

## Broadband Array in Taiwan for Seismology (BATS) FDSN 2005 Report

Wen-Tzong Liang Bor-Shouh Huang Chun-Chi Liu  
Institute of Earth Sciences, Academia Sinica, Taiwan  
wtl@earth.sinica.edu.tw

### Broadband Array in Taiwan for Seismology (BATS)

To better monitor the seismic activity in the Taiwan region, the Institute of Earth Sciences (IES), Academia Sinica, Taiwan established the BATS in 1994. By the end of 2001, the Taiwan Central Weather Bureau (CWB) started constructed the CWB BB network. Currently there are 16 (STS-1/STS-2) and 30 (Güralp CMG 40T, -3ESP) BB stations operated by the IES and the Taiwan Central Weather Bureau (CWB), respectively. Data from most of these stations are transferred to IES and CWB in a real-time manner through the Frame Relay system. Local events will be automatically detected and archived in terms of the USGS Earthworm system and the Oracle database. Continuous waveform data recorded by BATS are archived by IES and CWB separately. At the moment, only data from BATS/IES stations are available to the research community. Figure 1 shows the current BATS station distribution as well as the earthquake activities with  $M_L \geq 5$  that occurred from 1995 to 2005. Detail information for both the IES and CWB BB stations can be easily found in the official BATS website at <http://bats.earth.sinica.edu.tw>. Stations that are operated by the IES are summarized in Table 1.

### Real-time Data Exchange

Real-time data from only 7 IES BB stations (KMNB, NACB, SSLB, TPUB, TWGB, YHNB, and YULB) are transferred to IRIS DMC by ORB-ORB connection since July 2004. Users can access to these data through any of the IRIS data request facilities. Both the IES and CWB are running Earthworm systems and exchanging the BATS data streams through a high-speed optical cable line. The IES and NIED, Japan are planning to exchange data between BATS and F-net.

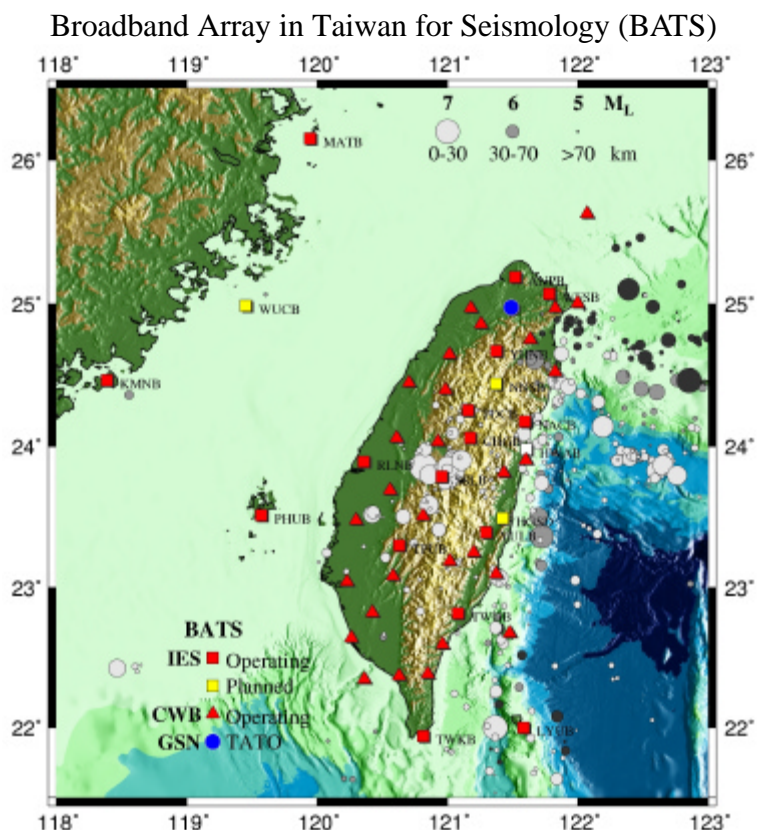


Figure 1. Operating (red) and planned (yellow) BATS stations in 2005. Squares and triangles represent IES and CWB BB stations, respectively. One GSN station TATO is shown in blue circle. Background seismicity ( $M_L \geq 5$ ) in Jan. 1991-Apr. 2005 is also displayed with gray circles.

Table 1. Summary of the BATS/IES stations.

Station	Location	Lat.	Long.	Elev.	Geology	Equip.	Operating
ANPB	Anbu	25.1865	121.5202	825	Andesite	STS2/Q330	970618~
HWAB	Hualien	23.9770	121.6050	20	Alluvial	STS2/Q4120	971103~000215
KMNB	Kinmen	24.4638	118.3884	43	Granite	STS2/Q4120	980205~
LYUB	Lanyu	22.0017	121.5840	40	Andesite	STS2/Q4120	970813~980716
LYUB	Lanyu	22.0387	121.5500	324	Andesite	STS2/4120	980716~
MATB	Matsu	26.1515	119.9456	75	Granite	STS2/Q4120	000625~
NACB	Ninganchiao	24.1738	121.5947	130	Marble	STS2/Q330	950727~
PHUB	Penghu	23.5133	119.5720	15	Basalt	STS2/Q330	020515~
SSLB	Suanglung	23.7875	120.9540	450	Sandstone	STS2/Q4120	960604~
TDCB	Techi	24.2531	121.1583	1295	Slate	STS1/Q680	960315~
TPUB	Dapu	23.3005	120.6296	370	Siltstone	STS2/Q4120	950323~
TWGB	Taitung	22.8176	121.0799	195	Meta-Sandstone	STS2/Q4120	941006~
TWKB	Kenting	21.9406	120.8125	90	Sandy Shale	STS2/Q680	941108~
WFSB	Wufenshan	25.0710	121.7810	100	Siltstone	STS2/Q4120	971023~
YHNB	Yeheng	24.6697	121.3757	775	Slate	STS2/Q330	021003~
YULB	Yuli	23.3924	121.2973	295	Black Schist	STS2/Q330	000215~
RLNB	Erlin	23.864	120.281	40	Sediment	CMT3TB/Q330	040625~
HGSD	Houtzshan	23.4921	121.4239	94	NA	CMT3TB/Q330	04
CHGB	Chinging	24.0602	121.1740		NA	STS2/Q330	050802~
NNSB	Nanshan	24.4400	121.3728	NA	NA	NA	NA
WUCB	Wuchi	24.988	119.453	NA	NA	NA	NA

## Data Distribution Mechanisms

Continuous BATS/IES waveform data from 1996 to 6 months before present are open to the public through the NINJA data request system at BATS website. In addition to those 7 stations that have been transferred to IRIS DMC (see the previous section), all the BATS/IES waveform data archived 1.5 years ago is also ready for access through IRIS request facilities.

## Taiwan CMT Solutions

One of the main tasks of the BATS is to help depict the seismogenic structures in the Taiwan region. Until the end of 2004, the BATS Data Center has reported 1000 final CMT solutions for earthquakes ( $M_L \geq 4$ ) occurred in the Taiwan region from July 1995 (Fig. 2). The Taiwan CMT catalog database is on-line for access at <http://bats.earth.sinica.edu.tw>.

## Portable Units

In 2004 and 2005, the BATS joined a PASSCAL project, Hi-CLIMB, to deploy 16 portable units as lateral stations in Tibet.

## BATS CMT Solutions

*JUL1995~DEC2004*

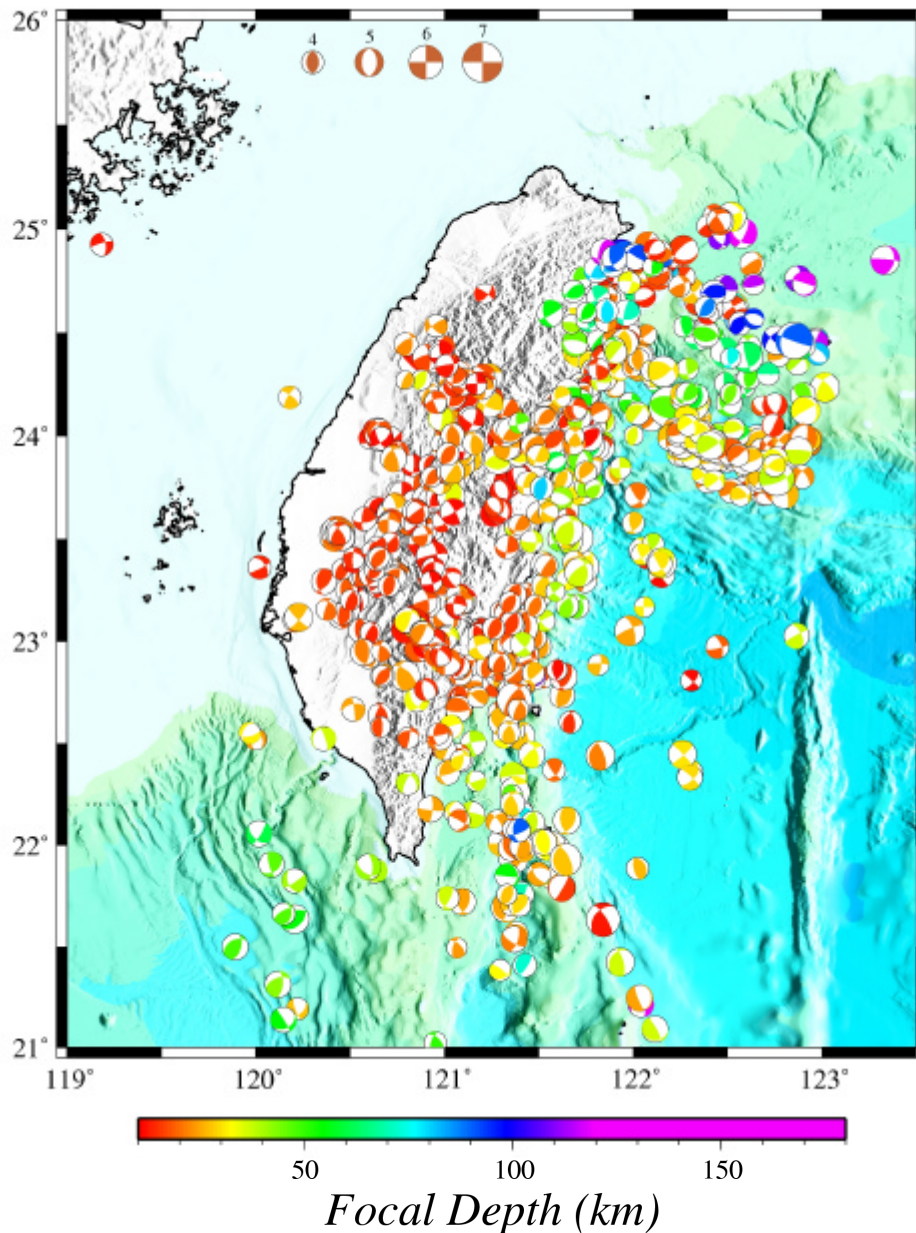


Figure 2. Spatial distribution of the BATS final CMT solutions for earthquakes occurred from 1995 to 2004. Extensive quadrants were filled according to the located centroid focal depth. Beachball size is proportional to the moment magnitude. The central part of Taiwan is suffering a NW-SE compression associated with the arc-continent collision, whereas the seismic activities to the NE and SE of Taiwan correspond to the subduction processes.