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Statistical modeling and machine learning studies on the forecast of earthquakes and fault slip

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Earthquakes refer to sudden and spontaneous rupture, or slip, of a geologic fault. Although the physics of fault slips are not fully understood, the governing equations of fault slips are used along with data assimilation methods to make forecast of future fault slip behavior. On the other hand, by focusing on the location and timing of occurrences, earthquakes have also been regarded and modeled as a point process. In both kinds of studies –that focuses on the fault slip evolution and that focuses on the earthquake occurrence patterns –statistical modeling and machine learning studies are changing the research landscape. Recently, science findings have been increasingly used in society, in particular for providing alert/advisory information related to future earthquake occurrence. It means that methodological developments having a larger predictive ability may change how society prepares for future earthquakes. In the talk, I will review the recent advances of statistical modeling and machine learning studies in earthquake science after explaining the fundamental backgrounds, and subsequently on how the research advances can contribute to society for earthquake disaster mitigation.

Presenter: FUKUSHIMA, Yo (Tohoku University - IRIDeS)

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