# AOB Seminar

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場　　所: 地震・噴火予知研究観測センター　別館第１会議室

講演題目&要旨：

## Coseismic Strengthening of the Shallow Subduction Megathrust Further Enhances Inelastic Wedge Failure and Tsunami Generation

Shallow portion (upper 5 – 10 km) of the subduction megathrust fault, governed by the velocity-strengthening friction, has generally been considered to reduce near-trench slip and tsunamigenesis. Kozdon and Dunham (2013) showed that large shallow slip can still occur in the presence of the velocity-strengthening friction if the rupture is driven strongly from the deeper fault segment (e.g., the 2011 Tohoku earthquake). Here we extend this dynamic rupture model to include inelastic wedge failure (Seno, 2000; Tanioka and Seno, 2001; Ma, 2012; Ma and Hirakawa, 2013). We show that increased basal friction due to velocity strengthening can further drive outer wedge into failure, proposed first by Wang and Hu (2006). Inelastic wedge failure reduces slip on the fault, but at the same time increases the efficiency of generating seafloor uplift (the uplift efficiency is defined as the ratio of the volume of uplift to seismic potency, which is dimensionless), especially when the fault is shallowly dipping. Both the wedge failure and velocity-strengthening friction decrease the rupture velocity at shallow depths and lead to more deficient high-frequency radiation and smaller moment-scaled radiated energy. As the transition of friction from velocity weakening to velocity strengthening is more abrupt strain can localize in the outer wedge developing mega-splay faults. This model thus encompasses all three different mechanisms for tsunamigenesis: large near-trench slip, splay faulting, and inelastic wedge failure, the plausibility of each is controlled by the wedge strength and fault friction properties.