THE GREAT SEAL OF PLUMACY

A plunging slab piercing rising plumage, with encircling plates, crested by basaltic edifice; recycle ad nauseam. Upper quadrant, the backarch option. To be placed on mantle and stationary.
HOTSPOT HANDBOOK

Plume Program
Experts
Onamasticon
Hotspot Time Line
Where are they?
Where aren't they?
Where shouldn't they be?
Plateaus
Sperical Harmonic Expansions
Correlations
Hotspot Chemistry
Plume Plans
Profiles
Swell (and not so swell) Parameters
Eruption rates
Questionable Hotspots
Plume Problems
Cosmic Coincidences
Daffy Definitions
Plume Prophecies
Geophysicists, Geochemists, Geologists and the Earth
Discussion Topics
Abstracts and Essays
PRELIMINARY
PLUME SYMPOSIUM SCHEDULE

Wednesday evening
6:30 PM
DABNEY
Reception and Poster Putting Up

Thursday morning
BAXTER

8:45-9:00
Introduction and ground rules

9:00-9:15
Turcotte- Intraplate volcanism: Associations with plumes and other sources

9:15-9:25
Buck- A non-Rayleigh Taylor instability in upwelling below mid-ocean ridges

9:25-9:40
Halliday- Plumes, fossil, pseudo-plumes and the Cameroon line

9:40-9:55
Sten- Where is OIB source? Further constraints from arcs

9:55-10:15
Discussion (Leaders- Loper, Olson, Stevenson)

10:15-10:45
Coffee/Posters  DABNEY

10:45-11:00
Hart- Mantle plumes: Interpreting the isotopic record (and other arcane pursuits)

11:00-11:10
Hoernle- Enriched shallow mantle beneath ocean basins-evidence from evolved ocean island volcanics

11:10-11:25
Gill- An OIB-BABB-subcontinental lithosphere connection

11:25-11:35
TBS

11:35-11:45
Hofmann- The origin of the species

11:45-12:15
Discussion (Leaders- Oxburgh, Stolper)

12:15-1:30
Lunch; Posters  DABNEY

Thursday afternoon
BAXTER

1:30-2:00
Anderson- The overview, the standard model and the strawman

2:00-2:10
Humphreys- Western US-interior structure tectonism and volcanism: Hot or wet?

2:10-2:25
Tanimoto- Long wavelength characteristics of Earth structure

2:25-2:40
Lay- The slab penetration controversy

2:40-2:50
Wyllie- Does ocean water reach mantle plume sources? If so what are the consequences?

2:50-3:00
McNutt- Plume observations: How much are they contaminated by lithospheric effects?

3:00-3:15
TBS

3:15-3:35
Debate (Leaders- Kanamori, Solomon)

3:35-4:05
Coffee/Posters

4:05-4:15
Albarede- The T, P, path of OIB generation

4:15-4:25
Menzies- Continental lower lithosphere- An insignificant reservoir for flood volcanism

4:25-4:40
TBS

4:40-4:50
Michael- Large scale mantle heterogeneity revealed by trace elements in MORB

4:50-5:00
Schilling- Mantle plume-Migrating ridge dynamics

5:00-5:15
Houseman- The geometry of thermal mantle plumes

5:15-5:30
Debate (Leaders- Gill, Wyllie)

6:00-7:45
Dinner- ATHENEAUM and local restaurants
Thursday evening

MODELLING DEBATE

BAXTER

8:00-9:45
- Loper- Models of mantle plumes
- Olson- The coupling between plume activity and geomagnetic reversal frequency
- Richards- A mantle plume initiation model for the formation of Wrangellia and other oceanic flood basalt plateaus
- Travis- High resolution calculation of compositional mixing in a plume
- Kellogg- Mantle plumes and the 670 km discontinuity
- Campbell- Stirring and structure in mantle plumes
- Yuen- Various mechanisms for generating diapiric structures in the mantle
- King- Plate velocity and subduction rate: A key to mantle differentiation?
(Leaders- Turcotte, Stevenson)

Friday morning

BAXTER

8:30-8:40
- Coffin- Crustal structure and emplacement rates of the Kerguelen and Ontong Java plateaus

8:40-8:50
- Frey- Compositional differences between Hawaiian shields: Source or process related

8:50-9:00
- Garcia- Geochemical evolution of a plume volcano: Lessons from Hawaii

9:00-9:10
- Graham-Helium isotope variations along mid-ocean ridges: Implications for mantle heterogeneity

9:10-9:25
- Craig- $^3$He hotspots and the elusive primitive mantle component: or, Plume hunting along the Tonga Trail

9:25-9:40
- White- Plume-asthenosphere interaction

9:40-10:00
- Debate (Leaders- Clague, Klein)

10:00-10:30
- Coffee/Posters

Friday afternoon

VENUS RAMO

1:30-2:50
- Saunders- Geologic constraints on Venus Highland structure and evolution
- Solomon- Venus: Global and regional tectonics
- Phillips- Venustian hot spots and plumes
<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
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<tbody>
<tr>
<td>1:30-2:50</td>
<td>Schubert</td>
<td>Three dimensional models of Venusian interior dynamics</td>
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<td>(cont'd.)</td>
<td>Bindschadler</td>
<td>Coronae: Plumes on Venus*</td>
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<td></td>
<td>Head</td>
<td>Centers of volcanism and volcanic sequence: Relation to tectonics in Highland of Venus</td>
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<td>Kaula</td>
<td>Volatiles, plumes and Venus</td>
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<td>2:50-3:15</td>
<td>Debate (Leaders- Burke, Sandwill)</td>
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<td>3:15-3:45</td>
<td>Coffee/Posters</td>
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<td>3:45-4:00</td>
<td>Wilson, Morgan, Vogt</td>
<td>Words of wisdom from Olympus</td>
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*in collaboration with G. Schubert, E. Stofan and other members of the Magellan Corona Science Analysis Team

Saturday morning

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<td>9:00-9:10</td>
<td>Okal- A surface -wave test of the lithosphere reheating model for hotspot swell formation</td>
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<td>Pringle- Early Cretaceous plateau basalts, EM1 from the lower mantle, and the origin of the Dupal anomaly</td>
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<td>Clague- An estimate of primary magma composition of tholeiitic basalt from Kilauea Volcano, Hawaii</td>
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<td>Larson- Super plumes stop magnetic field reversals</td>
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<td>Tarduno- Mantle plume volcanism and the formation of Ontong Java Plateau</td>
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<td>9:50-10:00</td>
<td>Sandwell/Hill- Plume tectonics</td>
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<td>Stolper- Mariannas BABB and the heterogeneity of the mantle</td>
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<td>Tatsumoto- DUPAL anomaly in the Sea of Japan: A plate recycling model for OIB sources</td>
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<td>Debate (Leaders- Davies, Langmuir)</td>
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<td>11:00-11:10</td>
<td>Acton- Global plate circuits and motion between hotspots: Paleomagnetic tests</td>
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<td>Jurdy- Hotspots: Inferences from their distribution, and plate kinematics</td>
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<td>Dalziel- Supercontinental fragmentation, Cambrian and Mesozoic-plume related?</td>
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<td>Davies, G.- Mantle convection and the role of plumes</td>
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<td>Evans- A general hotspot model accounting for known lithospheric structure</td>
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<td>Yuen- Various mechanisms for generating diapiric plumes in the mantle</td>
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<td>Froidevaux- Mantle plumes: What sizes, from what depths</td>
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<td>King- Plate velocity and subduction rate: The key to mantle differentiation</td>
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<td>Debate (Leaders- McNutt, Olson, Phillips)</td>
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<td>Lunch</td>
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<td>1:45</td>
<td>Additional talks</td>
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Saturday afternoon  MASSIVE OCEANIC AND CONTINENTAL MAGMATISM WORKSHOP; TOWARDS AN UNDERSTANDING LEADER - Dave Stevenson

Discussion Topics:

1. Plumes- main flow or secondary?
2. - Rayleigh-Taylor or plate controlled?
3. - Enriched, depleted or recycled?
4. Depleted mantle- shallowest?
   - plume source?
5. Source of energy- lower mantle?
   - within?
   - core?
6. Plume heads or pervasive shallow EM?
7. CFB=OIB=IAB=BABB=MORB+? (?) 
8. Whole mantle vs non-whole mantle?

Talks to be scheduled or possibly rescheduled (TBS):

Black- The African lithosphere and alkaline intraplate magmatism
Bonatti- MAR temperatures
Burke- The mantle role in mountain building: Implications for crust and mantle evolution as well as hot-spot distribution
Hanan- Pb isotopic constraints on mantle geodynamics: Observations from the Iceland hotspot and zero age MORBs
Hill- Plume tectonics
Jeanluz- Composition of the deep mantle
Kirschvink- A case for catastrophic true polar wander in the Cambrian
Kurz- Helium isotope in ocean island volcanoes: Variability in time and space and some inferences about mantle plumes
Oxburgh- Helium, plumes and mantle reservoirs

4/8/91
Caltech Plume Symposium

TITLES OF PAPERS

*Acton, Gary (with Gordon)
Global plate circuits and motion between hotspots: Paleomagnetic tests

*Albarède, Francis
The T, P, path of OIB generation

*Anderson, Don L.
The overview, the standard model and the strawman

*Basu, Asish R.
Primitive mantle plume origin for the Siberian flood basalts at the Permoo-Triassic boundary and implications for the origin of continental flood basalts provinces

Black, Russell
The African lithosphere and alkaline intraplate magmatism

*Bonatti, Enrico
Upper mantle temperature beneath the Mid-Atlantic Ridge

*Buck, Roger
A non-Rayleigh-Taylor instability in upwelling below mid-ocean ridges

*Burke, Kevin
The mantle role in mountain building: Implications for crust and mantle evolution as well as hot-spot distribution

*Campbell, Ian (with Griffiths)
Stirring and structure in mantle plumes

*Clague, David (with Weber)
An estimate of primary magma composition of tholeiitic basalt from Kilauea Volcano, Hawaii

*Coffin, Millard
Crustal structure and emplacement rates of the Kerguelen and Ontong Java plateaus

*Craig, Harmon
$^3$He in MORB, BABB hotspots and primitive mantle

*Dalziel, Ian W. D.
Supercontinental fragmentation, Cambrian and Mesozoic - plume related?

*Davies, Geoffrey
Mantle convection and the role of plumes

*Evans, John R. (with Iyer)
A general hotspot model accounting for known lithospheric structure

*Frey, Fred
Compositional differences between Hawaiian shields: Source or process related?

*Froidevaux, Claude
Mantle plumes: What sizes, from what depths?

*Garcia, Michael O.
Geochemical evolution of a plume volcano: Lessons from Hawaii
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<td>The Columbia River basalt: A mantle plume or back arc extension?</td>
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<td>Chemical, isotopic and tectonic evidence.</td>
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<td>*Iyer, H. M.</td>
<td>Imaging deep seismic structures beneath Yellowstone, Hawaii and Iceland, present hot spot locations in three global tectonic environments</td>
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<td>*Kedar, Sharon</td>
<td>Relationship between hotspots and mantle structure: Correlation with whole mantle seismic tomography</td>
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*King, Scott (with Staudigel) Plate velocity and subduction rate: A key to mantle differentiation?

*Kirschvink, Joseph A case for catastrophic true polar wander in the Cambrian

*Kurz, Mark D. Helium isotopes in ocean island volcanoes: variability in time and space and some inferences about mantle plumes

Langmuir, Charles H. Major element systematics of ocean island basalts

*Larson, Roger L. Super plumes stop magnetic field reversals

*Lay, Thorne The slab penetration controversy

*LeMasurier, Wesley Possibilities for mantle plume activity on Antarctica: Geochemical and structural characteristics of Cenozoic volcanism

Leitch, A. M. (with others) The stabilization of hot plumes by variable mantle properties

*Loper, David S. Models of mantle plumes

*McNutt, Marcia Plume observations: How much are they contaminated by lithospheric effects?

*Menzies, Martin Continental lower lithosphere - An insignificant reservoir for flood volcanism

*Michael, Peter J. Large-scale mantle heterogeneity revealed by H2O and trace elements in MORB

*Olson, Peter The coupling between plume activity and geomagnetic reversal frequency

*Oxburgh, E. R. Helium, plumes, and mantle reservoirs

*Phillips, Roger Venusian hot spots and plumes

*Phipps, Stephen P. Hot spots, hot lines, and magmatism from plume-modified lithosphere

*Pringle, Malcolm Early Cretaceous plateau basalts, EM1 from the lower mantle, and the origin of the Dupal anomaly

*Ray, Terrill (with Anderson) Correlation of hotspot isotopic data with mantle tomography

*Richards, Mark (with others) A mantle plume initiation model for the formation of Wrangellia and other oceanic flood basalt plateaus

*Saunders, R. Steven (with others) Geologic constraints on Venus Highland structure and evolution
*Schilling, Jean-Guy  Mantle plume - Migrating ridge dynamics

*Schubert, Gerald  Three dimensional models of Venusian interior dynamics

*Scrivner, Craig (with Anderson)  Correlation of Pangea and subducted slab with global seismic tomography

*S Sleep, Norman H.  Time dependance of mantle plumes.

*Solomon, S. C.  Venus: Global and regional tectonics

*Stern, Robert J.  Where is the OIB source? Further constraints from arcs

*Stofan, E. R. (with others)  Coronae: Plumes on Venus*

(*in collaboration with G. Schubert, Ellen Stofan & other members of the Magellan Corona Science Analysis Team)

Stolper, Edward  Marianas BABB and heterogeneity of the mantle

*Takata, Toshiko (with Anderson)  Correlation between plate motion and tomography

*Tanimoto, Toshiro (with Inoue)  Long wavelength characteristics of Earth structure

*Tarduno, John A. (with others)  Mantle plume volcanism and the formation of Ontong Java Plateau

*Tatsumoto, M.  DUPAL anomaly in the Sea of Japan: A plate recycling model for OIB sources

*Todesco, M) (with Spera)  Convective evolution of a chemically-stratified fluid heat from below: Application to mixing within the upper mantle

Travis, Bryan  High resolution calculation of compositional mixing in a plume

*Turcotte, Donald L.  Intraplate volcanism: Associations with plumes and other sources

White, William  Plume-asthenosphere interaction

*Wilson, J. Tuzo  On moving mountains

*Woods, M. T. (with Okal)  A surface-wave test of the lithosphere reheating model for hotspot swell formations

*Wyllie, Peter  Does ocean water reach mantle plume sources? If so what are the consequences?

*Yuen, David A. (with others)  Various mechanisms for generating diapiric structures in the mantle

*Yuen, David A.  The stabilization of hot plumes by variable mantle properties
*Zhang, Yu Shen  
(with Tanimoto)  
Ridges and hotspots: perspectives from global tomography  

*Zhang, Yu Shen  
(with Tanimoto)  
Oceanic lithosphere: perspectives from Love wave phase velocity  

Zindler, Alan  
Isotopic evidence for plume-upper mantle mixing  

*Abstracts received as of 5 April 1991