

Detection of slow slip events using long period seismic records of IRIS

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INTRODUCTION

There were studies of detection of slow slip events using long period seismic records. For examples, Kanamori (1976) showed that the 1967, Ms6.5, and the 1974, Ms6.9, Gibbs fracture zone earthquakes, north Atlantic ocean, were slow slip events of slip velocity of around 20cm/s, one order smaller than those of ordinary earthquakes. Using long period records of IDA, Shearer (1994) detected 32 silent earthquake for 10 years from 1981 to 1990, which were not included in seismological catalogue and mostly occurred along ocean ridges. The purpose of this study is the detection of slow slip events using IRIS long period records in which quantity and quality of data have been highly improved in the 1990s.

PROCEDURE OF DETECTION

All of IRIS long period records for one year of 1999 are passed through bandfilters of 25-50s, 50-100s, 100-200s, 200-400s. Looking for surface wave trains, two events on march 22 and August 29 are identified in the long period bandpassed traces, though they can not be recognized in the non-bandpassed traces. They are not included in USGS earthquake catalogue.

DETERMINATION OF EPICENTERS

By grid search with a grid interval of 0.1 degree and an assumption of surface depths, first-order epicenes are determined on the Pacific-Antarctic ridge.

DETERMINATION OF FOCAL MECHANISMS

By trial and errors of fitting synthetic seismograms (Kamigauchi, 1988) with observed ones bandpass-filtered between 50 s and 100 s, strike, dip, rake, scalar moment including latitude and longitude are determined. Earth model is 1066A (Gilbert and Dzwinski,1975). Their epicenes, their focal mechanisms and scalar moments are (57.5S,144.7W) and (64.6S,178.5W), (strike,dip,rake) = (300,80,20) and (315,70,20), 8.0×10^{17} (Mw5.8) and 3.8×10^{17} Nm (Mw5.7), respectively.

SUMMARY

We have detected two unknown slow-slip-events for one year of 1999. They are ridge events of vertical strike slip faults. As suggested by Shearer (1994), one of characteristic features of earthquakes along oceanic ridges and transform faults is small mb compared with large Ms, suggesting that they excite little short period body waves. The slow slip events detected can be regarded as extremeest ones of earthquakes having such feature.