**S110-004** **Room: 304** **Time: May 18 16:15-16:30**

# Temporal variation of the correlation between the phase of the moon and the occurrence of microearthquakes in the Tamba region


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Previously, we showed that during the two-year period following the 1995 Kobe earthquake the occurrence of the microearthquakes in the Tamba region seems to correlate with the phase of the moon (Katao [2002]) and that the correlation is statistically significant (Iwata and Katao [2003]). In this study, we investigate the temporal variation of this correlation using point-process modeling.

The earthquakes used in this study are listed in the catalogue compiled by the Disaster Prevention Research Institute of Kyoto University. We constructed datasets of earthquakes inside two rectangular areas: one covering the most of the Tamba region and the other covering a small area close to the focal region of the Kobe earthquake. We examine both datasets to show that the results are independent of the selection of the area. Since the features of the results change only slightly with the areas, we show only the results for the larger area.

To investigate the periodicity of seismicity using point-process modeling, Ogata [1983] suggested the intensity function x(t)=m+(trend)+(cluster)+(periodicity) that shows the occurrence rate of earthquakes in unit time. We use an N-th polynomial function to indicate trend and the ETAS model [Ogata, 1988] to indicate cluster. Since we consider two cycles—synodic and half-synodic months—periodicity is represented as A1(t)∗sin(q(t))+B1(t)∗cos(q(t))+A2(t)∗sin(2q(t))+B2(t)∗cos(2q(t)). The function q(t) converts the actual time t into the phase angle; we assign 0 or 360 to the times when a new moon appeared, 180 to a full moon, and then the angle to the time linearly from 0 to 180 or 180 to 360. A1(t) and B1(t) are L1-th polynomial functions, and A2(t) and B2(t) are L2-th ones.

Using the maximum likelihood method, we find the parameters of the model and then estimate the value of Akaike Information Criterion (AIC). The orders N, L1, and L2 are also determined using AIC; we choose the orders that minimize AIC. We analyze the microearthquakes that occurred during the four-year period following the Kobe earthquake. The minimum AIC is obtained in the case (N, L1, L2)=(3, 3, 3). Since L1 and L2 are more than 1, the periodicity has temporal variation. We also investigate sqrt(A1(t)∗∗2+B1(t)∗∗2) and sqrt(A2(t)∗∗2+B2(t)∗∗2) corresponding to the amplitude of the periodicity. The values of these functions were greatest just after the Kobe earthquake occurred, and decreases as time elapsed; the correlation was most remarkable just after the Kobe earthquake.

References


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