NSF Award Abstract - #0215534

CSEDI: Collaborative Research: Thermal, Petrological, and Seismological Study of Subduction Zones

NSF Org	EAR
Latest Amendment Date	September 12, 2002
Award Number	0215534
Award Instrument	Standard Grant
Program Manager	Robin Reichlin EAR DIVISION OF EARTH SCIENCES GEO DIRECTORATE FOR GEOSCIENCES
Start Date	September 1, 2002
Expires	August 31, 2005 (Estimated)
Expected Total Amount	$26455 (Estimated)
Investigator	Peter E. van Keken keken@umich.edu (Principal Investigator current)
Sponsor	University of Michigan 3003 S State St. RM 1062 Ann Arbor, MI 481091274 734/764-1817
NSF Program	1574 GEOPHYSICS
Field Application	0000099 Other Applications NEC
Program Reference Code	0000,1031,OTHR,

Abstract

EAR-0215534 van Keken

Most of the world's earthquakes occur in subduction zones where oceanic lithosphere descends into the mantle. Intermediate-depth earthquakes, which occur at 40-300 km depth, and the transport of water into the mantle are intimately linked to metamorphic reactions in the subducting lithosphere. The researchers propose to better understand subduction-zone processes by integrating seismological observations with thermal and petrological models. In order to test the dehydration-embrittlement hypothesis for intermediate-depth seismicity, the investigators will construct two-dimensional kinematic-dynamical thermal models for a set of subduction zones that span a range in subduction parameters and that include regions with significant along-strike variations in observed seismicity. Events in global and regional seismicity data sets will be systematical evaluated and relocated in order to test the hypotheses that (a) upper seismic zones are confined to the subducting mafic crust, (b) lower seismic zones are related to dehydration reactions in the subducting mantle, and (c) the forearc mantle is aseismic. Petrologic models of subducting lithosphere will be created using new phase diagrams and rock property data bases and the resulting layered seismic-velocity models will be tested against observed dispersion of seismic body waves. The amount and distribution of forearc mantle hydration (serpentinization) will be quantified by integrating seismological observations with mineral physics calculations.

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