グローバルＣＯＥ地球惑星科学
フロンティアセミナー

講演者　：　Teh-Ru Alex Song　博士

所　属　：　独立行政法人海洋研究開発機構
地球内部ダイナミクス領域

日　時　：　2011 年 2 月 4 日(金)　14:00 – 15:30

場　所　：　地震・噴火予知研究観測センター　別館 第一会議室

担当教員：　内田　直希　助教
内線# / E-mail:uchida@aob.gp.tohoku.ac.jp

Anisotropic mantle lid within young subducted slab underplating Central Mexico: Implications on paleo spreading rate in late Archean and early Proterozoic

講義内容：

Continental crusts, known as cratons, have been stable since the Archean age and sub-cratonic lithospheric mantle is known to be very depleted in iron and buoyant. Geodynamic processes that are relevant to sub-cratonic lithosphere formation and craton preservation include mantle overturn, large-scale plume ascent, and subduction lithosphere accretion and stacking. While it is not clear exactly when plate tectonics started, seismic investigations of one of the world's oldest Slave craton in North America revealed multiple dipping anisotropic layers in the sub-cratonic lithospheric mantle that point to the possibility of several shallow subduction episodes from late Archean (~2.6 Ga) to early Proterozoic (~1.8 Ga). Here we model local converted S-to-P waves and teleseismic P-to-S converted waves to interrogate the interior of the young subducted Cocos plate, which has been previously imaged underplating beneath Central Mexico where no deformation is shown in the overriding plate directly above the flat segment. We find strong peak-to-peak P-wave (+/-10%) and S-wave anisotropy (+/-10%) localized within the topmost 2-6 km of the subducting oceanic mantle, with a fast symmetric axis dipping at about 45 degrees toward subduction direction, 30-40 degrees clockwise from the north. Such an anisotropic mantle lid is probably composed of dunites and depleted harzburgites assemblages that were originally synthesized and strained at the East Pacific Rise and later subducted. This provides a strong case that processes generating dipping anisotropic layers beneath the Slave craton and other ancient continents and mechanisms essential to craton stabilization can be analogous to modern shallow subduction and underplating, except they operate under a different thermal state of the mantle in the Earth's history. The analogy established here allows direct inferences of seafloor spreading rates back to Archean, which has profound implication on the evolution of global heat flux and carbon cycle.

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

連絡先:　宮城県仙台市青葉区荒巻字青葉
東北大学大学院理学研究科　地学棟 404 号
GCOE地球惑星科学事務室　苫米地　由布
TEL/FAX 022(795)6668