



## Volume 39, Issue 8

April 2012

Brief  Detailed

### Atmospheric Science

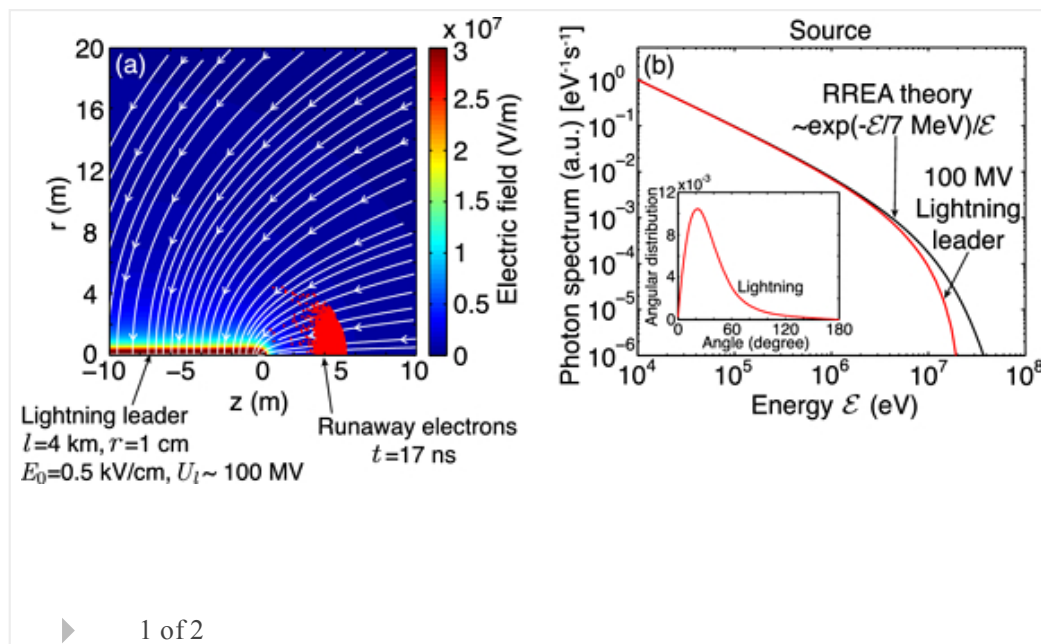
#### Source altitudes of terrestrial gamma-ray flashes produced by lightning leaders

Wei Xu, Sebastien Celestin, Victor P. Pasko

First Published: 18 April 2012 Vol: 39, L08801 | DOI: 10.1029/2012GL051351

##### KEY POINTS

- Source altitude of TGFs produced by 100 MV lightning leaders is  $\sim 12.4$  km
- The photon beam produced by lightning leaders has an average angle of  $\sim 38$  deg
- TGF photon fluence, beaming geometry and source altitudes are derived



#### Top-down estimate of dust emissions through integration of MODIS and MISR aerosol retrievals with the GEOS-Chem adjoint model

Jun Wang, Xiaoguang Xu, Daven K. Henze, Jing Zeng, Qiang Ji, Si-Chee Tsay, Jianping Huang

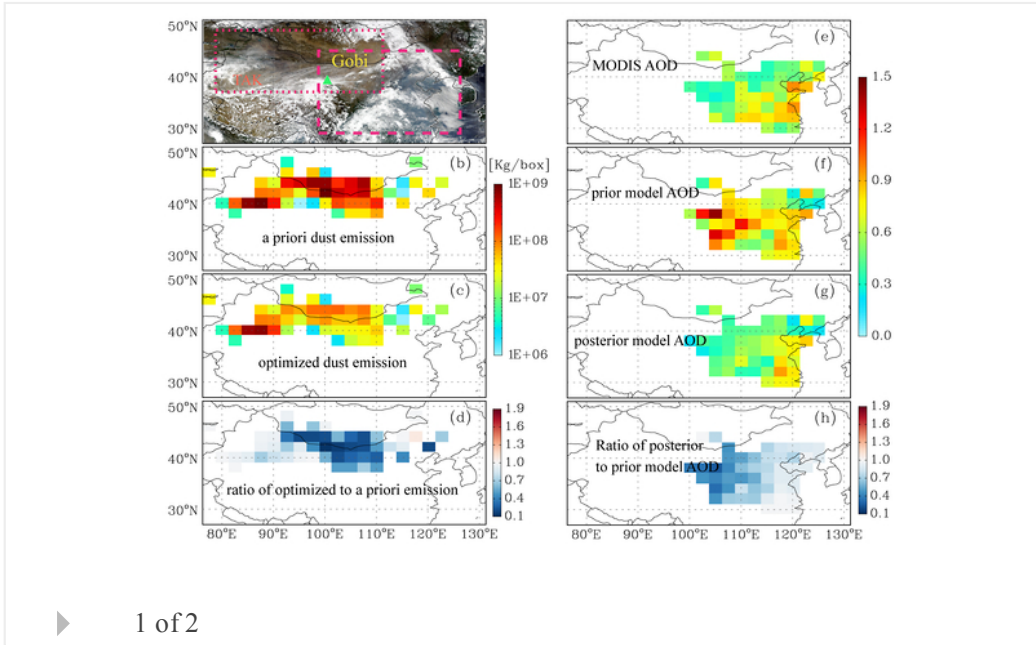
First Published: 20 April 2012 Vol: 39, L08802 | DOI: 10.1029/2012GL051136

##### KEY POINTS

- An integrated use of MODIS, MISR, and adjoint model to constrain dust emission
- Case study shows  $\sim 50\%$  overestimation of Asian dust emission in GEOS-chem

model

- Dust radiative forcing likely is significantly underestimated in models



### Global CO<sub>2</sub> distributions over land from the Greenhouse Gases Observing Satellite (GOSAT)

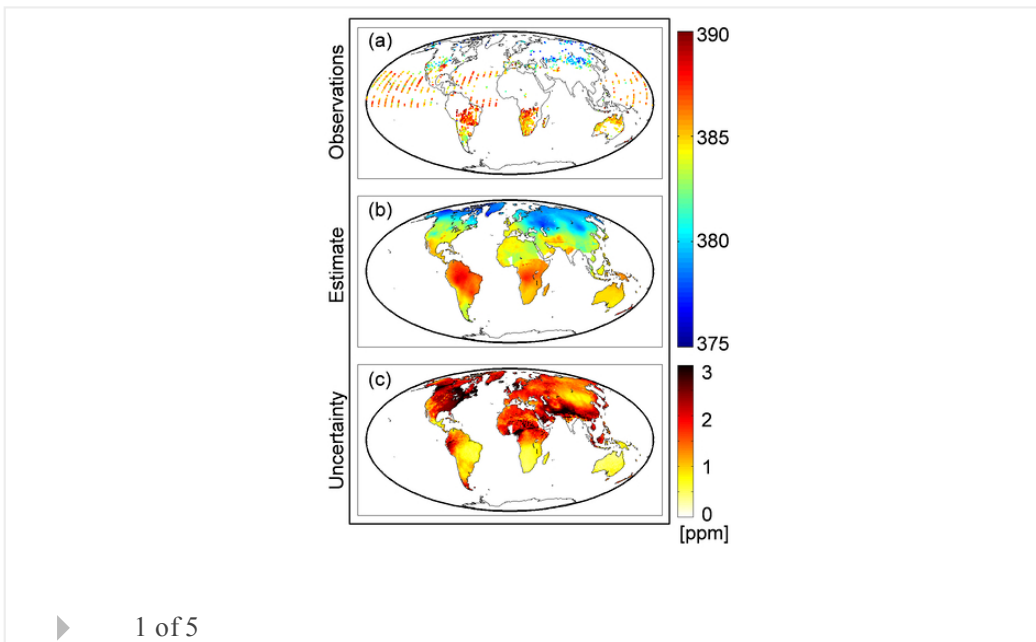
Dorit M. Hammerling, Anna M. Michalak, Christopher O'Dell, S. Randolph Kawa

First Published: 21 April 2012 Vol: 39, L08804 | DOI: 10.1029/2012GL051203

#### KEY POINTS

- High resolution GOSAT CO<sub>2</sub> maps capture synoptic scale and regional variability
- Southern latitudes constrained best, Sahara and high northern latitudes least
- Seasonal discrepancies with carbon cycle model in South America and central Asia

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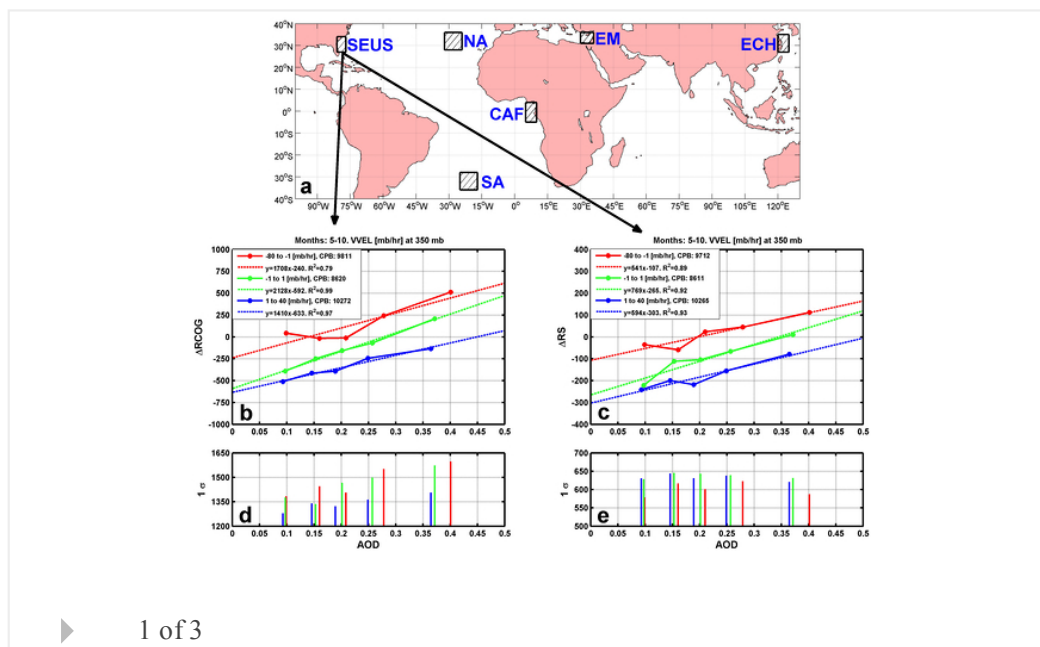
## New evidence of cloud invigoration from TRMM measurements of rain center of gravity

Reuven H. Heiblum, Ilan Koren, Orit Altaratz

First Published: 21 April 2012 Vol: 39, L08803 | DOI: 10.1029/2012GL051158

### KEY POINTS

- Aerosols cause precipitation profiles to reach higher and be more spread out
- The results imply invigoration of convective clouds in polluted regions
- Invigoration by aerosols is independent of meteorological conditions



## A 1-year long $\delta^{18}\text{O}$ record of water vapor in Niamey (Niger) reveals insightful atmospheric processes at different timescales

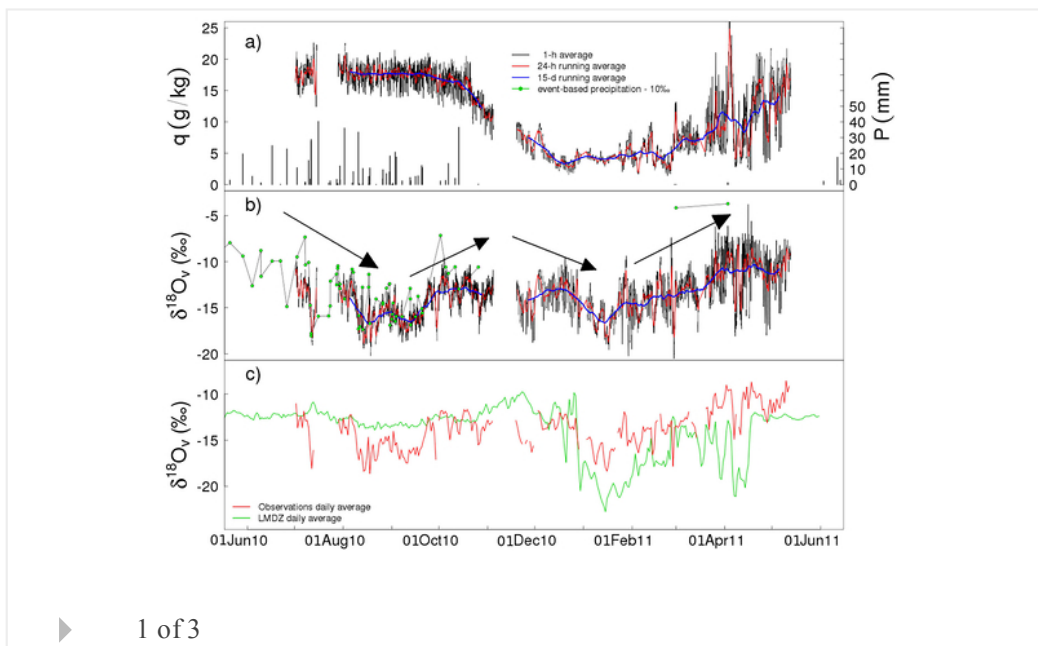
Guillaume Tremoy, Françoise Vimeux, Salla Mayaki, Ide Souley, Olivier Cattani, Camille Risi, Guillaume Favreau, Monique Oi

First Published: 24 April 2012 Vol: 39, L08805 | DOI: 10.1029/2012GL051298

### KEY POINTS

- Water vapor isotopes exhibit a W-shape at the seasonal scale
- Tropical-extratropical teleconnexions modulate winter intraseasonal variability
- Water vapor isotopes record density currents propagation and mixing process

Highlight



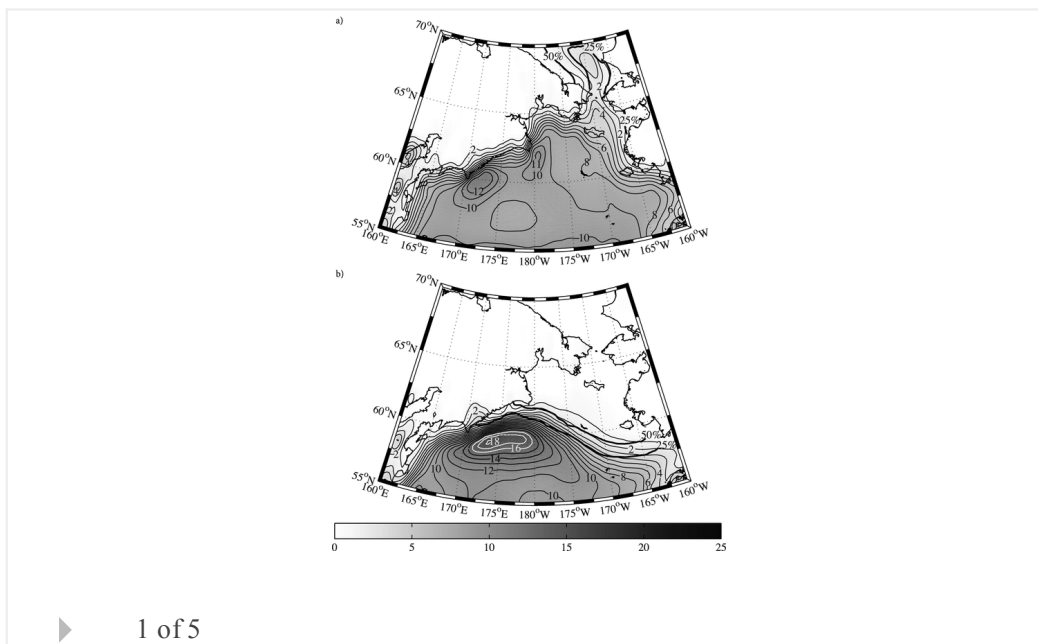
## Northern Bering Sea tip jets

G. W. K. Moore, R. S. Pickart

First Published: 28 April 2012 Vol: 39, L08807 | DOI: 10.1029/2012GL051537

### KEY POINTS

- High speed wind systems known as tip jets develop in the Bering Sea region
- These tip jets form as a result of topographic flow distortion
- These tip jets force climatologically and biologically important ocean currents



## Aerosol first indirect effects on non-precipitating low-level liquid cloud properties as simulated by CAM5 at ARM sites

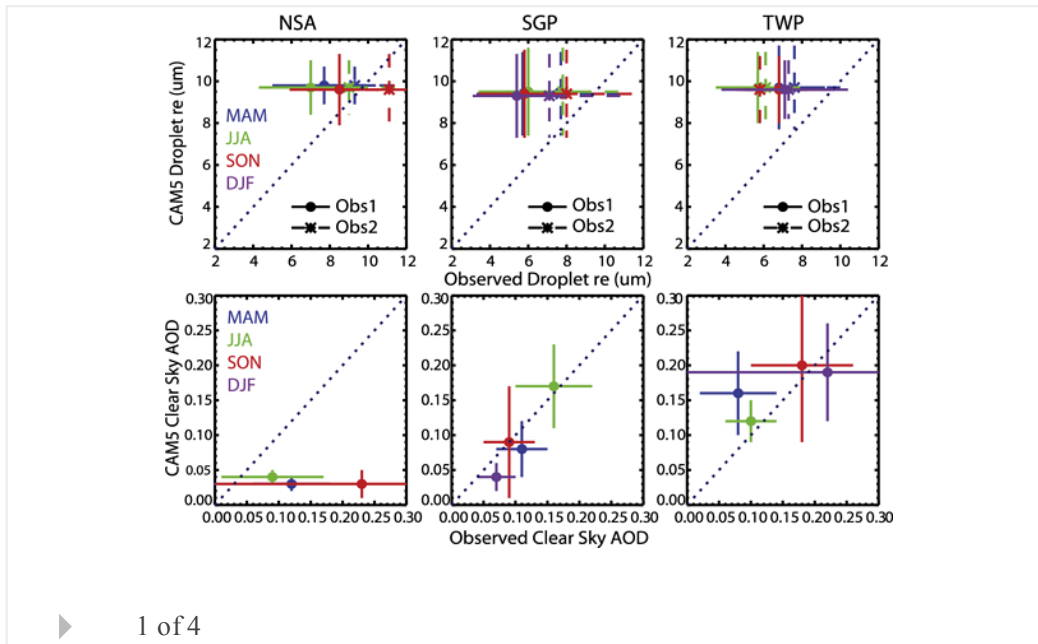
Chuanfeng Zhao, Stephen A. Klein, Shaocheng Xie, Xiaohong Liu, James S. Boyle,

Yuying Zhang

First Published: 28 April 2012 Vol: 39, L08806 | DOI: 10.1029/2012GL051213

**KEY POINTS**

- CAM5 simulates aerosol FIE reasonably well for examined clouds
- FIE shows clear sensitivity to LWC and variable choice of aerosol amount
- FIE has no strong sensitivity to location and season at examined ARM sites

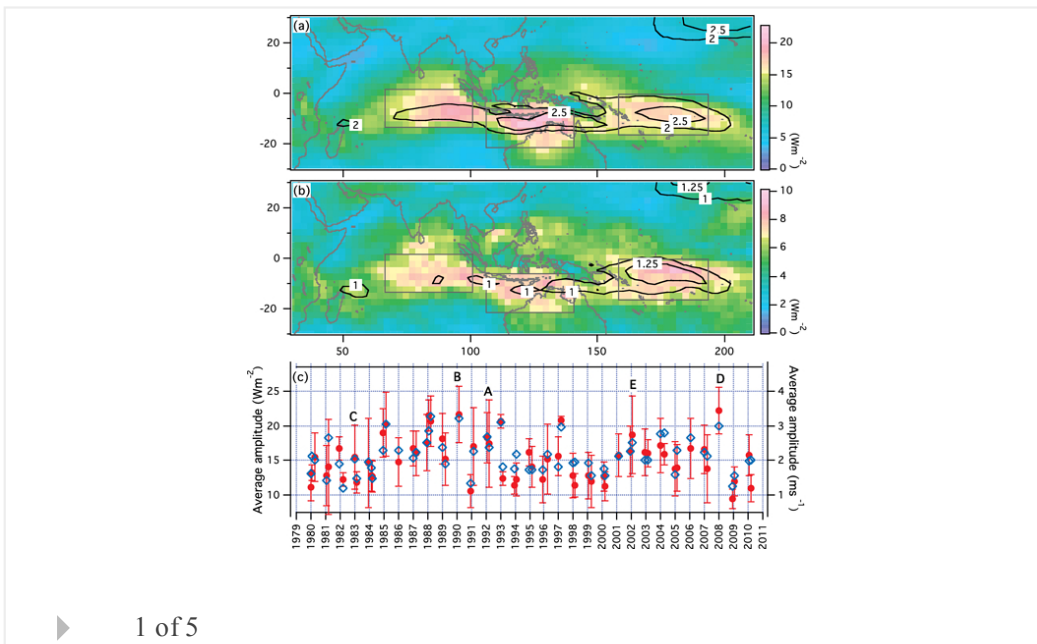
**Climate****The event-to-event variability of the boreal winter MJO**

H. Bellenger, J. P. Duvel

First Published: 20 April 2012 Vol: 39, L08701 | DOI: 10.1029/2012GL051294

**KEY POINTS**

- MJO events usually peak over one or two oceanic basins only
- Alternation between MJO peaking over the Indian-Ocean or the Pacific (IPI index)
- MJO-ENSO relation



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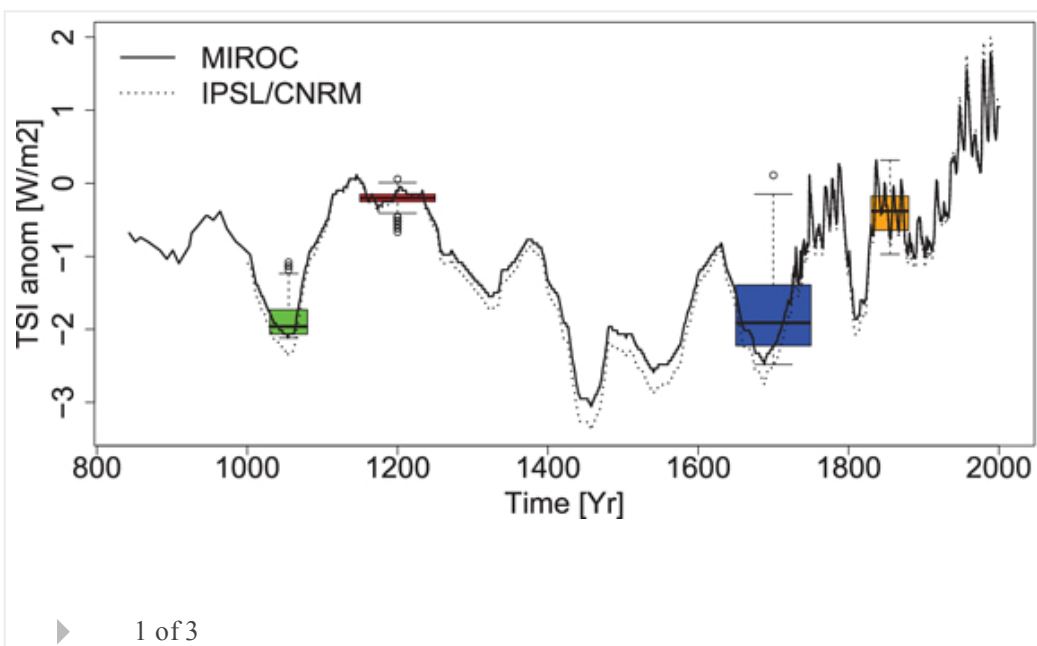
### Stability of weather regimes during the last millennium from climate simulations

Pascal Yiou, Jérôme Servonnat, Masakazu Yoshimori, Didier Swingedouw, Myriam Khodri, Ayako Abe-Ouchi

First Published: 25 April 2012 Vol: 39, L08703 | DOI: 10.1029/2012GL051310

#### KEY POINTS

- Unique study of daily climate variability in millennium experiments
- Sensitivity to solar forcing
- Multi-model comparisons



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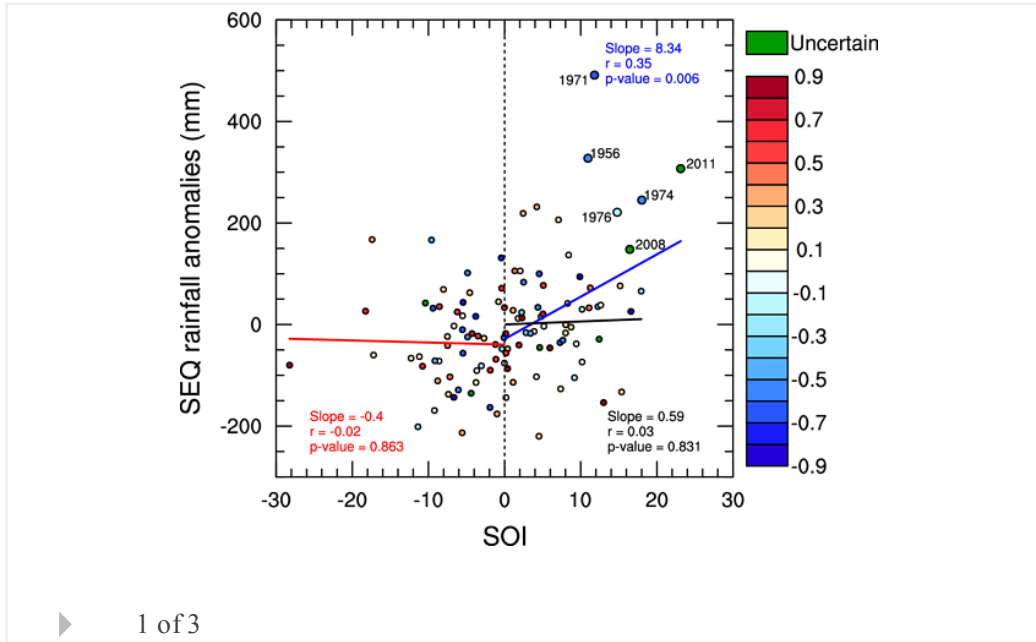
### The 2011 southeast Queensland extreme summer rainfall: A confirmation of a negative Pacific Decadal Oscillation phase?

Wenju Cai, Peter van Rensch

First Published: 25 April 2012 Vol: 39, L08702 | DOI: 10.1029/2011GL050820

**KEY POINTS**

- The 2011 floods are a line of evidence for a transition to a negative PDO phase
- The negative PDO provides favourable dynamic conditions for extreme floods
- There is an higher chance of extreme flooding in the next decade in Queensland



## Hydrology and Land Surface Studies

### Stability of backwater-influenced river bifurcations: A study of the Mississippi-Atchafalaya system

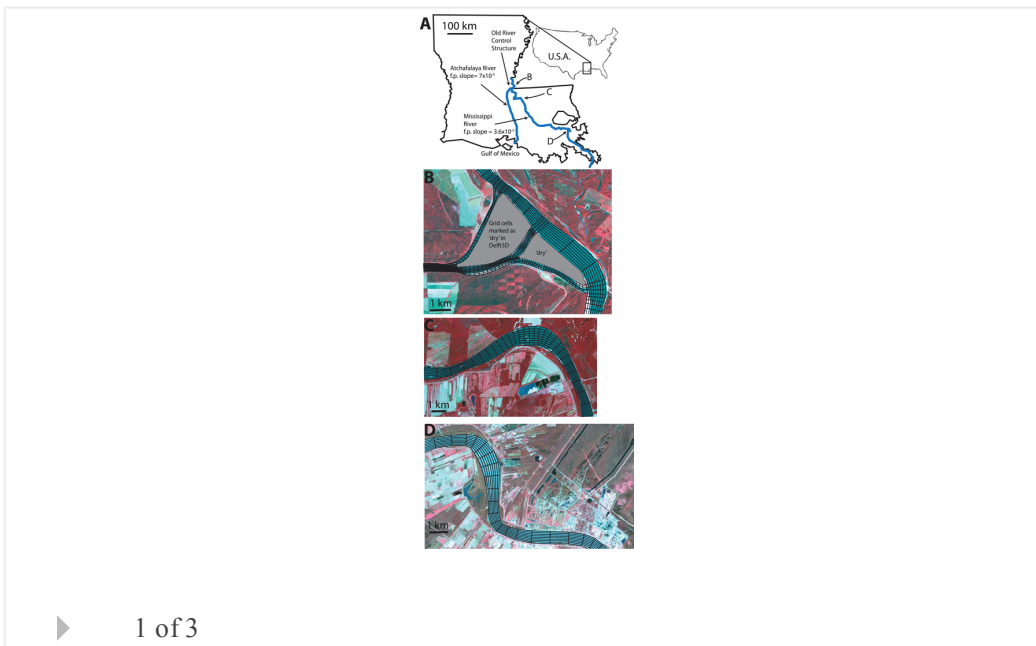
D. A. Edmonds

First Published: 19 April 2012 Vol: 39, L08402 | DOI: 10.1029/2012GL051125

**KEY POINTS**

- Bifurcation stability depends on the backwater profiles of bifurcate channels
- The direction of capture can change based on the backwater length scale
- The Mississippi-Atchafalaya bifurcation is unstable





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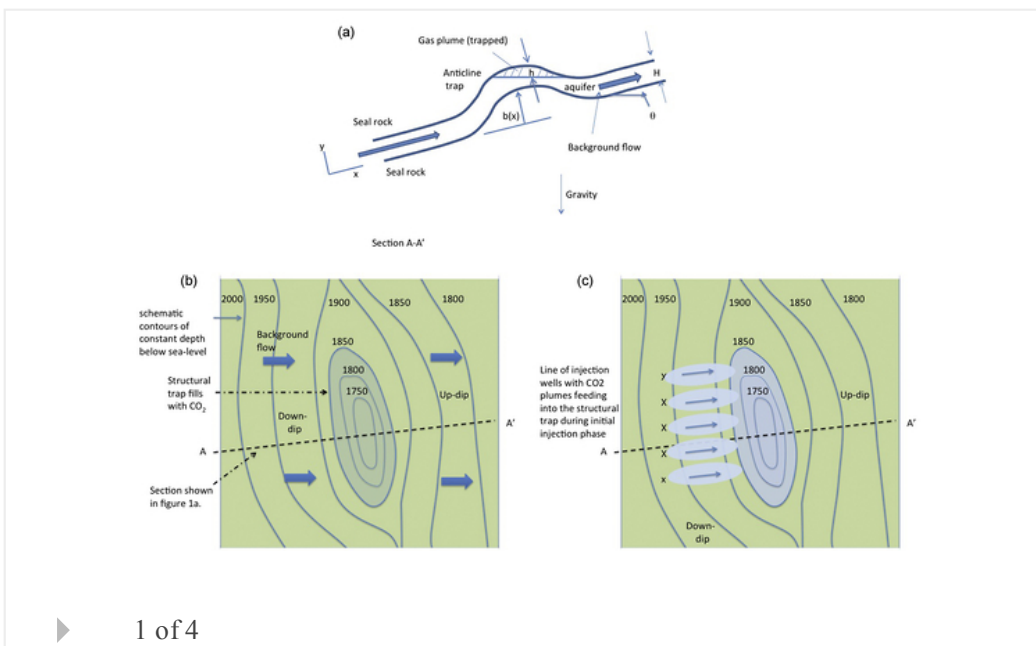
## Controls on the dissolution of CO<sub>2</sub> plumes in structural traps in deep saline aquifers

Andrew W. Woods, Tony Espie

First Published: 19 April 2012 Vol: 39, L08401 | DOI: 10.1029/2012GL051005

### KEY POINTS

- Structurally trapped CO<sub>2</sub> plumes need very large volumes of water to dissolve
- New model identifies bounds on the water flux in deep aquifers
- Lateral convection and groundwater flow are key rate limiting processes



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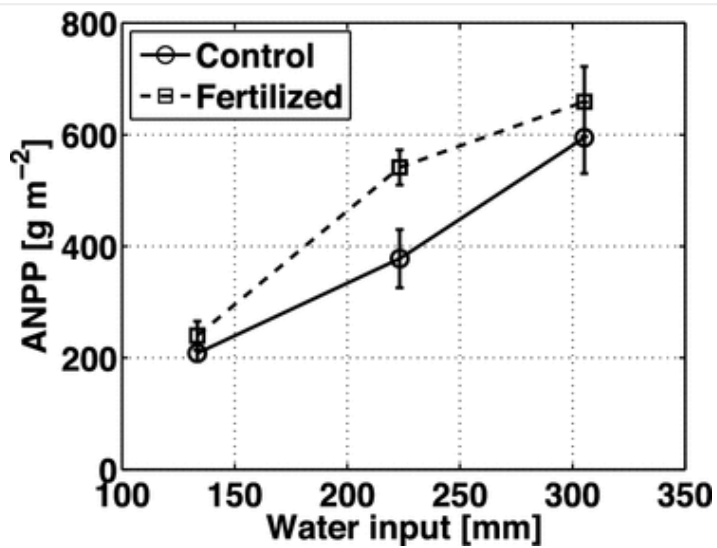
## Fertilization effects on the ecohydrology of a southern California annual grassland

A. J. Parolari, M. L. Goulden, R. L. Bras



**KEY POINTS**

- Fertilization modulates canopy properties, but does not alter the water balance
- Increased LAI in fertilized plots was offset by decreased leaf conductance
- Soil-plant-atmosphere hydraulic constraints may explain this feedback



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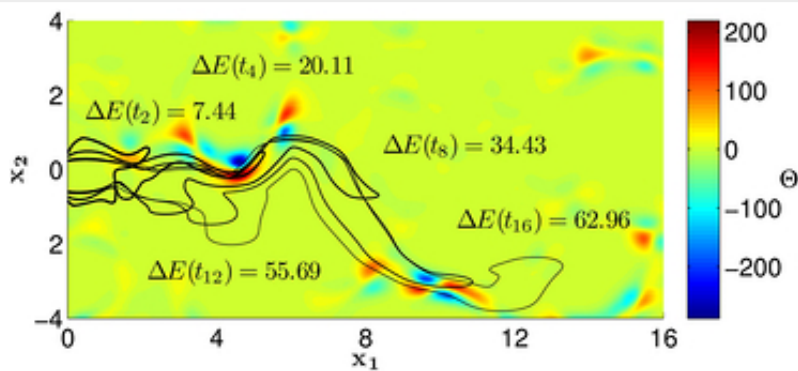
**Flow topology and scalar mixing in spatially heterogeneous flow fields**

Felipe P. J. de Barros, Marco Dentz, Jonas Koch, Wolfgang Nowak

First Published: 26 April 2012 Vol: 39, L08404 | DOI: 10.1029/2012GL051302

**KEY POINTS**

- Explicit quantification of the local scale mixing mechanisms
- Identification of the relation between entropy growth and flow metric
- Quantification of global mixing using a novel global flow metric



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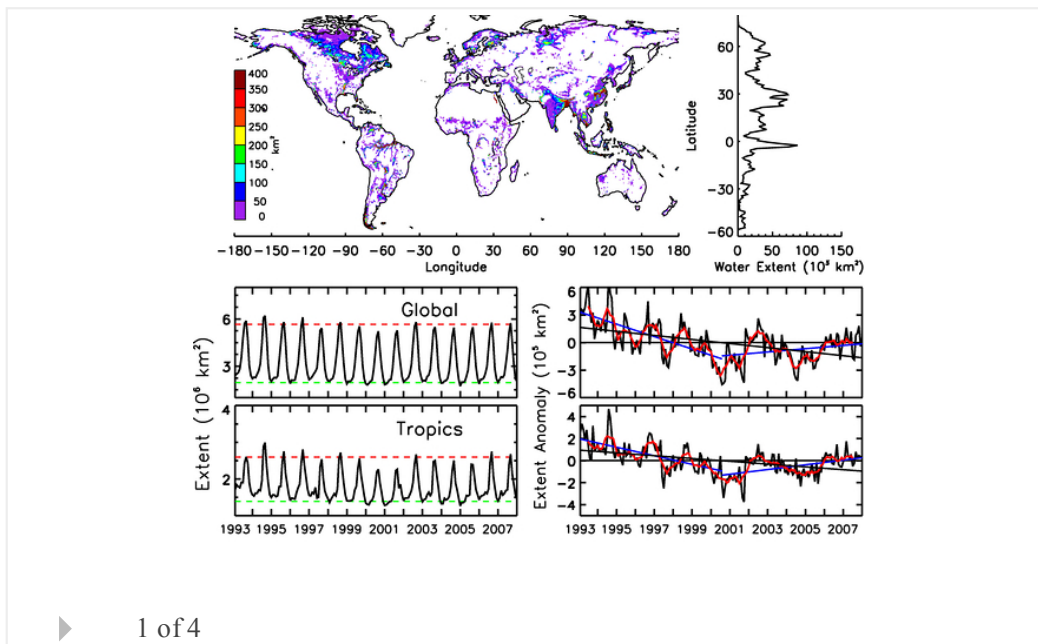
## Changes in land surface water dynamics since the 1990s and relation to population pressure

C. Prigent, F. Papa, F. Aires, C. Jimenez, W. B. Rossow, E. Matthews

First Published: 26 April 2012 Vol: 39, L08403 | DOI: 10.1029/2012GL051276

### KEY POINTS

- The monthly extent of global land surface water is estimated by satellites
- A large variability of the surface water extent is evidenced at global scale
- The effect of human activities on continental surface water is observed



## Oceans

### Wind-induced reorganization of the Bering shelf circulation

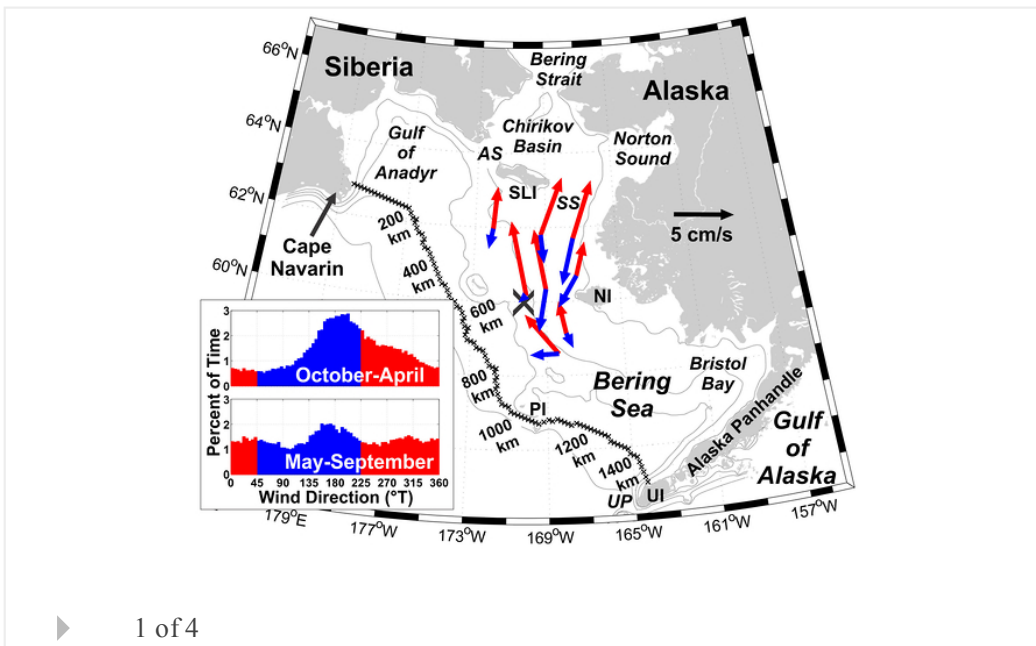
S. Danielson, K. Hedstrom, K. Aagaard, T. Weingartner, E. Curchitser

First Published: 19 April 2012 Vol: 39, L08601 | DOI: 10.1029/2012GL051231

### KEY POINTS

- Bering shelf circulation reorganizes with northwesterly and southeasterly winds
- Southeasterly wind increases on-shelf transport along majority of shelf length
- Flow past Cape Navarin reverses under northwesterly winds in October-April

Highlight



▶ 1 of 4

### Deep oceanic zonal jets constrained by fine-scale wind stress curls in the South Pacific Ocean: A high-resolution coupled GCM study

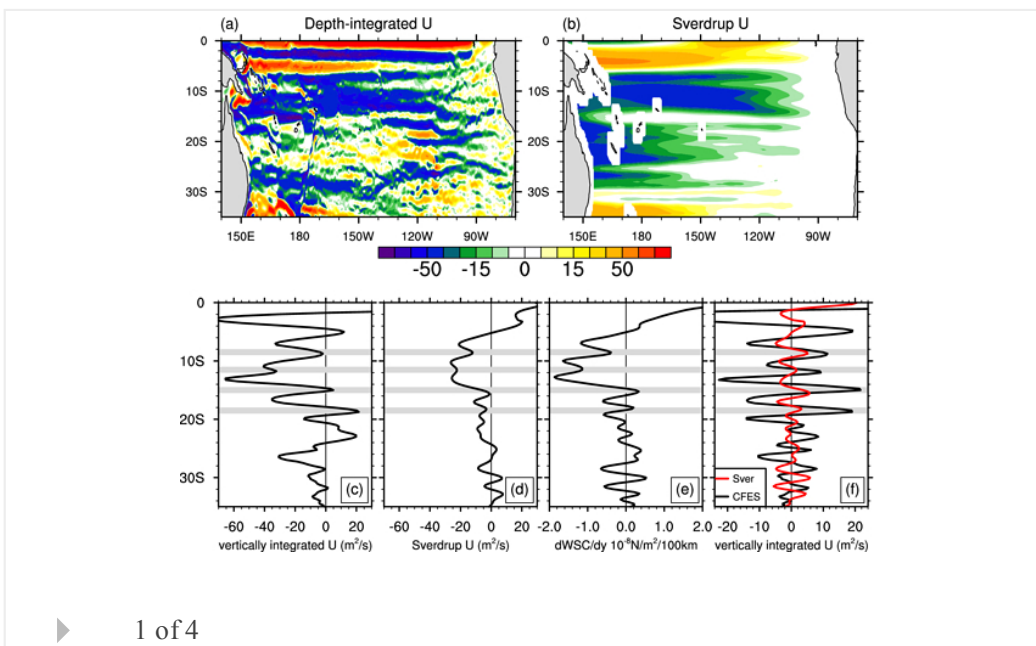
B. Taguchi, R. Furue, N. Komori, A. Kuwano-Yoshida, M. Nonaka, H. Sasaki, W. Ohfuchi

First Published: 24 April 2012 Vol: 39, L08602 | DOI: 10.1029/2012GL051248

#### KEY POINTS

- Oceanic deep zonal jets are examined using a high-resolution coupled GCM
- Vertically coherent oceanic zonal jets generate fine-scale SST anomaly
- SST-induced wind stress curl reinforces the oceanic jets, a positive feedback

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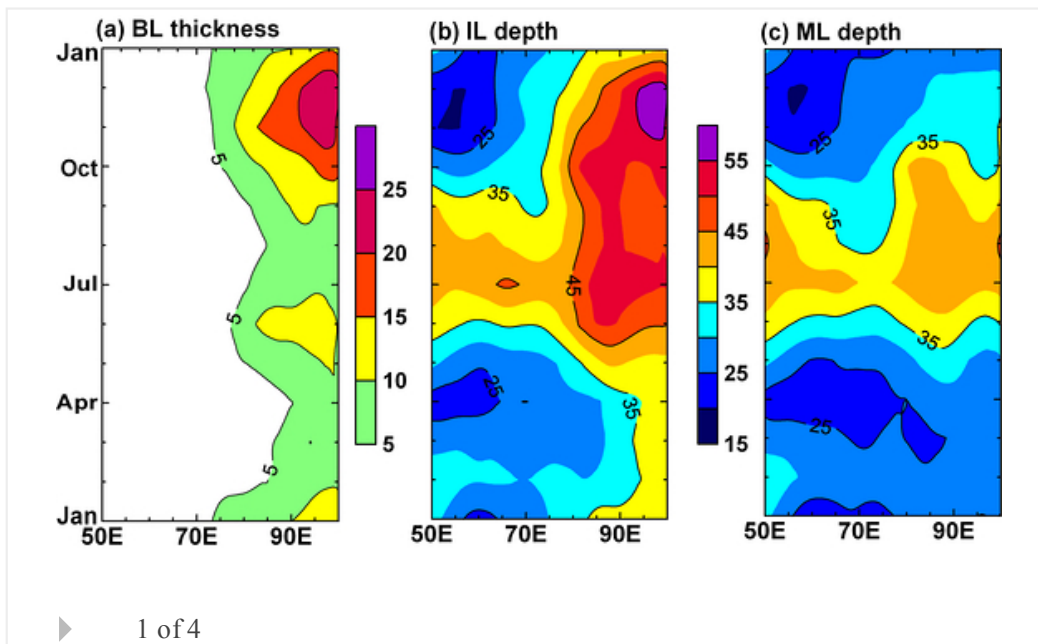
## Argo profiles variability of barrier layer in the tropical Indian Ocean and its relationship with the Indian Ocean Dipole

Yun Qiu, Wenju Cai, Li Li, Xiaogang Guo

First Published: 26 April 2012 Vol: 39, L08605 | DOI: 10.1029/2012GL051441

### KEY POINTS

- A semiannual cycle of the barrier layer off Sumatra exists, maximum in November
- Variability of the barrier layer enhances the IOD positive feedbacks
- Winds, Kelvin waves and the Wyrтки Jet link the IOD to the barrier layer



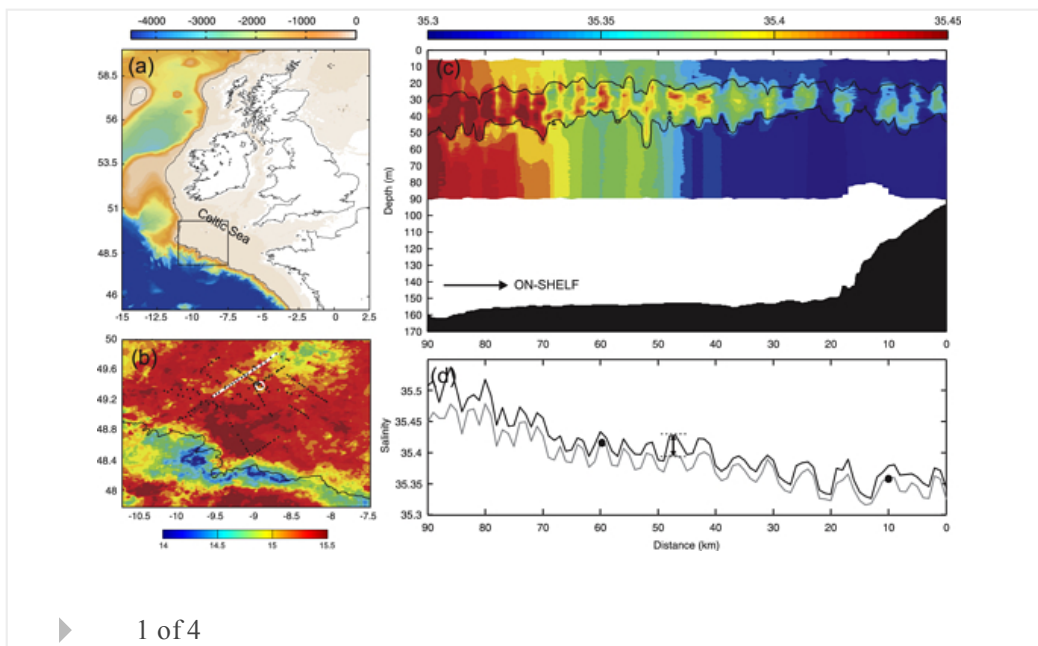
## On-shelf transport of slope water lenses within the seasonal pycnocline

J. Hopkins, J. Sharples, J. M. Huthnance

First Published: 26 April 2012 Vol: 39, L08604 | DOI: 10.1029/2012GL051388

### KEY POINTS

- A new shelf edge exchange mechanism is identified
- Lenses of high salinity slope water are found 100 km or more from the shelf edge
- Non-linear mode 2 internal waves drive on-shelf flow within the pycnocline



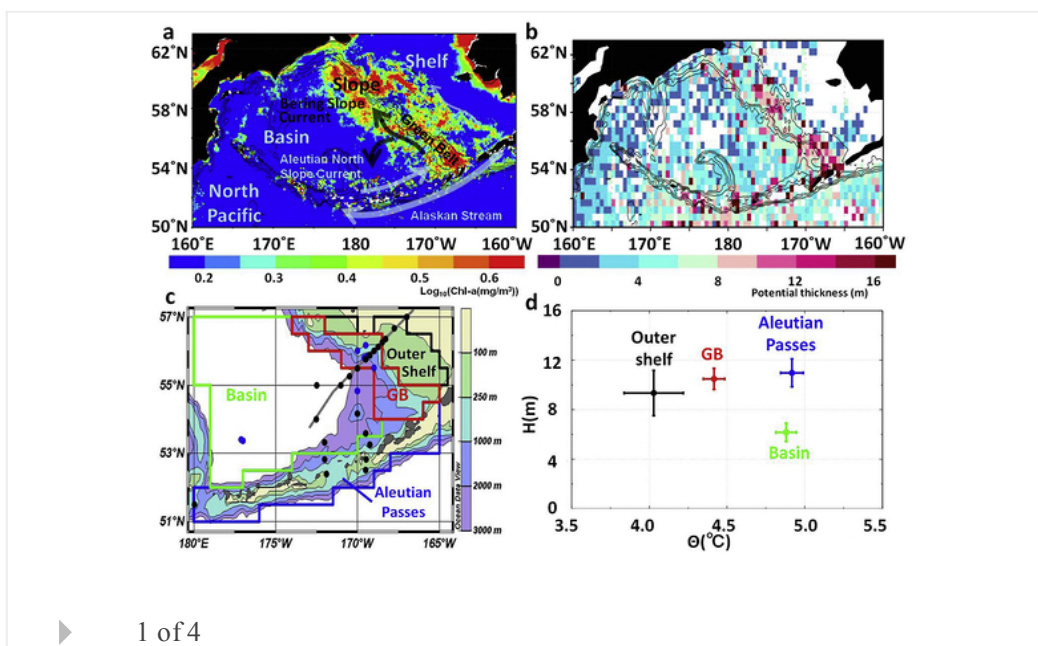
### Vertical turbulent iron flux sustains the Green Belt along the shelf break in the southeastern Bering Sea

T. Tanaka, I. Yasuda, K. Kuma, J. Nishioka

First Published: 26 April 2012 Vol: 39, L08603 | DOI: 10.1029/2012GL051164

**KEY POINTS**

- Thickness of the subsurface layer along the Green Belt is large
- This thick layer tends to contain high concentrations of iron
- Vertical turbulent iron flux from this thick layer can sustain the Green Belt



## Planets

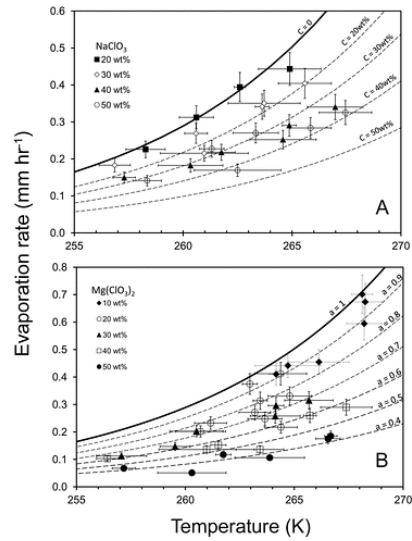
### Chlorate salts and solutions on Mars

Jennifer Hanley, Vincent F. Chevrier, Deanna J. Berget, Robert D. Adams

First Published: 24 April 2012 Vol: 39, L08201 | DOI: 10.1029/2012GL051239

### KEY POINTS

- Chlorates should be present in the Martian regolith
- Chlorate salts have eutectic temperatures as low as 204 K
- Chlorate salts would increase the stability of liquid water on Mars



▶ 1 of 4

## Solid Earth

### Frozen and active seismic anisotropy beneath southern Africa

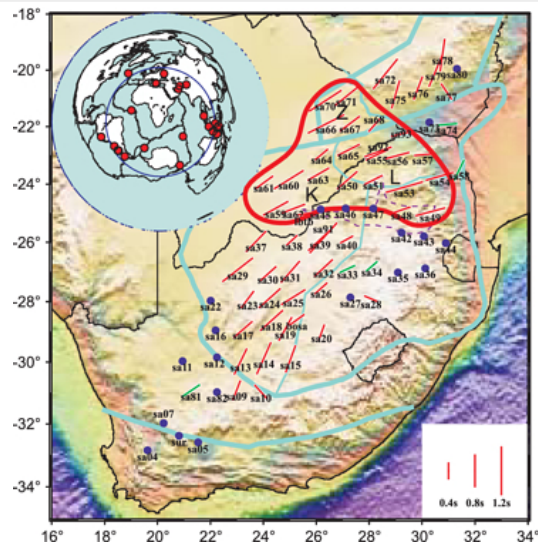
L. Vinnik, S. Kiselev, M. Weber, S. Oreshin, L. Makeyeva

First Published: 17 April 2012 Vol: 39, L08301 | DOI: 10.1029/2012GL051326

### KEY POINTS

- Methodology is improved by using a large seismograph array
- Anisotropy at depths less than 160 km is related to the Archean tectonics
- Anisotropy at larger depths is active and related to the recent mantle flow





▶ 1 of 4

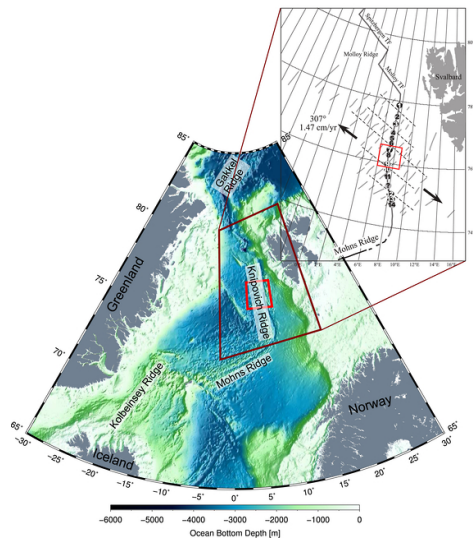
## Crustal thickness and earthquake distribution south of the Logachev Seamount, Knipovich Ridge

W. Jokat, J. Kollofrath, W. H. Geissler, L. Jensen

First Published: 19 April 2012 Vol: 39, L08302 | DOI: 10.1029/2012GL051199

### KEY POINTS

- Crustal thickness and seismicity along ultraslow spreading Knipovich Ridge
- Earthquakes in the upper mantle are quite common



▶ 1 of 4

## Fine-scale velocity structure of upper oceanic crust from full waveform inversion of downward continued seismic reflection data at the Lucky Strike Volcano, Mid-Atlantic Ridge

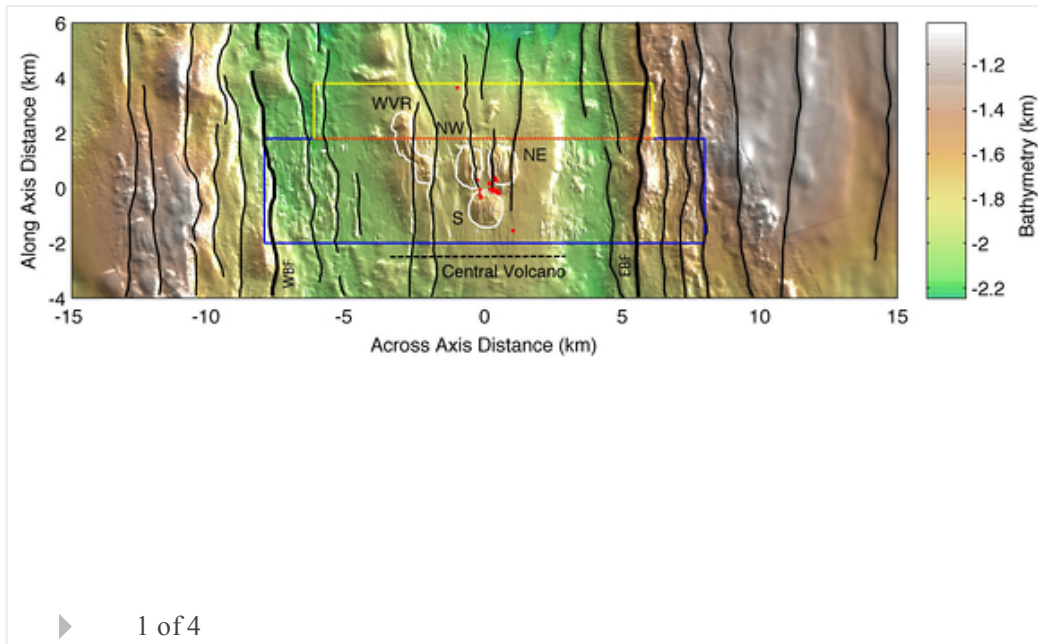


A. F. Arnulf, A. J. Harding, S. C. Singh, G. M. Kent, W. Crawford

First Published: 21 April 2012 Vol: 39, L08303 | DOI: 10.1029/2012GL051064

### KEY POINTS

- A new method to create high-resolution images of the crust using streamer data
- Piled up volcanic sequences form the upper Layer 2A
- Layer 2A beneath the Lucky Strike Volcano has a constructional origin



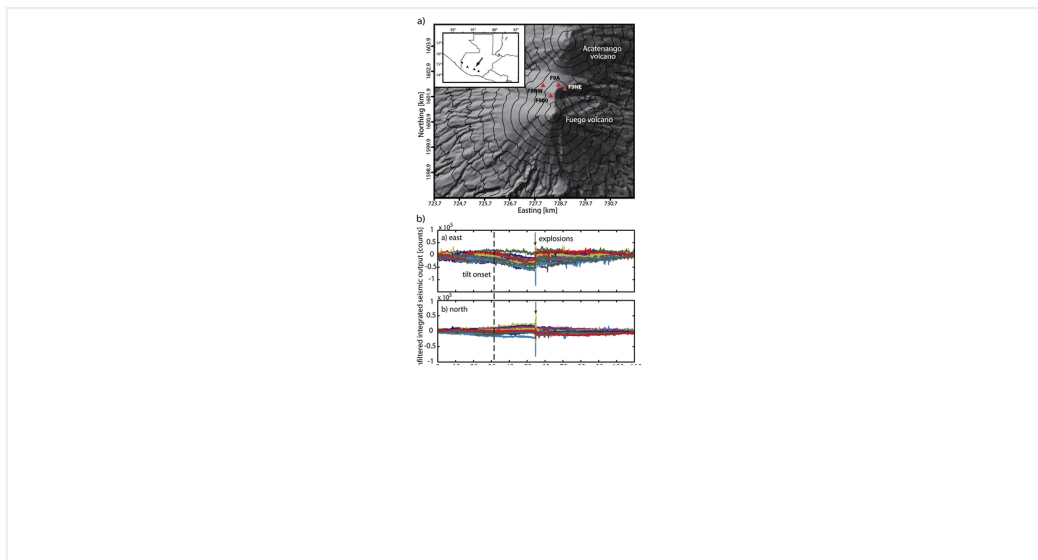
## Tilt prior to explosions and the effect of topography on ultra-long-period seismic records at Fuego volcano, Guatemala

John J. Lyons, Gregory P. Waite, Mie Ichihara, Jonathan M. Lees

First Published: 24 April 2012 Vol: 39, L08305 | DOI: 10.1029/2012GL051184

### KEY POINTS

- Tilt signals beginning 20-30 minutes prior to explosions are recorded
- The topography of Fuego affects the tilt signals, and must be considered
- Tilt is associated with slow pressurization followed by explosive release



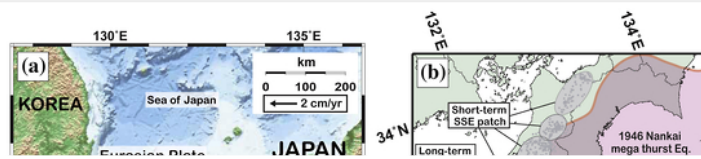
## Small repeating earthquake activity, interplate quasi-static slip, and interplate coupling in the Hyuga-nada, southwestern Japan subduction zone

Yusuke Yamashita, Hiroshi Shimizu, Kazuhiko Goto

First Published: 24 April 2012 Vol: 39, L08304 | DOI: 10.1029/2012GL051476

### KEY POINTS

- Interplate coupling spatially changes along the trench-axis and dip-direction
- Major large asperities are located low-slip-rate area in the Hyuga-nada
- RE analysis is a useful tool for assessing the potential of future large eq



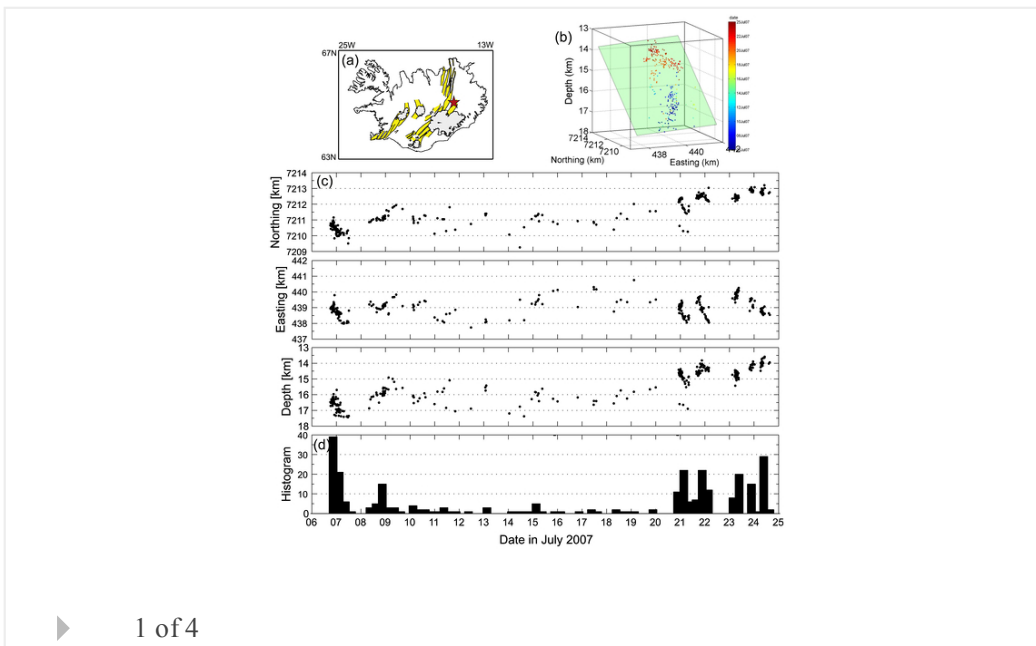
## Episodicity of seismicity accompanying melt intrusion into the crust

Robert S. White, Simon A. T. Redfern, Su-Ying Chien

First Published: 25 April 2012 Vol: 39, L08306 | DOI: 10.1029/2012GL051392

### KEY POINTS

- Episodicity of melt intrusion is a natural consequence of melt cooling in a dike
- As basalt cools from molten its shear strength first increases, then decreases
- Microseismicity in dikes can be caused by breaking plugs of frozen magma



▶ 1 of 4

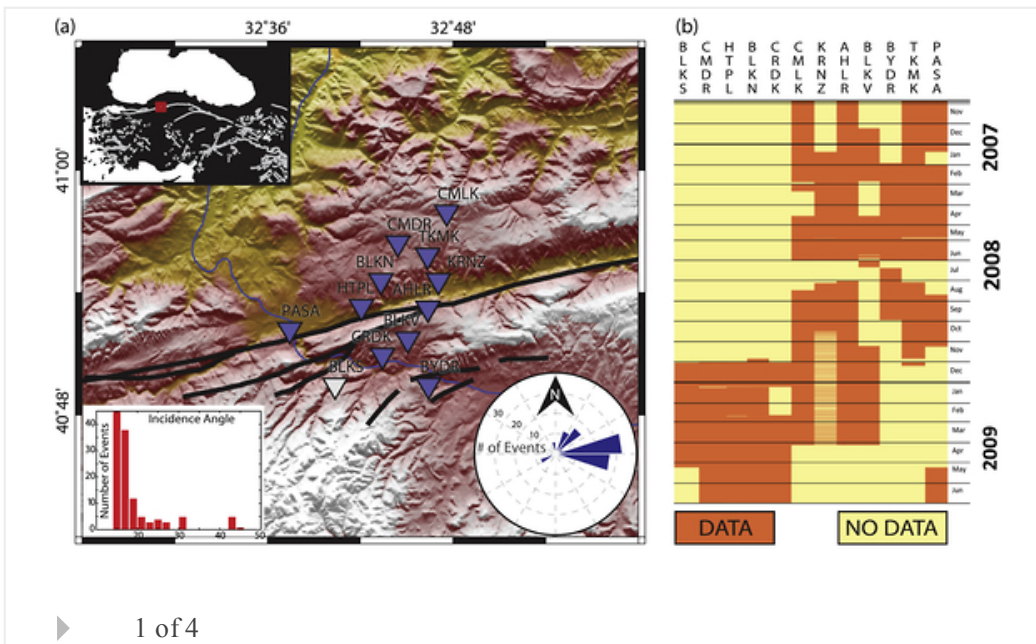
### Velocity contrast across the 1944 rupture zone of the North Anatolian fault east of Ismetpaşa from analysis of teleseismic arrivals

Yaman Ozakin, Yehuda Ben-Zion, Mustafa Aktar, Hayrullah Karabulut, Zhigang Peng

First Published: 26 April 2012 Vol: 39, L08307 | DOI: 10.1029/2012GL051426

#### KEY POINTS

- A simple new method to investigate velocity contrasts across faults
- Velocity contrast across the North Anatolian fault
- Using data comparisons at pairs of stations in cases with sparse data



▶ 1 of 4

### Regional trends in active diapirism revealed by mountain range-scale InSAR time

**series**

William D. Barnhart, Rowena B. Lohman

First Published: 27 April 2012 Vol: 39, L08309 | DOI: 10.1029/2012GL051255

**KEY POINTS**

- We use orogen-wide InSAR time series to constrain short wavelength deformation
- Active salt diapirism is principally controlled by stratigraphic exhumation
- Basement shortening in the Zagros leads to topographic steps



▶ 1 of 3

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**Along-dip seismic radiation segmentation during the 2007  $M_w$  8.0 Pisco, Peru earthquake**

Oner Sufri, Keith D. Koper, Thorne Lay

First Published: 28 April 2012 Vol: 39, L08311 | DOI: 10.1029/2012GL051316

**KEY POINTS**

- Down-dip portion of the 2007 Pisco earthquake was enriched in high frequencies
- Observations are similar to those made for other recent great earthquakes
- Along dip rupture segmentation is common in megathrust events



▶ 1 of 5

### **Aftershock seismicity of the 2010 Maule Mw=8.8, Chile, earthquake: Correlation between co-seismic slip models and aftershock distribution?**

A. Rietbrock, I. Ryder, G. Hayes, C. Haberland, D. Comte, S. Roecker, H. Lyon-Caen

First Published: 28 April 2012 Vol: 39, L08310 | DOI: 10.1029/2012GL051308

#### **KEY POINTS**

- Aftershock seismicity is concentrated between 40-140km from the trench
- Focal mechanisms indicate a predominance of thrust faulting
- A second band of seismicity, thrust faulting, is located at depths of 40-45km



▶ 1 of 2

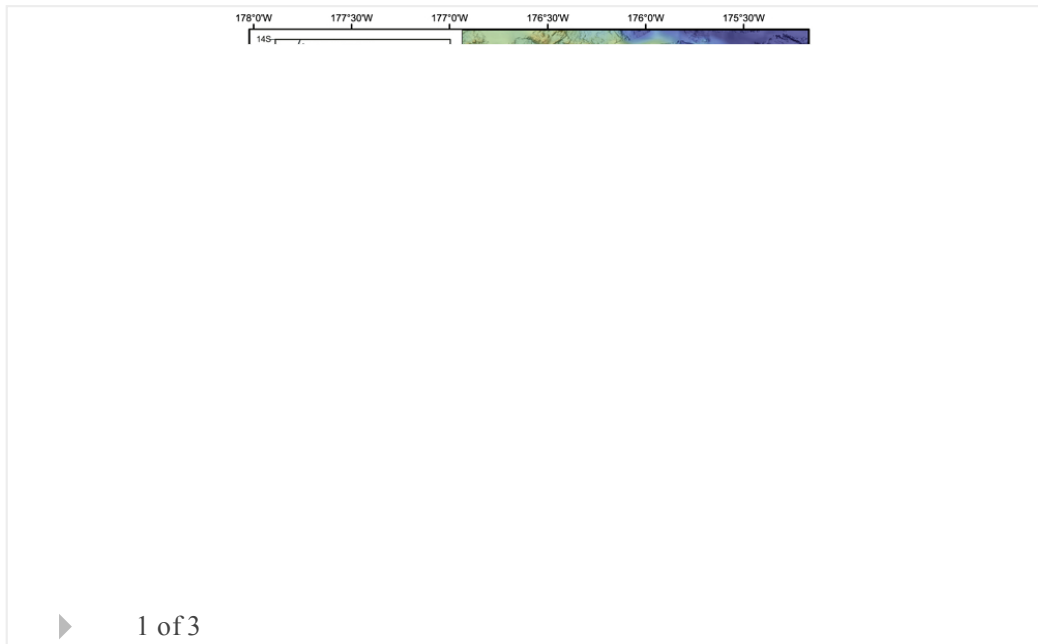
### **Mantle hotspot neon in basalts from the Northwest Lau Back-arc Basin**

J. E. Lupton, R. J. Arculus, L. J. Evans, D. W. Graham

First Published: 28 April 2012 Vol: 39, L08308 | DOI: 10.1029/2012GL051201

#### KEY POINTS

- New results show the presence of mantle hotspot type neon in the NW Lau Basin
- Results indicate 3 component mixing between air, MORB and OIB components
- Results support the presence of Samoan mantle plume material in NW Lau Basin



## Space Sciences

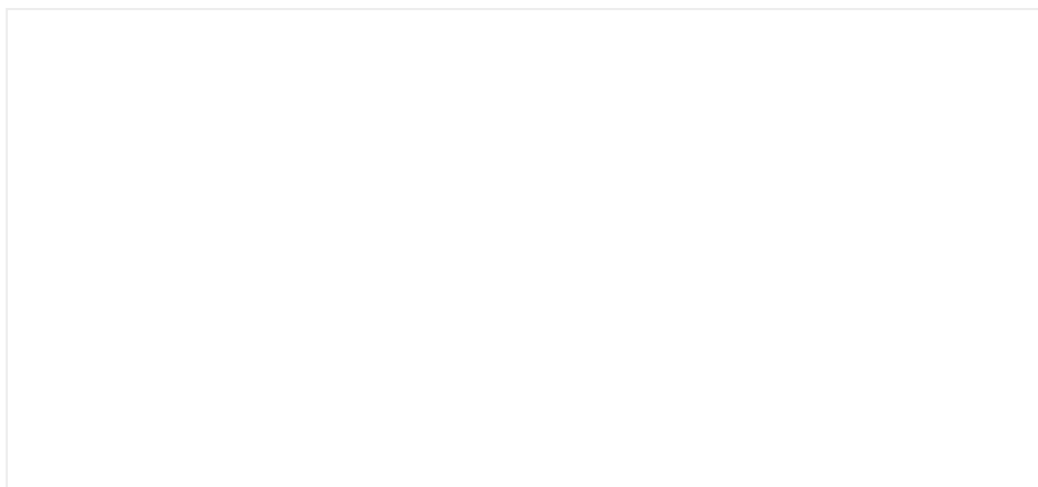
### The potential role of stratospheric ozone in the stratosphere-ionosphere coupling during stratospheric warmings

L. P. Goncharenko, A. J. Coster, R. A. Plumb, D. I. V. Domeisen

First Published: 18 April 2012 Vol: 39, L08101 | DOI: 10.1029/2012GL051261

#### KEY POINTS

- Planetary waves cause increase in stratospheric ozone in the tropics
- Amplified tides increase the variability in ionospheric electron density
- This mechanism works not only during SSW, but also in minor warmings



▶ 1 of 4

## Latitudinal anisotropy in ring current energetic neutral atoms

J. Goldstein, P. Valek, D. J. McComas, J. Redfern

First Published: 19 April 2012 Vol: 39, L08102 | DOI: 10.1029/2012GL051417

### KEY POINTS

- Duskside ions are 1–2 orders more anisotropic (equatorial) than dawnside ions
- The degree of duskside anisotropy decreases sharply with energy from 1–30 keV
- The observations are consistent with ion drift in self-consistent fields

▶ 1 of 4

## Pickup ions and ion cyclotron wave amplitudes upstream of Mars: First results from the 1D hybrid simulation

M. M. Cowee, S. P. Gary, H. Y. Wei

First Published: 20 April 2012 Vol: 39, L08104 | DOI: 10.1029/2012GL051313

### KEY POINTS

- Observed ICW amplitudes do directly reflect the local ion pickup rate
- Upstream of Mars, the observed waves are in a state of growth
- Wave growth time must be considered when correlating wave amp and pickup rate



▶ 1 of 4

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## The importance of plasma $\beta$ conditions for magnetic reconnection at Saturn's magnetopause

A. Masters, J. P. Eastwood, M. Swisdak, M. F. Thomsen, C. T. Russell, N. Sergis, F. J. Crary, M. K. Dougherty, A. J. Coates, S. M. Krimigis

First Published: 20 April 2012 Vol: 39, L08103 | DOI: 10.1029/2012GL051372

### KEY POINTS

- Plasma betas at Saturn's magnetopause are generally higher than those at Earth's
- These conditions should severely restrict where reconnection can occur
- Nature of solar wind-magnetosphere coupling at Saturn should not be Earth-like

Highlight

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## Comparison between theory and observation of the frequency sweep rates of equatorial rising tone chorus

X. Tao, W. Li, J. Bortnik, R. M. Thorne, V. Angelopoulos

First Published: 21 April 2012 Vol: 39, L08106 | DOI: 10.1029/2012GL051413

### KEY POINTS

- MLT and Kp are included in calculating frequency sweep rates
- Agreement between theory and observation is shown
- The results are important for understanding the generation of chorus

▶ 1 of 4

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## Electron pitch-angle diffusion in radiation belts: The effects of whistler wave oblique propagation

A. Artemyev, O. Agapitov, H. Breuillard, V. Krasnoselskikh, G. Rolland

First Published: 21 April 2012 Vol: 39, L08105 | DOI: 10.1029/2012GL051393

### KEY POINTS

- We describe the chorus waves by using the statistics of Cluster observations
- We calculate pitch-angle diffusion coefficients basing on experimental data
- The intensification of the diffusion is found for realistic chorus distribution

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## Magnetotail dipolarization front and associated ion reflection: Particle-in-cell simulations

P. Wu, M. A. Shay

First Published: 25 April 2012 Vol: 39, L08107 | DOI: 10.1029/2012GL051486

### KEY POINTS

- A low inflow density leads to a faster and steeper dipolarization front
- The DF is a moving ram that pushes the initial equilibrium plasma sheet plasmas
- The streaming of reflected ions is super-Alfvenic and excites instabilities

▶ 1 of 3

## Observations of electromagnetic whistler precursors at supercritical interplanetary shocks

L. B. Wilson III, A. Koval, A. Szabo, A. Breneman, C. A. Cattell, K. Goetz, P. J. Kellogg, K. Kersten, J. C. Kasper, B. A. Maruca, et al

First Published: 25 April 2012 Vol: 39, L08109 | DOI: 10.1029/2012GL051581

### KEY POINTS

- Whistler precursors observed at supercritical interplanetary shocks
- They can have amplitudes  $\geq 20$  nT and/or dB/B up to 2
- They cause perpendicular (parallel) ion (electron) heating (acceleration)

▶ 1 of 3

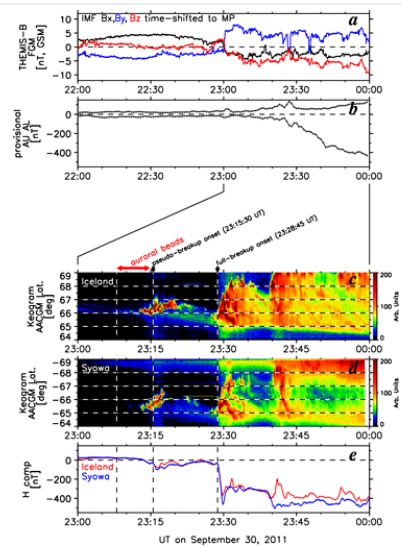
## Magnetic conjugacy of northern and southern auroral beads

Tetsuo Motoba, Keisuke Hosokawa, Akira Kadokura, Natsuo Sato

First Published: 25 April 2012 Vol: 39, L08108 | DOI: 10.1029/2012GL051599

### KEY POINTS

- Simultaneous observations of northern and southern auroral beads
- Remarkable interhemispheric similarities in the characteristics of auroral beads
- Two-step evolution of auroral beads



▶ 1 of 3

## Observations of kinetic ballooning/interchange instability signatures in the magnetotail

E. V. Panov, V. A. Sergeev, P. L. Pritchett, F. V. Coroniti, R. Nakamura, W. Baumjohann, V. Angelopoulos, H. U. Auster, J. P. McFadden

First Published: 26 April 2012 Vol: 39, L08110 | DOI: 10.1029/2012GL051668

### KEY POINTS

- Signatures of kinetic BICI observed at 11Re near presumed B-minimum
- Electron-driven sausage(ballooning)-like westward-drifting ion gyroscale fingers
- Observed at off-equatorial location in the middle of plasma sheet

▶ 1 of 4

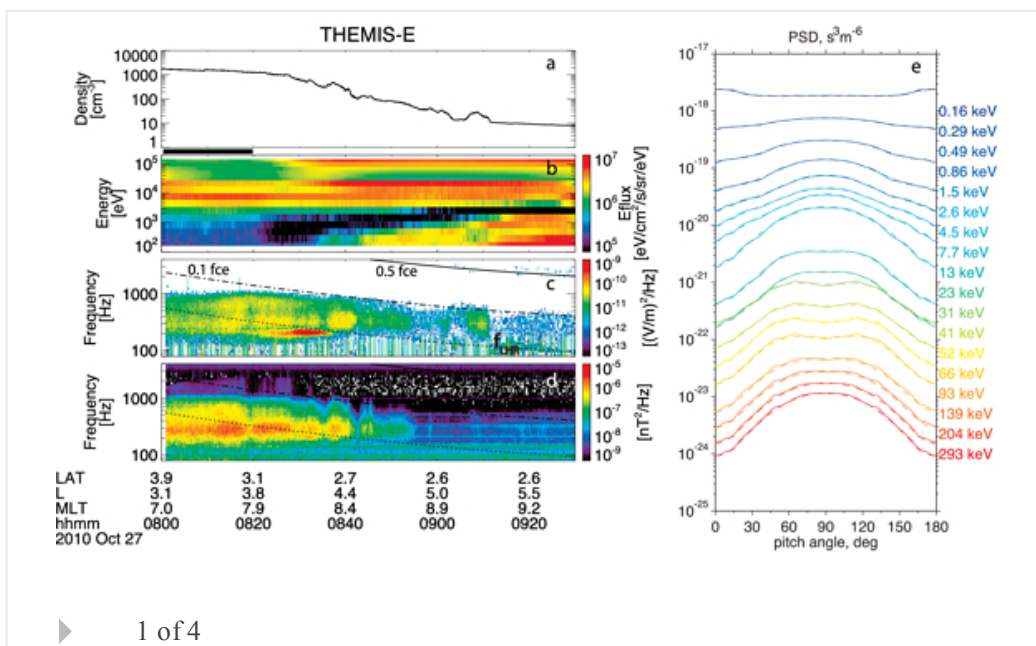
## Amplification of whistler-mode hiss inside the plasmasphere

Lunjin Chen, Wen Li, Jacob Bortnik, Richard M. Thorne

First Published: 27 April 2012 Vol: 39, L08111 | DOI: 10.1029/2012GL051488

### KEY POINTS

- Hiss forms via chorus as an embryonic source and internal amplification
- Our simulation reproduces many characteristics of hiss observation
- Hiss amplification only occurs in outer plasmasphere



## Observations of Mercury's northern cusp region with MESSENGER's Magnetometer

Reka M. Winslow, Catherine L. Johnson, Brian J. Anderson, Haje Korth, James A. Slavin, Michael E. Purucker, Sean C. Solomon

**KEY POINTS**

- Observe Mercury's northern cusp from 6 months of MESSENGER Magnetometer data
- Calculate the particle flux to the surface and sputtering implications
- Investigate the influence of solar wind and IMF on northern cusp

▶ 1 of 4

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## The Cryosphere

### Albedo evolution of seasonal Arctic sea ice

Donald K. Perovich, Christopher Polashenski

First Published: 20 April 2012 Vol: 39, L08501 | DOI: 10.1029/2012GL051432

**KEY POINTS**

- During the melt season the albedo of seasonal ice is less than multiyear
- Seasonal ice absorbs and transmits more sunlight to ocean than multiyear
- Albedo evolution of seasonal sea ice has 7 phases

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## Observations reveal external driver for Arctic sea-ice retreat

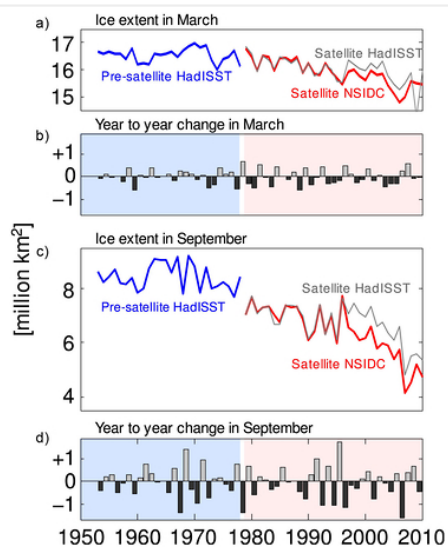
Dirk Notz, Jochem Marotzke

First Published: 27 April 2012 Vol: 39, L08502 | DOI: 10.1029/2012GL051094

### KEY POINTS

- Internal variability as estimated from observations can't explain sea-ice loss
- Superposition of a linear trend and internal variability explains sea-ice loss
- Observational sea-ice record shows no signs of self-acceleration

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## The Carrington event not observed in most ice core nitrate records

E. W. Wolff, M. Bigler, M. A. J. Curran, J. E. Dibb, M. M. Frey, M. Legrand, J. R. McConnell

First Published: 28 April 2012 Vol: 39, L08503 | DOI: 10.1029/2012GL051603

### KEY POINTS

- Most ice cores have no nitrate spike at 1859
- Greenland cores have nitrate spikes, but these are normally from biomass burning
- Nitrate in ice cannot be used to derive SEP statistics



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14-19 June 2015

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