Commonwealth Center for Coastal Physical Oceanography
Old Dominion University
Fall 2013 Seminar Series

"HADEAN HEAT PIPES AND THE ORIGIN OF PLATE TECTONICS"

WILLIAM MOORE
Hampton University

Monday, October 28, 2013
3:30 PM
Room 1202, Engineering and Computational Sciences Building

Abstract

The heat transport and lithospheric dynamics of early Earth are currently explained via plate-tectonic and vertical-tectonic models, but these do not offer a global synthesis consistent with the geologic record. We use numerical simulations and comparison with the geologic record to explore a heat-pipe model in which volcanism dominates surface heat transport. These simulations indicate that a cold and thick lithosphere developed as a result of frequent volcanic eruptions that advected surface materials downwards. Declining heat sources over time led to an abrupt transition to plate tectonics. Consistent with model predictions, the geological record shows rapid volcanic resurfacing, contractional deformation, a low geothermal gradient across the bulk of the lithosphere and a rapid decrease in heat-pipe volcanism after initiation of plate tectonics. The heat-pipe Earth hypothesis therefore offers a coherent geodynamic framework in which to explore the evolution of our planet before the onset of plate tectonics.

Biography

Dr. William Moore is the Hampton University Professor in Residence at the National Institute of Aerospace, a non-profit research consortium. A graduate of Penn State (B.S., 1991) and UCLA's Earth and Space Sciences Department (Ph.D., 1997), Dr. Moore has participated in NASA missions to Venus, Mars, Jupiter, and Saturn, investigating the processes that drive geological activity in solid planetary bodies using geophysical modeling techniques.

Reception before seminar at 3:00 PM