

SEISMIC PROPERTIES AND AUTOREGRESSIVE CONDITIONAL HETEROSKEDASTIC CHARACTERS OF EARTHQUAKES IN TAIWAN

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ABSTRACT

Four purposes are set for this paper. The first one is to find out the statistic properties of 3,085 labeled earthquakes data recorded in the seismic archive of the Central Weather Bureau (CWB) of Taiwan from January 1995 to October 2016. Hualien, a county in the east of Taiwan, has the most frequent number of earthquakes with 1,256 out of 3,085 times (40.7%) occurring there. Yilan County ranked second with a total of 524 earthquakes, which accounts for 17.0%. Most of earthquakes in Taiwan's twenty municipal cities and counties are categorized to be shallow (<70km), except Keelung, which has average hypocenters of 104.61 km (intermediate-depth). Maybe it is because earthquakes in Keelung are in the submerged tectonic plate. In the past 262 months (January 1995 to October 2016) the strongest magnitude (Richter scale, M_T) is 7.3, which occurred on September 21, 1999 in Nantou County and took away 2,415 lives as well as injured 11,305 people (wiki/921_earthquake).

The second purpose of this paper is to find out whether the time series of monthly number of earthquakes in the past 262 months in Hualien and Yilan are stationary or not. The author uses Augmented Dickey-Fuller (ADF) unit-root testing method to check the stationarity of the time series, and the results show that both Hualien and Yilan reveal to be stationary.

The third purpose is to check whether the time series of the monthly number of earthquakes in both counties are co-integrated or not. The outcome shows the time series of Hualien and Yilan are co-integrated, and no spurious effect exists. The regression equation shows that a unit increase of earthquake in Hualien may result in an increase of 0.2149 unit earthquake in Yilan.

The fourth purpose is to find out whether the autoregressive conditional heteroskedastic (ARCH) variances of the monthly number of earthquakes in both counties exist or not. The ARCH test shows the volatile variances of time series for both Hualien and Yilan are heteroskedastic.

KEYWORDS: CWB Archive, ARCH Model, Heteroskedastic

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