Seismic Data: Linking Waveforms, Phase Readings & Source Parameters

Ray Willemann, International Seismological Centre

Digital recording of broadband seismic data has fundamentally changed seismology. The ISC Bulletin is evolving to facilitate seismological research using sophisticated signal processing and statistical analysis of many data.

Formatted "Comments"

Data currently in variably-formatted comments are being parsed, then posted in IASPEI SEISMIC FORMAT (ISF).

Bibliographic Citations

Early bulletins cite research papers, a service lost in more prompt Bulletins. The on-line Bulletin, generated from a database that can be updated, could help to restore it.

Station Info.

The first instance of each station code links to further details, eventually to include links onward to sources such as the NEIC and FDSN station books.

USGS

Federation of Digital Seismograph Networks

New Types of Measurements

ISF is extensible, and ISC welcomes contributions of new data types, such as cross-correlation or AR-based times, S-splitting and other polarisation meas., and rms or other non-traditional amplitudes. The ISC is investigating the possibility of making automated measurements itself following normal manual analysis.

International Seismological Centre | Centre Séismologique International | Международный Сейсмологический Центр | 国際地震センター

国际地震中心 | Internationales Seismologisches Zentrum | المركز الدولي لبحوث الزلازل | Centro Internacional de Sismología

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DATA_TYPE BULLETIN ISF1.0
ISC Bulletin for the event 987230

Event   987230 Mindanao, Philippine Islands
  Date        Time          Err   RMS Latitude Longitude  Smaj  Smin  Az Depth   Err Ndef Nsta Gap  mdist  Mdist Qual   Author      OrigID
1996/09/20 04:05.00                          4.0000  127.0000                                                          uk NAO      2132346
1996/09/20 04:10:27.40                       9.4500  126.3000              33.0                                        uk MOS      2132347
1996/09/20 04:10:27.40                       9.4800  126.3000              22.9              35                        uk EIDC     2132348
1996/09/20 04:10:27.60                 1.13  9.4630  126.2840              33.0             199                        fe NEIC     2132349
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 (#                  17  1.600  0.400 USGS)
 (#MACRO Type Cou Location_Name  Intensity Scale Author)
 (#       F   PHI Butan                          PPI)
 (#       F   PHI Suriago                        PPI)
 (#       F   PHI Leyte                          PPI)
 (#SCALER_MOMENT sc Moment Uncert Author)
 (#                  19  1.300          PPI)
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 (#              BBP  25.00 66.00  110.00                USGS)
 (#                  163.00 31.00   52.00)
 (+                Depth from synthetics of broadband displacement seismograms.)
 (#MOMENT_TENSOR sc    M0 fCLVD    MRR    MTT    MPP    MRT    MTP    MPR    NST Author)
 (#                  eM0 eCLVD   eMRR   eMTT   eMPP   eMRT   eMTP   eMPR    NCO duration)
 (#              18 4.000          3.740 -4.000  3.520  1.300  0.060  3.520     35 USGS)
 (#                  )
 (#PRINCIPAL_AXES sc  T_val T_azim  T_pl  B_val B_azim  B_pl  P_val P_azim  P_pl Author)
 (#                   eTv    eTa    eTp    eBv    eBa    eBp    ePv    ePa    ePp fCLVD)
 (#                27  5.400 305.00 65.00 -0.010 189.00 11.00 -5.390  95.00 22.00 USGS)
 (#                   )
 (#NODAL_PLANES Typ Strike   Dip    Rake  NP  NS Plane Author)
 (#              BDC 165.00 25.00   63.00                USGS)
 (#                  14.00 67.00  102.00)
1996/09/20 04:10:27.90                       9.6200  126.4100              34.0                                        uk BJI      2132350
1996/09/20 04:10:33.60   0.10                9.5300  126.6600   1.1   1.1  90  22.0                                  uk HRVD     2132351
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 (#                  eM0 eCLVD   eMRR   eMTT   eMPP   eMRT   eMTP   eMPR    NCO duration)
 (#              18 7.500          5.010  0.670 -5.680  1.810  4.910  0.430     54 HRVD)
 (#                                0.030  0.030  0.030  0.080  0.090  0.030    122  2.4)
 (+                Data used: GSN; LP body waves)
 (+                In addition to body waves, also mantle waves at 48 stations and 101 components)
 (#PRINCIPAL_AXES sc  T_val T_azim  T_pl  B_val B_azim  B_pl  P_val P_azim  P_pl Author)
 (#                   eTv    eTa    eTp    eBv    eBa    eBp    ePv    ePa    ePp fCLVD)
 (#              18  7.420 307.00 64.00  0.180 187.00 13.00 -7.600  92.00 21.00 HRVD)
 (#                  )
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 (#              BDC 158.00 26.00   58.00                HRVD)
 (#                  13.00 68.00  105.00)
1996/09/20 04:10:28.22   0.92  1.11   9.4749  126.3234   3.2   2.8  90  39.5   8.2  318  396       2.00 172.00 m i uk ISC_EHB    2139969
1996/09/20 04:10:28.22   0.92  1.11   9.4749  126.3234   3.2   2.8  90  39.5   8.2  318  396       2.00 172.00 m i uk ISC_ak135  2139968
1996/09/20 04:10:28.22   0.92  1.11   9.4749  126.3234   3.2   2.8  90  39.5   8.2  318  396       2.00 172.00 m i uk ISC_SP12   2139967
1996/09/20 04:10:28.22   0.92  1.11   9.4749  126.3234   3.2   2.8  90  39.5   8.2  318  396       2.00 172.00 m i uk ISC        2132352
 (#pP_DEPTH  Depth Uncert Nphase Author)
 (#          44.54                ISC)

Magnitude  Err Nsta Author       OrigID
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mb     6.3       20 MOS        2132347
MS     6.4       26 MOS        2132347
mb     5.6       30 EIDC       2132348
mb     5.8       48 NEIC       2132349
MSZ    6.4       44 NEIC       2132349
Mw     6.6          HRVD;NEIC  2132349
Me     5.9          USGS;NEIC  2132349
Mw     6.5          USGS;NEIC  2132349
Ms     6.4          BRK;NEIC   2132349
mb     5.6          BJI        2132350
MS     6.4          BJI        2132350
mb     5.7      118 ISC        2132352
MS     6.3       82 ISC        2132352

Year Volume Page1 Page2 Journal
1995      76  109  112 Eos
 (#AUTHORS Torres,R.C., Self,S., Punongbayan,R.S.
 (#TITLE   Attention focuses on Taal: decade volcano of the Philippines., Eos, v76, pp241-247)
1995      22  109  112 Geophys. Res. Lett.
 (#AUTHORS Fujiwara,F., Tamaki,K., Fujimoto,H.)
 (#TITLE   Morphological studies of the Ayu Trough, Philippine Sea - Caroline Plate boundary., )
1995     243  241  253 Tectonophysics
 (#AUTHORS Ishida,M.)
 (#TITLE   The seismically quiescent boundary between the Philippine Sea plate )
 (+        and the Eurasian plate in central Japan.)
 (#EMAIL   ishida@.jp)
1995       1    5    8 Tsunami Newsl.
 (#TITLE   Mindoro Island, Philippines, earthquake and tsunami of November 14., 1995)
1995      14 1117 1132 Tectonics
 (#AUTHORS Hall,R., Ali,J.R., Anderson,C.D.)
 (#TITLE   Cenozoic motion of the Philippine Sea plate: Palaeomagnetic evidence from eastern Indonesia.)
 (#HREF    http://www.agu.org/)
1995     144  875  890 Pure Appl. Geophys.
 (#AUTHORS Imamura,F., Synolakis,C.E., Gica,E.)
 (#TITLE   Field survey of the 1994 Mindoro Island, Philippines tsunami.)
1995      22 3143 3146 Geophys. Res. Lett.
 (#AUTHORS Besana,G.M., Shibutani,T., Hirano,N.)
 (#TITLE   The shear wave velocity structure of the crust and uppermost mantle beneath Tagaytay,)
 (+        Philippines inferred from receiver function analysis)
1995      43  755  761 J. Phys. Earth
 (#AUTHORS Iidaka,T., Hirata,N., Uehira,K.)
 (#TITLE   The upper boundary of the Philippine Sea plate beneath eastern Kanto region estimated)
 (+        from spatially high dense seismic array.)

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QCP     7.26 316.0 P         04:12:08    -6.4                          T__                          _e              31093488
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KKM    10.58 252.0 P         04:13:02.9   2.5                          T__                          _e              31093490
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SWI    11.39                 04:15:09.0                                T__                          _e              31093492
PCI    12.17 212.0 P         04:13:25.0   3.1                          T__           12.0  0.80   _e              31093493
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JTI    15.24 348.0 P         04:14:06.2   3.9                          T__                          _e              31093495
TATo   16.09 344.0 P         04:14:11.43 -1.8                          T__          159.2  0.80   _e              31093496
HKC    17.28 319.0 P         04:14:30     1.7                          T__                          _e              31093497
HKC    17.28                 04:17:45.0                                T__                                          31093498
JIH    17.54   5.0 P         04:14:35.4   4.0                          T__                                          31093499
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QIZ    18.57 303.0 P         04:14:46.0   1.7                          T__        17600.0  8.00   _i              31093505
QIZ    18.57                 04:18:12.0                                T__                          _i              31093506
PJG    18.62  76.0 P         04:14:44    -1.0                          T__                          _e              31093508
GUMO   18.62  76.0 P         04:14:44.20 -0.8                          T__         1392.0  2.20   __              31093507
GUA    18.65  76.0 P         04:14:44    -1.4                          T__                          _e              31093509
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JSU    22.26   9.0 P         04:15:24.9   1.7                          T__                          _e              31093522
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NJZ    23.51 344.0 P         04:15:36.6   1.1                          T__           490.0  0.80   __ mb      6.0 31093524
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NJ2    23.51                 04:15:43.6                                T__                          __              31093526
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NJ2    23.51                 04:19:49.00                               T__       23180.0 16.00   __              31093528
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 (#MEASURE POLARISTION_ANGLE=45 SPLIT_LAG=+1.4 AUTHOR=BJI)
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PHILIPP  BZH C  1.00  10.0          1996/09/20  0.400 0.000                                               MAN      31093566
PHILIPP  BZH C  1.00  10.0 pP       1996/09/20  1.000 0.000                                               MAN      31093567
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 (#ORIG    KSA0)
IMS     BZH C  1.00  10.0 PcP       1996/09/20  0.400 0.000                                  0.1  0.05     EIDC     31093565
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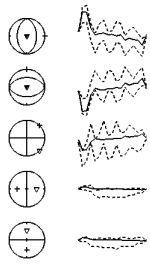
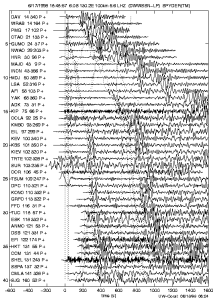
Links to Event-Based Products

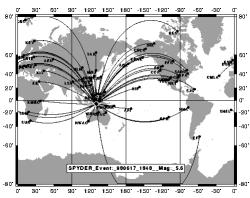
Moment Tensors:
Harvard, Berkeley,
ERI, BATS, MedNet

Source Parameters:
Source Time Funcs.
Mom. Tens. Rate Funcs.



Waveform Data:
IRIS FARM, SPYDER
ODC Vols., SPYDER
GFZ SPYDER

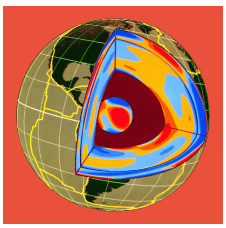




New Types of Locations

The ISC plans to continue publishing locations based on initial arrival times and J.-B. travel times.

As well, however, we are trying out locations using later phase arrivals and travel times from 3-D models.



Links to Contriubted Reports

Recently collected data are available in the original format from the ISC home page, and our new database schema will link each datum to its source. We plan to post provisionally processed data in ISF format within the year.

Unassociated Readings

A review of one month from each of the last 17 years of our data archive found that 28% of all contributed readings were not associated with a locatable event, and thus went unpublished. We are re-reading old binary-format files, and plan to post recovered readings as ISF unassociated phases.