AOB Seminar

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講演題目: Aspects of earthquake triggering and seismicity clustering

Earthquakes strongly cluster in space and time, driven both by earthquake-to-earthquake triggering and underlying physical processes, such as tectonic stress loading, increased pore pressure, etc.
To understand the general characteristics of earthquake clustering from a large dataset of earthquakes, I analyze seismicity in southern California. I use a high-resolution earthquake catalog based on waveform cross-correlation to study the spatial-temporal distribution of earthquakes. Parameters based on event location, magnitude and occurrence time are computed for isolated seismicity clusters. Spatial migration behavior is modeled using a weighted-L1-norm method.
Aftershock-like event clusters do not exhibit significant spatial migration compared with earthquake swarms. Two triggering processes are considered for swarms: slow slip and fluid diffusion, which are distinguished based on a statistical analysis of event migration. The results suggest fluid-induced seismicity is found across southern California, particularly within geothermal areas. In the Salton Sea geothermal field (SSGF), a correlation between seismicity and fluid injection activities is seen. Spatial-temporal variations of earthquake stress drops are investigated in different regions, and a distance-dependence of stress drop from the injection source is found in the SSGF, suggesting the influence of increased pore pressure. Temporal variation of stress drops within mainshock source regions shows that foreshocks and earthquake swarms have lower stress drops than background seismicity and aftershocks. These results, combined with the spatial migration observed for some large foreshock sequences, suggests an aseismic transient process is likely involved in foreshock triggering.