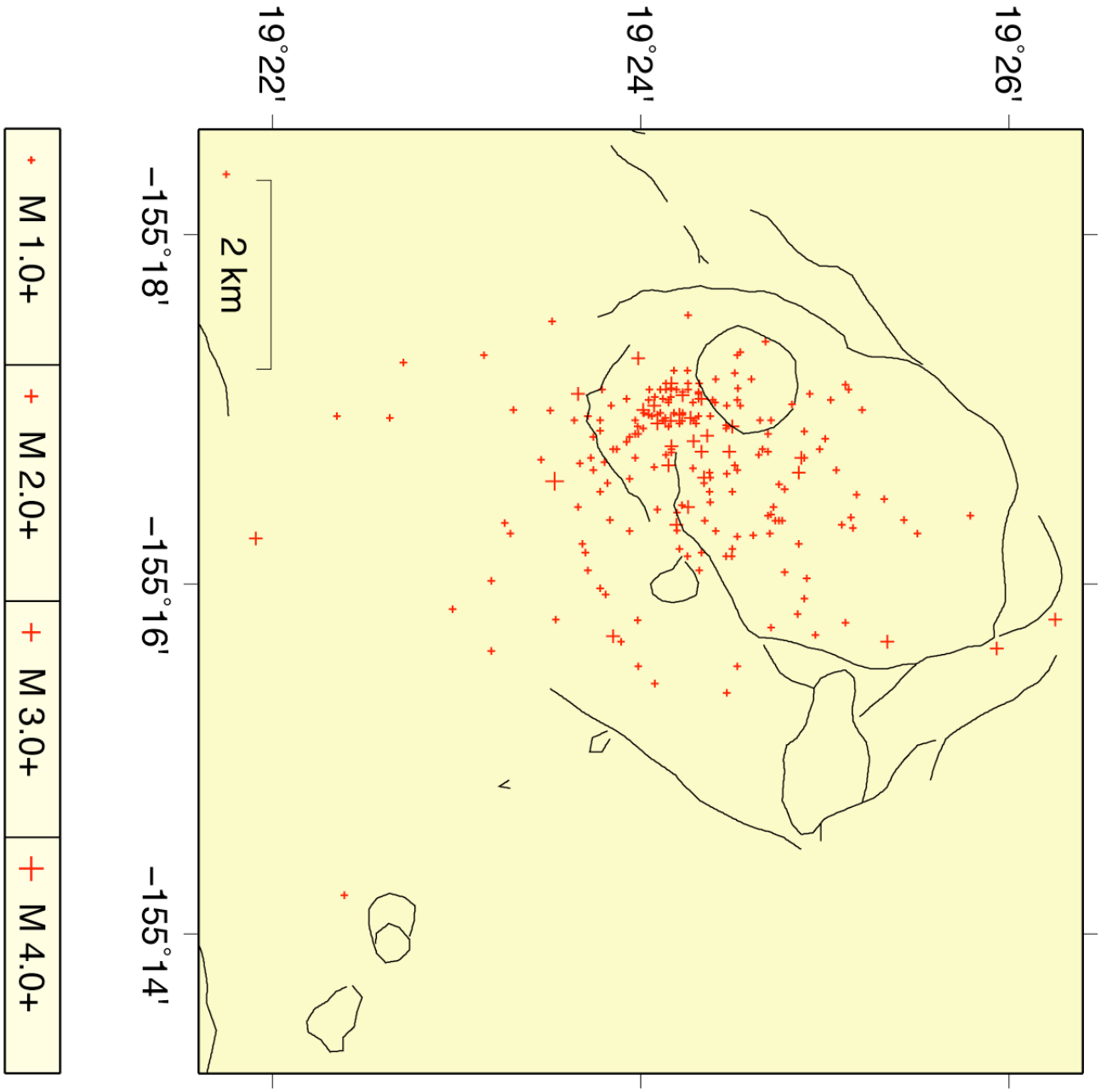


Figure 16. January–March 2009 earthquake locations, Kīlauea summit, shallow (0–5 km deep), M≥1.0.

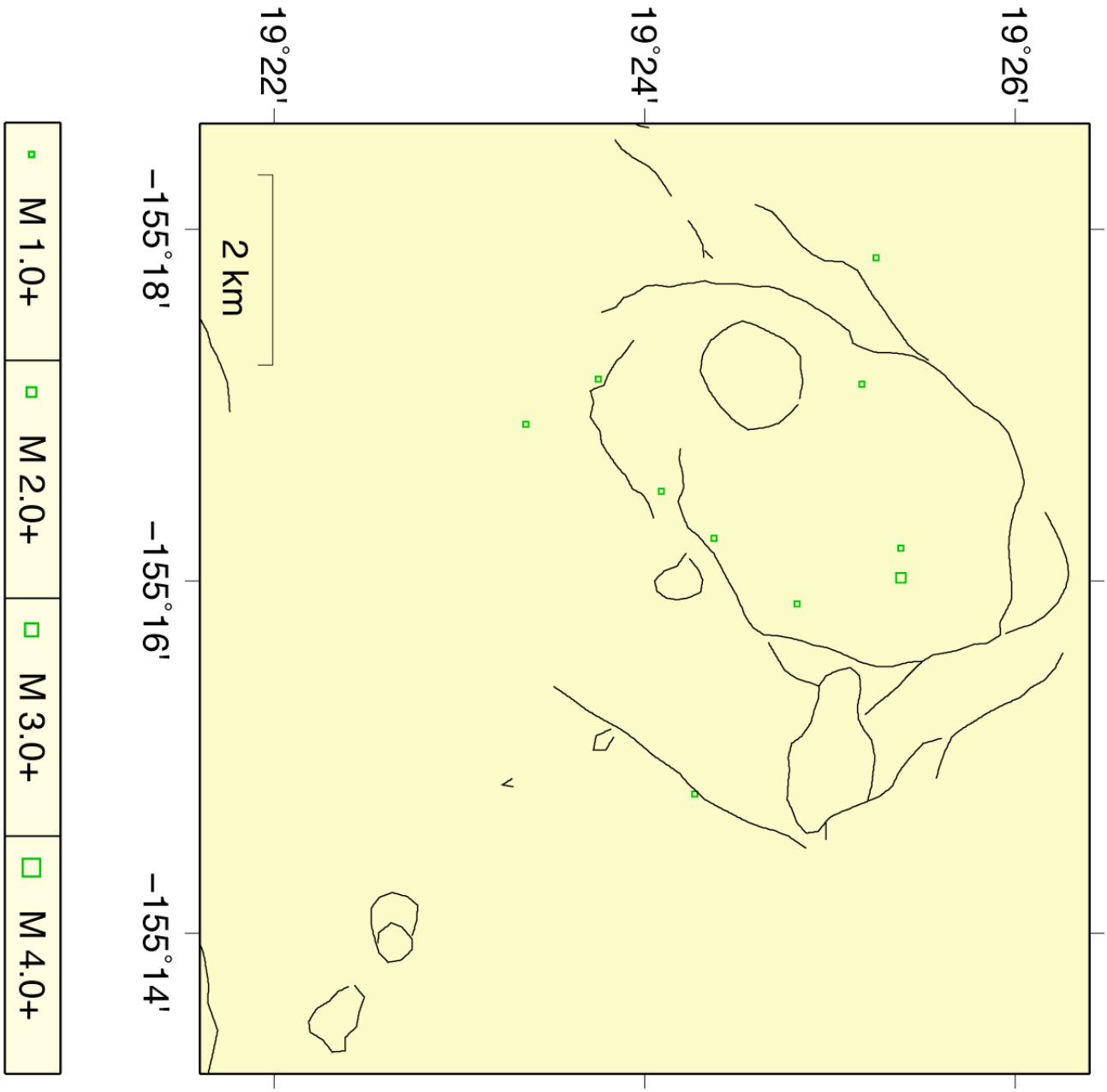


Figure 17. January–March 2009 earthquake locations, Kīlauea summit, intermediate depth (5.1–13.0 km deep), M≥1.0.

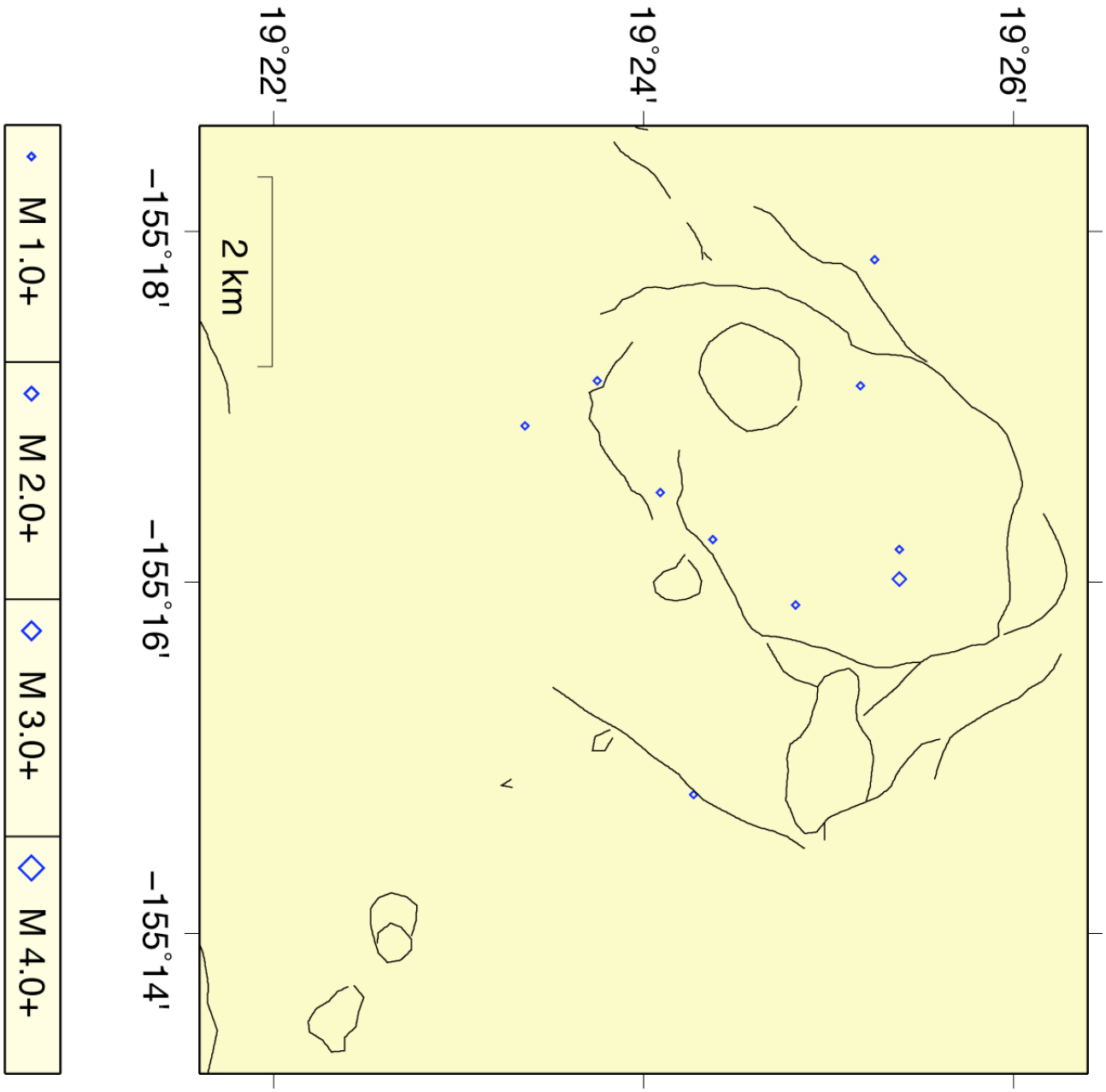


Figure 18. January–March 2009 earthquake locations, Kīlauea summit, deep (13.1–60.0 km deep), M≥1.0.

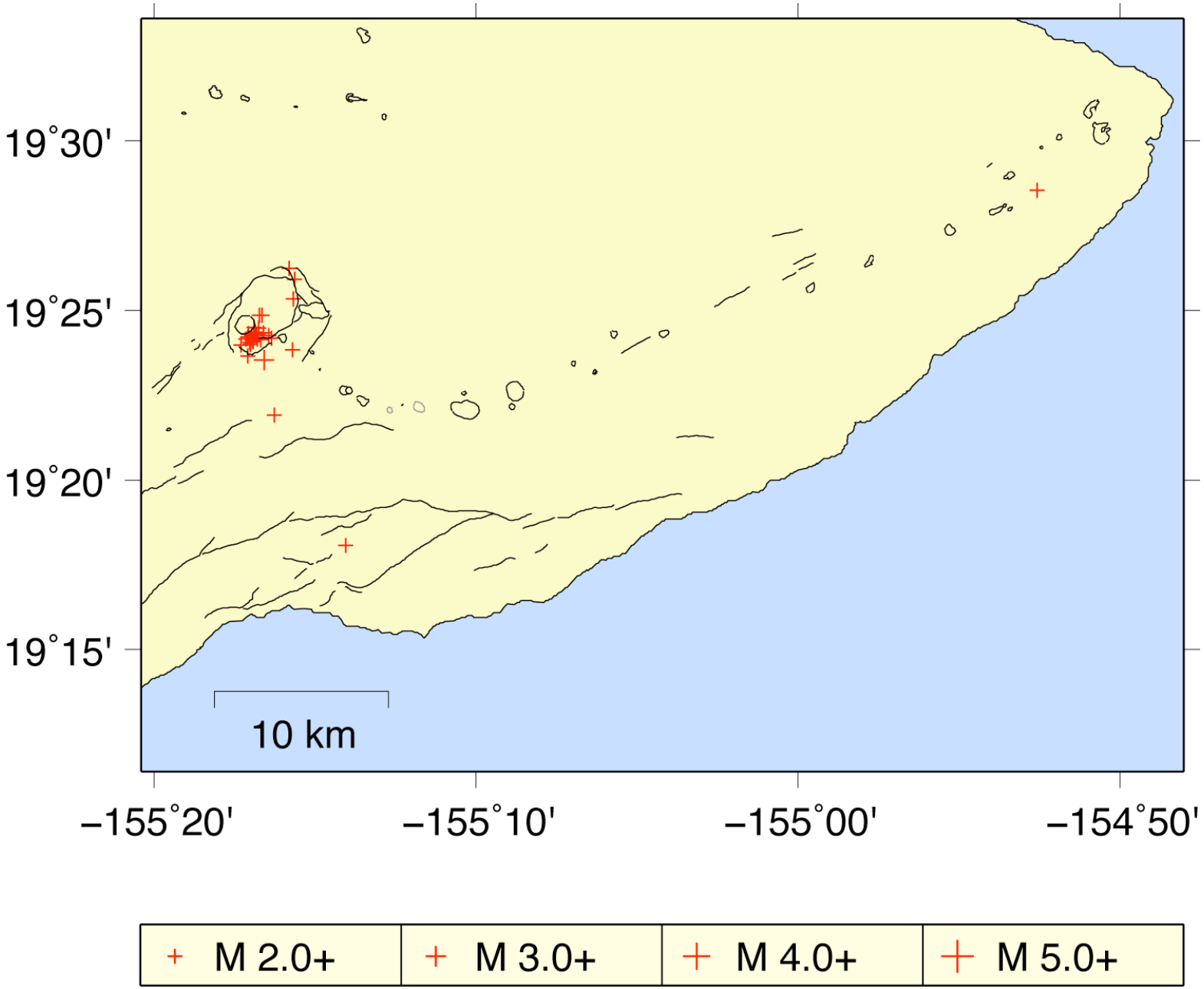


Figure 19. January–March 2009 earthquake locations, Kilauea south flank, shallow (0–5 km deep), M≥2.0.

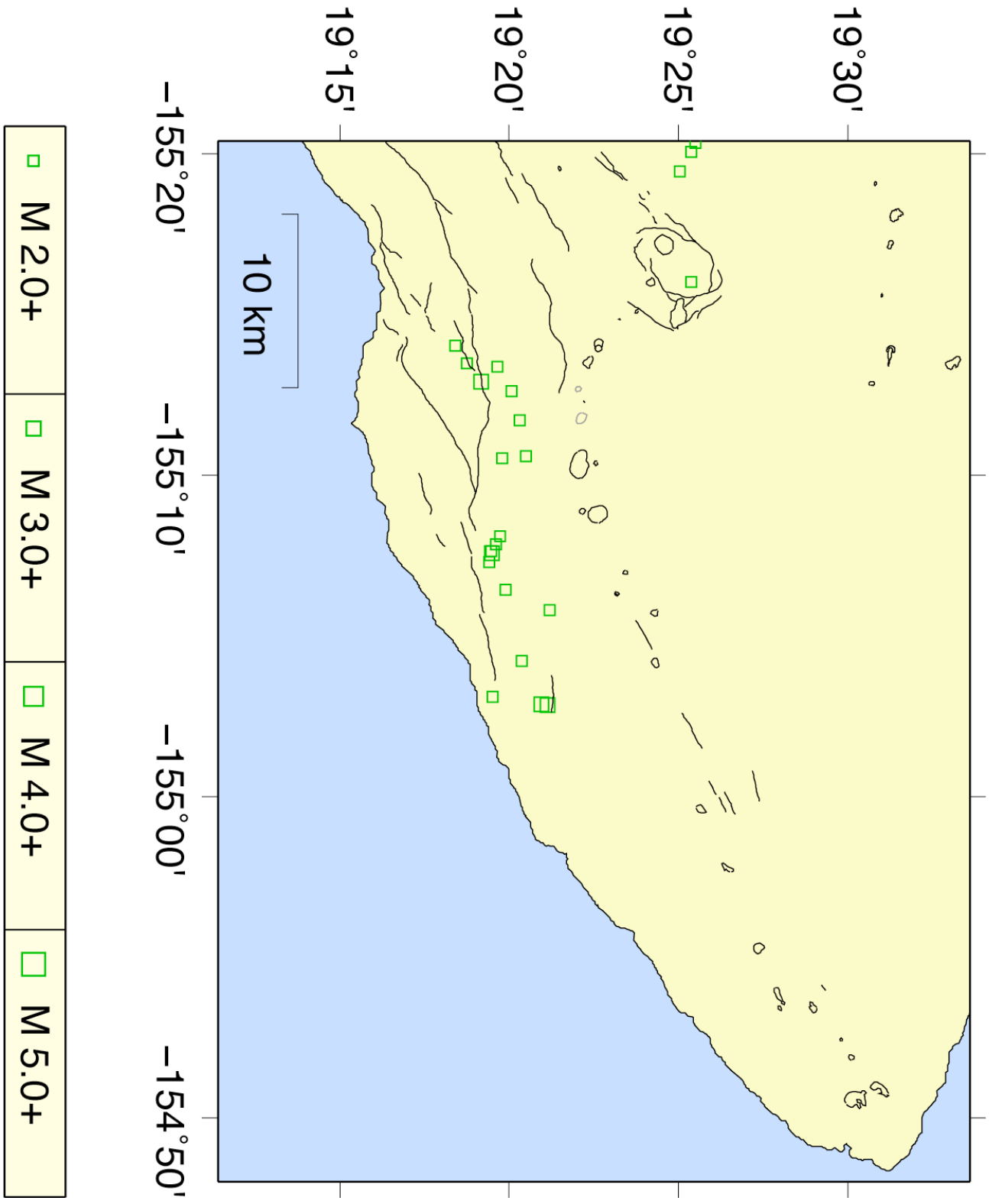


Figure 20. January–March 2009 earthquake locations, Kīlauea south flank, intermediate depth (5.1–13.0 km deep), M≥2.0.

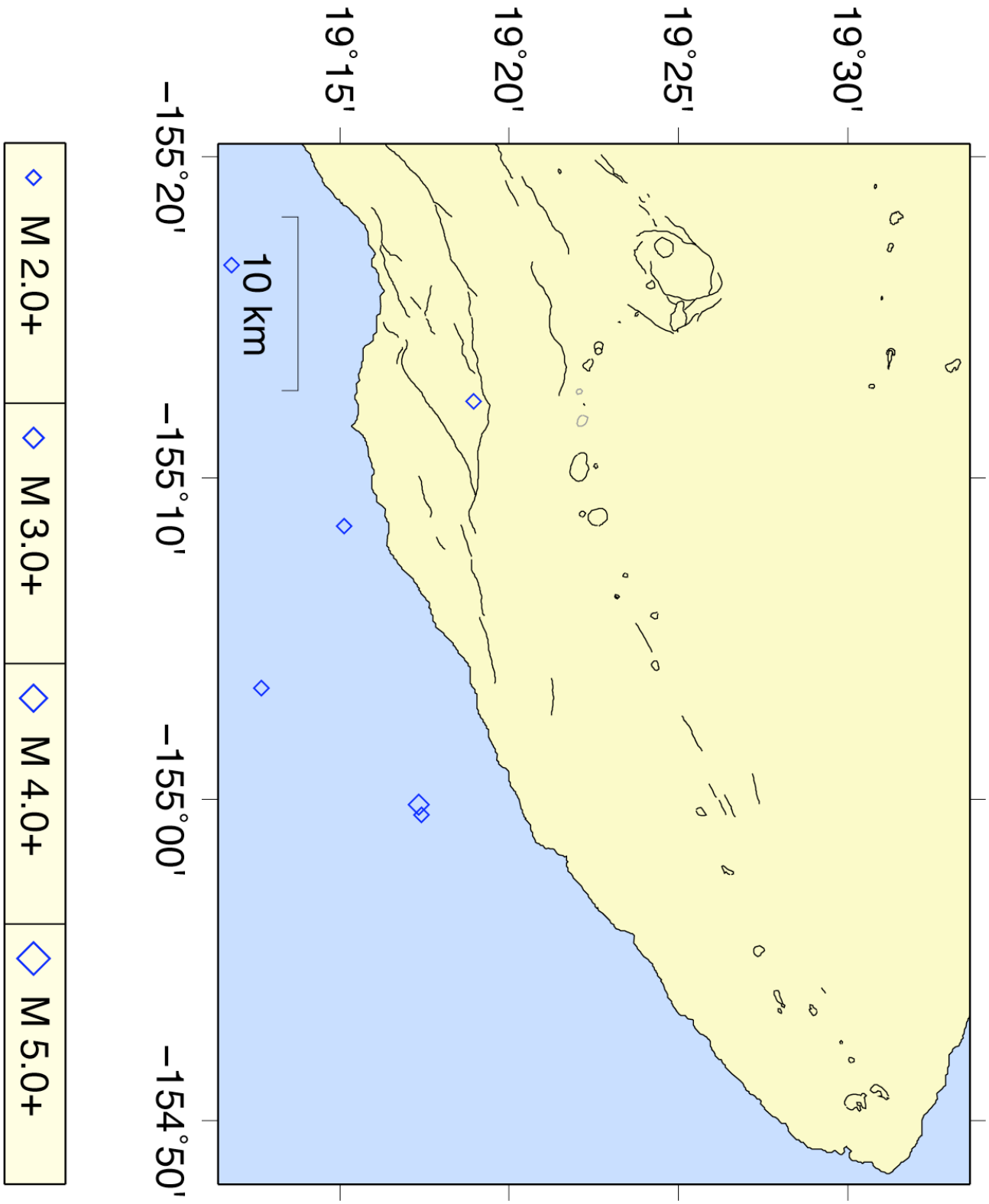


Figure 21. January–March 2009 earthquake locations, Kīlauea south flank, deep (13.1–60.0 km deep), M≥2.0.

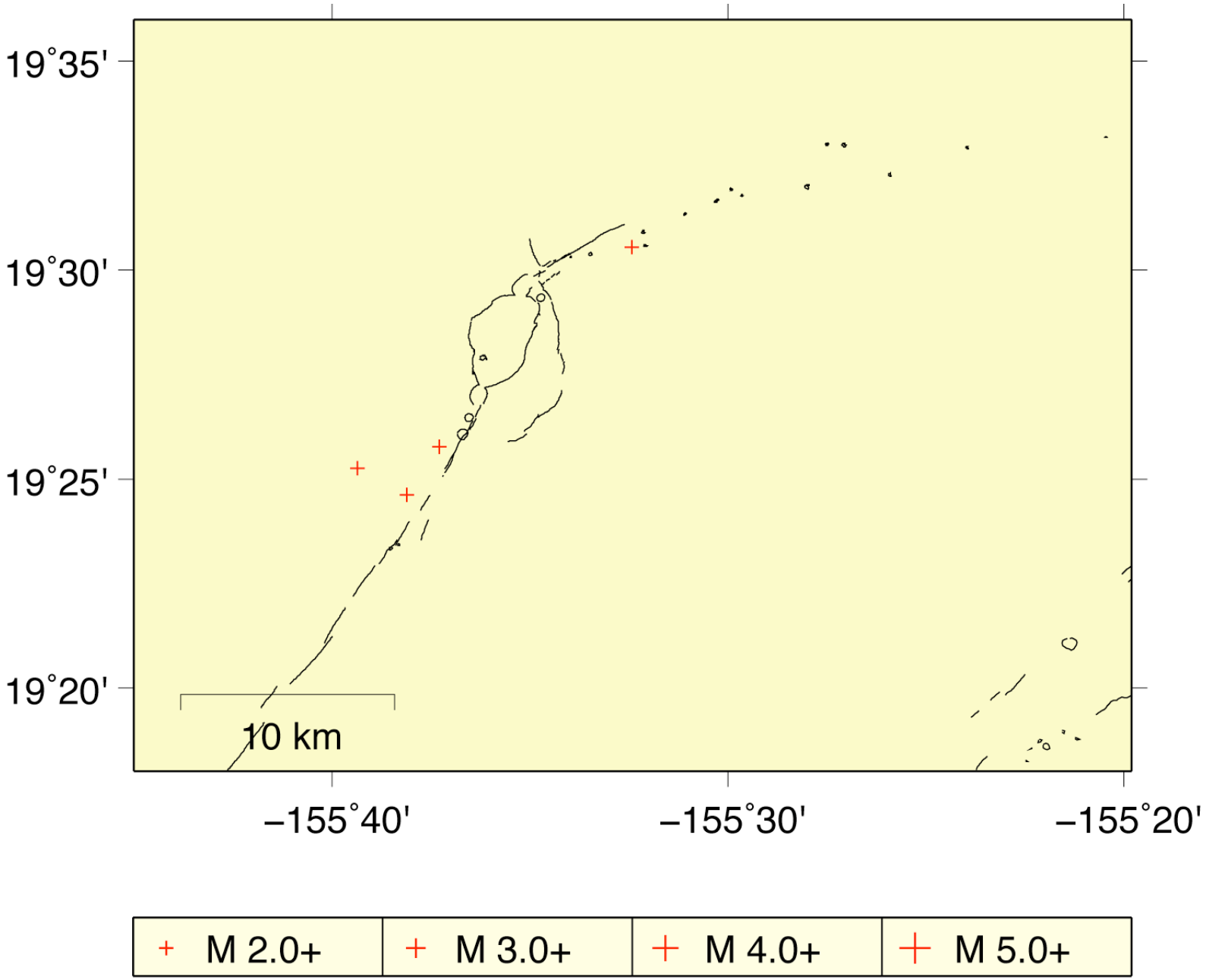


Figure 22. January–March 2009 earthquake locations, Mauna Loa summit, shallow (0–5 km deep), M≥2.0.

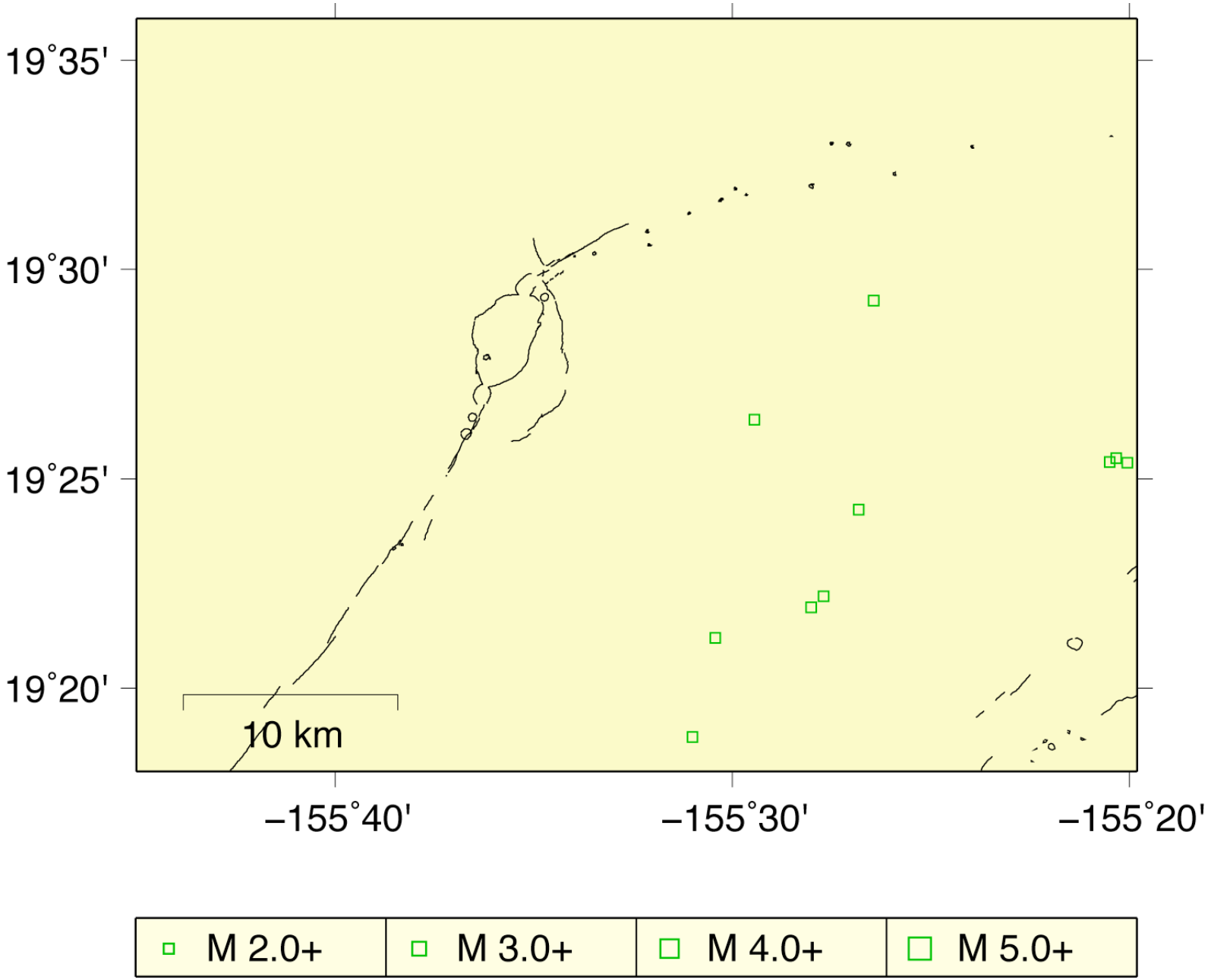


Figure 23. January–March 2009 earthquake locations, Mauna Loa summit, intermediate depth (5.1–13.0 km deep), M≥2.0.

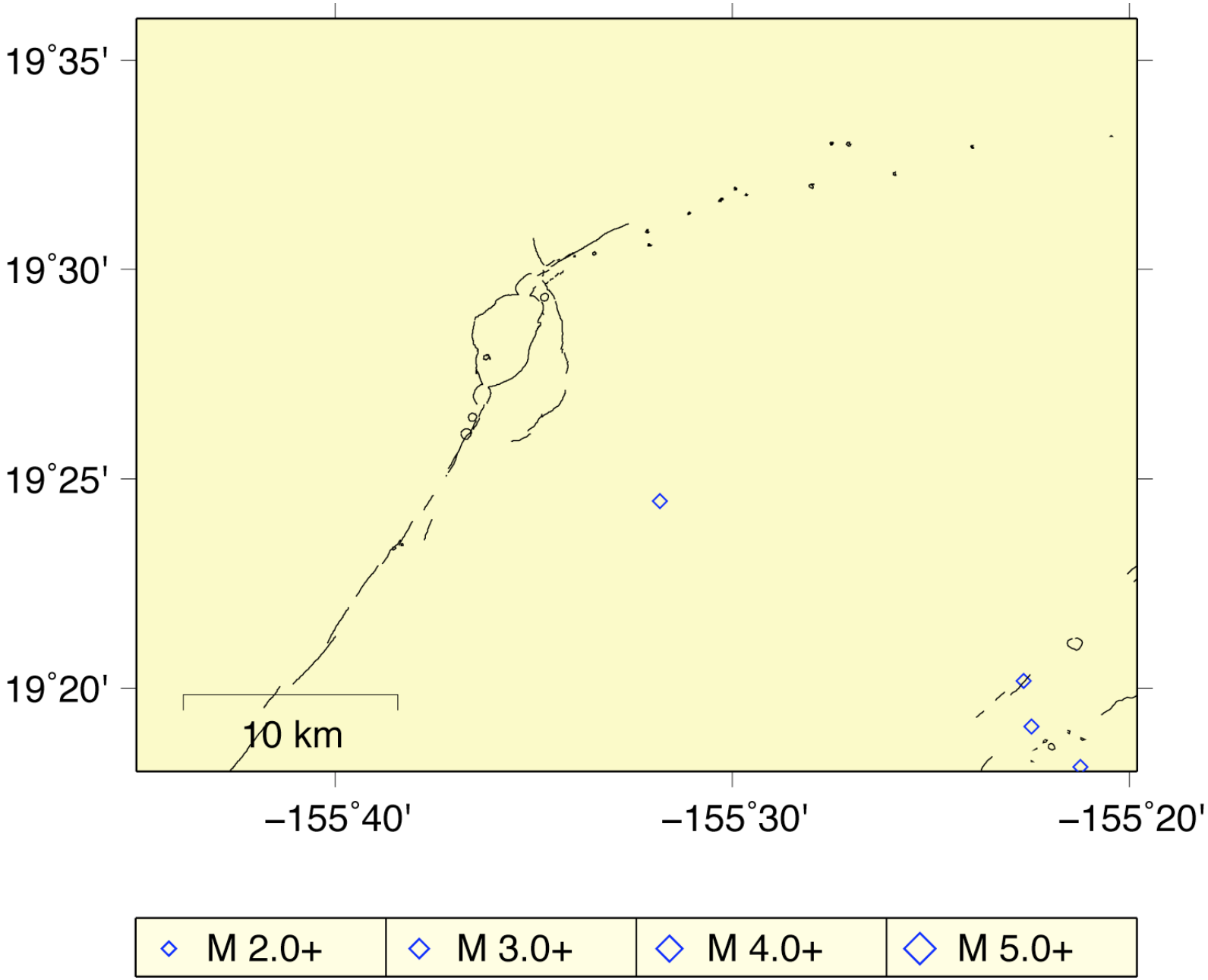


Figure 24. January–March 2009 earthquake locations, Mauna Loa summit, deep (13.1–60.0 km deep), M≥2.0.

Table 4. Chronological list of the 666 selected events successfully located in CUSP during Januanry–March 2009. Summary data files are available online at http://www.ncedc.org/anss/catalog-search.html (last accessed 02/24/2010). For each event, the following data are presented.

ORIGIN TIME—in Hawaiian Standard Time: date, hour (HR), minute (MN), and second (SEC).

EPICENTER—in degrees and minutes of north latitude (LAT N) and west longitude (LON W) in Old Hawaiian Datum.

DEPTH—depth of focus, in kilometers.

NRD—number of P & S arrival times with final weights >0.1.

NS—number of S arrival times with final weights >0.1.

RMS SEC—root mean square travel time residuals, in seconds.

ERH km—standard error of the epicenter, in kilometers.

ERZ km—standard error of depth of focus, in kilometers.

LOC REMKS—remarks, three-letter code for geographic location of events. See Figures 7–10 for location of mnemonic code. Additional one-letter codes have the following meanings:

F felt,

L long-period character,

T associated with harmonic tremor,

B quarry or other blast,

location program had a convergence problem, which usually means that the depth may be unreliable, and

- depth was held fixed.

PREF MAG—The preferred magnitude chosen from the available magnitudes.
Preference is set as:

X amplitude magnitude, if none,
D duration magnitude Develocorder equivalent, if none,
U external magnitude, usually calculated from drum records or from an external source.

AZ GAP—Largest azimuthal gap in degrees between azimuthally adjacent stations.

MIN DS—Distance to the nearest station, in kilometers.

Table 5. List of the 14 events of magnitude 3.0 or greater, selected from table 4.

Figures 25–40. Focal mechanism solutions computed by using the computer program FPFIT (Reasenberg and Oppenheimer, 1985, U.S. Geological Survey Open-File Report 85–739) for events listed in table 5. If calculated, multiple solutions are offered. The solutions are presented without interpretation. The program does not compute mechanism solution for events with additional one-letter codes of T (tremor) or B (blast).

Table 4.

ORIGIN YEAR	MON	DA	TIME (HST) HRMN	SEC	LAT N DEG	MIN	LON W DEG	MIN	DEPTH KM	N RD	N S	RMS SEC	ERH KM	ERZ KM	LOC REMKS	PREF MAG	N RD	AZ GAP	MIN DS
2009	JAN	1	0024	21.22	19	24.86	155	16.23	0.48	8	1	.05	.3	.7	SNCL	1.1X		162	2
2009	JAN	1	0126	52.33	19	24.89	155	16.87	3.19	10	1	.05	.5	.4	SNCL	1.9X		145	2
2009	JAN	1	0128	12.49	19	23.92	155	17.06	2.07	11	1	.08	.4	.3	SSCL	1.5X		92	1
2009	JAN	1	0141	3.71	19	24.89	155	16.72	1.06	10	1	.07	.3	.4	SNCL	1.5X		153	2
2009	JAN	1	0201	32.09	19	20.19	155	12.68	7.55	36	4	.12	.5	.6	SF2	1.7X		72	5
2009	JAN	1	0442	22.53	19	24.17	155	16.77	3.36	10	1	.06	.5	.4	SSCL	1.8X		109	1
2009	JAN	1	0555	28.25	19	24.68	155	17.39	3.09	9	1	.05	.6	.5	SNCL	1.3X		104	1
2009	JAN	1	1159	49.78	19	18.95	155	13.54	6.86	33	2	.12	.5	.7	SF2	1.8X		72	4
2009	JAN	1	2053	6.44	19	18.82	155	31.01	6.15	42	4	.15	.4	1.0	LSW	2.1X		38	7
2009	JAN	2	0432	14.79	19	12.07	155	30.53	41.05	21	1	.07	.9	2.2	DLS	1.9X		124	6
2009	JAN	2	0547	59.38	19	23.99	155	17.29	0.80	20	4	.12	.2	.2	SSCL	2.1X		87	1
2009	JAN	2	0551	48.95	19	24.17	155	16.79	1.35	26	6	.10	.2	.2	SSCL	2.1X		109	1
2009	JAN	2	0553	7.65	19	24.26	155	16.44	2.13	14	3	.08	.3	.3	SECL	2.2U		121	1
2009	JAN	2	0554	44.30	19	25.34	155	15.67	2.89	21	4	.13	.3	.5	SNCL	2.4X		153	3
2009	JAN	2	0909	32.01	19	24.15	155	16.68	2.81	20	3	.10	.4	.3	SSCL	2.0X		110	0
2009	JAN	2	1219	42.16	19	14.36	155	26.68	6.22	22	1	.14	.5	1.3	LSW	1.5X		104	5
2009	JAN	2	1303	42.91	19	25.39	155	37.03	1.83	10	1	.11	.5	.6	MLO	1.3X		109	2
2009	JAN	2	1434	42.04	19	24.29	155	16.82	1.50	26	4	.13	.3	.2	SSC	2.1X		113	1
2009	JAN	2	1625	11.88	19	16.92	155	25.87	37.63	26	1	.10	.9	1.9	DLS	1.7X		56	6
2009	JAN	2	1801	42.86	19	56.48	155	49.43	31.70	36	3	.08	1.5	2.0	KOH	2.3X		180	19
2009	JAN	2	2128	53.99	19	20.33	155	12.81	7.44	38	4	.13	.5	.6	SF2	1.8X		69	4
2009	JAN	2	2209	0.11	19	24.31	155	17.09	1.25	19	4	.14	.3	.3	SSCL	2.0X		105	1
2009	JAN	2	2318	10.71	19	19.92	155	13.34	6.80	28	1	.11	.5	.9	SF2	1.5X		67	5
2009	JAN	3	0042	53.34	19	24.22	155	16.93	1.70	18	4	.10	.3	.2	SSCL	1.7X		107	1
2009	JAN	3	0043	26.93	19	24.21	155	16.92	1.34	18	4	.08	.3	.2	SSCL	1.6X		107	1
2009	JAN	3	0654	27.43	19	17.13	155	26.03	38.52	28	1	.11	.7	1.7	DLS	1.7X		55	6
2009	JAN	3	0736	47.52	19	19.65	155	7.40	5.89	27	2	.12	.6	1.4	SF4	1.7X		137	4
2009	JAN	3	1058	23.35	19	13.43	155	28.26	10.39	19	1	.12	.6	1.1	LSW	1.7X		97	4
2009	JAN	3	1324	47.63	19	19.78	155	9.57	6.53	26	2	.10	.6	1.0	SF3	1.6X		87	5
2009	JAN	3	1445	26.01	19	51.49	155	22.67	24.35	17	1	.10	2.2	2.6	KEA	1.6X		157	5
2009	JAN	3	1529	14.17	19	22.43	155	2.61	7.46	21	2	.13	.8	.7	SF5	1.5X		171	5
2009	JAN	3	2301	31.44	19	11.55	155	24.70	36.67	35	1	.11	1.0	1.4	DEP	1.6X		167	5
2009	JAN	4	0137	45.40	19	27.47	155	46.11	9.66	21	4	.10	.5	1.2	KON	1.4X		80	6
2009	JAN	4	0705	58.48	19	14.14	155	25.12	42.61	36	2	.10	.8	1.5	DLS	1.7X		131	2
2009	JAN	4	0741	56.36	19	20.83	155	23.97	9.63	29	2	.11	.5	.6	SWR	1.7X		60	2
2009	JAN	4	0824	11.17	19	11.81	155	24.61	35.57	33	1	.10	.8	1.6	DEP	2.0X		160	5
2009	JAN	4	1945	28.56	19	23.75	155	17.15	5.42	14	3	.09	.7	.7	INTL	1.9X		88	1
2009	JAN	4	2140	24.41	19	21.41	155	25.26	12.60	44	6	.13	.4	.4	KAO	1.8X		47	4
2009	JAN	5	0105	37.13	19	19.42	155	13.37	6.33	28	4	.13	.5	.9	SF2	1.5X		72	4
2009	JAN	5	0553	48.87	19	6.89	155	34.56	12.26	42	7	.12	.4	.4	LSWF	2.5X		148	13
2009	JAN	5	0656	41.79	19	6.78	155	34.29	11.61	14		.15	1.1	.9	LSW	1.4X		151	12
2009	JAN	5	1351	12.30	20	14.60	155	29.18	9.41	16		.06	3.9	1.1	KEA	2.2X		261	33
2009	JAN	5	1716	35.65	19	30.56	155	32.43	4.56	43	9	.14	.4	2.9	MLO	2.3X		83	6
2009	JAN	5	2046	15.55	19	25.88	155	37.20	2.59	16	2	.11	.4	.5	MLO	1.3X		88	3
2009	JAN	6	0023	53.85	19	28.22	155	13.49	36.91	4610		.10	.6	.9	DEP	2.0X		54	7
2009	JAN	6	0105	59.45	19	30.45	155	31.51	1.85	17	3	.10	.4	1.0	MLO	1.0X		86	7
2009	JAN	6	0154	35.43	19	18.02	155	48.54	10.97	19		.12	.7	1.1	KON	1.4X		91	8
2009	JAN	6	0825	58.13	19	41.18	154	56.91	37.14	28	1	.09	3.1	2.3	HIL	1.9X		251	9
2009	JAN	6	1007	51.41	19	55.76	155	6.56	40.44	4710		.11	.9	1.3	KEA	2.9X		231	25
2009	JAN	6	1230	11.84	19	17.31	155	13.12	7.18	30	1	.10	.5	.8	SF2	1.7X		140	1
2009	JAN	6	1413	0.58	19	22.61	155	29.76	9.15	21	1	.07	.4	1.0	KAO	1.7X		70	4
2009	JAN	6	1439	49.34	19	11.72	155	41.57	10.11	17	2	.11	.6	2.7	LSW	1.4X		75	9
2009	JAN	6	1907	23.95	19	27.19	155	37.95	20.15	28	4	.09	.5	1.0	DML	1.9X		106	3
2009	JAN	6	2238	47.13	19	12.18	155	27.34	3.72	33	2	.13	.4	1.7	LSW	1.6X		117	5
2009	JAN	7	0057	46.28	19	27.09	155	30.18	12.75	14	1	.09	.6	1.7	KAO	1.4X		74	6
2009	JAN	7	0631	53.02	19	24.86	155	16.64	2.76	21	4	.10	.3	.2	SNCL	2.2X		143	2
2009	JAN	7	0728	30.19	19	11.73	155	41.47	1.03	13	1	.13	.6	1.5	LSW	1.8X		75	9
2009	JAN	7	1133	26.57	19	25.23	155	39.13	2.72	9	1	.03	.9	.6	MLO	1.6X		203	3
2009	JAN	7	1317	25.33	19	56.03	155	37.41	14.64	32	4	.10	.6	.7	KOHF	2.1X		136	9
2009	JAN	7	1805	52.54	19	19.23	155	11.25	6.35	28	1	.11	.5	.8	SF3	1.6X		103	6
2009	JAN	8	0242	35.33	19	23.89	155	26.95	9.54	19	1	.12	.5	1.0	KAO	1.4X		61	3
2009	JAN	8	0438	9.57	19	10.65	155	38.22	4.07	16		.13	.5	13.2	LSW -	1.4X		94	14
2009	JAN	8	0506	57.77	19	16.54	155	22.84	3.17	20	2	.13	.4	1.3	SWR	1.4X		121	5
2009	JAN	8	0605	0.49	19	20.17	155	22.66	34.07	47	8	.11	.6	.9	DEP	2.2X		74	1
2009	JAN	8	1509	27.67	19	20.80	155	7.84	7.83	25	2	.10	.6	.9	SF4	1.8X		119	5
2009	JAN	8	2253	5.42	19	16.53	155	12.12	8.60	26	3	.12	.7	.6	SF3	1.4X		203	3
2009	JAN	9	0039	19.20	19	24.30	155	16.92	1.59	21	4	.12	.3	.2	SSCL	1.8X		111	1
2009	JAN	9	0127	59.30	19	24.17	155	17.12	1.53	15	4	.10	.3	.3	SSCL	1.6X		99	1
2009	JAN	9	0544	37.59	19	47.13	155	35.42	15.24	4710		.10	.4	.6	KEA	2.5X		92	11
2009	JAN	9	0547	53.93	19	46.57	155	33.84	14.36	12	2	.10	1.3	.6	KEA	2.0X		169	11
2009	JAN	9	0712	21.55	19	21.49	155	5.57	7.22	29	3	.13	.6	.8	SF4	1.7X		149	5
2009	JAN	9	0907	35.40	19	11.77	155	33.54	33.81	26	2	.07	.7	1.8	DLS	1.6X		95	9
2009	JAN	9	2011	16.57	19	14.29	155	33.37	3.90	31	3	.15	.5	1.8	LSW	1.8X		115	6
2009	JAN	9	2127	44.08	19	14.44	155	24.71	36.32	23	2	.10	.8	1.4	DEP	1.4X		125	1
2009	JAN	9	2131	6.43	19	50.77	155	32.42	18.24	15	2	.08	.7	1.6	KEA	1.3X		114	11
2009	JAN	10	0156	1.78	19	25.39	155	29.45	11.34	17	2	.07	.4	1.2	KAO	1.4X		94	6
2009	JAN	10	0232	52.60	19	24.32	155	16.08	0.29	10	3	.08	.2	.4	SECL	1.4X		130	1
2009	JAN	10	0310	36.27	19	19.11	155	18.35	11.87	34	4	.11	.5	.4	SWR	1.6X		79	2
2009	JAN	10	0958	24.74	19	24.22	155	16.45	1.21	9	1	.09	.4	.4	SECL	1.4X		119	1
2009	JAN	10	1024	0.29	19	20.82	155	3.12	5.43	25	1	.12	.8	1.2	SF5	1.7X		185	7
2009	JAN	10	1053	50.10	19	24.14	155	17.11	4.08	7	1	.08	1.6	1.4	SSCL	1.4X		172	1
2009	JAN	10	1252	59.67	19	24.33	155	16.76	1.54	18	4	.07	.3	.2	SSCL	2.3X		117	1
2009	JAN	10	1625	34.87	19	24.12	155	16.94	1.67	11	1	.05	.4	.3	SSCL	1.7X		102	1
2009	JAN	10	1730	21.35	19	17.90	155	13.19	6.60	29	2	.09	.5	.8	SF2	1.7X		101	2
2009	JAN	10	1955	57.62	19	24.20	155	16.31	2.26	11	1	.03	.3	.3	SECL	1.8X		120	1
2009	JAN	10	2053	0.30	19	25.58	155	24.63	9.28	39	4	.12	.4	.8	KAO	1.9X		47	8
2009	JAN	11	0532	18.88	19	29.58	155	27.43	12.36	22	3	.11	.5	.7	KAO	1.7X		86	4
2009	JAN	11	0553	2.01	19	24.87	155	16.72	2.45	13	2	.09	.3	.4	SNCL	2.0X		145	2
2009	JAN	11	0555	42.53	19	19.70	155	11.50	7.43	40	4	.11	.4	.6	SF3	1.8X		91	6
2009	JAN	11	0625	12.55	19	24.25	155	16.16	1.89	10	1	.09	.3	.5	SECL	1.3X		125	1

---ORIGIN TIME (HST)--					-LAT N--		--LON W--		DEPTH	N	N	RMS	ERH	ERZ	LOC	PREF	N	AZ	MIN
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	S	SEC	KM	KM	REMKS	MAG	RD	GAP	DS
2009	JAN	11	1422	59.73	19	22.71	155	17.27	4.00	10	1	.07	.8	.7	SSCL	1.8X		144	1
2009	JAN	11	1739	4.45	19	19.98	155	7.91	6.46	26	1	.07	.5	1.0	SF4	1.5X		122	5
2009	JAN	11	2314	59.00	19	17.64	155	20.95	7.17	29	1	.12	.5	.9	SWR	1.5X		128	4
2009	JAN	12	0034	32.46	19	24.46	155	16.89	2.14	11	1	.08	.4	.3	SSCL	1.4X		119	1
2009	JAN	12	0504	34.51	19	24.94	155	38.67	3.27	14	2	.10	.8	.6	MLO	1.3X		189	2
2009	JAN	12	0552	59.24	19	23.31	155	17.00	3.35	11	2	.07	.5	.5	SSCL	1.4X		113	1
2009	JAN	12	1028	14.96	19	23.78	155	16.53	2.84	12	2	.09	.4	.3	SSCL	1.9X		93	0
2009	JAN	12	1213	36.78	19	24.33	155	17.06	1.71	22	3	.06	.3	.2	SSC	2.0X		107	1
2009	JAN	12	2130	56.66	19	24.11	155	17.11	2.22	13	1	.08	.4	.3	SSCL	1.8X		96	1
2009	JAN	12	2222	5.46	19	24.35	155	16.36	1.66	12	1	.06	.3	.3	SECL	2.0X		128	1
2009	JAN	12	2327	50.56	19	16.77	155	34.69	4.91	31	1	.17	.5	1.9	LSW	1.8X		97	9
2009	JAN	13	0254	49.61	19	10.50	155	31.68	32.19	33	1	.07	.8	1.2	DLS	1.5X		111	7
2009	JAN	13	0810	40.86	19	23.78	155	16.94	2.71	11	1	.07	.4	.3	SSCL	1.7X		90	1
2009	JAN	13	0847	37.18	19	24.89	155	15.92	3.31	7	1	.06	.7	1.3	SNCL	1.8X		170	2
2009	JAN	13	1323	50.67	19	20.39	155	7.66	6.61	26	2	.08	.5	.9	SF4	1.8X		126	5
2009	JAN	13	1826	23.78	19	25.20	155	51.32	14.06	15		.08	.7	.4	KON	.8X		133	10
2009	JAN	14	0021	57.41	19	23.78	155	15.98	3.49	10	1	.10	.5	.7	SECL	1.5X		103	1
2009	JAN	14	0145	48.56	19	29.30	155	27.33	8.28	26	4	.11	.3	1.0	KAO	1.6X		82	5
2009	JAN	14	0216	49.41	19	25.11	155	38.79	3.02	14	2	.08	.8	.6	MLO	1.7X		194	2
2009	JAN	14	0227	22.88	19	24.95	155	38.80	3.16	14	2	.09	.8	.6	MLO	1.6X		192	2
2009	JAN	14	0234	0.36	19	25.38	155	20.06	9.05	45	7	.10	.3	.6	KAO	2.6X		47	3
2009	JAN	14	0243	46.19	19	25.08	155	39.09	2.73	12	1	.08	1.0	.6	MLO	1.6X		201	3
2009	JAN	14	0259	32.65	19	25.26	155	39.36	2.53	18	1	.07	.6	.6	MLO	2.2X		154	3
2009	JAN	14	1041	10.05	19	24.01	155	16.89	2.19	11	1	.06	.4	.3	SSCL	1.7X		99	1
2009	JAN	14	1725	44.88	19	20.77	155	52.65	12.69	19	1	.14	1.2	.5	KON	1.5X		170	9
2009	JAN	14	2117	31.66	19	24.41	155	16.30	2.21	10	1	.05	.3	.4	SECL	1.8X		131	1
2009	JAN	15	1642	58.43	19	40.12	155	58.46	20.62	27	1	.10	1.4	1.5	HUA	2.2X		263	14
2009	JAN	16	0022	0.06	19	24.26	155	17.15	2.92	11	1	.04	.5	.3	SSC	1.6X		100	1
2009	JAN	16	0103	30.29	19	24.37	155	16.53	1.97	11	1	.05	.3	.3	SSCL	1.4X		125	1
2009	JAN	16	0454	25.00	19	24.51	155	16.68	1.44	12	1	.06	.3	.3	SSCL	1.7X		129	1
2009	JAN	16	0510	17.05	19	24.37	155	16.64	2.95	10	1	.06	.4	.5	SSCL	1.5X		122	1
2009	JAN	16	2351	48.11	19	29.25	155	25.68	4.17	16	2	.13	.4	1.8	KAO	1.7X		84	4
2009	JAN	17	0159	39.55	19	21.26	155	16.98	1.71	12	1	.07	.4	.7	SWRL	1.5X		65	3
2009	JAN	17	0255	9.59	19	17.33	154	59.82	39.67	5010		.10	.7	.8	LERF	3.3X		222	14
2009	JAN	17	0535	24.97	19	14.36	155	30.76	35.91	29	1	.06	.8	1.6	DLS	1.8X		61	2
2009	JAN	17	0854	32.87	20	6.74	155	50.88	32.83	21		.10	3.4	3.4	KOH	2.1X		261	7
2009	JAN	17	1209	0.72	19	24.20	155	16.41	1.40	10	1	.04	.3	.3	SECL	1.6X		119	1
2009	JAN	17	1740	39.47	19	24.34	155	16.61	3.81	13	2	.11	.5	.6	SSCL	2.0X		121	1
2009	JAN	17	1804	31.29	19	19.67	155	11.53	4.08	28	1	.11	.4	1.9	SSF	1.8X		91	6
2009	JAN	18	0925	52.03	19	23.98	155	16.90	3.64	11	1	.07	.5	.5	SSCL	1.9X		98	1
2009	JAN	18	0950	51.89	19	23.64	155	16.94	3.62	10	1	.08	.6	.6	SSCL	1.5X		69	0
2009	JAN	18	1336	25.04	19	18.81	155	47.77	10.47	38	5	.14	.4	.6	KON	2.4X		90	9
2009	JAN	18	1427	41.15	19	24.27	155	16.95	2.25	18	3	.07	.3	.3	SSCL	2.2X		108	1
2009	JAN	18	1432	29.28	19	24.17	155	17.15	0.59	17	3	.10	.2	.2	SSCL	2.2X		98	1
2009	JAN	18	1507	49.04	19	23.94	155	16.30	2.10	9	1	.05	.3	.4	SECL	1.5X		108	1

---ORIGIN TIME (HST)--					-LAT N--		--LON W--		DEPTH	N	N	RMS	ERH	ERZ	LOC	PREF	N	AZ	MIN
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	S	SEC	KM	KM	REMKS	MAG	RD	GAP	DS
2009	JAN	18	1525	52.28	19	24.31	155	17.10	1.44	21	3	.06	.2	.2	SSCL	2.0X		105	1
2009	JAN	18	1526	39.53	19	24.19	155	16.34	0.85	16	2	.06	.2	.4	SECL	2.3X		119	2
2009	JAN	18	1527	15.53	19	24.08	155	17.07	1.84	10	1	.06	.3	.3	SSCL	1.9X		96	1
2009	JAN	18	1529	9.07	19	24.50	155	16.90	1.67	27	4	.08	.3	.2	SSCL	2.1X		91	1
2009	JAN	18	1533	1.95	19	24.16	155	16.93	1.83	16	1	.07	.3	.3	SSCL	2.1X		105	1
2009	JAN	18	1535	3.85	19	24.17	155	16.75	2.47	15	1	.09	.4	.3	SSCL	1.8X		110	1
2009	JAN	18	1704	40.04	19	24.13	155	16.93	2.18	16	2	.06	.3	.3	SSCL	2.1X		103	1
2009	JAN	18	1821	49.49	19	23.97	155	16.86	2.02	9	1	.05	.4	.3	SSCL	1.4X		99	0
2009	JAN	18	1840	26.28	19	24.07	155	17.02	1.76	19	3	.05	.3	.2	SSCL	2.2X		98	1
2009	JAN	18	1932	37.27	19	24.12	155	17.06	1.73	15	1	.07	.3	.2	SSCL	1.7X		98	1
2009	JAN	18	1939	47.16	19	24.05	155	17.11	2.36	11	1	.07	.4	.4	SSCL	1.4X		94	1
2009	JAN	19	0032	17.34	19	24.32	155	17.15	2.62	12	1	.08	.4	.4	SSCL	1.4X		103	1
2009	JAN	19	0259	52.59	19	24.38	155	16.47	3.59	10	1	.06	.6	.6	SECL	1.7X		127	1
2009	JAN	19	0704	1.94	19	15.45	155	2.45	46.51	34	2	.09	1.3	1.7	DEP	2.0X		228	10
2009	JAN	19	1744	20.47	19	23.68	155	16.23	3.00	10	1	.07	.4	.4	SECL	1.4X		97	1
2009	JAN	19	1952	27.24	19	50.13	156	18.41	37.88	11		.08	11.6	6.2	HUA -	1.7X		324	52
2009	JAN	20	0128	13.30	19	23.26	155	16.35	1.27	11	1	.06	.3	.2	SECL	1.3X		93	1
2009	JAN	20	0645	33.30	19	23.73	155	16.72	1.93	10	1	.06	.4	.3	SSCL	1.5X		62	0
2009	JAN	20	0928	28.71	19	24.71	155	16.40	1.66	9	1	.02	.3	.5	SNCL	1.4X		148	2
2009	JAN	20	1627	4.32	19	21.76	155	52.04	7.27	30	3	.15	.6	1.0	KON	1.7X		156	11
2009	JAN	20	1710	21.15	19	19.42	155	7.29	7.11	35	3	.10	.6	.7	SF4	2.2X		143	4
2009	JAN	20	2203	39.48	19	19.07	155	22.47	35.72	41	5	.10	.7	1.1	DEP	2.2X		92	3
2009	JAN	20	2256	45.35	19	18.11	155	21.24	33.03	34	3	.10	.7	1.2	DEP	2.3X		117	5
2009	JAN	20	2347	23.89	19	24.70	155	16.29	3.00	9	1	.02	.5	.6	SNCL	1.5X		142	2
2009	JAN	21	0324	10.77	19	20.60	155	8.23	8.40	23	1	.05	.5	.8	SF4	1.4X		112	5
2009	JAN	21	0843	52.16	19	24.75	155	16.57	2.39	10	1	.07	.5	.5	SNCL	1.5X		147	2
2009	JAN	22	0131	29.55	19	24.09	155	16.97	3.31	10	1	.05	.5	.4	SSCL	1.7X		100	1
2009	JAN	22	0415	8.13	19	25.13	155	38.67	3.06	9		.03	.9	.6	MLO	1.1U		191	2
2009	JAN	22	0623	43.00	19	49.09	155	38.13	11.41	4910		.11	.4	.4	KEAF	2.8X		98	5
2009	JAN	22	1009	31.77	19	21.93	155	28.02	9.91	17	4	.10	.4	.6	KAO	2.3X		80	1
2009	JAN	22	1350	24.59	19	34.25	155	41.66	7.34	28	4	.13	.5	1.7	MLO	1.9X		62	10
2009	JAN	23	2357	19.42	19	19.92	155	11.35	7.09	29	3	.11	.5	.6	SF3	1.4X		87	6
2009	JAN	24	0054	40.29	19	22.47	155	27.89	5.30	28	1	.13	.4	.8	KAO	1.5X		59	0
2009	JAN	24	0448	49.73	19	32.21	155	26.81	23.43	23	3	.10	.6	1.1	DML	1.8X		95	2
2009	JAN	24	0524	32.15	19	23.89	155	15.67	2.58	10	2	.07	.4	.6	SECL	1.5X		108	2
2009	JAN	24	0658	23.42	19	21.87	155	1.35	3.92	26	1	.14	.9	2.4	SSF	1.6X		190	7
2009	JAN	24	1016	17.50	19	23.80	155	16.70	4.19	12	3	.10	.5	.5	SSCL	1.8X		70	0
2009	JAN	24	1238	32.05	19	25.43	155	16.37	4.90	9	2	.06	.8	1.1	SNCL	1.5X		202	2
2009	JAN	24	1324	49.47	19	18.45	155	15.38	7.05	29	4	.11	.6	.7	SF1	1.3X		116	4
2009	JAN	24	1345	28.25	19	11.75	155	27.57	7.05	29	2	.14	.6	1.1	LSW	1.7X		116	4
2009	JAN	25	1032	46.29	19	25.11	155	39.05	3.12	13	2	.07	.8	.7	MLO	1.6X		199	3
2009	JAN	25	2359	56.75	19	19.86	155	1.13	4.58	9		.09	1.5	13.2	SSFB-			213	10
2009	JAN	26	0000	10.78	19	26.14	155	2.11	3.34	12		.10	1.0	2.0	GLNB			135	6
2009	JAN	26	0020	12.30	19	19.66	155	13.37	9.60	41	4	.12	.5	.5	SF2	2.4X		118	5
2009	JAN	26	0604	27.11	19	23.29	155	16.29	1.86	12	1	.09	.4	.3	SECL	1.6X		89	1

ORIGIN TIME (HST)					-LAT N-		-LON W-		DEPTH	N	N	RMS	ERH	ERZ	LOC	PREF	N	AZ	MIN
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	S	SEC	KM	KM	REMKS	MAG	RD	GAP	DS
2009	JAN	26	0813	40.11	19	24.77	155	38.47	2.59	12	1	.10	.7	.4	MLO	1.4X	105		1
2009	JAN	26	1232	2.27	19	20.43	155	13.17	6.99	32	4	.13	.5	.6	SF2	1.7X	64		4
2009	JAN	26	1234	36.27	19	20.50	155	13.20	6.86	21	1	.12	.6	1.1	SF2	1.4X	63		4
2009	JAN	26	1401	46.01	19	13.55	155	34.78	32.40	27	2	.06	.6	1.5	DLS	1.9X	79		9
2009	JAN	26	1711	32.60	19	24.62	155	38.10	3.15	33	4	.16	.4	.6	MLO	2.2X	99		1
2009	JAN	26	2012	11.09	19	20.80	155	5.91	7.41	25	2	.09	.6	.8	SF4	1.8X	153		6
2009	JAN	26	2024	12.34	19	25.10	155	39.25	3.14	16	2	.10	.8	.7	MLO	1.6X	204		3
2009	JAN	26	2358	26.48	19	10.75	155	40.39	0.66	18	3	.13	.5	.6	LSW	1.5X	84		10
2009	JAN	27	0120	44.18	20	9.77	155	37.16	41.15	39		.09	2.2	2.5	KOH	2.3X	231		17
2009	JAN	27	0306	14.77	19	10.36	155	32.65	4.20	20		.13	.6	12.6	LSW -	1.4X	113		9
2009	JAN	27	0436	42.16	19	28.28	154	56.15	1.74	20	1	.13	2.0	2.2	SLE	1.6X	153		2
2009	JAN	27	0520	41.13	19	25.64	155	37.95	3.25	17	3	.07	.4	.5	MLO	1.6X	98		2
2009	JAN	27	0638	27.02	19	54.68	156	27.68	27.98	23		.11	6.1	4.6	DIS	2.5X	291		70
2009	JAN	27	1114	0.60	19	47.90	155	5.31	45.84	37	5	.09	.9	1.3	KEA	2.2X	212		12
2009	JAN	27	1652	51.80	19	1.78	155	22.27	35.14	37	3	.09	1.0	1.7	LOI	2.2X	217		17
2009	JAN	28	0104	21.80	19	19.29	155	8.46	6.23	24	1	.11	.5	1.2	SF4	1.2X	109		4
2009	JAN	28	1100	15.07	19	24.37	155	16.24	5.70	12	2	.09	.8	.9	INTL	1.9X	130		1
2009	JAN	29	0928	25.43	19	12.68	155	3.45	51.06	35	4	.10	1.1	1.5	DEP	2.2X	222		12
2009	JAN	29	1610	42.36	19	19.31	155	13.18	5.43	31	1	.12	.5	1.0	SF2	1.9X	76		4
2009	JAN	30	0112	28.32	19	19.94	155	11.91	6.31	29	2	.11	.5	.9	SF3	1.4X	83		5
2009	JAN	30	0228	20.73	19	15.88	155	22.26	35.31	31	3	.10	.8	1.4	DEP	1.5X	137		4
2009	JAN	30	0442	22.15	19	19.93	155	7.90	7.27	21	1	.10	.6	1.0	SF4	1.4X	123		5
2009	JAN	30	0600	11.48	19	24.51	155	17.21	3.19	12	2	.04	.4	.3	SSCL	1.8X	108		2
2009	JAN	30	1537	0.76	19	13.42	155	27.86	6.25	40	2	.12	.5	.8	LSWF	3.0X	103		7
2009	JAN	30	1543	19.58	19	13.04	155	27.17	3.01	27	1	.15	.5	1.5	LSW	1.8X	119		6
2009	JAN	30	1559	31.03	19	24.41	155	17.17	2.47	12	2	.06	.4	.4	SSCL	1.6X	106		1
2009	JAN	30	1721	26.64	19	54.48	155	29.54	13.90	25		.08	1.8	.9	KEA	1.8X	203		16
2009	JAN	30	1803	10.09	19	24.14	155	16.74	2.87	11	1	.06	.4	.3	SSCL	1.6X	108		0
2009	JAN	30	1912	55.61	19	21.14	155	2.84	8.88	48	9	.10	.6	.4	SF5	3.1X	185		7
2009	JAN	30	1917	6.08	19	20.96	155	2.86	9.15	48	10	.11	.6	.4	SF5	3.4X	187		7
2009	JAN	30	2332	24.30	19	24.31	155	16.96	1.81	11	1	.07	.3	.3	SSCL	1.7X	109		1
2009	JAN	31	0303	28.27	19	24.16	155	17.12	1.97	15	2	.06	.3	.3	SSCL	1.8X	97		1
2009	JAN	31	0858	40.47	19	15.13	155	8.51	41.55	37	5	.10	.9	1.3	DEP	2.0X	200		4
2009	JAN	31	1208	14.08	19	24.54	155	17.33	4.11	10	1	.08	.6	.7	SSCL	1.9X	103		2
2009	JAN	31	2222	19.01	19	23.74	155	16.84	1.53	13	1	.07	.3	.2	SSCL	1.7X	77		1
2009	FEB	1	1442	40.51	19	20.14	155	8.54	7.47	26	3	.09	.5	.9	SF4	1.4X	107		5
2009	FEB	1	1840	30.44	19	24.41	154	58.36	4.07	13	1	.13	1.3	.8	SLE	1.1X	190		1
2009	FEB	1	2201	45.01	19	22.82	154	59.77	8.07	33	2	.11	1.0	.4	LER	1.9X	193		5
2009	FEB	2	0314	3.66	19	24.26	155	17.54	3.15	11	1	.09	.5	.4	SSCL	1.4X	88		2
2009	FEB	2	0501	14.64	19	24.34	155	29.68	10.31	18	2	.09	.5	1.1	KAO	1.4X	66		5
2009	FEB	2	0503	12.48	19	24.55	155	29.53	8.94	41	5	.10	.3	.6	KAO	1.9X	32		5
2009	FEB	2	0959	3.69	19	22.39	155	14.22	3.15	16	3	.08	.4	.4	SEC	1.5X	79		2
2009	FEB	2	1422	35.26	19	24.09	155	16.97	1.20	12	1	.10	.3	.3	SSCL	1.6X	100		1
2009	FEB	2	1531	6.72	19	21.90	155	28.11	7.26	14	1	.11	.6	1.1	KAO	1.3X	72		1
2009	FEB	2	1609	22.28	19	23.19	155	16.02	4.73	11	2	.07	.7	.6	SECL	1.6X	81	1	---

ORIGIN TIME (HST)					-LAT N-		-LON W-		DEPTH	N	N	RMS	ERH	ERZ	LOC	PREF	N	AZ	MIN
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	S	SEC	KM	KM	REMKS	MAG	RD	GAP	DS
2009	FEB	2	2348	33.84	19	23.99	155	16.86	2.20	12	2	.09	.4	.3	SSCL	1.5X	99		0
2009	FEB	3	0051	54.38	19	27.95	155	53.23	12.63	21	2	.17	1.0	.5	KON	1.7X	133		4
2009	FEB	3	1252	53.73	19	19.79	155	10.52	8.01	28	4	.09	.5	.7	SF3	2.0X	92		6
2009	FEB	3	1318	20.11	19	12.52	155	33.12	5.81	33	3	.11	.4	1.3	LSW	1.9X	86		7
2009	FEB	3	1432	52.73	19	24.19	155	17.11	1.67	13	3	.08	.3	.3	SSCL	1.6X	100		1
2009	FEB	3	2119	13.31	19	29.67	155	26.03	8.15	28	4	.13	.4	1.0	KAO	1.5X	91		5
2009	FEB	3	2359	20.56	19	19.73	155	8.09	7.47	32	3	.11	.4	.7	SF4	2.1X	118		4
2009	FEB	4	0047	59.26	19	19.76	155	7.97	7.04	32	4	.10	.5	.7	SF4	1.9X	121		4
2009	FEB	4	0947	29.71	19	22.64	155	16.95	1.93	8	1	.08	1.5	.4	SSCL	1.8X	245		1
2009	FEB	4	1204	19.29	19	17.43	155	30.77	7.96	25	1	.14	.5	1.3	LSW	1.5X	76		4
2009	FEB	4	1421	57.75	19	23.92	155	16.81	1.78	17	3	.09	.3	.2	SSCL	1.8X	97		0
2009	FEB	4	1444	52.36	19	23.82	155	16.58	1.37	10	1	.06	.3	.3	SSCL	1.2X	83		0
2009	FEB	4	2102	57.38	19	20.49	155	10.59	8.68	36	4	.09	.5	.3	SF3	2.2X	78		4
2009	FEB	4	2207	55.83	19	23.19	155	15.62	3.53	16	1	.10	.4	.3	SECL	1.6X	96		2
2009	FEB	4	2214	48.07	19	19.85	155	12.54	8.80	38	2	.10	.4	.4	SF2	1.9X	79		5
2009	FEB	5	0236	26.25	19	18.77	155	29.08	3.51	27		.08	.4	4.1	LSW	1.3X	63		7
2009	FEB	5	0526	49.48	19	20.40	155	7.37	7.29	24	1	.11	.5	.8	SF4	1.5X	131		5
2009	FEB	5	0847	31.49	19	23.94	155	16.84	4.38	11	2	.05	.6	.7	SSCL	1.4X	98		0
2009	FEB	5	1309	40.58	19	23.83	155	16.37	1.27	7	1	.06	.4	.4	SECL	1.1X	102		0
2009	FEB	5	1341	23.27	19	16.95	155	29.58	6.68	20	1	.16	.5	1.5	LSW	1.4X	51		4
2009	FEB	5	1552	44.79	19	24.52	155	16.65	1.76	15	2	.07	.4	.2	SSCL	1.9X	130		1
2009	FEB	6	0602	6.28	19	24.28	155	16.66	2.12	12	2	.10	.4	.3	SSCL	1.8X	117		1
2009	FEB	6	0605	27.09	19	24.49	155	16.16	4.92	13	2	.07	.5	.7	SECL	1.7X	134		1
2009	FEB	6	0753	28.07	19	24.07	155	57.52	12.74	19	3	.13	1.9	.6	KON	1.5X	271		18
2009	FEB	6	0814	24.86	19	11.30	155	41.66	5.66	19		.14	.6	5.3	LSW	1.5X	76		8
2009	FEB	6	0935	14.86	19	28.04	155	29.57	9.93	32	4	.13	.4	1.0	KAO	1.7X	58		8
2009	FEB	6	0951	1.92	19	25.02	155	29.26	8.77	35	4	.10	.4	.8	KAO	1.8X	50		5
2009	FEB	6	1116	19.52	19	24.52	155	17.05	3.22	12	2	.10	.5	.4	SSCL	1.5X	116		1
2009	FEB	6	1241	5.16	19	14.08	155	34.67	3.38	29	2	.17	.4	3.0	LSW	1.8X	75		8
2009	FEB	7	0702	45.65	19	31.43	155	51.92	4.49	14	1	.08	.8	8.0	KON	1.3U	133		7
2009	FEB	7	0847	24.56	19	24.28	155	17.04	1.86	11	1	.08	.4	.3	SSCL	1.2X	106		1
2009	FEB	7	0944	10.57	19	24.52	155	16.27	2.99	12	2	.11	.5	.4	SECL	1.5X	136		1
2009	FEB	7	1036	23.93	19	17.89	155	14.68	8.05	27	3	.09	.6	.9	SF1	1.7X	128		3
2009	FEB	7	1052	32.61	19	57.98	155	33.76	17.16	25	1	.10	1.1	2.8	KEA	1.9X	161		16
2009	FEB	7	1228	56.42	19	26.41	155	29.44	9.64	40	6	.12	.4	.7	KAO	2.2X	42		8
2009	FEB	7	1517	15.95	19	23.52	155	17.50	4.23	13	4	.10	.6	.5	SSCL	1.8X	149		1
2009	FEB	7	1652	13.95	19	24.46	155	16.16	0.13	14	2	.08	.2	.4	SECL	1.8X	133		1
2009	FEB	8	0115	40.71	19	23.70	155	16.18	0.96	12	1	.08	.2	.3	SECL	1.4X	98		1
2009	FEB	8	0138	45.61	19	18.82	155	13.15	8.39	38	4	.11	.5	.6	SF2	1.8X	131		7
2009	FEB	8	0358	26.32	19	13.99	155	33.42	6.42	39	4	.12	.4	1.1	LSW	2.0X	117		6
2009	FEB	8	0803	24.64	19	45.74	156	9.53	29.29	18	1	.14	2.6	3.3	HUA	2.0X	256		39
2009	FEB	8	0846	30.22	19	18.99	155	13.30	5.85	27	1	.13	.6	1.4	SF2	1.5X	78		4
2009	FEB	8	0957	40.79	19	24.82	155	17.03	3.57	14	4	.09	.4	.3	SNCL	1.9X	135		1
2009	FEB	8	1004	4.23	19	24.99	155	16.38	1.50	7	1	.07	.4	.8	SNCL	.9X	152		2
2009	FEB	8	1348	43.33	19	25.63	155	1.81	5.09	10	1	.05	1.4	2.2	SF5	1.8X	176		5

---ORIGIN TIME (HST)--					-LAT N--		--LON W--		DEPTH	N	N	RMS	ERH	ERZ	LOC	PREF	N	AZ	MIN
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	S	SEC	KM	KM	REMKS	MAG	RD	GAP	DS
2009	FEB	8	1936	34.24	19	20.18	155	10.82	8.05	27		.08	.4	.7	SF3	1.8X		83	5
2009	FEB	9	1328	40.98	19	24.75	155	16.36	4.70	10	1	.08	.6	.8	SNCL	1.6X		144	2
2009	FEB	10	0255	37.88	19	25.11	155	15.78	3.73	10	1	.04	.5	.6	SNCL	1.6X		163	3
2009	FEB	10	0425	39.24	19	25.45	155	29.16	8.41	31	3	.11	.3	.9	KAO	1.6X		39	6
2009	FEB	10	0616	23.44	19	45.01	156	3.46	8.13	23		.11	1.7	1.2	HUA	2.0X		235	24
2009	FEB	10	0633	36.42	19	18.75	155	13.48	7.77	35	3	.11	.5	.7	SF2	2.1X		78	3
2009	FEB	10	0756	1.38	19	19.95	155	7.77	7.05	22	1	.09	.5	1.0	SF4	1.4X		126	5
2009	FEB	10	1304	50.24	19	18.02	155	12.97	6.96	25	2	.10	.6	1.1	SF2	1.4X		109	2
2009	FEB	10	1305	59.77	19	17.86	155	8.56	38.60	21		.08	2.8	4.5	DEP	1.6X		126	1
2009	FEB	10	1553	23.36	19	23.54	155	15.80	2.92	8	1	.07	.5	.9	SECL	1.2X		92	2
2009	FEB	10	2118	34.51	19	17.52	155	28.84	9.48	24	1	.12	.4	.9	LSW	1.3X		49	5
2009	FEB	10	2138	14.71	19	23.99	155	15.53	2.54	11	2	.07	.4	.5	SECL	1.6X		113	2
2009	FEB	10	2217	8.26	19	24.59	155	25.45	8.60	23	2	.12	.4	1.0	KAO	1.6X		62	5
2009	FEB	10	2301	47.67	19	24.99	155	20.72	6.46	15	2	.08	.5	1.5	KAO	1.4X		108	3
2009	FEB	11	0118	25.07	19	25.69	155	36.97	1.73	11	1	.12	.3	.5	MLO	.9X		102	3
2009	FEB	11	0118	55.78	19	25.57	155	37.16	2.06	10		.12	.5	.6	MLO	1.2U		99	2
2009	FEB	11	0146	31.49	19	24.22	155	53.11	9.26	17	1	.16	.8	2.1	KON	.9U		166	10
2009	FEB	11	0307	1.82	19	25.52	155	37.59	2.78	17	2	.10	.4	.5	MLO	1.4X		79	2
2009	FEB	11	0726	33.41	19	24.07	155	16.67	1.68	11	1	.08	.3	.2	SSCL	1.3X		107	0
2009	FEB	11	1422	32.31	19	19.97	155	8.07	7.43	24	1	.12	.6	1.1	SF4	1.4X		141	5
2009	FEB	11	1758	45.47	19	15.53	155	31.40	8.48	22	1	.16	.6	1.4	LSW	1.7X		96	2
2009	FEB	11	2338	10.72	19	27.73	155	13.82	34.68	38	2	.11	.7	1.4	DEP	1.9X		52	6
2009	FEB	12	0049	19.79	20	3.47	155	27.09	49.46	20	1	.08	3.5	3.6	KEA	1.6X		283	22
2009	FEB	12	1200	42.57	19	24.31	155	17.06	1.71	12	2	.08	.4	.3	SSCL	1.6X		106	1
2009	FEB	12	1327	2.83	19	20.52	155	6.65	6.17	21	1	.13	.6	1.4	SF4	1.4X		176	5
2009	FEB	12	1718	31.71	19	11.60	155	24.83	34.93	26	1	.11	1.1	2.0	DEP	1.7X		165	5
2009	FEB	12	1921	40.00	19	21.75	155	18.34	1.78	16	1	.07	.3	.8	SWR	1.4X		67	4
2009	FEB	12	1942	15.40	19	58.93	155	25.13	21.09	41	7	.12	.9	1.7	KEA	2.2X		193	13
2009	FEB	12	2216	34.67	19	24.53	155	17.12	1.30	13	2	.10	.4	.3	SSCL	1.5X		113	1
2009	FEB	12	2326	45.78	19	19.88	156	10.15	12.85	13		.14	13.6	1.6	KON -	1.8X		312	32
2009	FEB	12	2341	13.85	19	23.78	155	16.88	1.93	12	1	.09	.4	.3	SSCL	1.7X		87	1
2009	FEB	13	0143	42.95	19	11.75	155	29.29	7.28	15		.13	.7	1.5	LSW	1.8X		133	5
2009	FEB	13	0313	45.19	19	19.90	155	10.70	7.79	26	1	.10	.5	.8	SF3	1.5X		89	5
2009	FEB	13	0639	15.08	19	30.47	155	57.40	22.01	14		.11	5.3	4.8	KON	1.1X		276	5
2009	FEB	13	0945	44.65	19	30.50	155	50.91	8.00	13	1	.11	1.1	1.6	KON	1.1X		180	8
2009	FEB	13	1215	20.99	19	28.40	156	29.59	38.04	15	1	.12	4.7	4.2	DIS	2.3X		323	60
2009	FEB	13	1351	35.93	19	25.00	155	16.83	3.17	11	2	.08	.5	.5	SNCL	1.9X		148	2
2009	FEB	13	2124	47.64	19	14.09	155	26.43	6.19	26	1	.12	.5	1.1	LSW	1.4X		113	4
2009	FEB	14	0503	34.57	19	24.77	155	16.36	1.78	9	1	.02	.3	.5	SNCL	1.3X		153	2
2009	FEB	14	0507	34.02	19	45.66	156	5.73	9.04	43	6	.13	1.1	.9	HUAF	3.5X		243	35
2009	FEB	14	0522	9.96	19	24.46	155	31.82	45.74	30	5	.09	.7	1.2	DMLF	2.2X		49	2
2009	FEB	14	0534	49.72	19	38.08	155	57.23	25.87	12		.11	2.8	5.2	KON	1.7X		243	13
2009	FEB	14	0621	2.83	19	44.13	155	59.56	7.18	16		.15	3.8	1.1	HUA	1.9X		269	17
2009	FEB	14	1120	53.24	19	20.32	155	11.70	7.09	42	6	.13	.4	.6	SF3	2.3X		78	5
2009	FEB	14	1719	51.17	19	20.03	155	2.36	5.60	27	4	.12	.8	1.6	SF5	1.8X		202	9

---ORIGIN TIME (HST)--					-LAT N--		--LON W--		DEPTH	N	N	RMS	ERH	ERZ	LOC	PREF	N	AZ	MIN
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	S	SEC	KM	KM	REMKS	MAG	RD	GAP	DS
2009	FEB	14	1843	23.92	19	24.15	155	17.05	1.50	13	2	.06	.3	.2	SSCL	1.6X		100	1
2009	FEB	14	1850	27.14	19	23.52	155	26.68	4.63	14	1	.10	.4	.9	KAO	1.3X		61	3
2009	FEB	14	2141	36.06	19	24.83	155	28.92	8.39	27	2	.10	.4	.9	KAO	1.7X		62	5
2009	FEB	14	2206	45.70	19	23.23	155	30.82	9.60	17	1	.09	.6	1.2	KAO	1.4X		76	6
2009	FEB	15	0135	48.32	19	19.75	155	8.52	5.80	35	4	.14	.5	.8	SF4	1.8X		108	5
2009	FEB	15	0334	0.08	19	25.39	155	20.50	8.65	36	5	.11	.4	.6	KAO	2.0X		46	3
2009	FEB	15	0409	25.81	19	5.30	155	22.36	38.46	43	6	.09	.7	1.1	LOI	2.5X		201	12
2009	FEB	15	1205	54.40	19	25.50	155	20.33	8.06	30	5	.10	.4	.8	KAO	2.0X		90	3
2009	FEB	15	1208	46.14	19	25.43	155	20.58	7.62	18	3	.10	.5	1.3	KAO	1.6X		120	4
2009	FEB	15	2352	23.02	19	15.11	155	7.12	44.60	37	2	.10	1.4	1.5	DEP	1.7X		213	4
2009	FEB	16	0245	19.54	19	55.44	156	10.05	35.34	48	9	.11	1.2	1.7	KOH	3.2X		264	43
2009	FEB	16	0943	35.43	19	12.23	155	27.42	4.12	30	3	.11	.6	2.6	LSW	1.8X		115	5
2009	FEB	16	0945	5.47	19	12.21	155	27.36	4.47	36	4	.11	.4	1.5	LSWF	2.0X		117	5
2009	FEB	16	1145	36.55	19	12.00	155	26.89	5.32	21	1	.13	.6	2.3	LSW	1.4X		128	5
2009	FEB	16	1206	4.28	19	11.39	155	24.60	35.89	21	1	.09	1.1	2.3	DEP	1.5X		178	6
2009	FEB	16	1620	12.45	19	45.91	155	8.53	0.18	23	4	.11	.6	.3	HIL	1.9X		176	14
2009	FEB	16	1700	46.68	19	24.08	155	15.43	2.93	8	1	.05	.6	.8	SECL	1.4X		117	2
2009	FEB	16	2238	35.07	19	24.52	155	15.53	2.57	7	1	.10	.6	1.1	SECL	1.3X		146	2
2009	FEB	17	0407	16.34	19	17.98	155	15.08	6.48	23		.09	.6	.8	SF1	1.4X		125	3
2009	FEB	17	0606	11.92	19	24.69	155	16.39	2.85	10	1	.11	.6	.5	SNCL	1.4X		142	2
2009	FEB	17	0734	12.06	19	28.02	155	28.94	12.77	14	2	.12	.6	1.8	KAO	1.6X		78	8
2009	FEB	17	0746	23.04	19	26.34	155	30.52	13.47	13	1	.14	.8	1.9	DML	1.1X		81	5
2009	FEB	17	1138	17.49	19	19.87	155	13.15	6.44	24	2	.11	.5	1.1	SF2	1.5X		71	5
2009	FEB	17	1253	19.53	19	24.09	155	16.43	0.72	10	1	.06	.2	.3	SECL	1.4X		113	0
2009	FEB	18	0038	16.85	19	26.81	155	30.03	9.13	30	4	.10	.3	.9	KAO	1.6X		60	9
2009	FEB	18	0127	41.96	19	26.76	155	51.76	15.63	13	1	.14	1.4	1.5	KON	.9X		126	7
2009	FEB	18	0227	29.64	19	24.09	155	16.51	5.97	10	1	.06	.8	1.1	INTL	1.4X		112	0
2009	FEB	18	0333	46.33	19	24.47	155	15.38	3.10	9	1	.11	.6	.9	SECL	1.1X		132	2
2009	FEB	18	1251	52.89	19	25.79	155	38.16	4.28	8	1	.08	1.2	1.0	MLO	1.1U		187	3
2009	FEB	18	1423	33.09	19	20.01	155	11.35	7.09	26	2	.10	.5	.9	SF3	1.6X		85	6
2009	FEB	18	1839	28.27	19	24.27	155	14.79	6.76	7	1	.06	1.4	3.4	INTL	1.3X		113	1
2009	FEB	18	2124	45.83	19	22.98	155	2.71	2.07	14	1	.11	.8	1.3	SSF	1.7X		162	4
2009	FEB	18	2130	49.49	19	19.29	155	24.11	31.65	23	2	.08	.7	1.5	DEP	1.1X		75	2
2009	FEB	18	2343	3.53	19	29.69	155	55.36	17.42	16	1	.12	2.2	2.6	KON	1.2U		215	1
2009	FEB	18	2353	8.93	19	25.44	155	39.47	1.90	8		.06	1.1	1.3	MLO	1.2U		212	4
2009	FEB	19	0120	16.96	19	23.46	155	16.71	2.83	13	1	.06	.4	.3	SSCL	1.9X		99	0
2009	FEB	19	0401	7.40	19	24.66	155	16.77	2.40	10	1	.07	.4	.4	SNCL	1.5X		135	1
2009	FEB	19	0757	3.92	19	22.98	155	15.86	3.27	9	1	.05	.7	.5	SECL	1.4X		97	1
2009	FEB	19	0853	9.53	19	17.92	155	48.32	9.02	20	2	.12	1.1	2.7	KON	1.8X		127	8
2009	FEB	19	0902	36.04	19	24.54	155	17.02	2.48	10	1	.06	.4	.3	SSCL	1.6X		118	1
2009	FEB	19	1023	40.83	19	25.38	155	16.02	7.79	10	2	.06	1.2	1.1	INTL	2.2X		202	3
2009	FEB	19	1225	38.65	19	20.08	155	12.62	7.40	36	5	.12	.4	.6	SF2	2.0X		74	5
2009	FEB	19	1238	40.77	19	25.38	155	28.75	10.78	16	1	.09	.5	1.2	KAO	1.2X		59	6
2009	FEB	19	1537	3.03	19	12.37	155	28.86	4.23	40	5	.13	.4	1.7	LSW	2.5X		99	6
2009	FEB	20	0142	4.96	19	50.89	155	33.39	19.14	26	3	.11	.7	1.4	KEA	1.7X		114	11

---ORIGIN TIME (HST)--					-LAT N--		--LON W--		DEPTH	N	N	RMS	ERH	ERZ	LOC	PREF	N	AZ	MIN
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	S	SEC	KM	KM	REMKS	MAG	RD	GAP	DS
2009	FEB	20	0147	37.21	19	25.84	155	29.93	10.24	34	4	.11	.3	.6	KAO	1.6X	42		6
2009	FEB	20	0327	17.22	19	19.90	155	6.43	8.21	33	5	.10	.6	.4	SF4	2.1X	156		5
2009	FEB	20	0420	20.56	19	26.45	155	16.49	6.90	12	2	.07	1.0	1.1	INTL	1.9X	183		3
2009	FEB	20	0637	8.36	19	5.48	155	31.31	45.08	20	1	.13	1.3	2.7	DLSL	2.3X	172		10
2009	FEB	20	0848	1.96	19	24.13	155	16.95	2.82	11	1	.11	.5	.4	SSCL	1.8X	102		1
2009	FEB	20	1219	35.31	19	24.69	155	16.76	4.56	10	1	.07	.7	.7	SNCL	1.7X	138		1
2009	FEB	20	2330	27.17	19	12.10	155	25.79	38.05	24	1	.10	.9	1.8	DLS	1.5X	160		5
2009	FEB	21	0008	9.87	19	19.11	155	55.50	13.01	14		.12	2.4	.6	KON	1.1X	261		8
2009	FEB	21	0524	36.71	19	24.11	155	16.98	1.74	11	1	.08	.4	.3	SSCL	1.4X	101		1
2009	FEB	21	0900	23.33	19	24.76	155	38.59	3.03	12	1	.10	.7	.6	MLO	1.4U	107		2
2009	FEB	21	0909	19.89	19	19.13	155	13.07	7.45	33	4	.11	.5	.8	SF2	1.8X	81		4
2009	FEB	21	1203	19.66	19	24.09	155	16.92	1.83	17	3	.05	.3	.2	SSCL	2.2X	102		1
2009	FEB	21	1316	6.45	19	22.24	155	29.27	8.50	30	2	.12	.4	.7	KAO	1.6X	66		3
2009	FEB	21	1358	57.44	19	31.36	155	53.25	14.84	13	1	.09	1.2	.8	KON	1.4X	154		5
2009	FEB	21	1453	51.31	19	27.12	155	22.01	11.41	29	4	.12	.5	.6	KAO	1.8X	106		5
2009	FEB	21	1456	40.46	19	26.99	155	22.50	11.06	23	2	.08	.4	.7	KAO	1.7X	103		5
2009	FEB	21	1517	47.67	19	27.00	155	22.30	10.86	22	3	.09	.4	.7	KAO	1.7X	106		5
2009	FEB	21	1645	57.21	19	24.52	155	17.31	2.62	12	2	.05	.4	.3	SSCL	1.8X	103		2
2009	FEB	21	2325	19.29	19	19.18	155	12.90	9.80	47	10	.13	.5	.4	SF2F	3.2X	129		4
2009	FEB	22	0539	44.60	19	24.39	155	17.05	1.44	13	2	.08	.3	.3	SSCL	1.7X	110		1
2009	FEB	22	1045	59.43	19	30.63	155	30.14	3.14	19	2	.09	.4	1.2	MLO	1.9X	112		5
2009	FEB	22	1059	21.67	19	18.92	155	13.15	6.95	24	1	.08	.5	1.0	SF2	1.2X	83		4
2009	FEB	22	1238	46.79	19	24.16	155	17.07	1.65	17	3	.05	.3	.2	SSCL	1.9X	99		1
2009	FEB	22	1655	18.57	19	23.19	155	30.30	10.21	13	1	.06	.6	1.3	KAO	1.2U	82		5
2009	FEB	22	1733	59.54	19	33.19	155	36.92	8.22	14	1	.19	.8	2.7	MLO	1.1X	124		7
2009	FEB	22	1743	37.28	19	33.98	155	35.41	4.01	14		.11	.6	12.2	MLO -	1.3U	130		9
2009	FEB	22	1920	39.16	21	16.71	154	53.33	14.75	30	2	.11	7.5	11.4	DIS -	3.0X	324		158
2009	FEB	23	0919	28.73	19	21.91	155	16.26	2.84	12	1	.07	.4	.3	KOAL	2.0X	70		1
2009	FEB	23	0947	12.36	19	14.41	155	31.86	6.76	20	1	.18	.6	1.8	LSW	1.4X	107		3
2009	FEB	23	1407	53.60	19	22.55	155	30.07	10.21	22	1	.06	.4	.9	KAO	1.8X	72		4
2009	FEB	23	1409	2.29	19	24.71	155	26.84	10.22	23	1	.11	.4	.9	KAO	1.6X	63		4
2009	FEB	23	1619	50.40	19	25.61	155	25.47	9.43	17	2	.10	.5	1.3	KAO	1.6X	65		7
2009	FEB	23	1834	50.82	19	25.50	155	26.13	7.90	32	2	.12	.4	1.1	KAO	1.9X	36		6
2009	FEB	24	0025	55.58	19	13.93	155	16.20	46.15	36	2	.11	1.0	1.5	DEP	1.7X	183		7
2009	FEB	24	0226	50.64	19	25.77	155	37.48	2.79	17	3	.09	.4	.5	MLO	1.4X	81		3
2009	FEB	24	0521	6.95	19	20.01	155	5.13	8.84	24	1	.11	.7	.5	SF5	1.6X	175		7
2009	FEB	24	0529	56.42	19	12.20	155	32.02	38.67	26	1	.08	.9	2.1	DLS	1.7X	87		6
2009	FEB	24	0551	54.62	19	47.92	155	24.14	21.94	39	4	.11	.6	1.3	KEA	2.0X	78		6
2009	FEB	24	0605	36.12	19	16.94	155	32.58	11.56	14	1	.11	.8	1.9	LSW	1.4X	155		6
2009	FEB	24	0616	18.98	19	31.86	155	42.36	7.61	30	4	.12	.4	1.2	MLO	1.7X	81		7
2009	FEB	24	1124	28.56	19	33.85	155	43.42	11.13	15	1	.10	.8	1.5	KON	1.3X	120		7
2009	FEB	24	1234	18.02	19	25.13	155	17.11	4.18	9	1	.06	1.0	.6	SNCL	1.3X	159		1
2009	FEB	24	1334	22.73	19	19.59	155	8.47	6.95	22	1	.08	.5	1.0	SF4	1.7X	108		4
2009	FEB	24	1837	48.93	19	20.54	155	8.73	6.54	14		.12	.6	1.6	SF4	1.3U	102		5
2009	FEB	24	2116	50.49	19	46.35	155	54.80	11.56	15		.12	3.3	.9	HUA	1.2X	248		28

---ORIGIN TIME (HST)--					-LAT N--		--LON W--		DEPTH	N	N	RMS	ERH	ERZ	LOC	PREF	N	AZ	MIN
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	S	SEC	KM	KM	REMKS	MAG	RD	GAP	DS
2009	FEB	24	2207	4.62	19	25.03	155	17.05	2.95	11	2	.08	.6	.3	SNCL	1.5X	152		1
2009	FEB	25	0837	7.44	19	23.66	155	16.44	2.72	11	1	.06	.4	.4	SECL	1.4X	94		1
2009	FEB	25	0923	37.42	19	25.06	155	16.65	2.67	9	1	.07	.6	.4	SNCL	1.6X	168		2
2009	FEB	25	0940	18.30	19	4.51	155	29.08	31.81	25	2	.11	1.0	2.0	DLS	2.1X	189		9
2009	FEB	25	1043	44.68	19	19.77	155	12.29	6.60	32	2	.11	.5	.7	SF3	1.8X	83		5
2009	FEB	25	1543	57.14	19	20.38	155	3.91	4.29	19		.12	.9	5.9	SSF	1.7X	186		7
2009	FEB	25	1617	38.99	19	18.10	155	29.05	11.42	19	1	.10	.5	1.1	LSW	1.4X	44		6
2009	FEB	25	2207	6.51	19	18.17	155	29.36	12.28	27	1	.08	.4	.8	LSW	1.6X	47		6
2009	FEB	25	2333	35.84	19	19.51	155	3.10	5.84	28	1	.11	.9	1.3	SF5	2.1X	203		9
2009	FEB	25	2333	50.43	19	13.14	155	33.20	5.71	43	6	.14	.4	1.2	LSW	2.2X	81		6
2009	FEB	25	2335	47.98	19	19.12	155	2.91	4.51	24	1	.10	1.1	3.0	SSF	1.8X	210		9
2009	FEB	25	2345	40.12	19	20.25	155	10.08	8.59	19	2	.11	.7	1.2	SF3	2.0X	94		5
2009	FEB	26	0038	42.92	19	24.60	155	17.17	3.89	13	2	.07	.5	.4	SNCL	1.5X	114		2
2009	FEB	26	0601	1.76	19	28.72	155	36.20	1.15	9	1	.11	.5	.3	MLO	1.7X	180		1
2009	FEB	26	0628	30.40	19	24.61	155	16.28	1.59	10	1	.10	.3	.4	SNCL	1.5X	139		1
2009	FEB	26	0843	6.93	19	23.97	155	16.94	3.04	8	1	.02	.5	.5	SSCL	1.5X	96		1
2009	FEB	26	0856	58.99	19	26.53	155	16.48	2.58	8	1	.06	1.5	.8	SNCL	1.3X	264		3
2009	FEB	26	0938	59.31	19	8.12	155	17.17	65.18	16		.09	5.5	8.9	LOIT-		235		17
2009	FEB	26	1123	11.39	19	23.36	155	16.89	5.83	8	1	.08	1.1	1.8	INTL	1.6X	143		0
2009	FEB	26	1206	23.10	19	44.63	156	0.65	34.14	31	4	.11	1.1	1.7	HUA	2.3X	225		19
2009	FEB	26	1331	20.79	19	19.80	155	9.09	5.56	25	1	.10	.5	1.3	SF4	1.4X	95		5
2009	FEB	26	2136	57.85	19	11.61	155	29.13	36.66	20	1	.09	1.1	2.1	DLS	1.7X	132		4
2009	FEB	26	2227	6.15	19	23.87	155	16.77	4.29	11	1	.07	.5	.6	SSCL	1.5X	97		0
2009	FEB	26	2233	40.08	19	23.51	155	16.99	1.83	11	1	.09	.4	.3	SSCL	1.5X	82		0
2009	FEB	26	2253	7.86	19	52.44	155	49.36	16.05	10	1	.16	1.2	1.5	HUA	1.4X	184		17
2009	FEB	26	2259	5.10	19	18.69	155	15.15	6.31	29	1	.14	.5	.8	SF1	1.3X	97		4
2009	FEB	27	0017	26.86	20	3.09	156	8.66	4.55	13	1	.08	2.3	1.7	KOH	1.8X	276		39
2009	FEB	27	0023	32.84	19	23.94	155	16.60	1.82	9	1	.06	.3	.3	SSCL	1.1X	103		0
2009	FEB	27	0126	32.57	19	19.96	155	13.09	6.45	24	1	.08	.4	1.0	SF2	1.2X	70		5
2009	FEB	27	0313	39.31	19	19.88	155	11.77	6.59	21	1	.09	.5	1.1	SF3	1.5X	86		6
2009	FEB	27	0437	20.67	19	24.74	155	19.14	5.44	16	3	.07	.4	1.0	KAO	1.5X	102		2
2009	FEB	27	0912	35.49	19	10.93	155	28.29	34.77	34	3	.07	.7	1.5	DLS	2.0X	93		3
2009	FEB	27	1219	37.92	19	53.96	155	23.43	28.45	26	2	.09	1.2	1.4	KEA	1.9X	217		5
2009	FEB	27	1754	44.44	19	12.80	155	28.35	40.54	24	1	.08	1.0	2.2	DLS	1.7X	99		5
2009	FEB	27	2356	24.64	19	17.42	154	59.52	40.45	44	7	.10	1.0	.9	LER	2.6X	233		14
2009	FEB	28	0332	19.80	19	49.07	156	11.05	43.85	26	2	.10	1.9	2.2	HUA	2.2X	293		46
2009	FEB	28	0616	2.22	19	21.56	155	30.25	10.39	25	1	.07	.4	.9	KAO	1.6X	53		5
2009	FEB	28	0951	27.56	19	22.01	155	25.70	9.75	17	1	.09	.6	.9	KAO	1.5X	69		3
2009	FEB	28	1003	9.27	19	20.08	154	59.83	7.51	32	3	.11	1.0	.7	LER	1.8X	221		10
2009	FEB	28	1006	29.81	19	21.02	155	0.24	7.92	24	1	.10	1.1	.7	SF5	1.5X	208		8
2009	FEB	28	1253	48.61	19	23.14	155	1.83	0.03	6		.08	1.6	4.4	SSFB#		171		5
2009	FEB	28	1303	28.93	19	21.94	155	2.02	0.42	10		.03	.9	3.8	SSFB		182		6
2009	FEB	28	1315	15.79	19	29.08	155	2.48	6.23	14		.06	.9	3.3	GLNB		176		10
2009	FEB	28	1318	52.89	19	20.62	155	1.23	4.60	21		.07	.9	2.0	SSFB		204		9
2009	FEB	28	1322	58.05	19	23.65	155	1.59	0.02	22		.14	.7	1.2	SMEB#		163		6

---ORIGIN TIME (HST)--					-LAT N--		--LON W--		DEPTH	N	N	RMS	ERH	ERZ	LOC	PREF	N	AZ	MIN
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	S	SEC	KM	KM	REMKS	MAG	RD	GAP	DS
2009	FEB	28	1659	30.57	19	36.87	155	59.67	11.47	20	2	.13	1.7	.6	KON	2.0X		220	16
2009	FEB	28	1805	14.51	19	23.85	155	15.70	3.30	35	5	.09	.3	.3	SEC	2.2X		80	2
2009	FEB	28	2355	19.56	20	3.18	155	39.43	13.67	25	1	.13	1.1	.8	KOH	2.3X		174	15
2009	FEB	28	2359	15.83	19	11.54	155	28.73	5.81	25	1	.13	.5	1.5	LSW	1.7X		104	4
2009	MAR	1	0042	10.92	19	51.18	155	33.38	22.22	21		.08	1.2	2.2	KEA	1.8X		165	11
2009	MAR	1	0059	28.81	19	25.97	155	29.53	11.00	25	2	.09	.4	.8	KAO	1.4X		63	7
2009	MAR	1	0203	0.43	19	54.27	156	6.61	44.23	46	7	.10	1.2	1.4	HUA	3.0X		254	43
2009	MAR	1	0243	25.08	19	51.75	155	33.66	23.61	12	1	.07	.9	1.7	KEA	1.6X		173	10
2009	MAR	1	0714	22.32	19	24.99	155	39.09	3.64	15	2	.08	.9	.8	MLO	1.3X		199	3
2009	MAR	1	1013	39.73	19	29.26	155	26.43	8.70	42	5	.12	.3	.8	KAO	2.2X		49	6
2009	MAR	1	1505	43.30	19	24.40	155	17.04	1.93	10	1	.03	.3	.3	SSCL	1.7X		110	1
2009	MAR	1	1754	6.40	19	51.78	155	33.60	22.92	30	5	.10	.7	1.6	KEA	1.6X		120	10
2009	MAR	1	1900	5.02	19	54.31	155	18.10	22.32	12	1	.12	1.9	2.2	KEA	1.7X		239	5
2009	MAR	1	1932	26.20	19	24.34	155	16.58	3.85	9	1	.09	.7	.8	SSCL	1.7X		122	1
2009	MAR	1	1950	53.11	19	22.22	155	1.80	8.25	28	4	.11	.7	.5	SF5	1.8X		182	6
2009	MAR	2	0239	48.96	19	11.73	155	28.32	4.16	42	6	.17	.4	1.7	LSW	2.3X		96	4
2009	MAR	2	0526	0.02	19	20.31	155	13.01	6.35	28	1	.11	.5	.9	SF2	1.4X		67	4
2009	MAR	2	1903	23.63	19	10.46	155	23.11	45.87	26		.10	1.3	2.6	DEP	1.6X		194	7
2009	MAR	2	2046	1.12	19	19.39	155	11.10	4.94	24	1	.11	.5	1.8	SSF	1.7X		100	6
2009	MAR	3	0708	9.71	19	12.44	155	27.70	3.47	20	1	.13	.4	1.9	LSW	1.5X		109	5
2009	MAR	3	1209	55.14	19	18.31	155	15.70	4.78	19		.10	.7	2.5	SSF	1.5X		123	5
2009	MAR	3	1513	55.84	19	35.66	155	45.91	10.00	26	2	.11	.5	.8	KON	1.9X		90	9
2009	MAR	4	0441	38.76	19	29.26	155	35.46	1.52	10	1	.09	.6	.4	MLO	1.5X		127	1
2009	MAR	4	0640	10.81	19	6.74	155	11.36	23.96	30	2	.06	1.4	1.6	LOI	2.0X		239	19
2009	MAR	4	0741	41.57	19	25.45	155	31.25	10.34	19	2	.09	.5	1.3	KAO	1.2X		76	8
2009	MAR	4	0920	36.11	19	28.51	156	10.27	38.68	45	8	.08	1.0	1.3	KONF	3.1X		254	27
2009	MAR	4	1316	44.75	19	25.26	155	39.25	2.66	11		.06	1.0	.7	MLO	1.2X		205	3
2009	MAR	4	2024	28.09	19	12.06	155	29.42	32.97	39	6	.07	.6	1.1	DLS	2.1X		75	5
2009	MAR	5	0150	15.33	19	40.68	155	35.38	12.80	21	3	.10	.4	.6	KEA	1.3X		101	14
2009	MAR	5	0825	57.94	19	28.55	154	52.56	0.28	27	3	.16	1.1	.4	SLEF	2.5X		265	5
2009	MAR	5	1227	15.29	19	19.85	155	8.27	7.03	26	2	.11	.5	.9	SF4	1.8X		114	5
2009	MAR	5	1456	59.18	19	20.10	155	7.35	7.05	11	1	.04	.6	1.6	SF4	1.4X		162	5
2009	MAR	5	1505	8.08	19	20.32	155	11.11	7.94	33	4	.09	.5	.7	SF3	1.7X		81	5
2009	MAR	5	1827	1.31	19	25.79	155	16.39	3.75	11	1	.04	.8	.6	SNCL	1.3X		175	2
2009	MAR	5	2126	47.93	19	4.08	155	22.09	35.47	37	4	.08	.8	1.4	LOI	2.2X		207	14
2009	MAR	5	2251	42.01	19	53.85	156	25.80	18.34	20	1	.11	3.3	12.4	DIS -	1.8X		318	66
2009	MAR	5	2302	39.53	19	20.22	155	6.75	5.05	33	3	.12	.5	1.1	SF4	1.8X		145	6
2009	MAR	6	0209	15.11	19	19.49	155	7.57	9.49	48	11	.10	.5	.3	SF4F	3.4X		134	4
2009	MAR	6	1054	17.08	19	22.19	155	27.70	9.43	38	4	.11	.4	.6	KAO	2.0X		40	1
2009	MAR	6	1549	24.77	19	24.58	155	38.56	3.09	14	2	.10	.8	.5	MLO	1.5X		183	1
2009	MAR	6	1604	46.68	19	19.61	155	7.85	8.47	31	3	.09	.5	.6	SF4	2.0X		126	4
2009	MAR	6	1632	25.42	19	19.58	155	5.28	5.96	27	2	.11	.7	1.3	SF5	1.6X		181	6
2009	MAR	6	1900	56.68	19	19.54	155	8.01	6.86	27	1	.10	.5	.8	SF4	1.6X		121	4
2009	MAR	6	2049	9.31	19	16.03	155	28.34	9.13	23	1	.16	.6	1.1	LSW	1.7X		129	4
2009	MAR	7	0513	32.11	19	55.80	155	31.85	32.75	33	2	.09	1.2	1.7	KEA	1.6X		221	16

---ORIGIN TIME (HST)--					-LAT N--		--LON W--		DEPTH	N	N	RMS	ERH	ERZ	LOC	PREF	N	AZ	MIN
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	S	SEC	KM	KM	REMKS	MAG	RD	GAP	DS
2009	MAR	7	0628	51.82	19	25.17	155	16.51	3.05	10	1	.03	.6	.5	SNCL	1.7X		157	2
2009	MAR	7	0655	55.06	19	24.92	155	17.09	2.93	10	1	.06	.5	.4	SNCL	1.6X		140	1
2009	MAR	7	1248	10.70	19	25.40	155	20.05	7.85	17	3	.10	.5	1.2	KAO	1.5X		124	3
2009	MAR	7	1257	50.09	19	24.38	155	16.96	1.59	21	2	.07	.3	.2	SSCL	2.0X		113	1
2009	MAR	7	1412	42.39	19	24.78	155	16.54	2.02	10	1	.05	.4	.4	SNCL	1.5X		150	2
2009	MAR	7	2226	47.49	19	15.13	155	27.94	8.15	40	6	.13	.4	.7	LSW	2.5X		94	7
2009	MAR	7	2316	17.44	19	20.45	155	12.85	8.58	28	1	.06	.4	.7	SF2	1.6X		67	4
2009	MAR	8	0338	4.06	19	24.36	155	16.85	1.74	36	5	.10	.3	.2	SSC	2.3X		44	1
2009	MAR	8	1143	54.04	19	26.25	155	29.54	10.21	22	4	.09	.4	1.2	KAO	1.3X		65	8
2009	MAR	8	1706	11.19	19	22.49	155	50.33	11.61	15	1	.13	1.1	.7	KON	1.4X		164	12
2009	MAR	8	2242	14.51	19	24.71	155	16.94	3.68	12	2	.07	.5	.5	SNCL	1.7X		132	2
2009	MAR	9	0126	21.35	19	24.27	155	26.81	10.62	40	6	.11	.4	.7	KAO	2.0X		51	4
2009	MAR	9	0252	0.45	19	10.71	155	32.88	0.01	39	4	.16	.4	.4	LSW #	2.2X		107	9
2009	MAR	9	0944	53.14	20	8.30	155	9.90	23.31	47	8	.11	1.2	3.3	KEAF	4.3X		251	33
2009	MAR	9	1119	12.73	19	25.11	155	17.14	4.98	11	1	.08	.7	.7	SNCL	1.7X		150	1
2009	MAR	9	1222	24.55	19	14.86	155	36.87	2.57	24	1	.13	.6	2.5	LSW	1.8X		153	12
2009	MAR	9	1244	36.69	20	57.15	155	9.13	14.42	33	2	.13	8.4	11.5	DIS -	3.0X		318	112
2009	MAR	9	1416	20.92	19	24.69	155	16.86	2.55	11	1	.06	.4	.3	SNCL	1.6X		134	2
2009	MAR	9	1901	58.02	19	24.02	155	16.98	1.82	12	2	.05	.3	.3	SSCL	1.9X		98	1
2009	MAR	9	2310	7.33	19	29.40	155	27.26	6.02	18	2	.08	.4	1.6	KAO	1.7X		83	5
2009	MAR	10	0017	7.86	19	26.70	155	51.42	13.34	18	1	.12	.9	.5	KON	1.6X		122	8
2009	MAR	10	0147	0.51	19	9.20	155	34.25	33.09	26	2	.10	.7	2.0	DLS	1.8X		123	11
2009	MAR	10	0417	25.99	19	24.29	155	16.94	1.92	12	1	.07	.3	.3	SSCL	1.9X		110	1
2009	MAR	10	0442	25.58	19	18.96	155	12.38	35.66	49	9	.10	.6	.9	DEP	2.8X		98	4
2009	MAR	10	0756	38.65	19	24.06	155	16.96	1.95	11	1	.06	.3	.3	SSCL	1.6X		100	1
2009	MAR	10	1146	32.61	19	15.12	155	34.22	8.48	21	1	.13	.5	1.4	LSW	1.8X		111	7
2009	MAR	10	1559	54.81	19	19.47	155	7.63	8.65	29	4	.07	.5	.7	SF4	2.0X		160	4
2009	MAR	10	1835	11.04	19	25.17	155	17.12	6.97	10	1	.04	1.3	1.3	INTL	1.7X		162	1
2009	MAR	10	2138	43.61	19	26.90	155	16.96	7.39	10	1	.05	2.3	1.3	INTL	2.0X		260	3
2009	MAR	11	0031	40.59	19	13.79	155	21.73	8.53	26	1	.12	.5	.6	SWR	1.3X		167	4
2009	MAR	11	0219	5.69	19	11.28	155	39.49	4.99	45	8	.18	.5	1.3	LSW	2.7X		85	12
2009	MAR	11	0321	29.91	19	23.29	155	29.35	8.82	21	1	.10	.4	.9	KAO	1.8X		46	3
2009	MAR	11	0419	34.69	19	24.72	155	16.44	2.79	11	1	.08	.5	.3	SNCL	1.5X		142	2
2009	MAR	11	0632	7.09	19	32.06	155	36.48	9.30	10	1	.11	.7	2.0	MLO	1.0X		116	5
2009	MAR	11	1841	58.08	19	25.20	155	17.00	4.13	10	1	.07	.9	.5	SNCL	1.6X		171	1
2009	MAR	11	1931	8.50	19	32.26	155	54.08	14.08	16	1	.13	2.2	.6	KON	1.3X		242	6
2009	MAR	11	2349	13.04	19	22.23	155	26.27	9.41	21	1	.10	.4	.8	KAO	1.1X		56	2
2009	MAR	12	0439	31.12	19	25.15	155	22.12	9.93	25	3	.11	.4	.8	KAO	1.6X		84	5
2009	MAR	12	0523	14.79	19	12.16	155	26.72	2.19	28	1	.13	.4	1.2	LSW	1.6X		130	5
2009	MAR	12	0624	55.97	19	12.15	155	26.81	3.05	21		.14	.5	1.8	LSW	1.4X		133	5
2009	MAR	12	0713	58.44	19	12.49	155	27.31	6.19	18	1	.16	.6	2.0	LSW	1.6X		116	6
2009	MAR	12	0754	53.84	19	19.03	155	49.17	10.24	18	1	.10	.8	1.2	KON	1.5X		150	8
2009	MAR	12	1726	53.86	19	12.15	155	27.07	2.57	22	1	.13	.4	1.5	LSW	1.5X		124	5
2009	MAR	12	1803	4.07	19	52.03	155	23.53	26.11	25	2	.10	.9	1.6	KEA	1.9X		155	6
2009	MAR	12	1904	56.73	19	23.85	155	16.77	3.95	10	1	.10	.5	.6	SSCL	1.6X		96	0

---ORIGIN TIME (HST)--					-LAT N--		--LON W--		DEPTH	N	N	RMS	ERH	ERZ	LOC	PREF	N	AZ	MIN
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	S	SEC	KM	KM	REMKS	MAG	RD	GAP	DS
2009	MAR	13	0108	11.76	20	4.62	155	54.77	12.28	14	1	.10	2.2	1.2	KOH	1.8X		250	15
2009	MAR	13	0138	26.56	19	45.14	155	24.23	27.21	36	3	.11	.7	1.3	KEA	2.0X		83	7
2009	MAR	13	0455	14.30	19	18.08	155	14.06	5.24	28	2	.12	.5	1.4	SF2	1.5X		85	2
2009	MAR	13	0507	36.67	19	23.66	155	17.09	1.79	12	1	.06	.4	.2	SSCL	2.0X		88	1
2009	MAR	13	0836	28.65	19	21.24	155	18.69	1.49	13	1	.09	.3	1.1	SWR	1.5X		54	5
2009	MAR	13	1241	21.18	19	28.65	155	47.58	3.02	13	1	.07	.8	1.9	KON	1.6U		123	5
2009	MAR	13	1339	19.84	19	13.62	155	27.28	12.62	24	2	.10	.5	.8	LSW	1.9X		110	6
2009	MAR	13	1500	0.20	19	24.71	155	15.75	3.45	9	1	.09	.7	.6	SNCL	1.3X		159	2
2009	MAR	13	1524	16.08	19	24.47	155	17.02	2.18	12	1	.07	.4	.3	SSCL	1.6X		115	1
2009	MAR	14	0225	48.02	19	43.13	155	34.50	36.34	25	2	.07	.8	1.4	KEA	1.8X		110	16
2009	MAR	14	0336	35.47	19	24.15	155	17.04	1.62	12	1	.08	.4	.3	SSCL	1.5X		101	1
2009	MAR	14	1653	6.12	19	24.23	155	17.08	1.95	15	2	.06	.3	.3	SSCL	2.1X		102	1
2009	MAR	14	2036	38.00	19	43.51	155	51.59	26.30	20	1	.10	1.3	2.7	HUA	1.4X		220	26
2009	MAR	14	2325	36.07	19	58.68	155	26.91	10.94	13	1	.04	1.3	.6	KEA	1.7X		195	15
2009	MAR	15	0453	21.21	19	23.97	155	16.72	2.18	11	1	.08	.4	.3	SSCL	1.6X		102	0
2009	MAR	15	0456	31.22	19	24.01	155	17.00	0.95	22	3	.09	.3	.2	SSCL	2.3X		60	1
2009	MAR	15	0614	14.80	19	15.12	156	11.25	31.82	21	1	.09	5.2	2.5	KON	2.1X		289	33
2009	MAR	15	0720	0.22	19	24.18	155	17.22	0.02	8	1	.09	.3	.5	SSCL#	1.3X		98	1
2009	MAR	15	0839	23.82	19	23.71	155	16.08	4.27	10	1	.08	.7	.8	SECL	1.4X		99	1
2009	MAR	15	0840	0.98	19	23.67	155	16.69	1.06	10	1	.04	.3	.2	SSCL	1.5X		72	0
2009	MAR	15	0944	10.57	19	12.44	155	41.38	8.22	16	1	.12	.7	3.2	LSW	1.8X		132	10
2009	MAR	15	1109	12.43	19	23.81	155	15.94	1.70	11	1	.07	.3	.4	SECL	1.2X		104	1
2009	MAR	15	1131	43.29	19	24.50	155	16.20	1.68	8	1	.09	.4	.6	SECL	1.2X		139	1
2009	MAR	15	1132	2.67	19	24.04	155	17.05	2.59	12	2	.07	.4	.4	SSCL	2.0X		97	1
2009	MAR	15	1204	34.89	19	24.46	155	16.91	1.59	10	1	.03	.3	.3	SSCL	1.3X		118	1
2009	MAR	15	1204	58.99	19	24.50	155	16.53	0.23	14	2	.07	.2	.3	SSCL	1.9X		132	1
2009	MAR	15	1326	1.88	19	24.68	155	16.16	0.03	6	1	.06	.2	1.0	SNCL#	.9X		152	2
2009	MAR	15	1347	36.53	19	16.57	155	13.02	4.57	20	1	.08	.6	.8	SSF	1.4X		164	1
2009	MAR	15	1535	39.35	19	15.06	155	31.94	7.14	34	3	.17	.4	1.0	LSW	1.9X		62	3
2009	MAR	15	1810	11.34	19	24.90	155	16.03	0.79	9	1	.07	.3	.8	SNCL	1.8X		168	2
2009	MAR	15	2141	29.42	19	24.04	155	16.97	1.92	11	1	.09	.4	.3	SSCL	1.8X		98	1
2009	MAR	16	0020	40.93	19	24.25	155	17.22	2.19	11	1	.07	.4	.4	SSCL	2.0X		97	1
2009	MAR	16	0230	51.12	19	18.41	155	14.02	9.96	43	6	.11	.4	.4	SF2	2.8X		133	8
2009	MAR	16	0231	26.37	19	18.07	155	14.06	3.98	29	1	.12	.4	1.0	SSF	2.2X		85	2
2009	MAR	16	1331	27.19	19	24.64	155	16.74	0.02	8	1	.07	.3	.6	SNCL#	1.5X		136	1
2009	MAR	17	0744	59.57	19	19.75	155	10.67	8.47	38	5	.08	.4	.5	SF3	2.0X		93	6
2009	MAR	17	1415	33.29	19	23.15	155	17.31	3.28	11	1	.06	.5	.5	SSCL	1.8X		124	1
2009	MAR	17	1819	46.68	19	25.93	155	15.63	2.25	31	5	.09	.3	.4	SNCFL	2.4X		89	3
2009	MAR	17	1825	40.79	19	26.25	155	15.80	1.98	19	3	.06	.3	.5	SNCL	2.0X		161	4
2009	MAR	17	1959	38.55	19	25.14	155	16.38	3.66	10	1	.10	.7	.6	SNCL	1.7X		157	2
2009	MAR	17	2130	51.05	19	24.26	155	17.11	1.66	18	2	.06	.3	.2	SSCL	1.7X		102	1
2009	MAR	18	0557	41.37	19	24.48	155	16.76	1.63	17	3	.07	.3	.2	SSCL	2.2X		125	1
2009	MAR	18	0721	35.11	19	24.23	155	17.10	0.60	10	1	.05	.3	.3	SSCL	1.7X		102	1
2009	MAR	18	1226	33.21	19	26.94	155	19.99	5.33	21	3	.12	.6	1.7	KAO	1.8X		156	5
2009	MAR	18	1247	49.13	19	52.23	156	1.61	42.07	47	7	.10	.9	1.4	HUAF	3.3X		236	28

---ORIGIN TIME (HST)--					-LAT N--		--LON W--		DEPTH	N	N	RMS	ERH	ERZ	LOC	PREF	N	AZ	MIN
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	S	SEC	KM	KM	REMKS	MAG	RD	GAP	DS
2009	MAR	18	1832	15.18	19	23.71	155	16.96	2.20	10	1	.09	.4	.4	SSCL	1.3X		80	1
2009	MAR	19	0004	41.58	19	10.65	155	40.49	0.97	16	1	.12	.5	1.3	LSW	1.4X		83	10
2009	MAR	19	0030	50.16	19	24.97	155	16.77	2.13	10	1	.05	.4	.4	SNCL	1.4X		158	2
2009	MAR	19	0046	0.49	19	24.92	155	19.58	6.62	21	3	.10	.5	1.0	KAO	1.6X		110	2
2009	MAR	19	0612	21.06	19	21.46	155	1.26	7.10	27	1	.11	.9	.7	SF5	1.4X		195	8
2009	MAR	19	1012	32.67	19	49.81	155	1.95	48.61	46	8	.12	.9	1.2	KEA	2.6X		230	14
2009	MAR	19	1255	45.35	19	14.04	155	26.29	5.27	23	1	.14	.5	1.6	LSW	1.2X		117	4
2009	MAR	20	0403	45.03	19	20.01	155	8.41	6.34	33	2	.11	.5	.7	SF4	1.8X		110	5
2009	MAR	20	0718	22.12	19	24.85	155	15.83	0.03	9	1	.08	.3	.7	SNCL#	1.6X		167	2
2009	MAR	20	0911	31.12	19	40.75	156	8.69	41.47	46	7	.10	1.1	1.4	HUAF	2.9X		250	32
2009	MAR	20	1317	39.33	19	25.05	155	19.44	6.62	39	7	.11	.3	.6	KAO	2.4X		46	3
2009	MAR	20	1745	1.28	19	25.09	155	16.34	3.34	8	1	.06	.7	1.1	SNCL	1.3X		177	2
2009	MAR	20	2039	58.07	19	25.15	155	16.32	1.83	11	1	.06	.4	.5	SNCL	1.7X		157	2
2009	MAR	21	0736	59.62	18	49.60	155	9.47	51.87	29	1	.09	3.1	2.0	LOI	2.1X		269	49
2009	MAR	21	0739	50.41	19	24.21	155	16.20	2.27	10	1	.07	.3	.4	SECL	1.6X		123	1
2009	MAR	21	1019	14.93	19	24.15	155	16.90	1.04	8	1	.09	.3	.4	SSCL	1.4X		105	1
2009	MAR	21	2145	28.83	19	19.35	155	13.50	6.76	33	1	.11	.5	.9	SF2	1.8X		69	4
2009	MAR	22	0655	47.62	19	25.07	155	29.36	9.90	17	2	.07	.4	1.2	KAO	1.6X		63	6
2009	MAR	22	0807	4.22	19	26.53	155	15.90	4.18	10	1	.04	1.1	.9	SNCL	1.8X		205	4
2009	MAR	22	0943	1.45	19	24.95	155	15.71	1.57	10	1	.04	.4	.5	SNCL	1.8X		177	2
2009	MAR	22	1239	34.24	19	23.98	155	15.79	0.21	10	1	.05	.2	.4	SECL	1.6X		113	1
2009	MAR	22	1249	52.79	19	27.95	155	15.66	0.02	6		.04	3.6	5.6	SNCL#	1.7X		299	6
2009	MAR	22	1838	23.91	19	19.70	155	8.18	7.10	29	3	.08	.5	.8	SF4	1.9X		116	4
2009	MAR	22	2205	33.04	20	4.62	155	33.18	27.82	34	3	.11	1.0	2.1	KEA	2.4X		203	24
2009	MAR	23	1657	5.09	19	20.37	155	4.21	6.51	30	2	.12	.7	1.1	SF5	2.0X		180	7
2009	MAR	24	0134	31.25	19	24.73	155	16.36	1.75	10	1	.07	.4	.5	SNCL	1.0X		151	2
2009	MAR	24	0731	4.77	19	21.38	155	49.19	10.76	31	4	.14	.5	.6	KON	1.9X		116	11
2009	MAR	24	2330	45.54	19	18.96	155	15.56	5.42	30	1	.10	.4	1.1	SF1	1.5X		107	5
2009	MAR	25	0306	18.24	19	25.32	155	16.49	4.87	10	1	.09	1.1	1.0	SNCL	1.9X		192	2
2009	MAR	25	0330	32.49	19	24.47	155	16.63	2.68	9	1	.07	.4	.5	SSCL	2.0X		128	1
2009	MAR	25	0750	35.60	19	12.32	155	29.40	33.20	30	4	.07	.6	1.4	DLS	2.0X		76	5
2009	MAR	25	1103	20.05	19	23.53	155	16.59	0.25	13	2	.10	.2	.2	SSCB	3.0U		93	1
2009	MAR	25	1108	35.78	19	22.35	155	16.96	1.39	9	1	.03	.4	.4	SSCL	1.7X		164	2
2009	MAR	25	2252	59.19	19	23.84	155	17.02	2.66	9	1	.08	.4	.4	SSCL	1.8X		90	1
2009	MAR	26	0430	34.09	19	51.14	155	34.33	26.17	29	1	.08	.8	1.7	KEA	1.8X		115	9
2009	MAR	26	0444	58.44	19	28.70	155	27.33	7.43	35	5	.13	.3	1.1	KAO	1.9X		46	6
2009	MAR	26	0640	6.13	19	18.59	154	51.14	45.78	32	1	.09	2.6	2.0	LER	1.8X		279	18
2009	MAR	26	0845	24.41	19	27.56	155	16.73	3.31	8	1	.03	2.0	1.2	SNCL	1.5X		284	4
2009	MAR	26	1443	39.61	19	11.52	155	30.85	44.63	26		.09	1.0	3.1	DLST			91	6
2009	MAR	26	1651	47.16	19	28.35	155	24.75	2.42	23	4	.13	.3	.8	KAO	1.7X		70	4
2009	MAR	26	1755	47.39	19	25.26	155	39.60	0.80	8		.15	1.0	2.1	MLO	1.2X		125	4
2009	MAR	26	1806	8.53	19	8.68	155	34.12	45.56	18	1	.11	2.1	2.1	DLST			266	11
2009	MAR	26	2037	38.07	19	24.58	155	38.40	2.90	12		.08	.7	.4	MLO	1.5X		104	1
2009	MAR	27	0711	9.83	19	25.16	155	39.35	2.04	8	1	.06	1.0	.8	MLO	1.6U		207	3
2009	MAR	27	1006	15.73	19	11.81	155	16.63	45.86	27	2	.10	1.2	2.3	DEP	2.1X		202	11

---ORIGIN TIME (HST)--				-LAT N--		--LON W--		DEPTH	N	N	RMS	ERH	ERZ	LOC	PREF	N	AZ	MIN
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	S	SEC	KM	KM	REMKS	MAG	RD	GAP	DS
2009	MAR	27	1018	25.68	19	15.64	155	19.78	43.72	18		.11	1.7	4.0	DEPT			172	5
2009	MAR	27	1113	44.10	19	21.19	155	30.42	9.78	26	2	.09	.4	1.0	KAO	2.1X		54	5
2009	MAR	27	1740	10.79	19	11.71	155	30.43	8.17	23	1	.12	.6	1.2	LSW	1.8X		150	6
2009	MAR	27	1922	26.49	19	21.19	155	5.81	7.37	40	5	.12	.4	.6	SF4	2.4X		149	5
2009	MAR	28	0058	23.04	19	24.82	155	15.87	5.99	7	1	.05	1.2	3.0	INTL	1.5X		165	2
2009	MAR	28	0124	15.72	19	20.04	155	8.16	6.76	34	2	.08	.5	.7	SF4	1.8X		115	5
2009	MAR	28	0634	16.78	19	25.25	155	17.84	5.46	8	1	.03	1.3	1.2	INTL	1.8X		188	1
2009	MAR	28	0806	18.06	19	25.38	155	16.19	5.54	9	1	.09	1.2	1.3	INTL	2.0X		200	2
2009	MAR	28	0904	0.35	20	4.41	156	20.66	16.40	34	4	.14	2.6	16.6	DIS -	2.6X		318	68
2009	MAR	28	1208	58.53	19	25.77	155	37.29	2.97	29	5	.14	.4	.5	MLO	2.4X		78	3
2009	MAR	28	1416	18.30	19	24.65	155	16.94	2.10	9	1	.05	.4	.4	SNCL	1.7X		128	2
2009	MAR	28	1435	14.49	19	24.23	155	16.98	1.97	9	1	.03	.3	.3	SSCL	1.6X		105	1
2009	MAR	28	1632	29.81	19	24.33	155	16.18	2.34	8	1	.06	.4	.6	SECL	1.8X		129	1
2009	MAR	28	1852	13.56	19	24.78	155	16.07	1.90	12	2	.07	.3	.5	SNCL	1.6X		149	2
2009	MAR	28	1932	15.90	19	24.18	155	16.98	2.59	11	1	.06	.3	.3	SSCL	1.7X		103	1
2009	MAR	28	2016	12.24	20	23.57	156	0.83	7.93	35	3	.10	6.6	8.8	KOH -	2.4X		313	70
2009	MAR	28	2303	11.76	19	23.79	155	17.11	2.98	11	1	.09	.5	.5	SSCL	1.7X		87	1
2009	MAR	28	2310	50.76	19	20.23	155	7.09	6.08	29	1	.11	.6	1.1	SF4	1.4X		138	6
2009	MAR	29	0428	15.06	19	59.99	155	19.96	9.21	20	2	.21	1.6	1.1	KEA	1.7X		208	12
2009	MAR	29	0538	48.37	19	23.74	155	16.65	1.16	10	1	.06	.3	.2	SSCL	1.5X		66	0
2009	MAR	29	1757	9.29	19	18.23	155	12.83	6.46	27	1	.07	.4	.8	SF2	1.7X		107	2
2009	MAR	29	1901	57.60	19	10.46	155	42.42	12.32	16	2	.10	.6	1.2	LSW	1.6X		81	7
2009	MAR	29	2256	1.25	19	24.38	155	16.61	3.72	12	2	.07	.5	.6	SSCL	1.8X		124	1
2009	MAR	29	2339	15.95	19	45.25	155	26.44	22.91	16	2	.13	1.1	1.9	KEA	1.5X		129	3
2009	MAR	30	0026	46.15	19	21.63	155	25.28	12.07	39	4	.10	.3	.4	KAO	1.8X		43	4
2009	MAR	30	0041	11.46	19	25.33	155	24.57	5.99	34	4	.13	.4	1.5	KAO	1.8X		37	7
2009	MAR	30	0136	59.47	19	18.44	155	15.32	5.13	24	1	.09	.5	1.9	SF1	1.2X		116	4
2009	MAR	30	0307	25.03	19	17.15	154	59.82	39.11	37	4	.10	1.1	1.3	LER	1.9X		238	14
2009	MAR	30	1453	25.82	20	0.34	155	37.53	10.28	14	2	.11	.8	.7	KOH	1.9X		162	17
2009	MAR	30	1524	35.39	19	0.26	155	27.90	39.98	48	10	.08	.8	1.1	DLS	2.8X		216	17
2009	MAR	30	2356	0.05	19	24.14	155	17.15	1.97	12	2	.05	.3	.3	SSCL	1.8X		96	1
2009	MAR	31	0259	17.79	19	41.16	155	57.48	14.60	25	4	.10	1.1	.5	HUA	2.3X		211	13
2009	MAR	31	0441	10.22	19	12.01	155	29.07	36.42	33	7	.09	.7	1.5	DLS	1.9X		84	5
2009	MAR	31	0941	25.38	19	25.50	155	16.29	4.80	10	1	.09	1.2	.9	SNCL	1.5X		207	2
2009	MAR	31	0942	34.43	19	24.21	155	16.97	1.81	25	4	.07	.3	.2	SSCL	2.0X		85	1
2009	MAR	31	1717	22.05	19	34.05	156	11.69	26.17	15		.09	6.9	4.1	KON	1.8X		296	30

Table 5.

ORIGIN YEAR	MON	DA	TIME (HST) HRMN	SEC	LAT N DEG	MIN	LON W DEG	MIN	DEPTH KM	N RD	N S	RMS SEC	ERH KM	ERZ KM	LOC REMKS	PREF MAG	N RD	AZ GAP	MIN DS
2009	JAN	17	0255	9.59	19	17.33	154	59.82	39.67	50	10	.10	.7	.8	LERF	3.3X		222	14
2009	JAN	30	1537	0.76	19	13.42	155	27.86	6.25	40	2	.12	.5	.8	LSWF	3.0X		103	7
2009	JAN	30	1912	55.61	19	21.14	155	2.84	8.88	48	9	.10	.6	.4	SF5	3.1X		185	7
2009	JAN	30	1917	6.08	19	20.96	155	2.86	9.15	48	10	.11	.6	.4	SF5	3.4X		187	7
2009	FEB	14	0507	34.02	19	45.66	156	5.73	9.04	43	6	.13	1.1	.9	HUAF	3.5X		243	35
2009	FEB	16	0245	19.54	19	55.44	156	10.05	35.34	48	9	.11	1.2	1.7	KOH	3.2X		264	43
2009	FEB	21	2325	19.29	19	19.18	155	12.90	9.80	47	10	.13	.5	.4	SF2F	3.2X		129	4
2009	FEB	22	1920	39.16	21	16.71	154	53.33	14.75	30	2	.11	7.5	11.4	DIS -	3.0X		324	158
2009	MAR	1	0203	0.43	19	54.27	156	6.61	44.23	46	7	.10	1.2	1.4	HUA	3.0X		254	43
2009	MAR	4	0920	36.11	19	28.51	156	10.27	38.68	45	8	.08	1.0	1.3	KONF	3.1X		254	27
2009	MAR	6	0209	15.11	19	19.49	155	7.57	9.49	48	11	.10	.5	.3	SF4F	3.4X		134	4
2009	MAR	9	0944	53.14	20	8.30	155	9.90	23.31	47	8	.11	1.2	3.3	KEAF	4.3X		251	33
2009	MAR	18	1247	49.13	19	52.23	156	1.61	42.07	47	7	.10	.9	1.4	HUAF	3.3X		236	28
2009	MAR	25	1103	20.05	19	23.53	155	16.59	0.25	13	2	.10	.2	.2	SSCB	3.0U		93	1

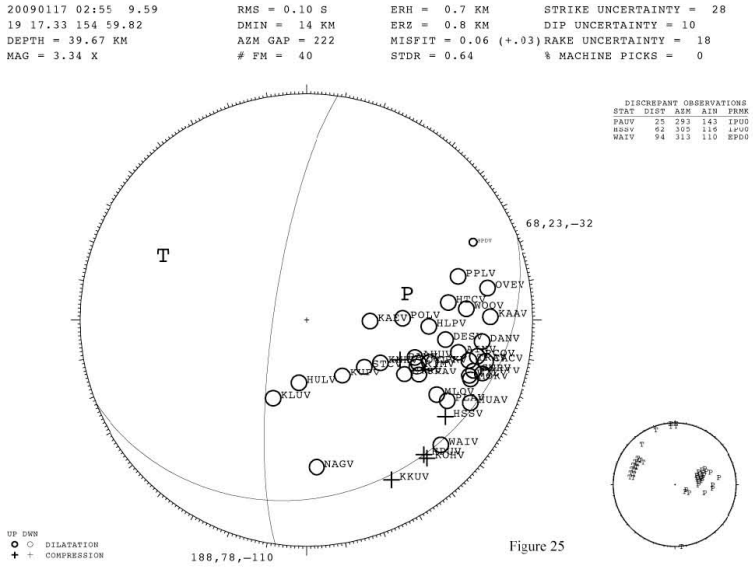


Figure 25

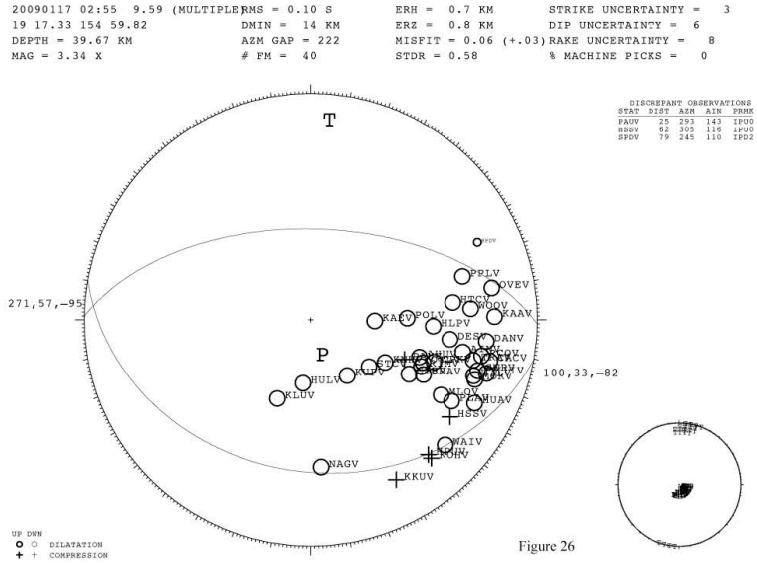


Figure 26

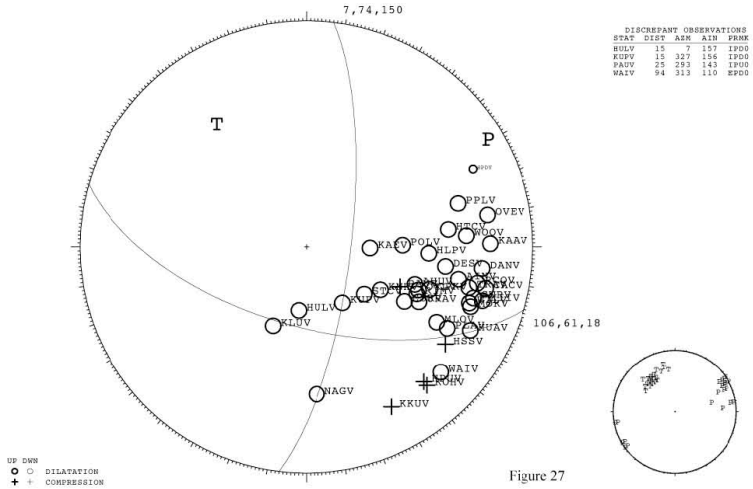


Figure 27

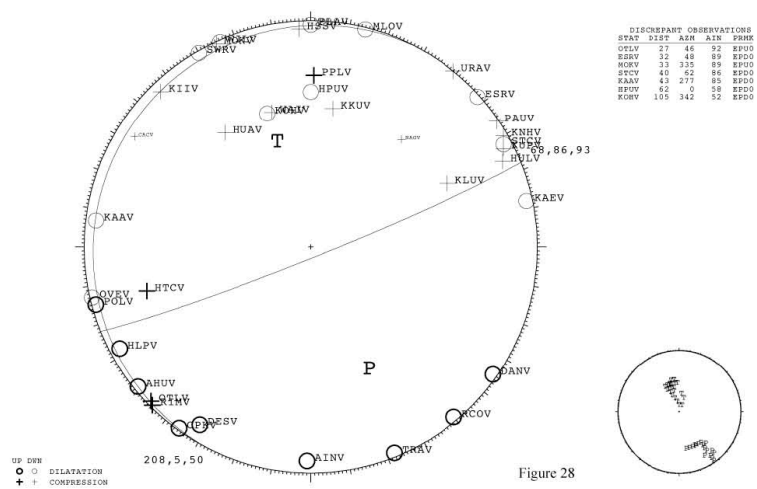


Figure 28

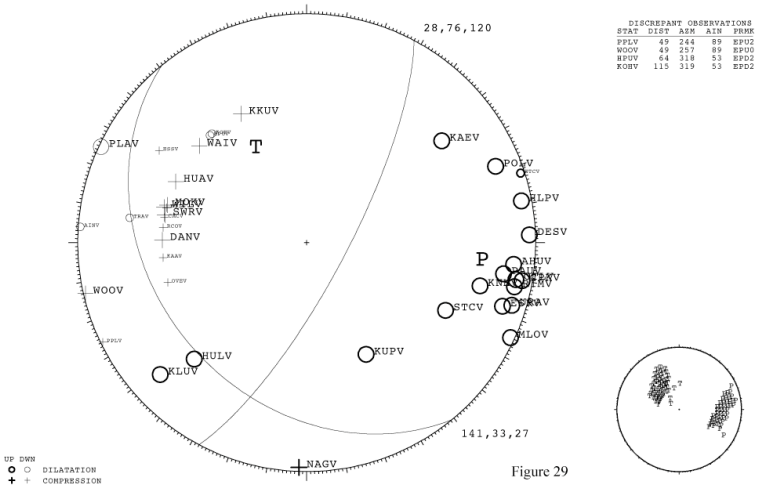
Figure 25-28.

20090130 19:12 55.61
19 21.14 155 2.84
DEPTH = 8.88 KM
MAG = 3.08 X

RMS = 0.10 S
DMIN = 7 KM
AZM GAP = 185
FM = 39

ERH = 0.6 KM
ERZ = 0.4 KM
MISFIT = 0.07 (+.03)
STDR = 0.75

STRIKE UNCERTAINTY = 20
DIP UNCERTAINTY = 8
RAKE UNCERTAINTY = 20
% MACHINE PICKS = 0



DISCREPANT OBSERVATIONS

STAT	DIST	AZM	AIN	PRMK
PPLV	49	244	89	EPU2
WOOV	49	257	89	EPU0
HPUV	64	318	53	EPD2
KOHV	115	319	53	EPD2

UP DWN
o ○ DILATATION
+ + COMPRESSION

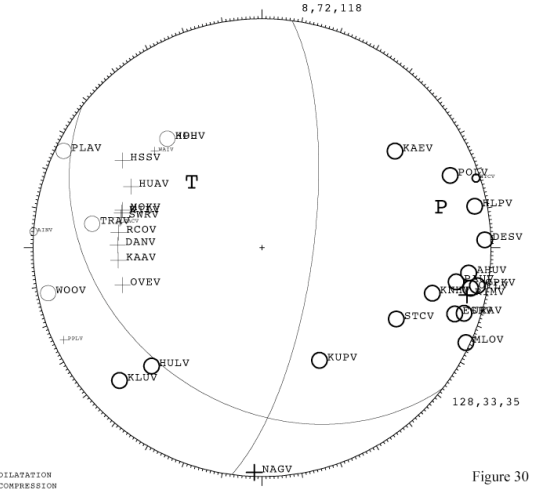
Figure 29

20090130 19:17 6.08
19 20.96 155 2.86
DEPTH = 9.15 KM
MAG = 3.39 X

RMS = 0.11 S
DMIN = 7 KM
AZM GAP = 187
FM = 38

ERH = 0.6 KM
ERZ = 0.4 KM
MISFIT = 0.14 (+.03)
STDR = 0.73

STRIKE UNCERTAINTY = 27
DIP UNCERTAINTY = 12
RAKE UNCERTAINTY = 30
% MACHINE PICKS = 0



DISCREPANT OBSERVATIONS

STAT	DIST	AZM	AIN	PRMK
RINV	25	283	59	EPU0
PPLV	49	245	85	EPU2
TRAV	53	278	64	EPD0
EPUV	64	319	53	EPD0
KOHV	115	319	53	EPD0

UP DWN
o ○ DILATATION
+ + COMPRESSION

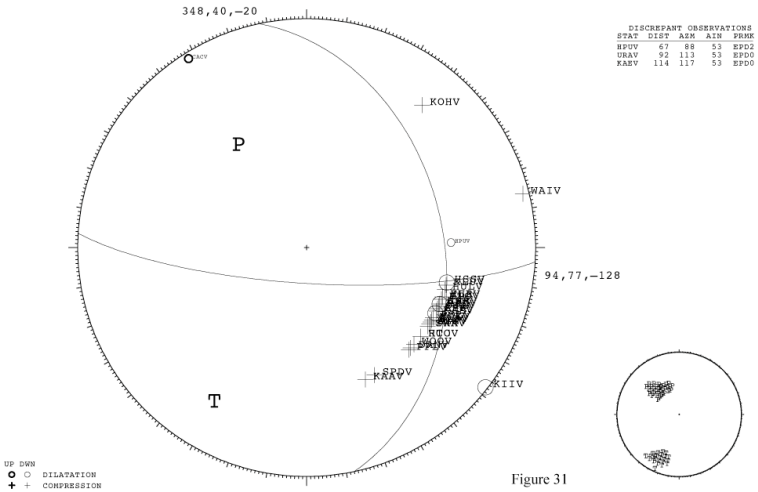
Figure 30

20090214 05:07 34.02
19 45.66 156 5.73
DEPTH = 9.04 KM
MAG = 3.47 X

RMS = 0.13 S
DMIN = 35 KM
AZM GAP = 243
FM = 37

ERH = 1.1 KM
ERZ = 0.9 KM
MISFIT = 0.04 (+.02)
STDR = 0.23

STRIKE UNCERTAINTY = 10
DIP UNCERTAINTY = 8
RAKE UNCERTAINTY = 15
% MACHINE PICKS = 0



DISCREPANT OBSERVATIONS

STAT	DIST	AZM	AIN	PRMK
HPUV	67	88	53	EPD2
URAV	92	113	53	EPD0
KABV	114	117	53	EPD0

UP DWN
o ○ DILATATION
+ + COMPRESSION

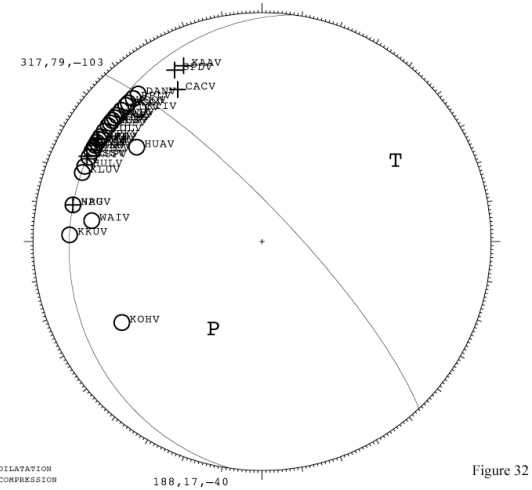
Figure 31

20090216 02:45 19.54
19 55.44 156 10.05
DEPTH = 35.34 KM
MAG = 3.22 X

RMS = 0.11 S
DMIN = 43 KM
AZM GAP = 264
FM = 39

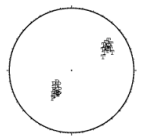
ERH = 1.2 KM
ERZ = 1.7 KM
MISFIT = 0.07 (+.02)
STDR = 0.14

STRIKE UNCERTAINTY = 2
DIP UNCERTAINTY = 4
RAKE UNCERTAINTY = 5
% MACHINE PICKS = 0



DISCREPANT OBSERVATIONS

STAT	DIST	AZM	AIN	PRMK
EPUV	76	101	107	IPU0
RINV	110	121	107	EPU0
OTLV	110	122	107	EPU0
ESRV	113	120	107	EPU0

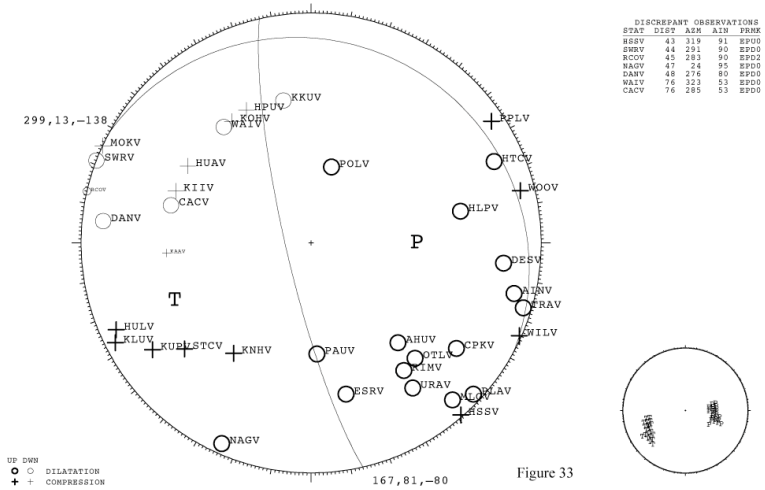


UP DWN
o ○ DILATATION
+ + COMPRESSION

Figure 32

Figure 29-32.

20090221 23:25 19.29 RMS = 0.13 S ERH = 0.5 KM STRIKE UNCERTAINTY = 5
19 19.18 155 12.90 DMIN = 4 KM ERZ = 0.4 KM DIP UNCERTAINTY = 4
DEPTH = 9.80 KM AZM GAP = 129 MISFIT = 0.17 (+.03) RAKE UNCERTAINTY = 15
MAG = 3.18 X # FM = 37 STDR = 0.54 % MACHINE PICKS = 0

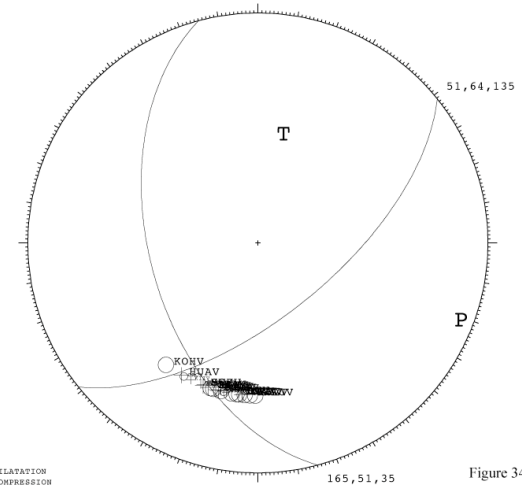


DISCREPANT OBSERVATIONS

STAT	DIST	AZM	AIN	PRMK
HSSV	43	319	91	EPU0
SWRV	44	291	90	EPD0
RCOV	45	283	90	EPD2
NAGV	47	24	95	EPD0
DANV	48	276	80	EPD0
WAIV	76	323	53	EPD0
CACV	76	285	53	EPD0

Figure 33

20090222 19:20 39.16 RMS = 0.11 S ERH = 7.5 KM STRIKE UNCERTAINTY = 5
21 16.71 154 53.33 DMIN = 158 KM ERZ = 11.4 KM DIP UNCERTAINTY = 5
DEPTH = 14.75 KM AZM GAP = 324 MISFIT = 0.20 (+.04) RAKE UNCERTAINTY = 5
MAG = 3.03 X # FM = 29 STDR = 0.15 % MACHINE PICKS = 0



DISCREPANT OBSERVATIONS

STAT	DIST	AZM	AIN	PRMK
HLOV	204	195	56	EPU0
KUPV	208	186	56	EPU0
URAV	210	192	56	EPU2
AINV	219	196	56	EPU0
KAEV	222	187	56	EPU2
CACV	226	209	56	EPU2
HTCV	232	194	56	EPU2

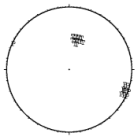
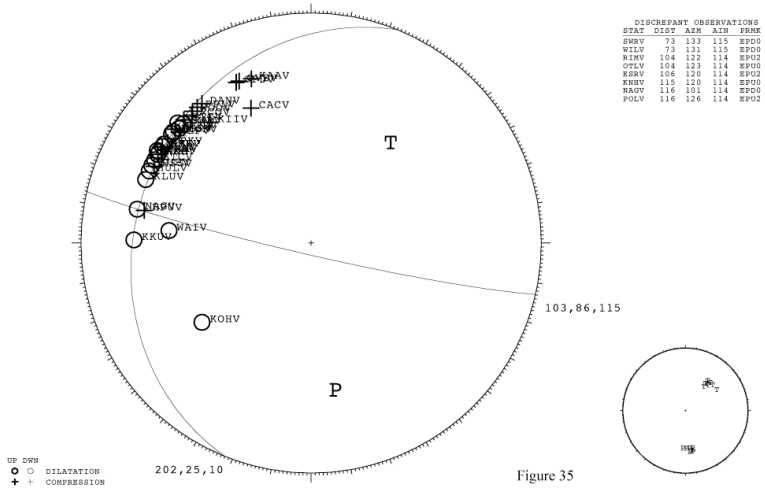


Figure 34

20090301 02:03 0.43 RMS = 0.10 S ERH = 1.2 KM STRIKE UNCERTAINTY = 6
19 54.27 156 6.61 DMIN = 43 KM ERZ = 1.4 KM DIP UNCERTAINTY = 0
DEPTH = 44.23 KM AZM GAP = 254 MISFIT = 0.09 (+.03) RAKE UNCERTAINTY = 10
MAG = 3.03 X # FM = 39 STDR = 0.16 % MACHINE PICKS = 0

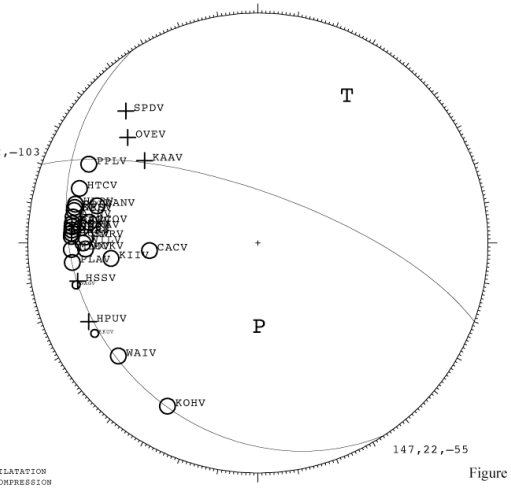


DISCREPANT OBSERVATIONS

STAT	DIST	AZM	AIN	PRMK
SWRV	73	133	115	EPD0
WILV	73	131	115	EPD0
RIMV	104	122	114	EPU2
OTLV	104	123	114	EPU0
ESRV	106	120	114	EPU2
KNHV	115	120	114	EPU0
NAGV	116	101	114	EPD0
POLV	116	126	114	EPU2

Figure 35

20090304 09:20 36.11 RMS = 0.08 S ERH = 1.0 KM STRIKE UNCERTAINTY = 13
19 28.51 156 10.27 DMIN = 27 KM ERZ = 1.3 KM DIP UNCERTAINTY = 4
DEPTH = 38.68 KM AZM GAP = 254 MISFIT = 0.07 (+.02) RAKE UNCERTAINTY = 8
MAG = 3.09 X # FM = 37 STDR = 0.21 % MACHINE PICKS = 0



DISCREPANT OBSERVATIONS

STAT	DIST	AZM	AIN	PRMK
HSSV	73	78	111	EPU0
ESRV	98	93	110	EPU0
KKUV	98	61	110	EPD2
KNHV	106	95	110	EPU0
NAGV	123	77	110	EPD2

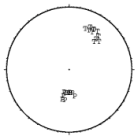


Figure 36

Figure 33-36.

20090306 02:09 15.11
19 19.49 155 7.57
DEPTH = 9.49 KM
MAG = 3.42 X

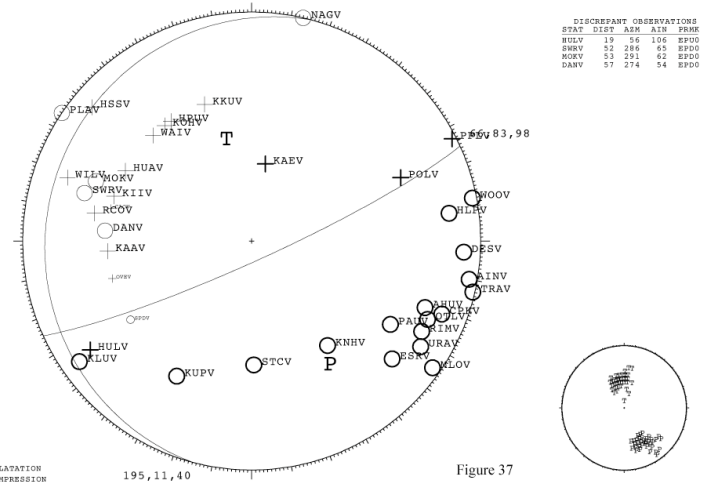
RMS = 0.10 S
DMIN = 4 KM
AZM GAP = 134
FM = 39

ERH = 0.5 KM
ERZ = 0.3 KM
MISFIT = 0.09 (+.03)
STDR = 0.61

STRIKE UNCERTAINTY = 10
DIP UNCERTAINTY = 17
RAKE UNCERTAINTY = 10
% MACHINE PICKS = 0

DISCREPANT OBSERVATIONS

STAT	DIST	AZM	AIN	PRMK
HULV	19	56	106	EPU0
SWRV	52	286	65	EPD0
MOKV	53	291	62	EPD0
DANV	57	274	54	EPD0



UP DWN
DILATATION
COMPRESSION

Figure 37

20090309 09:44 53.14
20 8.30 155 9.90
DEPTH = 23.31 KM
MAG = 4.26 X

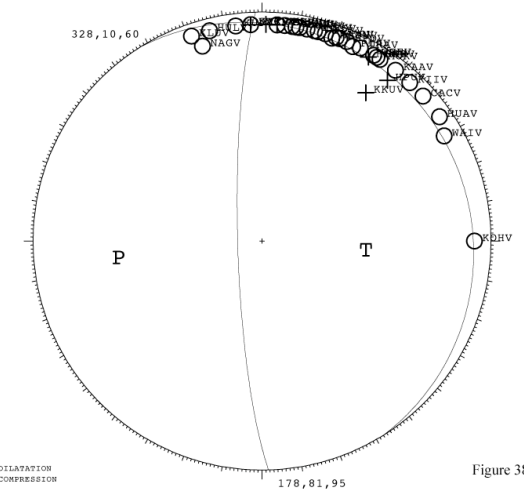
RMS = 0.11 S
DMIN = 33 KM
AZM GAP = 251
# FM = 40
STDR = 0.16

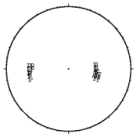
ERH = 1.2 KM
ERZ = 3.3 KM
MISFIT = 0.03 (+.02)

STRIKE UNCERTAINTY = 4
DIP UNCERTAINTY = 1
RAKE UNCERTAINTY = 10
% MACHINE PICKS = 0

DISCREPANT OBSERVATIONS

STAT	DIST	AZM	AIN	PRMK
HSSV	68	210	98	IPU0
STCV	83	177	96	EPU0
POLV	95	184	96	IPD0





UP DWN
DILATATION
COMPRESSION

Figure 38

20090318 12:47 49.13
19 52.23 156 1.61
DEPTH = 42.07 KM
MAG = 3.35 X

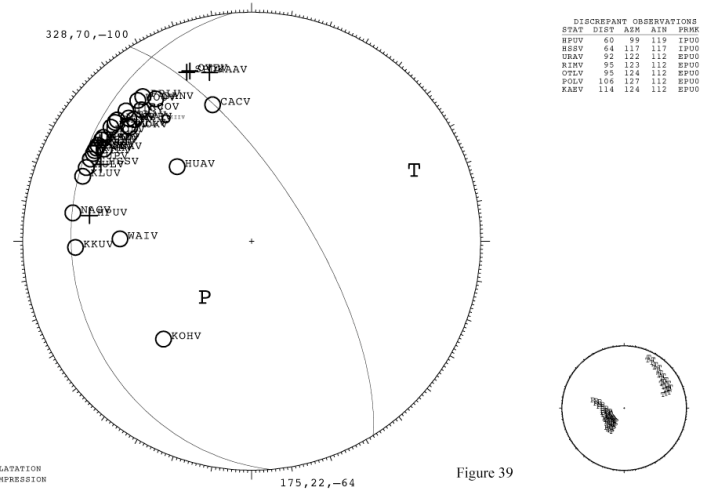
RMS = 0.10 S
DMIN = 28 KM
AZM GAP = 236
# FM = 40
STDR = 0.31

ERH = 0.9 KM
ERZ = 1.4 KM
MISFIT = 0.18 (+.02)

STRIKE UNCERTAINTY = 5
DIP UNCERTAINTY = 5
RAKE UNCERTAINTY = 25
% MACHINE PICKS = 0

DISCREPANT OBSERVATIONS

STAT	DIST	AZM	AIN	PRMK
HPUV	60	99	119	IPU0
HSSV	64	117	117	IPU0
URAV	92	122	112	EPU0
KIMV	95	123	112	EPU0
OTLV	95	124	112	EPU0
POLV	106	127	112	EPU0
KAEV	114	124	112	EPU0



UP DWN
DILATATION
COMPRESSION

Figure 39

20090318 12:47 49.13 (MULTIPLE)
19 52.23 156 1.61
DEPTH = 42.07 KM
MAG = 3.35 X

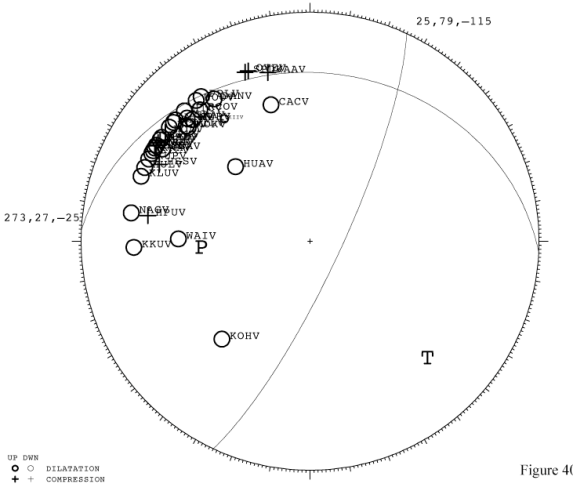
RMS = 0.10 S
DMIN = 28 KM
AZM GAP = 236
# FM = 40
STDR = 0.50

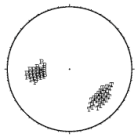
ERH = 0.9 KM
ERZ = 1.4 KM
MISFIT = 0.20 (+.02)

STRIKE UNCERTAINTY = 8
DIP UNCERTAINTY = 5
RAKE UNCERTAINTY = 5
% MACHINE PICKS = 0

DISCREPANT OBSERVATIONS

STAT	DIST	AZM	AIN	PRMK
HPUV	60	99	119	IPU0
HSSV	64	117	117	IPU0
URAV	92	122	112	EPU0
KIMV	95	123	112	EPU0
OTLV	95	124	112	EPU0
POLV	106	127	112	EPU0
KAEV	114	124	112	EPU0





UP DWN
DILATATION
COMPRESSION

Figure 40

Figure 37-40.