Tectonic motions and their geodynamic drivers: The need for an integrative large-scale perspective

David Fernandez-Blanco

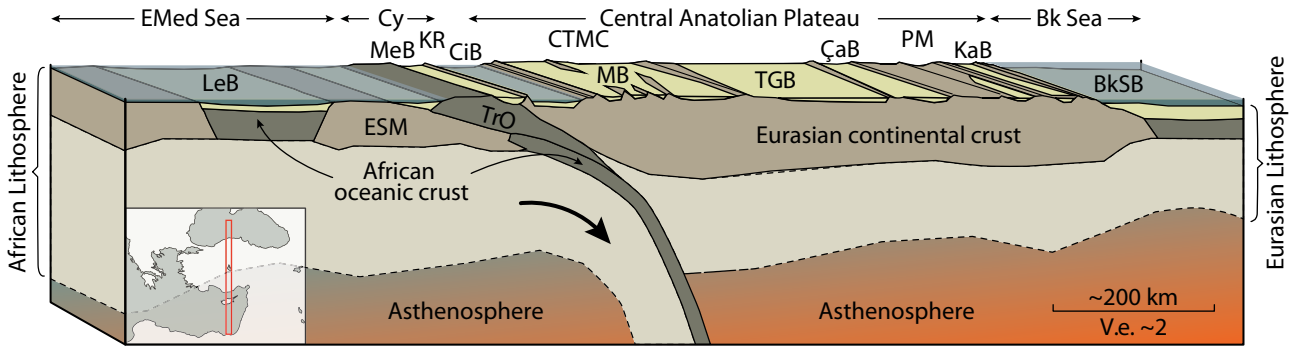
Vrije Universiteit Amsterdam / ETH Zurich

Lecture announcement:

Thursday, September 4th, 2014, 1:15 pm
Lochnerstraße 4-20, Room 408

Topic:

This talk analyses the tectonic motions undergone in three disparate case studies; (i) the southern margin of the Central Anatolian plateau, which underwent regional uplift coupled with coeval counteracting subsidence since the Late Miocene in front of the Cyprian subduction zone; (ii) the Moroccan Atlantic margin, which shows km-scale exhumation during post-rift thermal subsidence of the passive margin in Jurassic to Early Cretaceous times; and, (iii) the Great Sumatran Fault, which presently drives lateral motion of the Sunda sliver plate and its vertical motions, while setting earthquakes and volcanic activity. At the southern margin of the Central Anatolian plateau, the results are based on a variety of approaches (field work, structural/geometrical methods, reflection seismics, subsidence curves, source-to-sink analysis, and numerical models), as well as in large-scale compilations from available literature with special focus on representing and interpreting 3D structural, stratigraphic and geophysical data sets. This integrative broad data coverage made possible the proposal of a new mechanism accounting for the observed tectonic motions. I propose a model in which the tectonic motions in the area are controlled by the evolution of the Cyprus subduction system. The initiation of retreat of the slab to present trench position led to stretching of the crust first, and subsequent regional subsidence. Accretion in the margin took place during stabilisation of the subduction system, driving the differential tectonic motions, including the contemporaneous inland uplift - seaward subsidence. Later verticalization of the slab and partial break-off caused a change in the regional kinematics and facilitated the extrusion of the Anatolian-Eagean plate. In the last two study cases, where field work and DEM analysis were performed, I will show evidence that partially dissent with their classical geodynamic models. However, lacking these studies the aforementioned integrative large-scale perspective, this evidence remains insufficient. In each of the three study areas, like in most settings worldwide, a wide range of geodynamic processes are proposed. However, commonly the proposed models are based solely on discipline-specific data sets. Regional-scale data-intense studies integrating structural and basin analysis approaches, coupled with geochronological, geophysical and numerical methods, and inputs from all other available sources, should be used to understand the geodynamic context of any research area. In other words, since the Earth is a dynamic system, so should it be our approach to it.



Structural Geology - Tectonics - Geomechanics, RWTH Aachen University

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