

TO seminar Nov. 26th – Jamshid Hassanzadeh

Anatomy of a continental arc at its initial stage: Views from study of subduction initiation along the passive margin of the Neo-Tethys in Iran

Abstract:

Subduction initiation is geodynamically well investigated in intra-oceanic arc systems, and subsequent birth of an island arc is petrologically well studied. In contrast, the kinematics of how a full-blown Andean-type margin initiates, are cryptic largely because: 1) there are no obvious on-going conversions of passive margins into active ones, and 2) the early arc products are concealed. We suggest that investigation of the rock record can be used for clarifying this important geodynamic problem. In particular, arc magmatic suites preserved in continents are reliable indicators of the presence of ancient subduction zones. We have acquired a relatively complete picture of variations in age of calc-alkaline granitoids and volcanic rocks along the ca. 1700 km-long, 50-100 km wide, Mesozoic arc preserved within the Sanandaj-Sirjan zone of the Iranian Plateau. Based on a this study, subduction in this system appears to have initiated along the continental margin at 185 Ma, nucleating at as many as three centers spaced about 500 km apart. Initiation appears to have propagated, unidirectionally northwestward away from these centers, at rates of order 1 cm/yr. Early Jurassic basalts in this zone have MORB-like and tholeiitic compositions and mafic-ultramafic cumulates reveal boninitic affiliation, all of which indicate close similarities with initial stage of intra-oceanic arc systems in terms melt chemistry.