Geophysical Research Abstracts, Vol. 9, 07554, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-07554

Physical mechanisms of deterministic seismicity precursory to large earthquakes

F. Takeda (1) and M. Takeo (2)

(1) Takeda Engineering Consultant Inc., Hiroshima, Japan, (2) Dept of Physics, Portland State University, Oregon, USA (takeda@tec21.jp / Fax: +81-82-252-2113)

We divide Japan into meshes of about 5 degrees. Time series analyses of each local seismicity find only two types of deterministic precursors to large earthquakes (*EQ*'s) of $M >$ about 6 [*Takeda*, 2003; *Takeda* and *Takeo*, 2004]. The local time series data are the *EQ* source parameters collected from a catalog with a regionally dependent magnitude window of $M \geq 3.3$ or 3.5. We named the two precursors *CQK* and *CQT* after the 1995 *Kobe* M 7.2 and the 2000 *Tottori* M 7.2, respectively. *CQ* is as *critical* seismic *quiescence*, K as *Kobe* and T as *Tottori*. We find each physical mechanism originating from a selective role of characteristic magnitude *Mc* in a depth dependent seismicity averaged over 15-25 consecutive *EQ*'s. It starts the seismicity with *Mc* $\approx$ 4 and then induces another with *Mc* $\approx$ 3.5. The linear depth variation, created by the seismicity of *Mc* $\approx$ 4 and *Mc* $\approx$ 3.5, becomes comparable to the source dimension of the large *EQ*.

Studying a high-resolution map of coda$Q$ constructed by *Jin and Aki* [2005], we also find *CQK* and *CQT* synonymous with slow and fast codaQ^{-1}, respectively. CodaQ^{-1} is the decay rate of coda waves.

Furthermore, we find the mechanisms of *Aki's* precursors [*Aki*, 2004] originating from *CQK* and *CQT*. *Aki's* precursors are a temporal delay of codaQ^{-1} with respect to N (*Mc*) time series. N (*Mc*) is the relative frequency of *EQ* occurrences with *Mc* in a region. *Mc* is within either 3-3.5 or 4-4.5 depending on the regional characteristic of slow or fast codaQ^{-1}, respectively.