

Gerald Schubert

Perspectives on a Planetary Scientist in the Golden Age

Peter Olson

University of New Mexico

University of California Los Angeles

May 8, 2026



Jerry Schubert's Route to Science

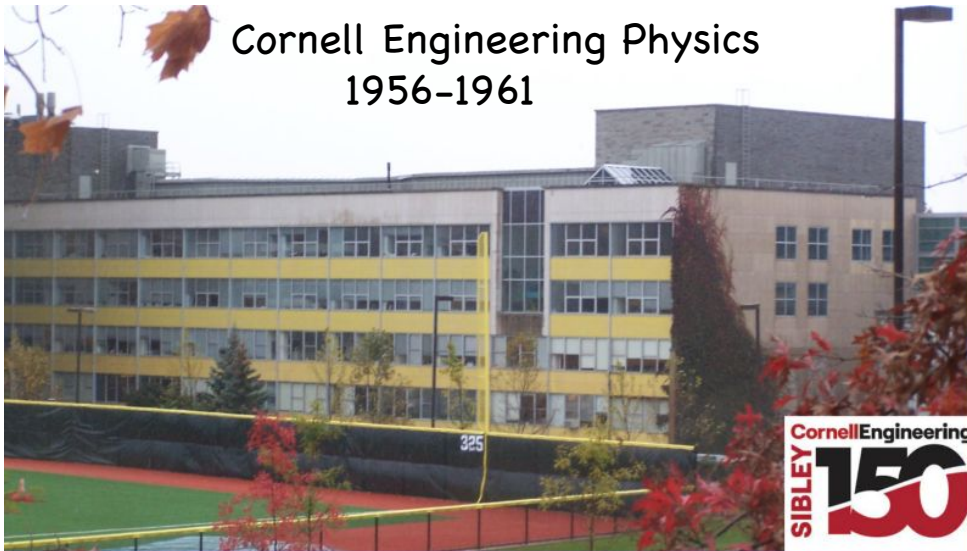
The Hub



Brooklyn Technical Highschool

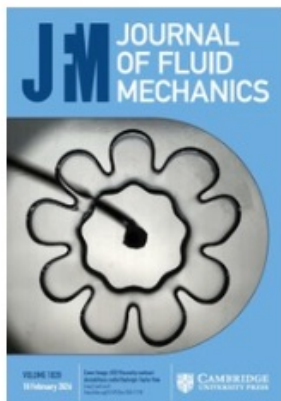


Cornell Engineering Physics
1956-1961



Donald Turcotte

U.S. Navy Nuclear Power School and UC Berkeley 1961–1965



Journal of Fluid
Mechanics

The dynamics of turbulence near a wall according to a linear model

Published online by Cambridge University Press: 28 March 2006

Gerald Schubert and G. M. Corcos

[Hide author detail](#)

Gerald Schubert Affiliation: College of Engineering, University of California, Berkeley

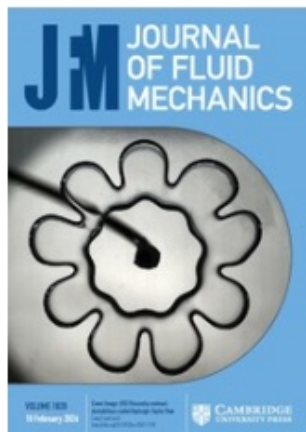
G. M. Corcos Affiliation: College of Engineering, University of California, Berkeley

Article Metrics

Cambridge DAMTP 1965–1966



Keith Moffatt



Viscous flow near a cusped corner

Published online by Cambridge University Press: 28 March 2006

G. Schubert

[Hide author details ^](#)

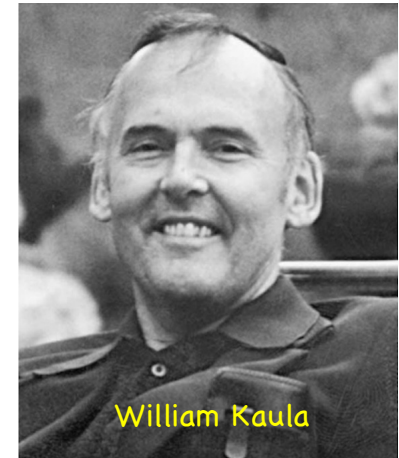
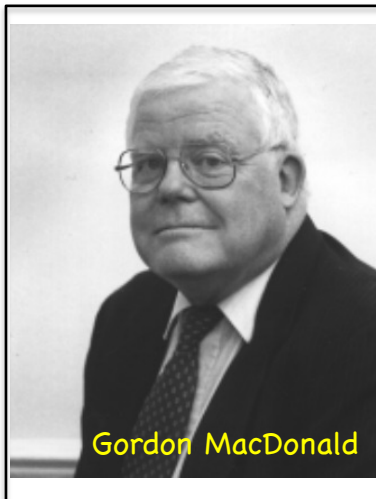
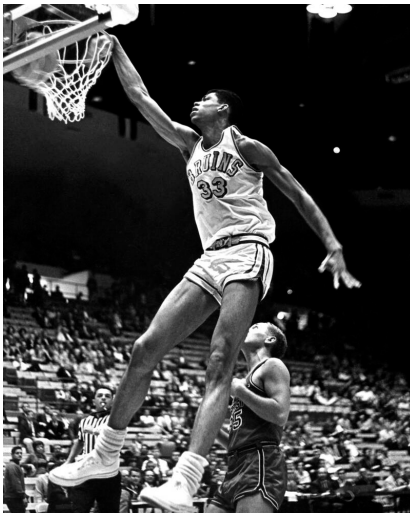
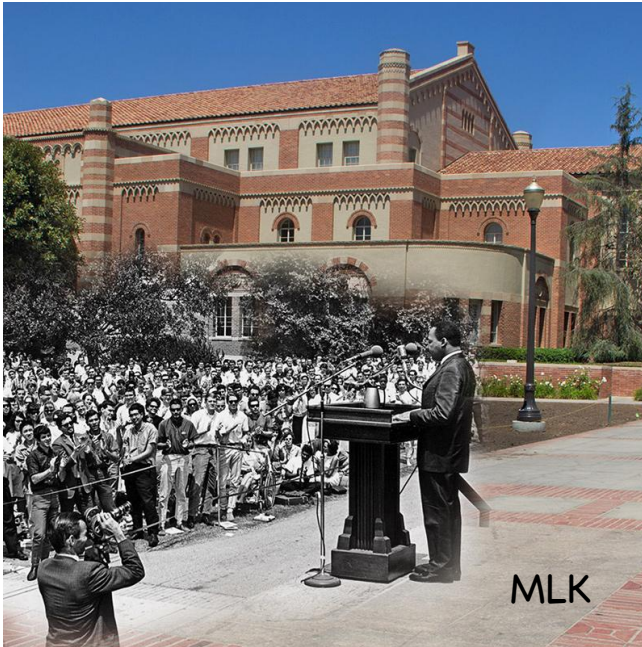
G. Schubert

Affiliation: Department of Applied Mathematics and Theoretical Physics, University of Cambridge

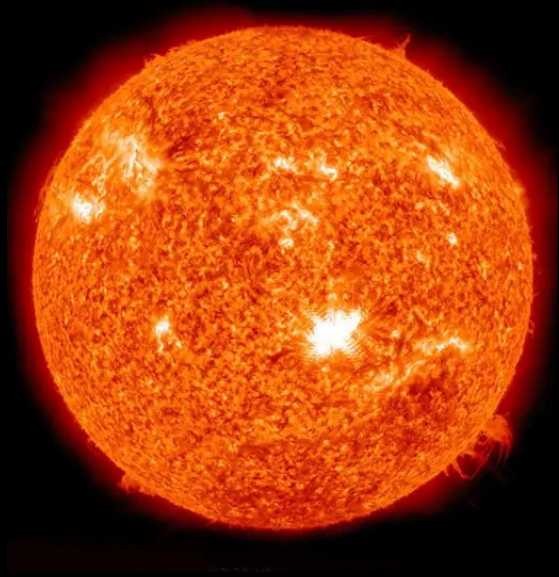
Article

Metrics

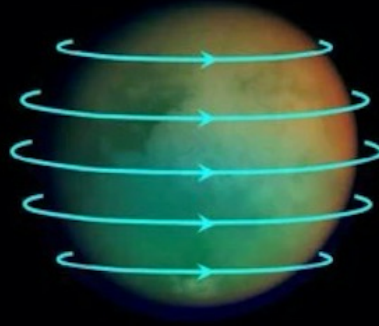
UCLA in the 1960s



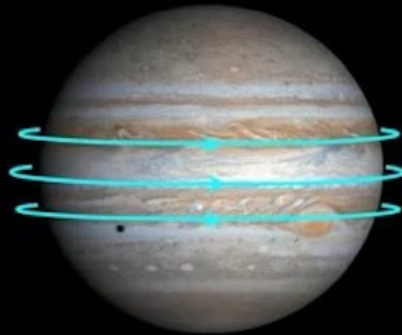
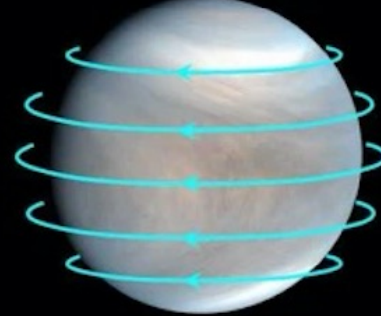
Super-Rotation in Stars and Planets



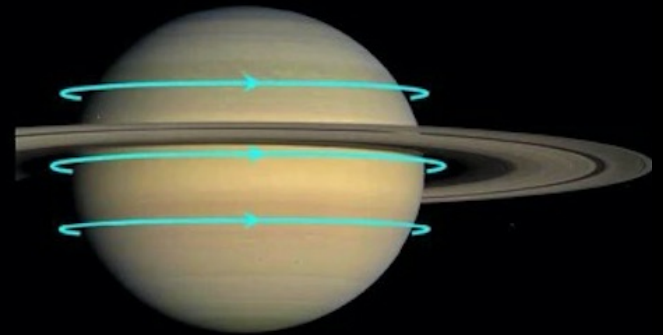
Titan



Venus



Jupiter



Saturn

DIFFERENTIAL ROTATION IN STARS

PETER GOLDREICH

California Institute of Technology

AND

GERALD SCHUBERT

University of California at Los Angeles

Received April 4, 1967; revised June 16, 1967

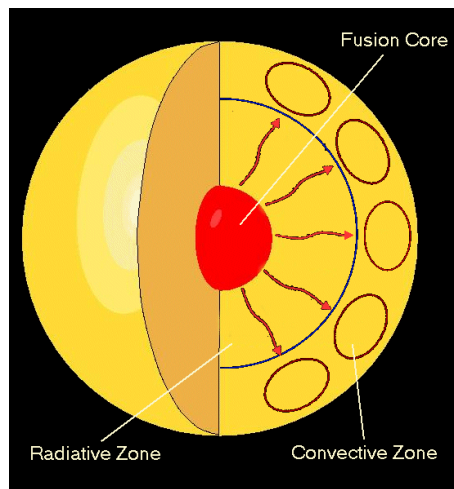
I. INTRODUCTION

Evidence that the interior of the Sun is in rapid rotation has recently been presented by Dicke (1967). He has interpreted his measurement of a solar oblateness of 5×10^{-5} as implying a 1.8-day rotation period for the solar radiative interior. This period is derived on the assumption that the slow surface rotation is confined to the convective zone. Of course, many other models are also consistent with Dicke's observation.

Dicke (1964) has claimed that his model of the differentially rotating Sun is stable. We do not agree. Indeed, most differentially rotating solar models which are consistent with Dicke's observation are found to be unstable.

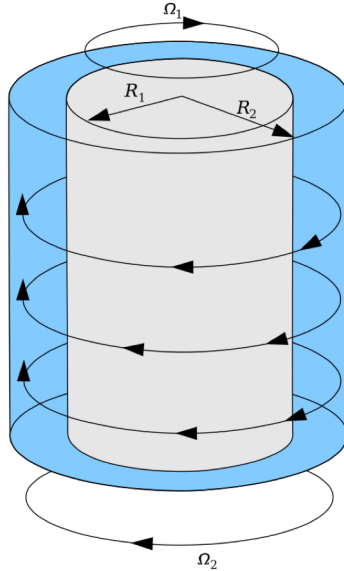


Peter Goldreich

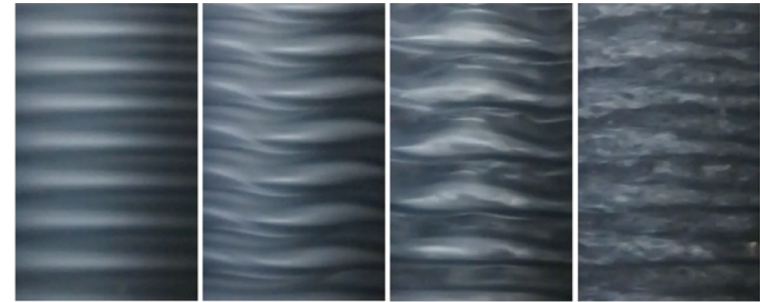


Robert Dicke

Differential-Rotation Instabilities

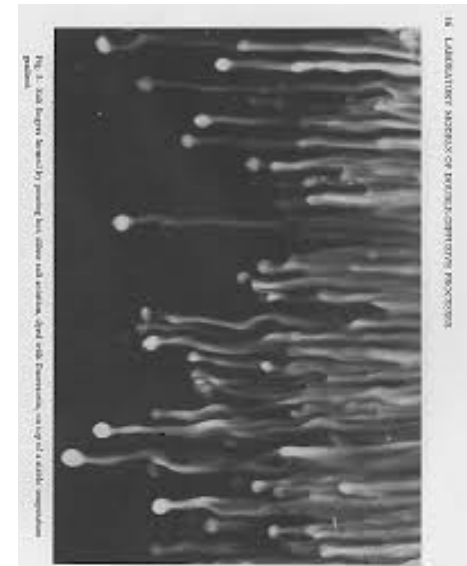


General Condition for Instability:
Adverse Angular Momentum Gradient

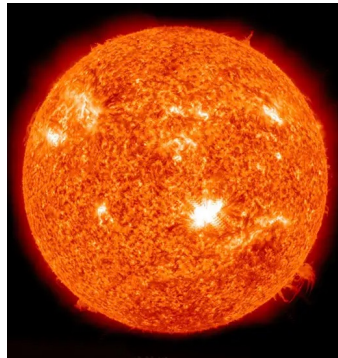


Homogeneous Fluid: Taylor Vortices

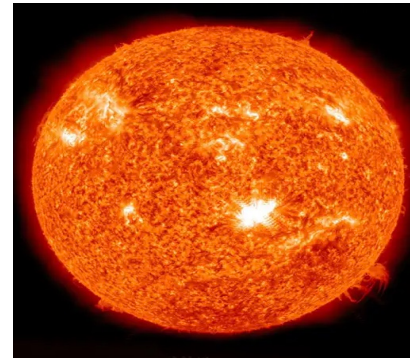
Thermally Conducting, Compressible Fluid:
Goldreich-Schubert Instabilities



Solar Super-Rotation and General Relativity

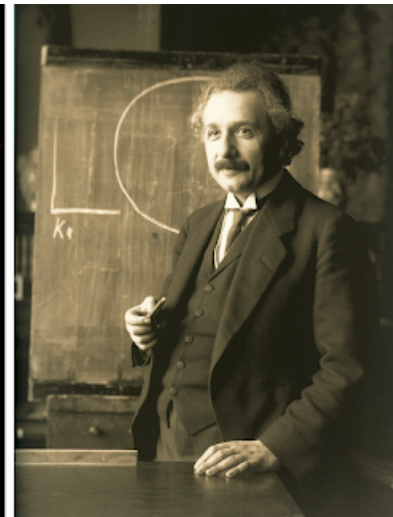
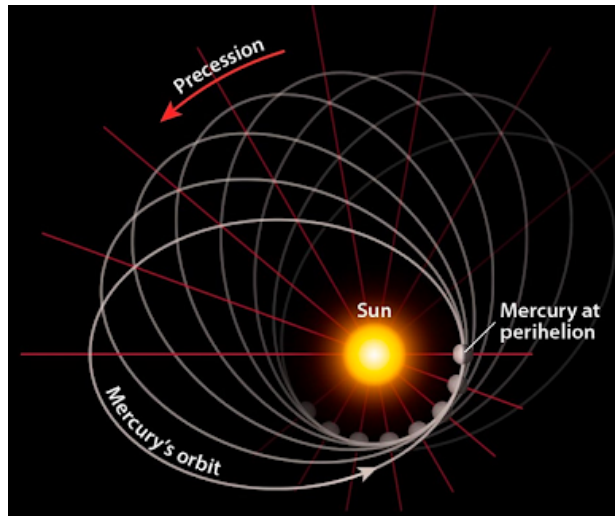


VS

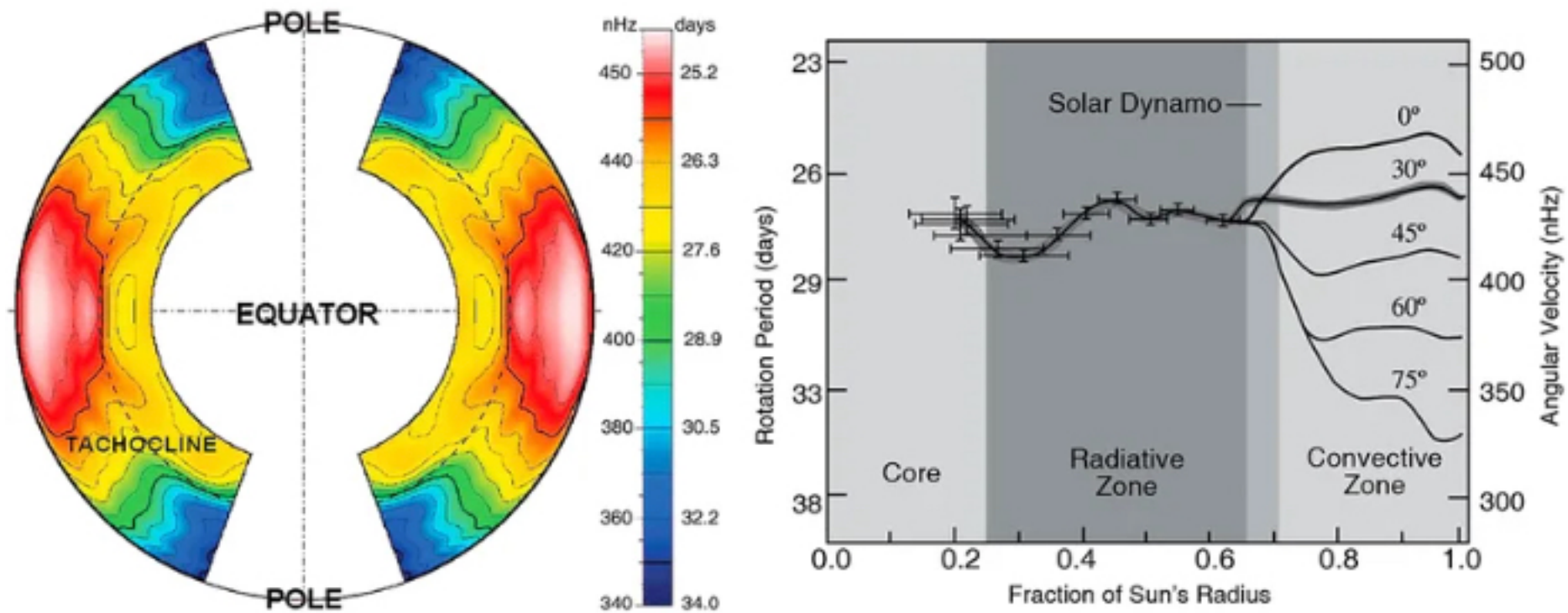


Without Super-Rotation
 1×10^{-5} oblateness

With Super-Rotation
 5×10^{-5} oblateness

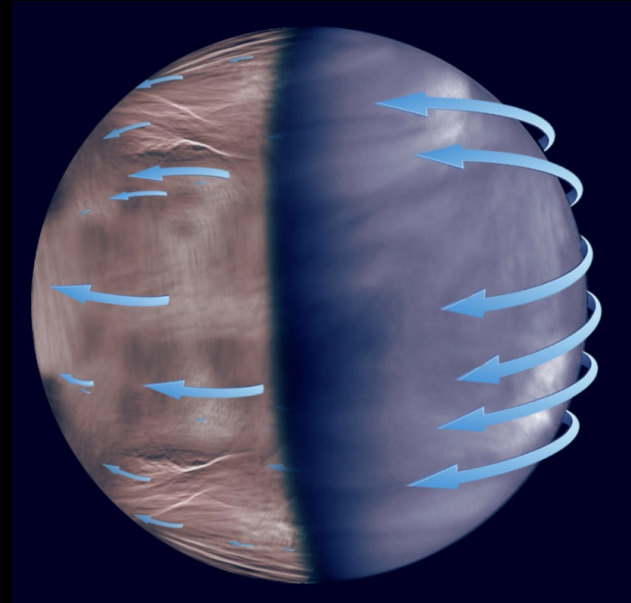
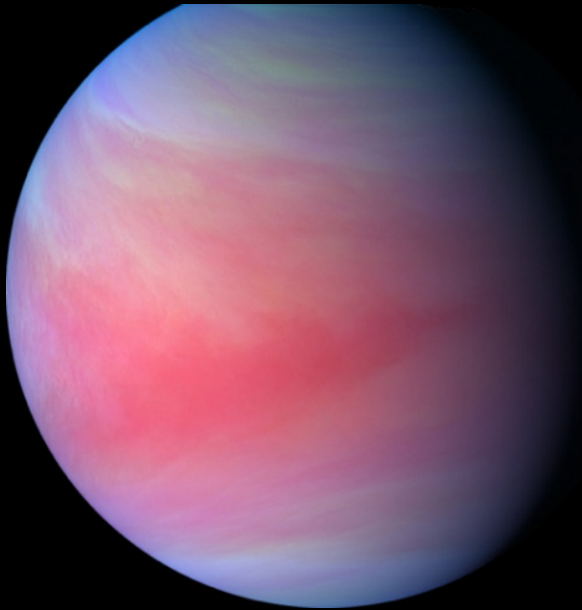


Is there much super-rotation in the Sun?



Russell et al., *Rev. Geophys.* 2019

Super-Rotation on Venus



Rotation Periods

Planet Surface: 243 days

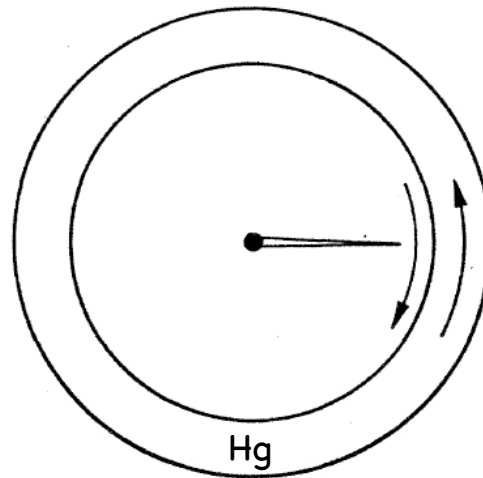
Atmosphere: 4 days

(both retrograde)

Moving Flame Experiment with Liquid Mercury: Possible Implications for the Venus Atmosphere

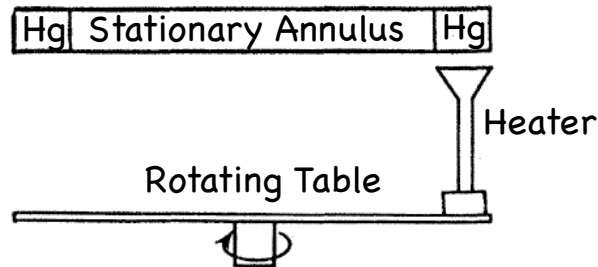
G. Schubert & J.A. Whitehead
Science v163, 1969

Top View:



Key Observation: Steady circulation in the liquid Hg, opposite to the heater rotation and 4x faster.

Side View:



Subduction and the Mantle Transition Zone

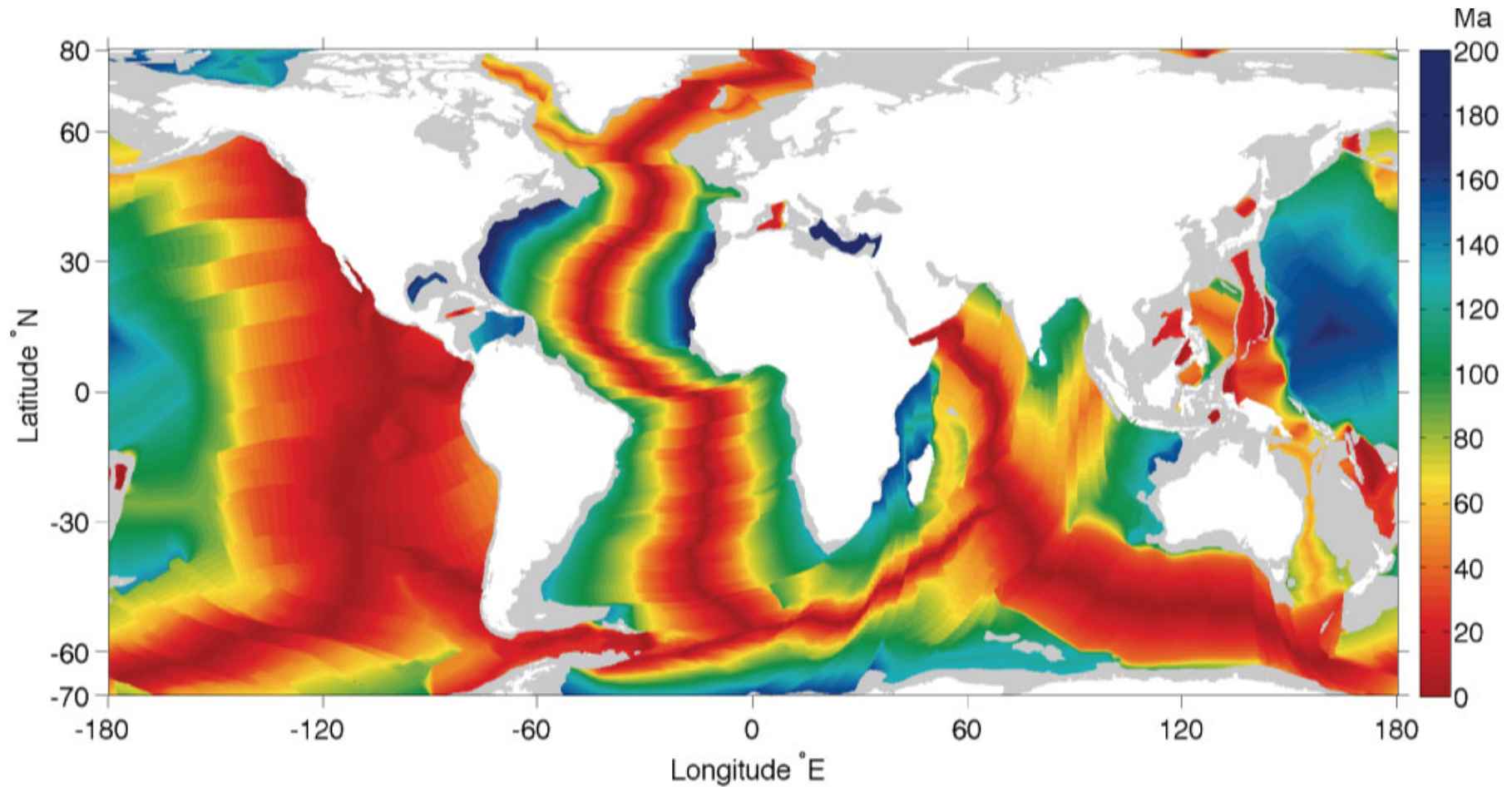
Role of Phase Transitions in a Dynamic Mantle

Gerald Schubert, David A. Yuen and Donald L. Turcotte

Geophys. J. R. astr. Soc. (1975) **42**, 705–735.



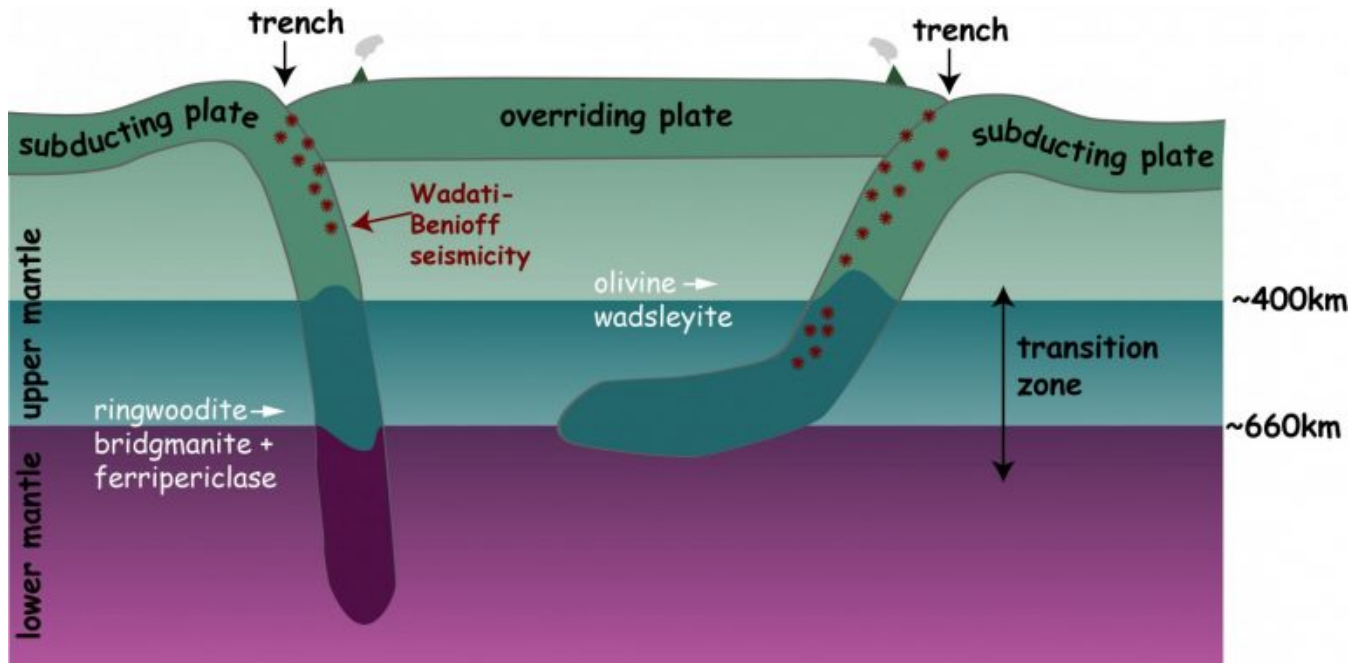
Oceanic Crust Age Distribution: The “Smoking Gun” of Plate Tectonics



Muller et al., 2018

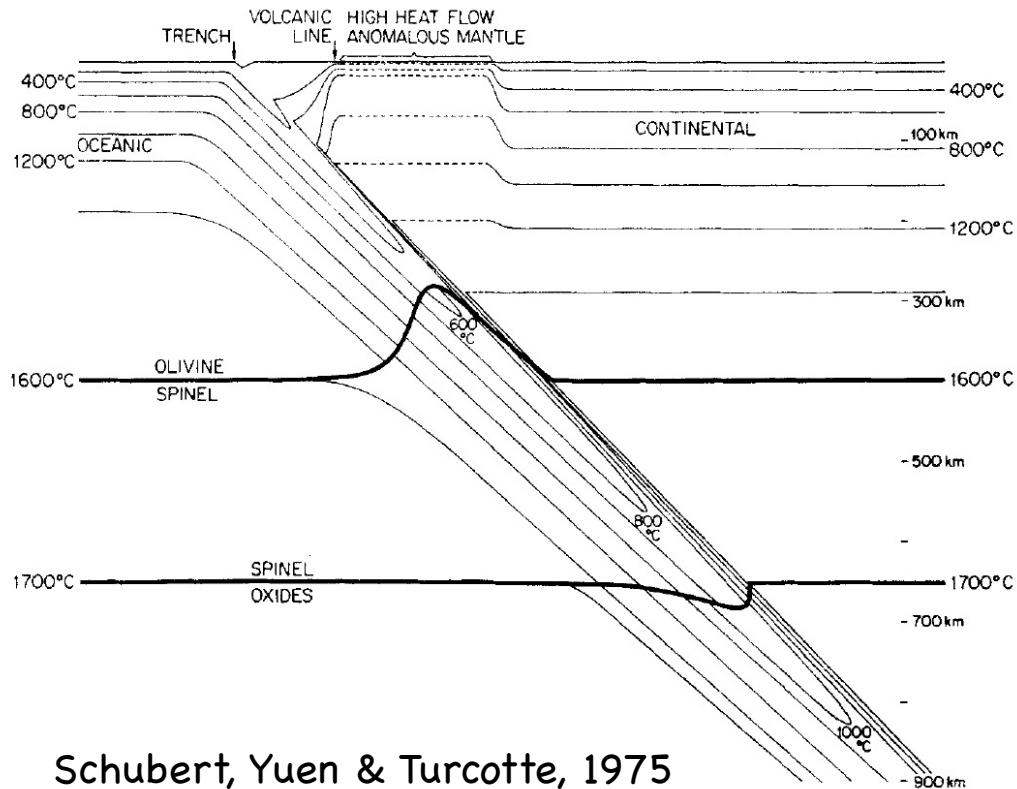
Depth of Mantle Convection

(Major Post-Plate Tectonics Controversy)



Main Geodynamical Question: Does subducted lithosphere penetrate the 660-km discontinuity?

Lithospheric Slab Thermal Structure

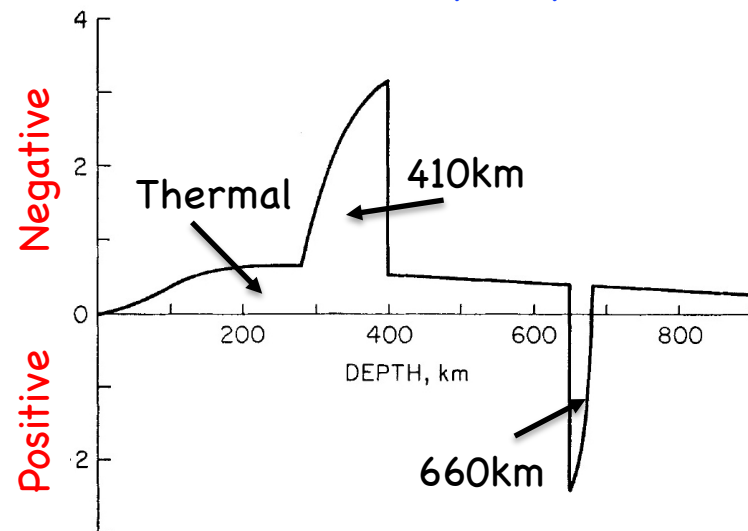


Schubert, Yuen & Turcotte, 1975

Exothermic

Endothermic

Slab Buoyancy



Cooling of the Earth and Moon

JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 85, NO. B5, PAGES 2531-2538, MAY 10, 1980

Whole Planet Cooling and the Radiogenic Heat Source Contents of the Earth and Moon

GERALD SCHUBERT AND DAVID STEVENSON

Department of Earth and Space Sciences, University of California, Los Angeles, California 90024

PATRICK CASSEN

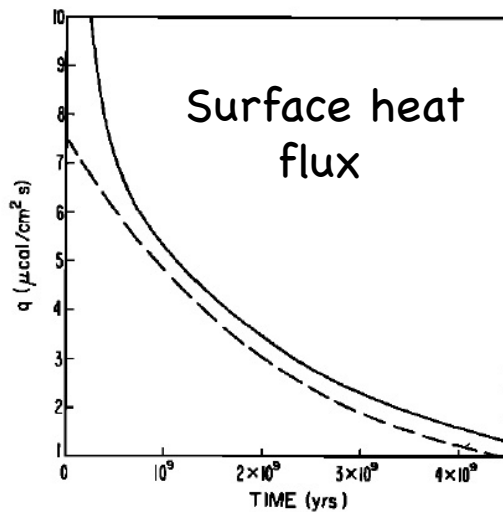
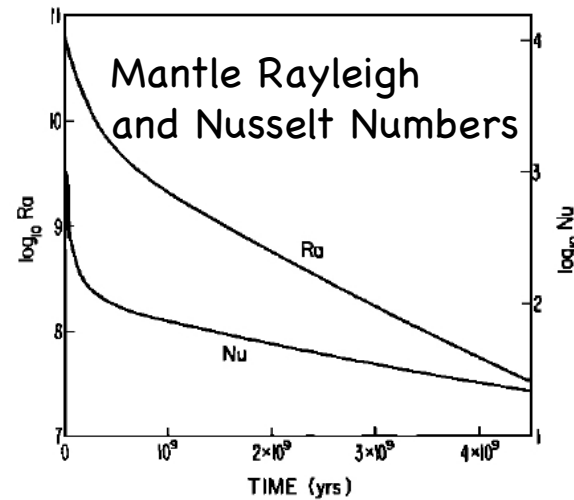
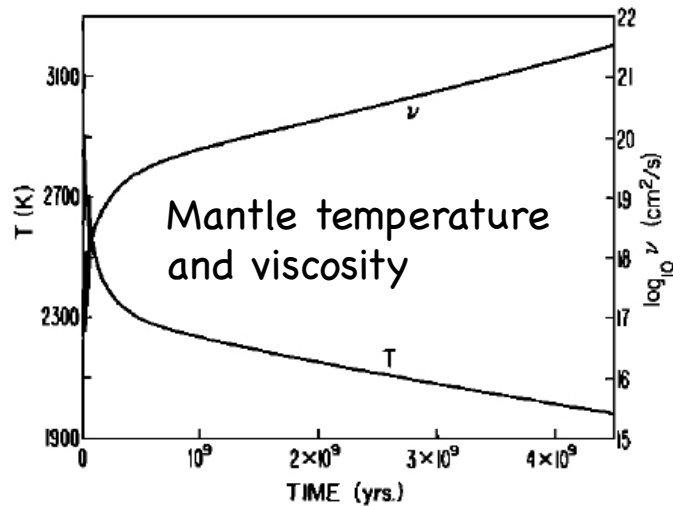
NASA Ames Research Center, Moffett Field, California 94035

...radioactive heat production *cannot* equal
surface heat flux, so both Earth and
Moon *must be cooling*...



Earth Thermal History and the Urey Ratio

Schubert, Stevenson & Cassen, 1980



Urey Ratio

radioactive heat production/heat loss

bulk Earth: $Ur=0.4-0.5$; mantle: $Ur=0.2-0.4$



PHANEROZOIC ADDITION RATES TO THE CONTINENTAL CRUST AND CRUSTAL GROWTH

Arthur Reymer and Gerald Schubert¹

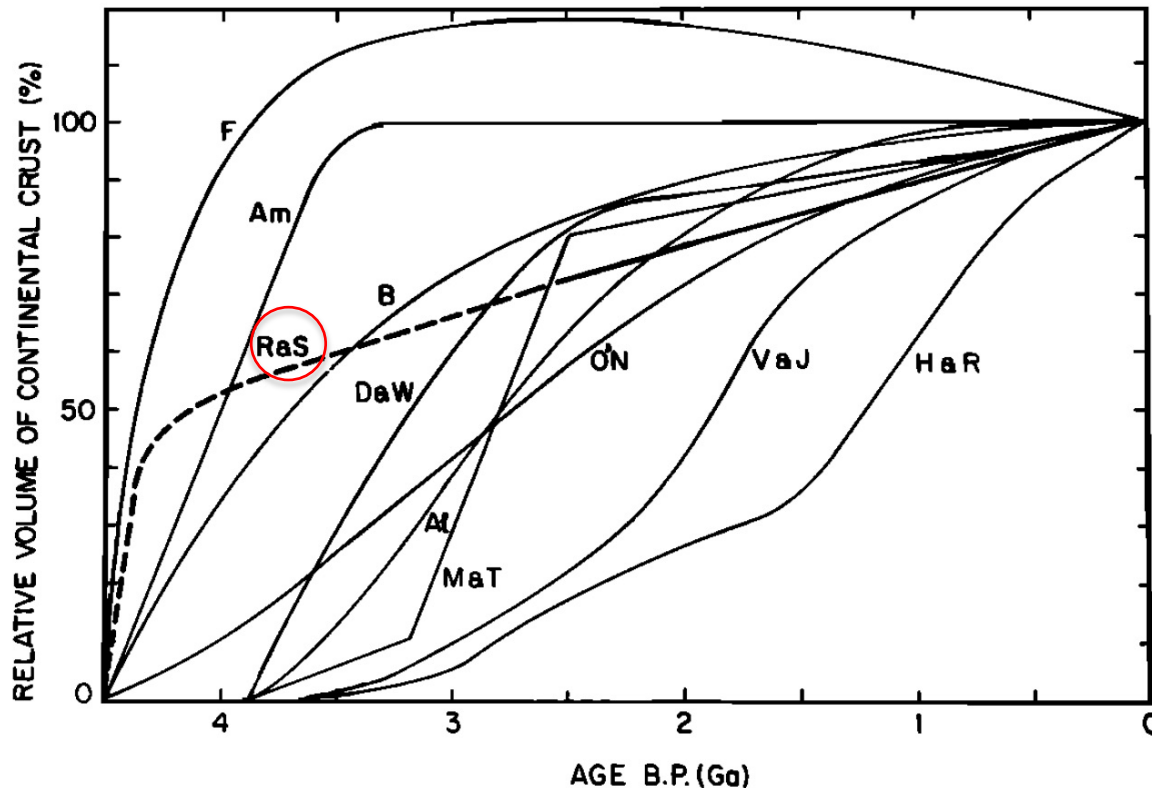
Department of Geology, The Hebrew University of Jerusalem

TECTONICS, VOL. 3, NO. 1, PAGES 63-77, FEBRUARY 1984



Continental Crust Growth History

Reymer and Schubert: Crustal Growth



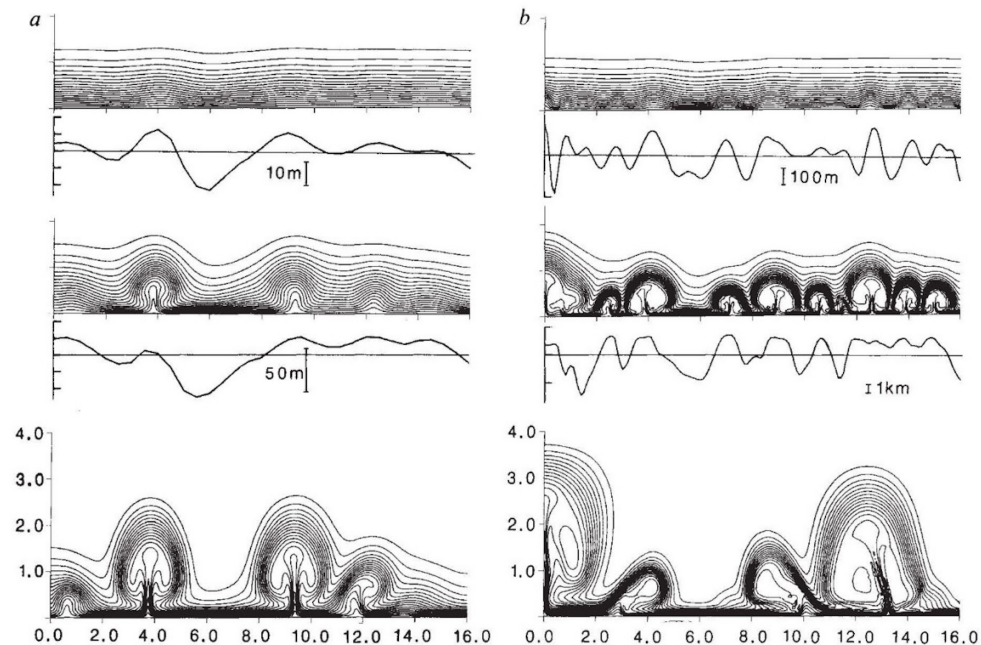
Reymer-Schubert Growth Curve **R&S** :

Rapid Hadean growth followed by slow, steady accumulation

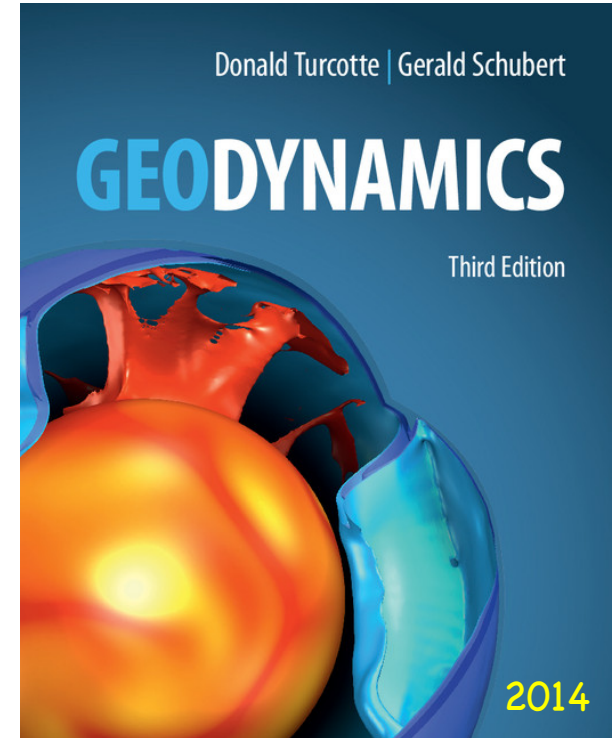
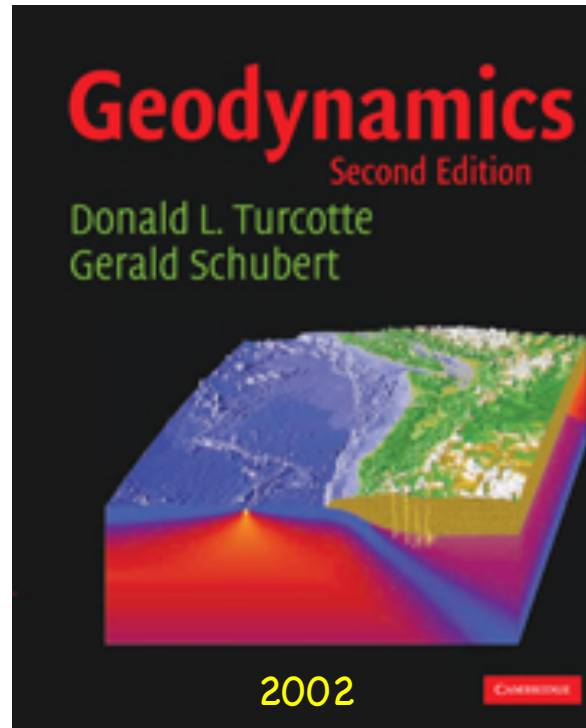
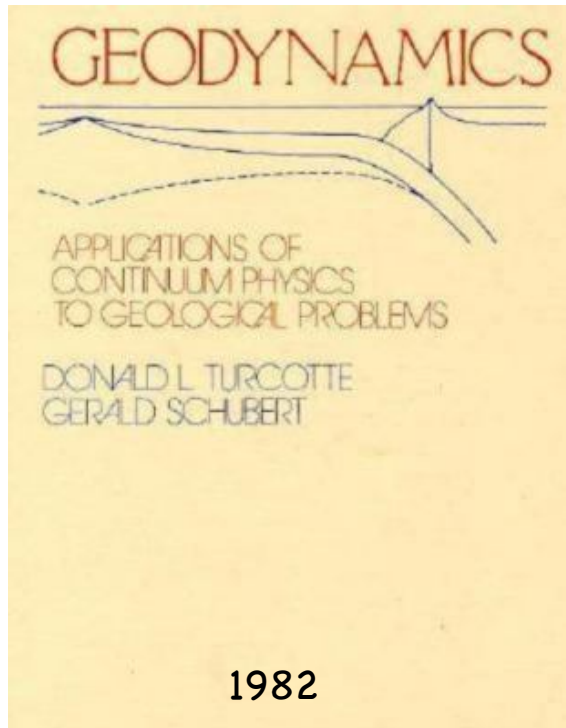
Plume formation in the D''-layer and the roughness of the core–mantle boundary

Peter Olson*, Gerald Schubert† & Charles Anderson‡

Nature 327, 1987

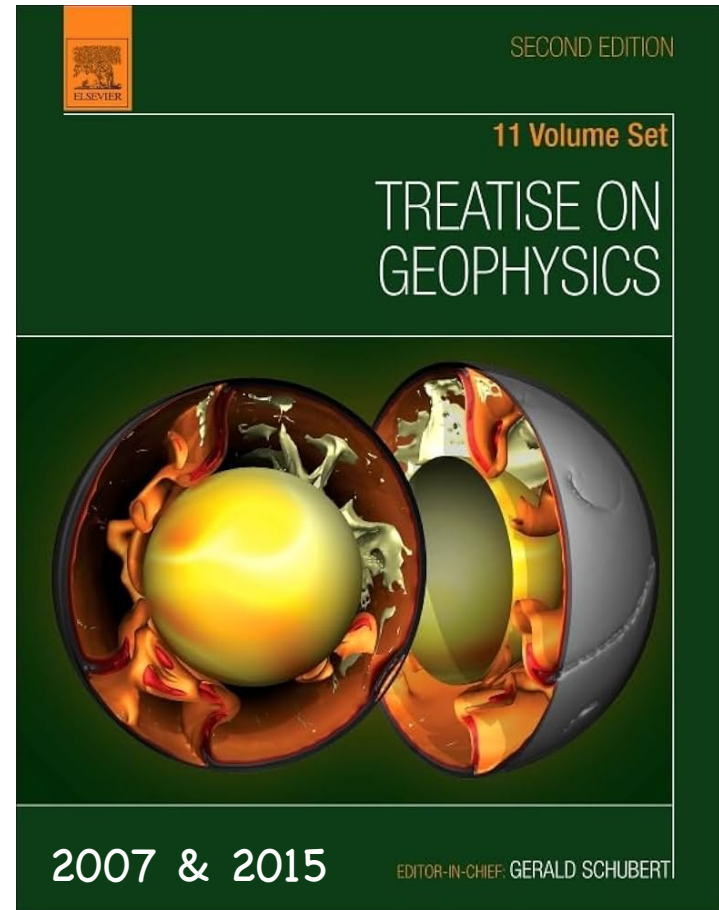
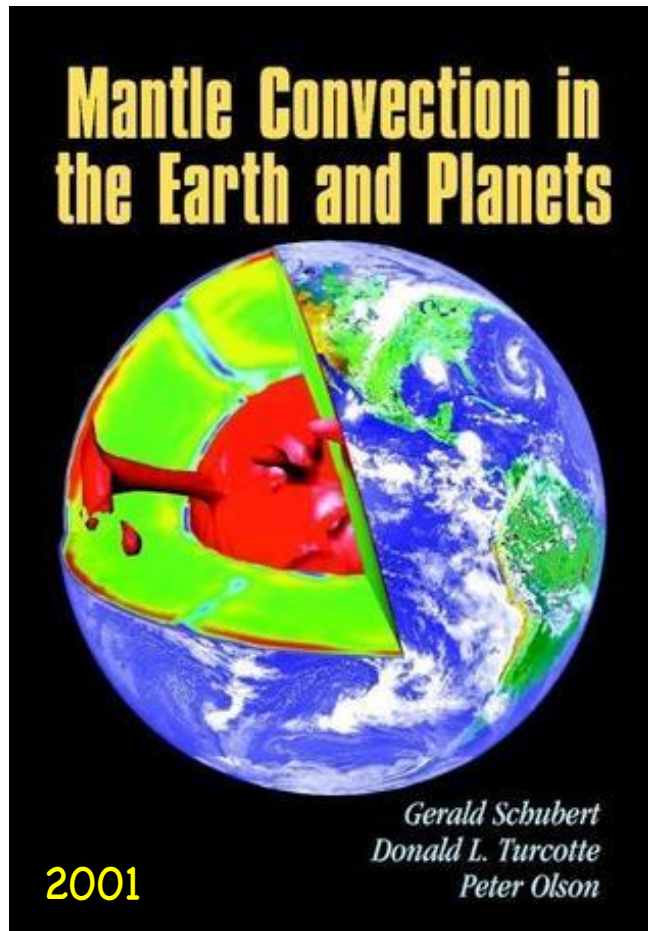


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Gerald Schubert: Major Awards and Service

- AGU Macelwane Medal
- Editor, J. Geophys. Res.
- NASA Missions: Apollo, Pioneer Venus, Magellan, Galileo
- AGU Harry H. Hess Award
- UCLA ESS Chairman
- AGU Planetary Science Section President
- NAS and AAAS Member

Earth & Planetary Science Milestones 1965–2025

- Plate tectonics
- Mantle convection
- Earth & Moon formation
- Early Earth history
- Planetary exploration
- Planetary dynamos

Jerry Schubert contributed to all of these...

