SSS022-08   会場: 301A   時間: 5月24日11:00-11:15

Applications of the gambling score in evaluating earthquake predictions and forecasts

Applications of the gambling score in evaluating earthquake predictions and forecasts

庄 建倉[1*], Jeremy D. Zechar[2], Changsheng Jiang[3], Rodolfo Console[4], Maura Murru[4], Giuseppe Falcone[4]

Jiancang Zhuang[1*], Jeremy D. Zechar[2], Changsheng Jiang[3], Rodolfo Console[4], Maura Murru[4], Giuseppe Falcone[4]

[1]統計数理研究所, [2]Swiss Seismological Service, [3]China Earthquake Administration, [4]Isti. Nazionale di Geofisica e Vulcano.

[1]Inst. of Statistical Mathematics, [2]Swiss Seismological Service, [3]China Earthquake Administration, [4]Isti. Nazionale di Geofisica e Vulcano.

This study presents a new method, namely the gambling score, for scoring the performance earthquake forecasts or predictions. Unlike most other scoring procedures that require a regular scheme of forecast and treat each earthquake equally, regardless their magnitude, this new scoring method compensates the risk that the forecaster has taken. Starting with a certain number of reputation points, once a forecaster makes a prediction or forecast, he is assumed to have bet some points of his reputation. The reference model, which plays the role of the house, determines how many reputation points the forecaster can gain if he succeeds, according to a fair rule, and also takes away the reputation points bet by the forecaster if he loses. This method is also extended to the continuous case of point process models, where the reputation points bet by the forecaster become a continuous mass on the space-time-magnitude range of interest.

For discrete predictions, we apply this method to evaluate performance of the predictions made by using the Reverse Tracing of Precursors (RTP) algorithm and of the outputs of the predictions from the Annual Consultation Meeting on Earthquake Tendency held by China Earthquake Administration. For the continuous case, we apply it to compare the probability forecasts of seismicity in the Abruzzo region before and after the L'aquila earthquake based on the ETAS model and the PPE model.

Keywords: gambling score, earthquake prediction, earthquake forecast