

# グローバルCOE地球惑星科学 フロンティアセミナー

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所 属 : カーネギー研究所  
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場 所 : 地震・噴火予知研究観測センター  
第 2 会議室  
担当教員 : 長谷川 昭 名誉教授/客員教授  
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## Earthquake Fault studies, modeling, forecasting and prediction.

### 講義内容 :

Earthquake prediction has been a notable disappointment in the seismological community despite years of data. One problem may be the lack of a realistic physical model of the earthquake fault and source. A model should yield realistic b-values, and have events over a range of magnitudes with more or less the same stress drop as is commonly observed. Only if the model results fit these and other observed characteristics, can it be used for meaningful comparison with data. Some observations over many decades do seem promising but not for standard techniques and instrumentation. B-value changes may occur before great earthquakes, but usually are recognized only after the event, when the location is known. One result of high shear stress in fault regions can be dilatancy, and that has been recognized in the laboratory for half a century. This causes both strengthening and, by providing increased pore space, decreased pore pressure on the fault. The stiffer fault zone somewhat shields the surrounding area leading to magnitude-dependent quiescence. Many examples are available and will be shown. However, both the above observables can only suggest a future earthquake at some time possibly years later, i.e. only a forecast. Eventually, water seeps back into the dilatant region and the pore pressure recovers, leading to enhanced failure probability. Generally, this cannot be detected seismically. The dilatancy collapse will, however, expel water that has filled the dilatancy-caused pore spaces. This expelled water is very often observable. There are numerous examples directly or indirectly observed. The time involved is of order days, so this can be, and has been, a real prediction. Examples will be shown. The observables discussed above, can potentially suggest a different strategy and instrumentation, for forecast and prediction of damaging earthquakes.

主 催 : 東北大学 グローバルCOEプログラム  
『変動地球惑星学の統合教育研究拠点』  
拠点リーダー 大谷 栄治

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