Data Files on the Pingtung Earthquake Doublet from the Broadband Downhole Array in Taipei Basin

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INTRODUCTION

The Institute of Earth Sciences (IES) is a contractor of Central Geological Survey (CGS) to execute a four years project of Geophysical investigation and monitoring for micro-earthquake in metropolitan Taipei . The purpose of this project is to investigate, evaluate and continuously monitor the seismic activities of the faults and low frequency tremors in the Taipei area. Because the high noise produced by the human activities which affects the seismic observations is a serious problem, three permanent borehole arrays were established to avoid noise in the Taipei urban area. Installations of these three arrays are in 2005 at Daan Park (DANB), 2006 at Guandu Nature Park (GDUB) and 2007 at Sinjhuang Life Hall Park (SNJB). This is a pilot installing and operating broadband downhole seismic arrays in Taipei Basin.

STATION AND INSTRUMENT INFORMATION

The arrays are located in the Daan Park (DANB) at the southeastern side of Taipei Basin, in the Guandu Nature Park (GDUB) at the northern end of the potential fault of Shanchiao, in the Sinjhuang Life Hall Park (SNJB) at the southwestern site of Taipei Basin. The three downhole arrays were guided in a triangle shape to provide a minimum coverage over the entire Taipei metropolitan area.

DANB, GDUB and SNJB are designed with collocated sets of accelerometers and velocity sensors. Each site consists of two holes with depths of (a) 50 and 90 m, for DANB; (b) 50 and 150 m, for GDUB and (c) 50 and 100 m, for SNJB. Accelerometers (Model AS-3250) emplaced at a depth of 50 meters from the surface and velocity sensors (Model VSE-355G3R) at the bottom of the borehole. Both are made by Tokyo Sokoshin Inc., Japan. For the Tokyo Sokoshin seismometers, the plus motion represents a positive voltage output from the seismometers. Accordingly, the plus motions are pointing to the ‘up’, ‘east’ and ‘north’ directions for the ‘vertical’, ‘transverse’ and ‘longitudinal’ components, respectively.

The bandwidth of the VSE-355G3R is from 0.008 to 70 Hz. It is capable of recording with full scale of 200 cm/sec. The AS-3250 have linear response from DC to 250 Hz and an ability to record shaking levels as high as 2g. The VSE-355G3R and AS-3250 are connected to a Kinemetrics Quanterra Q330 recorder. The recorder handles up to six input channels sampled at a rate of 100 sps for the VSE-355G3R and 20 sps for the AS-3250 with 24-bit A/D conversion.

The Pingtung Earthquake Doublet Data

Two borehole sites at DANB and GDUB preserved the ground-motion acceleration and velocity records completely from the December 26, 2006, Pingtung earthquake doublet. The origin time of these two earthquakes (12:26 and 12:34) was 8 minutes apart. The raw data have all been written into a uniform file format, with one file contains the pair of earthquakes for each recording component. Each file has a header section before the set of ground motion values (digital counts). The header is designed to provide users with information regarding the earthquakes and the recording stations. In the header section of each file, number in parentheses denotes source parameters for the second event (12:34).

Contents on the CD

In the directory \HuangWG, there are 2 subdirectories, and one files: readme.doc (this Note). The 2 subdirectories are named by borehole locations with DANB or GDUB. Each subdirectory contains the raw data of the ground-motion records. The filenames of the data in each subdirectory are named by DANB or GDUB followed by the extension name with ‘BLx’ or ‘HHx’, depending on the recording system: Q330. For the extension name labeled as ‘BLx’, the data is sampled at rate of 20 sps from AS-3250; while the extension name labeled as ‘HHx’, the data is sampled at a high rate of 100 sps from VSE-355G3R. No DC-offset correction was made to the data.