

## Issue Contents



## Volume 39, Issue 24

28 December 2012

Brief  Detailed

## Atmospheric Science

## Attribution of the Arctic ozone column deficit in March 2011

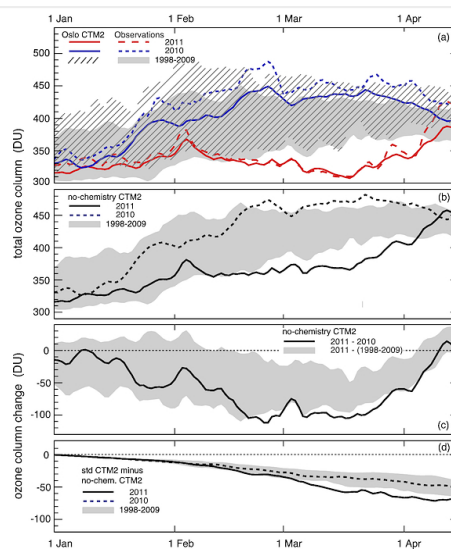
I. S. A. Isaksen, C. Zerefos, W.-C. Wang, D. Balis, K. Eleftheratos, B. Rognerud, F. Stordal, T. K. Berntsen, J. H. LaCasce, O. A. Søvde, et al

First Published: 25 December 2012 Vol: 39, L24810 | DOI: 10.1029/2012GL053876

## KEY POINTS

- Good model agreement with observations
- The model reproduces the Arctic ozone deficit in 2011
- Dynamics play a major role for the ozone deficit in 2011

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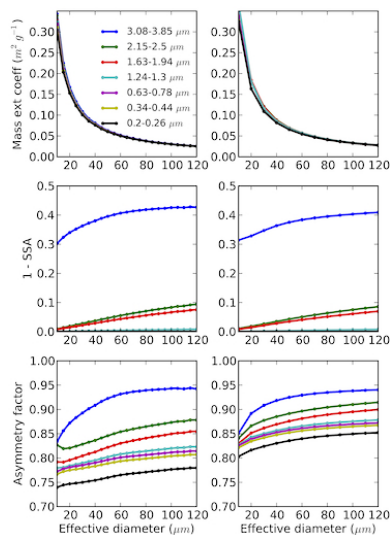
1 of 1

## Simulation of the global contrail radiative forcing: A sensitivity analysis

Bingqi Yi, Ping Yang, Kuo-Nan Liou, Patrick Minnis, Joyce E. Penner

**KEY POINTS**

- The annual 2006 mean shortwave, longwave, and net contrail radiative forcings
- Regional contrail radiative forcing can be large
- Microphysical properties of contrail particles are important



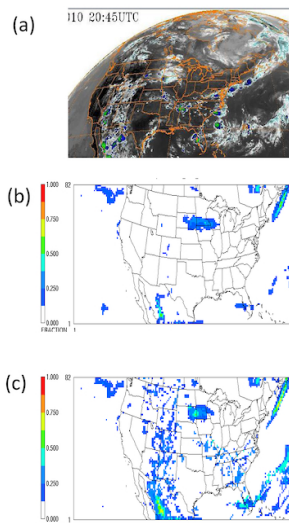
**Introducing subgrid-scale cloud feedbacks to radiation for regional meteorological and climate modeling**

Kiran Alapaty, Jerold A. Herwehe, Tanya L. Otte, Christopher G. Nolte, O. Russell Bullock, Megan S. Mallard, John S. Kain, Jimmy Dudhia

First Published: 21 December 2012 Vol: 39, L24809 | DOI: 10.1029/2012GL054031

**KEY POINTS**

- Parameterized convective cloud and radiation interactions
- Impacts on weather and climate
- Credible weather and climate simulations



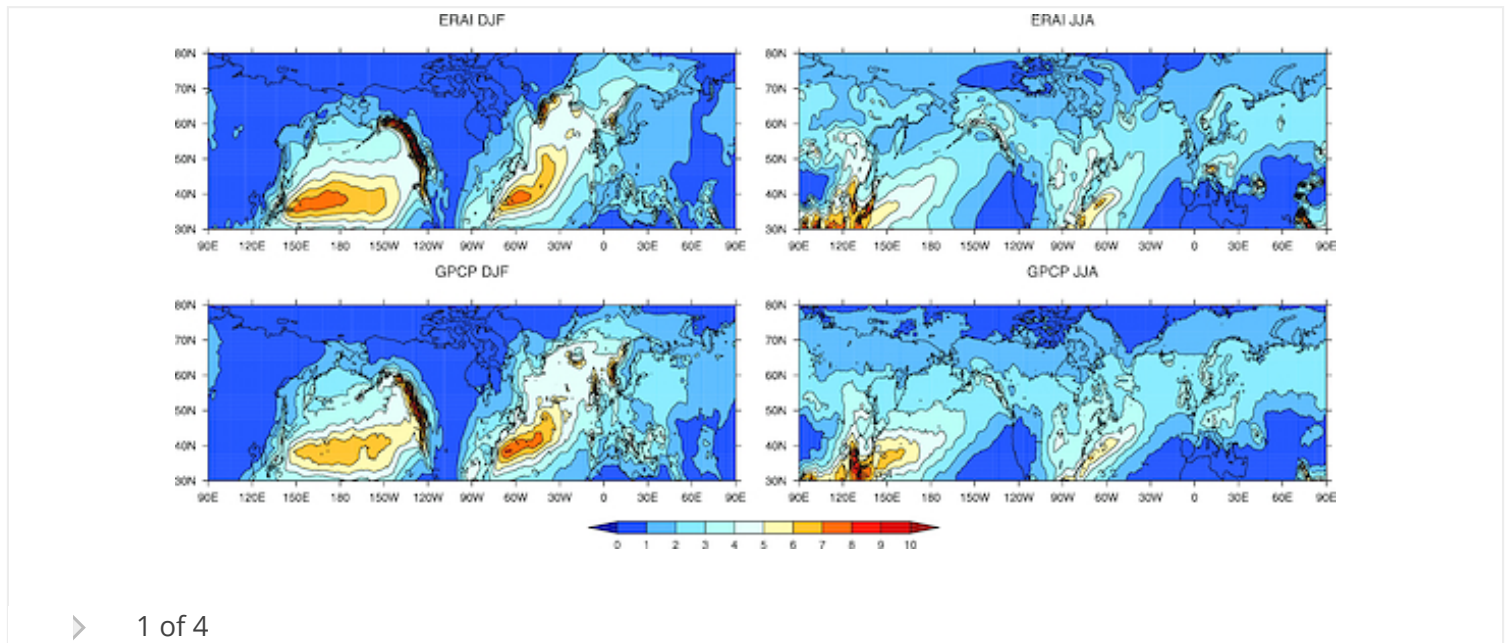
## How much Northern Hemisphere precipitation is associated with extratropical cyclones?

M. K. Hawcroft, L. C. Shaffrey, K. I. Hodges, H. F. Dacre

First Published: 21 December 2012 Vol: 39, L24809 | DOI: 10.1029/2012GL053866

### KEY POINTS

- Extratropical cyclones contribute over 50% of NH precipitation
- Cyclones contribute up to 90/85% of precipitation in some regions in DJF/JJA
- The most intense storms contribute significantly to the total climatology



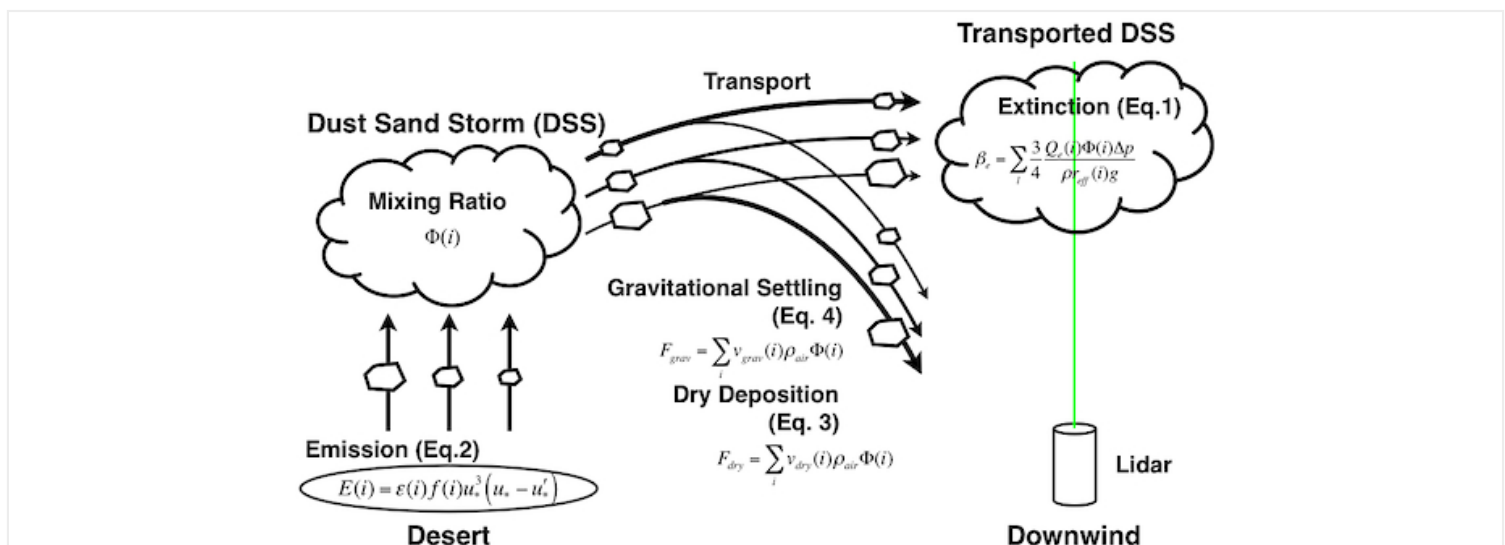
## Size-resolved adjoint inversion of Asian dust

K. Yumimoto, I. Uno, N. Sugimoto, A. Shimizu, Y. Hara, T. Takemura

First Published: 21 December 2012 Vol: 39, L24808 | DOI: 10.1029/2012GL053890

### KEY POINTS

- A severe dust storm in April 2005 was reexamined by size-resolved inversion
- Inverted dust-size distribution differed between eastern and western regions
- Vegetation and soil type and moisture might explain the inverted distribution



## A new approach to retrieving cirrus cloud height with a combination of MODIS 1.24- and 1.38- $\mu\text{m}$ channels

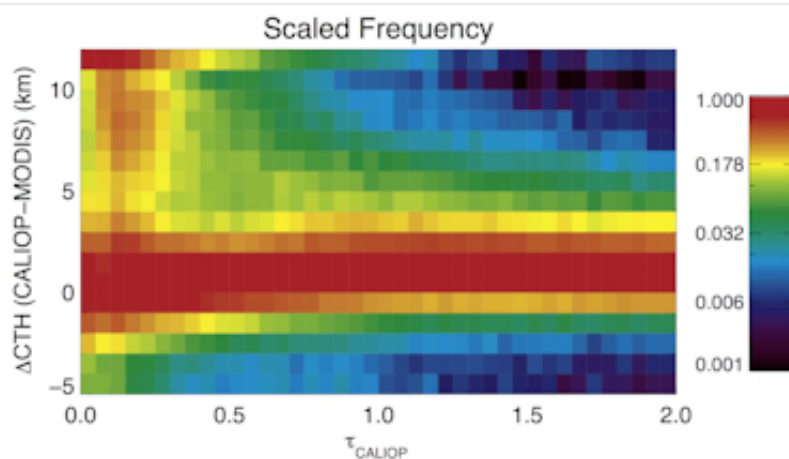
Chenxi Wang, Shouguo Ding, Ping Yang, Bryan Baum, Andrew E. Dessler

First Published: 20 December 2012 Vol: 39, L24806 | DOI: 10.1029/2012GL053854

### KEY POINTS

- Retrieval of cirrus cloud height
- Use of the MODIS 1.38-micrometre channel
- The new method performs better than the conventional methods

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## Parameterization of contrail radiative properties for climate studies

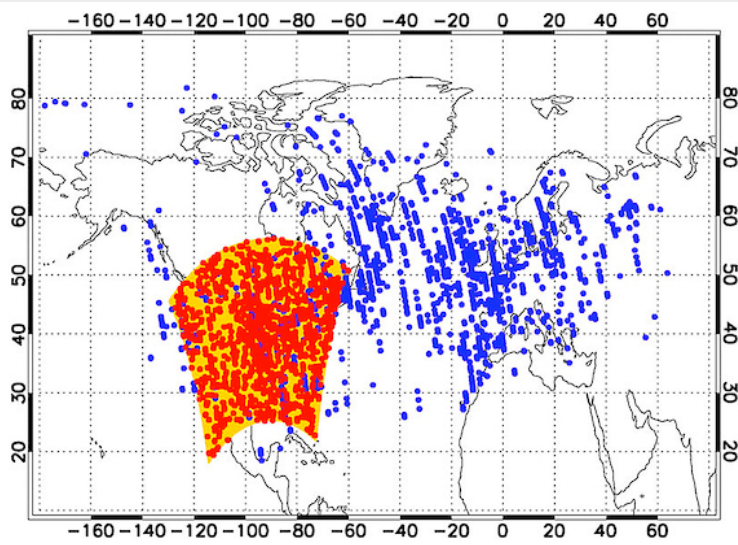
Yu Xie, Ping Yang, Kuo-Nan Liou, Patrick Minnis, David P. Duda

First Published: 20 December 2012 Vol: 39, L00F02 | DOI: 10.1029/2012GL054043

### KEY POINTS

- MODIS and CALIPSO data are used
- A contrail particle shape model is developed
- A new contrail property parameterization is developed

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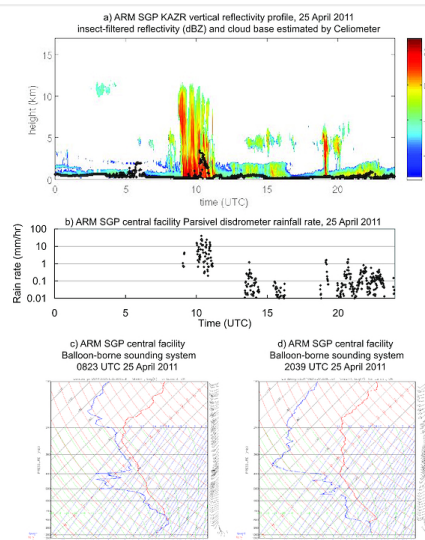
## Two distinct modes in one-day rainfall event during MC3E field campaign: Analyses of disdrometer observations and WRF-SBM simulation

Takamichi Iguchi, Toshihisa Matsui, Ali Tokay, Pavlos Kollias, Wei-Kuo Tao

First Published: 20 December 2012 Vol: 39, L24805 | DOI: 10.1029/2012GL053329

### KEY POINTS

- Surface rainfall microphysics of a golden event during MC3E field campaign
- Comparison between surface disdrometric measurements and WRF-SBM simulation
- Precipitation classification



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## Soil-derived sulfate in atmospheric dust particles at Taklimakan desert

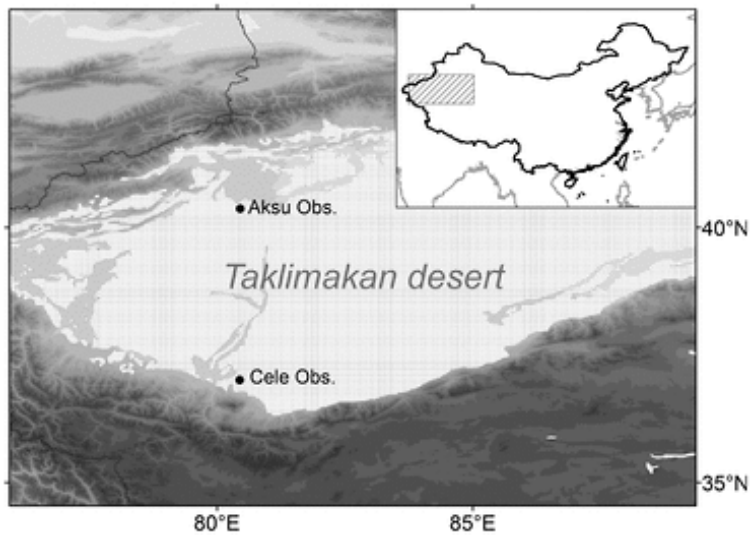
Feng Wu, Daizhou Zhang, Junji Cao, Hongmei Xu, Zhisheng An

First Published: 19 December 2012 Vol: 39, L24803 | DOI: 10.1029/2012GL054406

### KEY POINTS

- Sulfate in atmospheric dust could originate directly from surface soil

- Soil-derived sulfate could largely exceed secondary sulfate in some cases
- Awareness of soil-derived sulfate benefits studies related to Asian dust



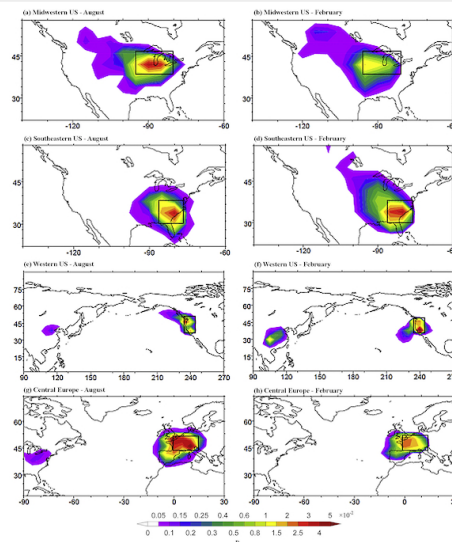
1 of 1

## Using a global aerosol model adjoint to unravel the footprint of spatially-distributed emissions on cloud droplet number and cloud albedo

V. A. Karydis, S. L. Capps, R. H. Moore, A. G. Russell, D. K. Henze, A. Nenes  
 First Published: 19 December 2012 Vol: 39, L24804 | DOI: 10.1029/2012GL053346

### KEY POINTS

- Adjoint modeling unravels the impact of aerosol on cloud properties
- Long range transport of aerosol has important impacts on clouds
- Future emissions will impact droplet number mostly central Europe



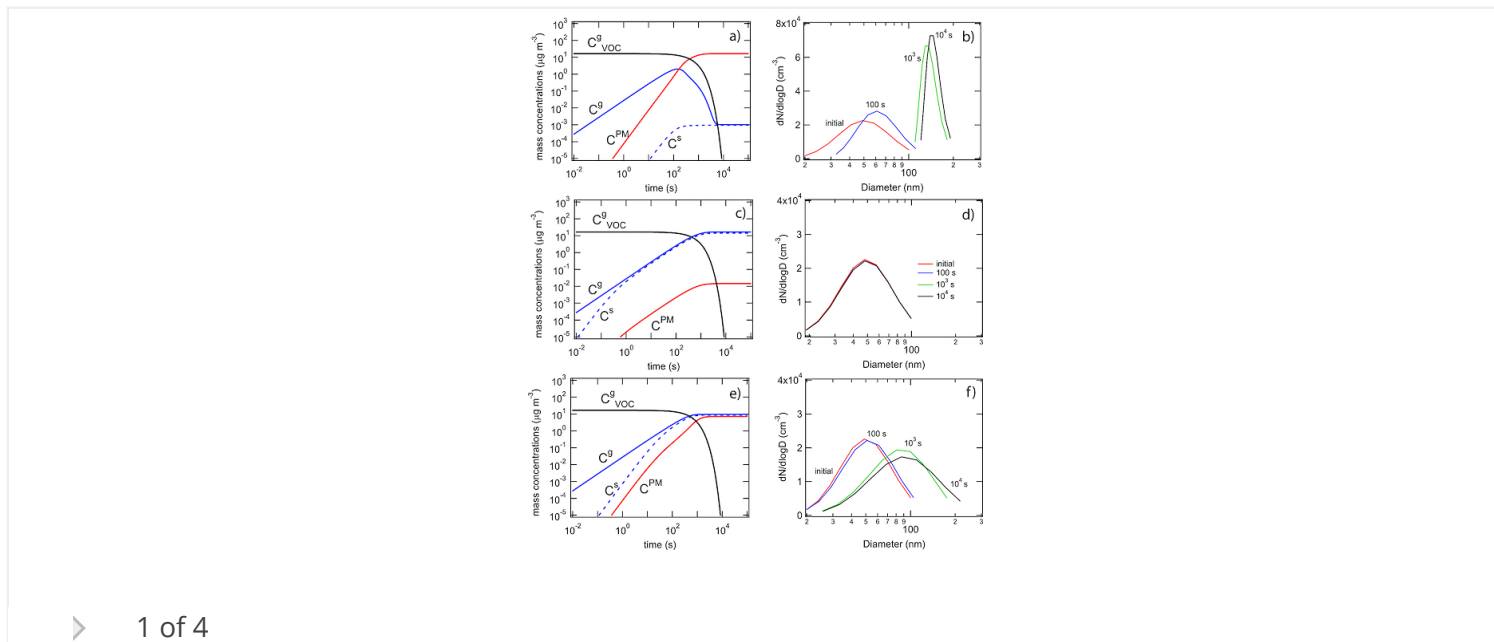
> 1 of 2

## Equilibration timescale of atmospheric secondary organic aerosol partitioning

Manabu Shiraiwa, John H. Seinfeld

**KEY POINTS**

- Equilibration timescale of SOA partitioning is estimated
- Kinetically limited vs. quasi-equilibrium particle growth is discussed
- Phase state has large impact on SOA partitioning kinetics



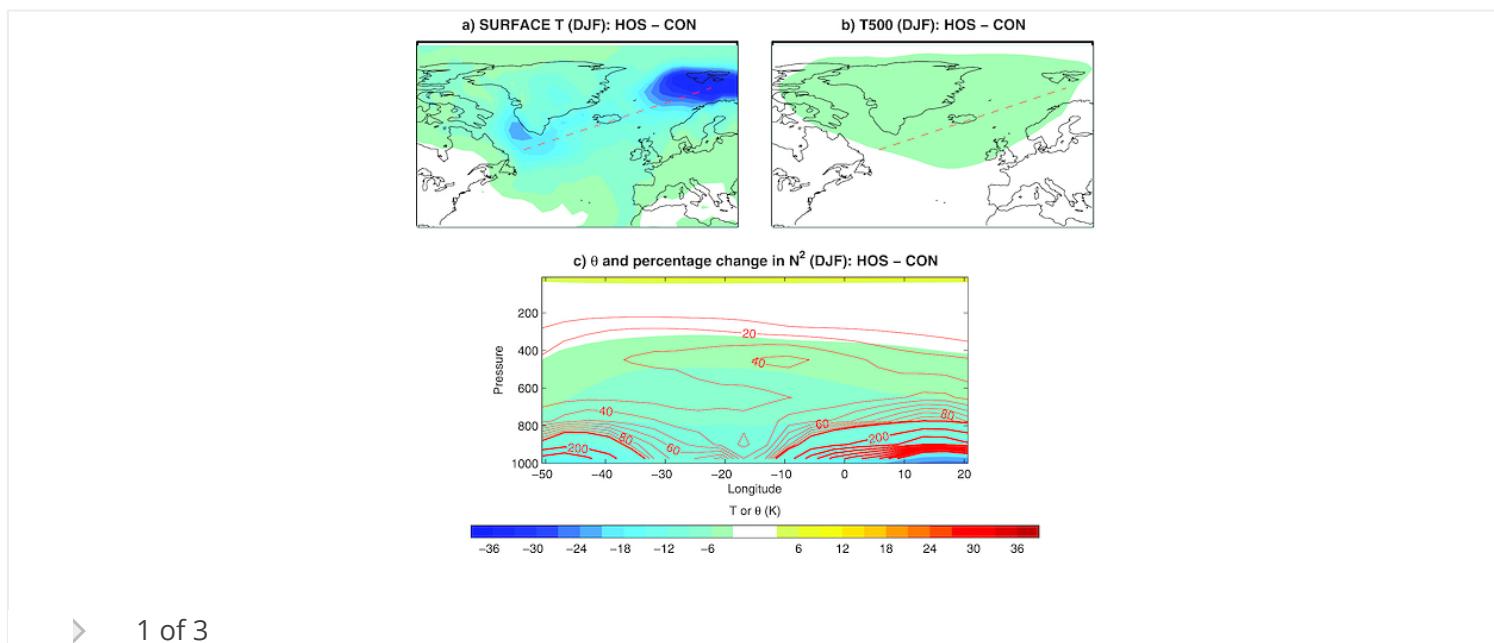
**On the role of the ocean in projected atmospheric stability changes in the Atlantic polar low region**

T. Woollings, B. Harvey, M. Zahn, L. Shaffrey

First Published: 18 December 2012 Vol: 39, L24802 | DOI: 10.1029/2012GL054016

**KEY POINTS**

- AMOC-induced temperature changes are restricted to the lower troposphere
- Stability increases over the North Atlantic are influenced by the AMOC
- Confidence in future polar low changes depends on confidence in ocean changes



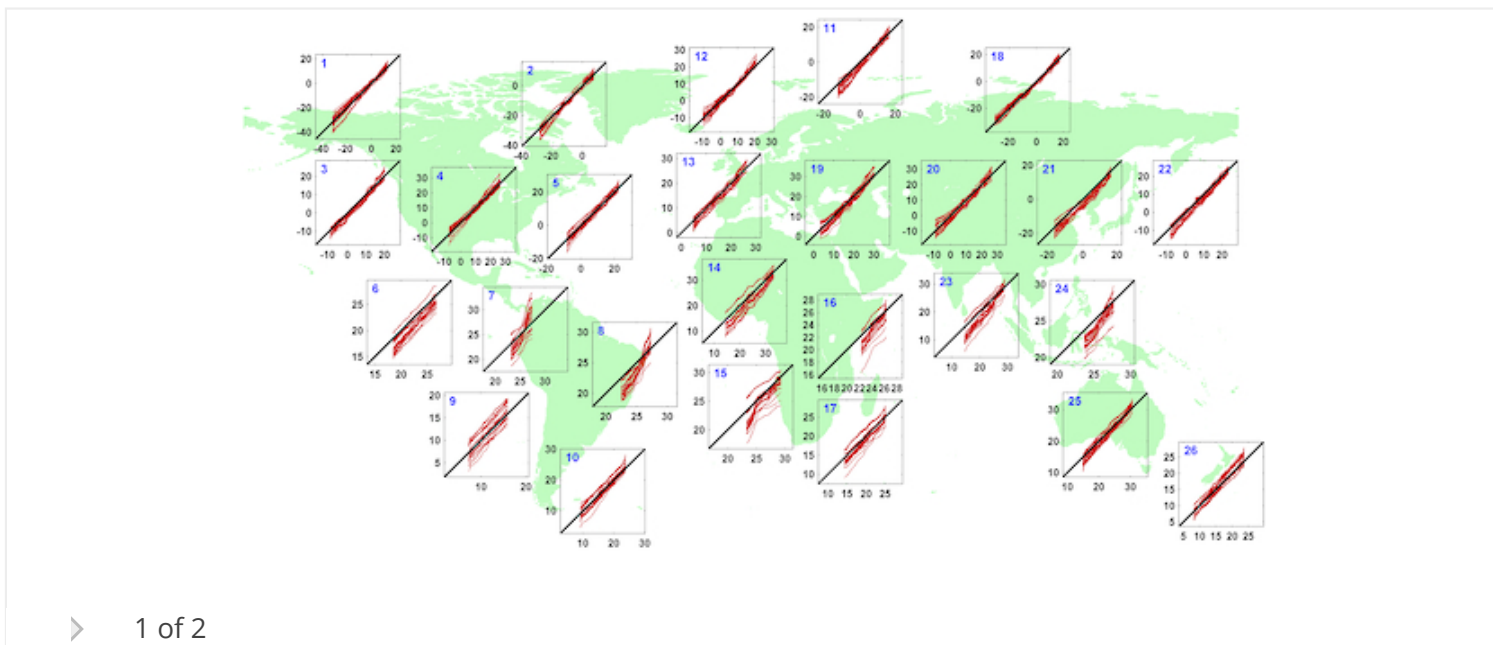
## Temperature dependent climate projection deficiencies in CMIP5 models

Jens H. Christensen, Fredrik Boberg

First Published: 28 December 2012 Vol: 39, L24705 | DOI: 10.1029/2012GL053650

### KEY POINTS

- GCMs suffer from temperature-dependent biases
- This leads to an overestimation of projections of regional temperatures
- We estimate that 10-20% of projected warming is due to model deficiencies



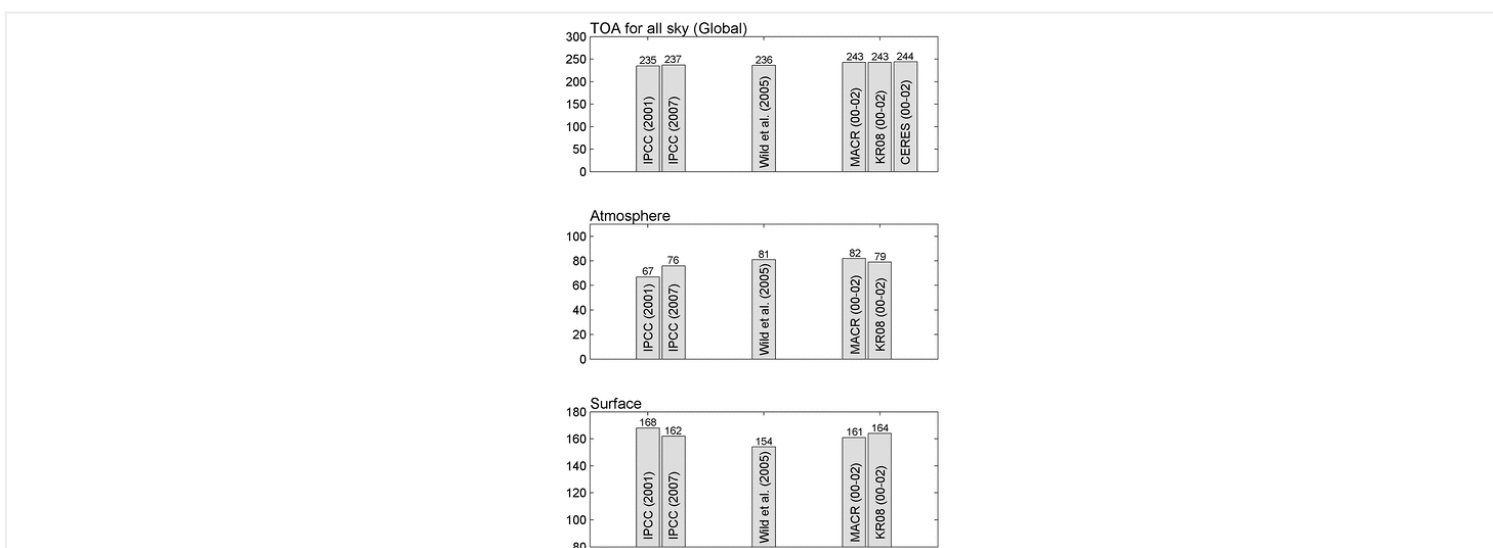
## Improved estimates and understanding of global albedo and atmospheric solar absorption

Dohyeong Kim, V. Ramanathan

First Published: 25 December 2012 Vol: 39, L24704 | DOI: 10.1029/2012GL053757

### KEY POINTS

- Improved estimation of global albedo and atmospheric solar absorption
- Understanding and explaining global radiation budgets of the Earth
- The fundamental components of model inputs for simulation of global radiation





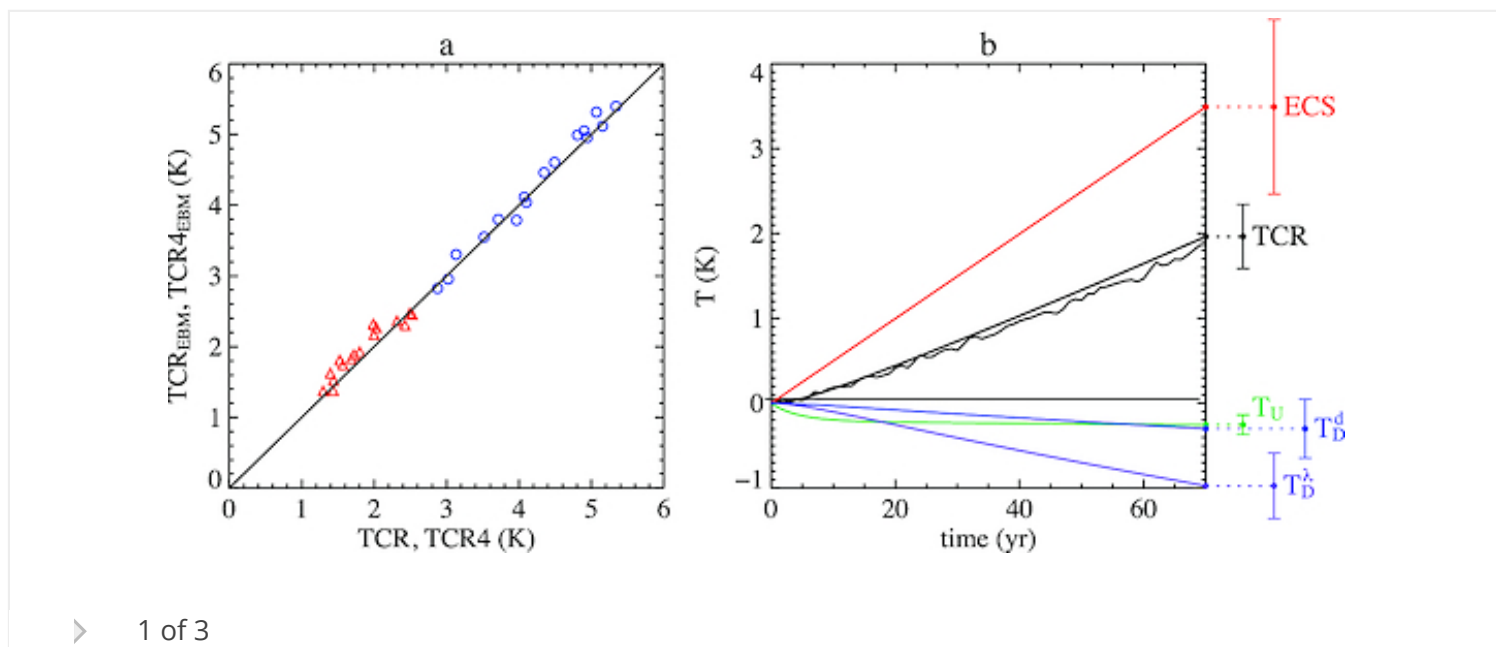
## Quantifying the sources of spread in climate change experiments

O. Geoffroy, D. Saint-Martin, A. Ribes

First Published: 21 December 2012 Vol: 39, L24703 | DOI: 10.1029/2012GL054172

### KEY POINTS

- The total radiative feedback is the main contributor to the inter-model spread
- The adjusted radiative forcing is also an important source of spread of the TCR
- The role of the efficacy of deep-ocean heat uptake is found to be not negligible



## Can the Last Glacial Maximum constrain climate sensitivity?

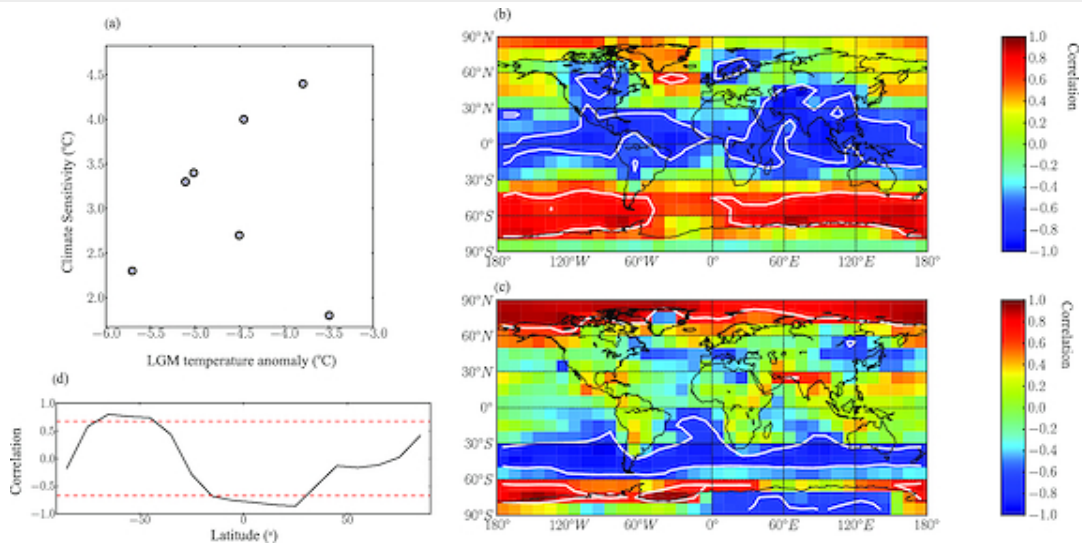
J. C. Hargreaves, J. D. Annan, M. Yoshimori, A. Abe-Ouchi

First Published: 20 December 2012 Vol: 39, L24702 | DOI: 10.1029/2012GL053872

### KEY POINTS

- Climate sensitivity is estimated using data and models from the LGM
- The best estimate is about 2.5C with a high probability of being under 4C
- Consistent results are obtained with Bayesian and Frequentist methods

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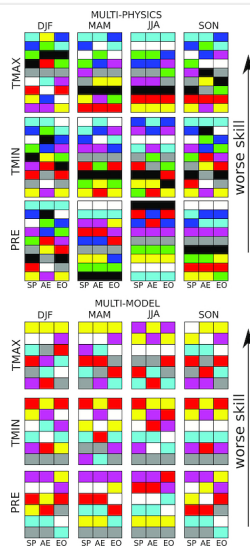
## What is the role of the observational dataset in the evaluation and scoring of climate models?

J. J. Gómez-Navarro, J. P. Montávez, S. Jerez, P. Jiménez-Guerrero, E. Zorita

First Published: 20 December 2012 Vol: 39, L24701 | DOI: 10.1029/2012GL054206

### KEY POINTS

- Observations include important uncertainties
- Weighting model ensembles should consider uncertainty in observations
- New tools have to be developed to address underestimation of uncertainty



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## Hydrology and Land Surface Studies

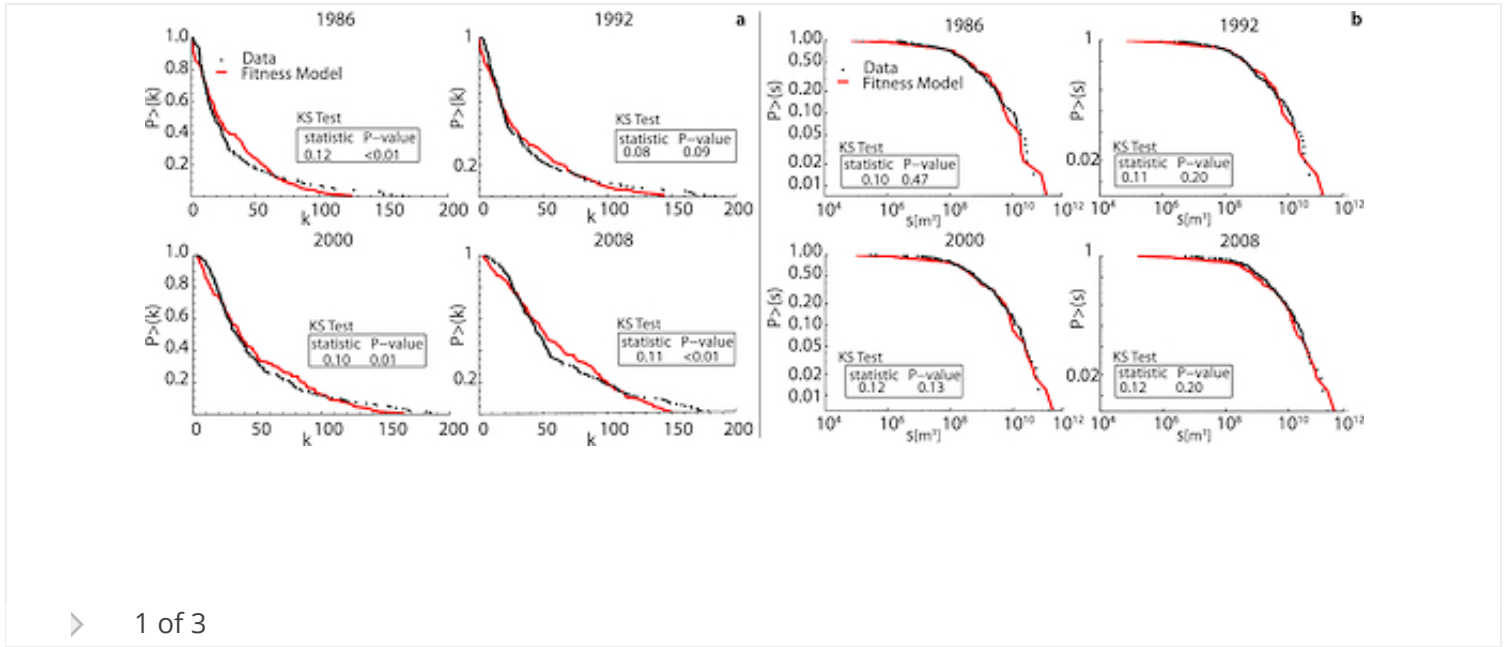
### Modeling past and future structure of the global virtual water trade network

C. Dalin, S. Suweis, M. Konar, N. Hanasaki, I. Rodriguez-Iturbe

First Published: 28 December 2012 Vol: 39, L24402 | DOI: 10.1029/2012GL053871

### KEY POINTS

- Simple national variables reproduce the complete network's structure over time
- Population is used as a new control to reproduce directed virtual water flows
- The heterogeneity of virtual water trade flows is expected to increase by 2030



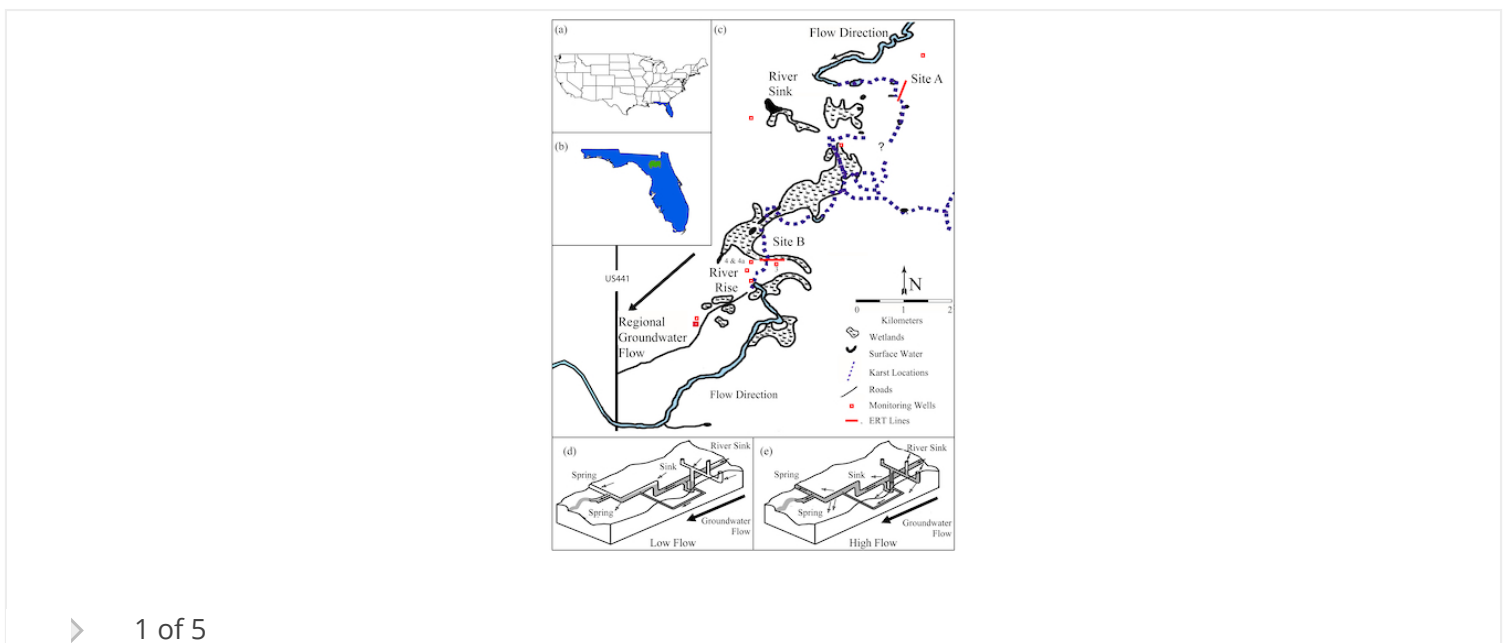
## Visualization of conduit-matrix conductivity differences in a karst aquifer using time-lapse electrical resistivity

Steven B. Meyerhoff, Marios Karaoulis, Florian Fiebig, Reed M. Maxwell, André Revil, Jonathan B. Martin, Wendy D. Graham

First Published: 19 December 2012 Vol: 39, L24401 | DOI: 10.1029/2012GL053933

### KEY POINTS

- Different temporal and spatial karst matrix exchange is visualized
- Visualization of karst conduits and changes in electrical conductivity
- ERT time-lapse visualizes previous hypotheses on karst exchange dynamics



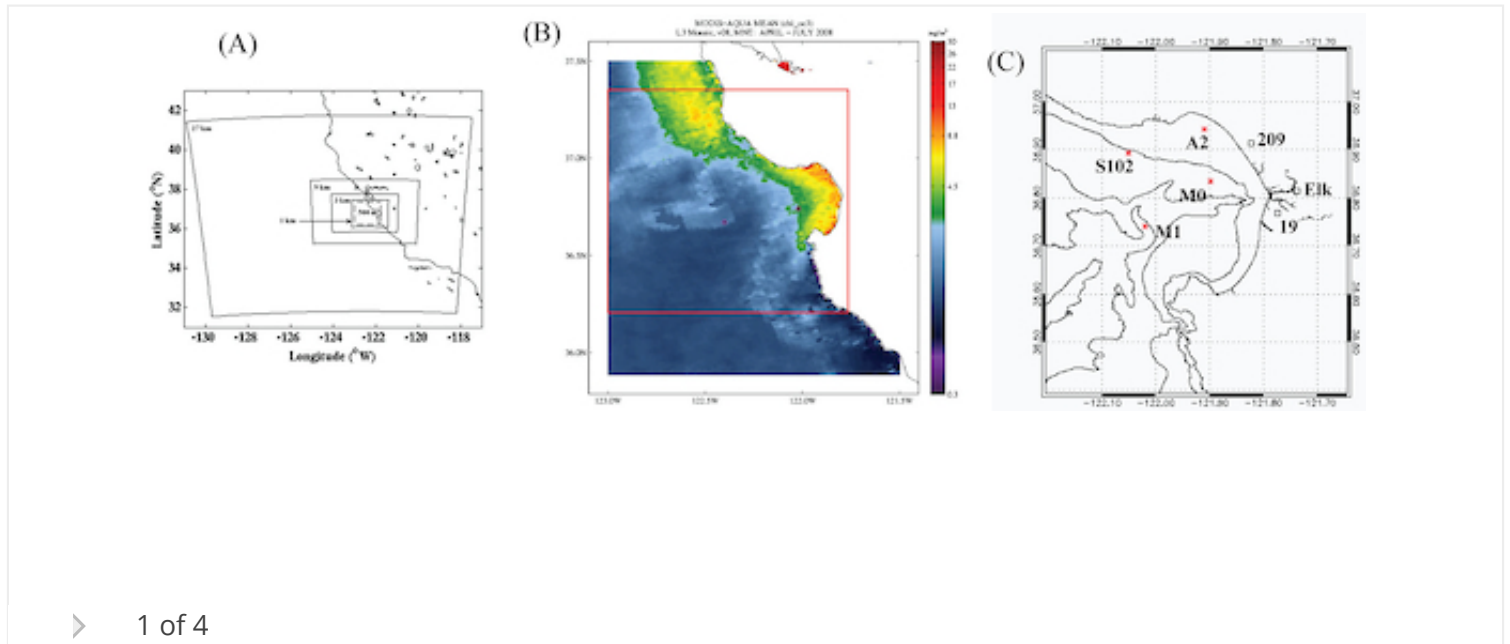
# The impact of coastal phytoplankton blooms on ocean-atmosphere thermal energy exchange: Evidence from a two-way coupled numerical modeling system

Jason K. Jolliff, Travis A. Smith, Charlie N. Barron, Sergio deRada, Stephanie C. Anderson, Richard W. Gould, Robert A. Arnone

First Published: 25 December 2012 Vol: 39, L24607 | DOI: 10.1029/2012GL053634

## KEY POINTS

- Numerical models suggest that phytoplankton modulate air-sea thermal energy exchange
- Phytoplankton blooms may have a discernible warming effect on local air temperatures



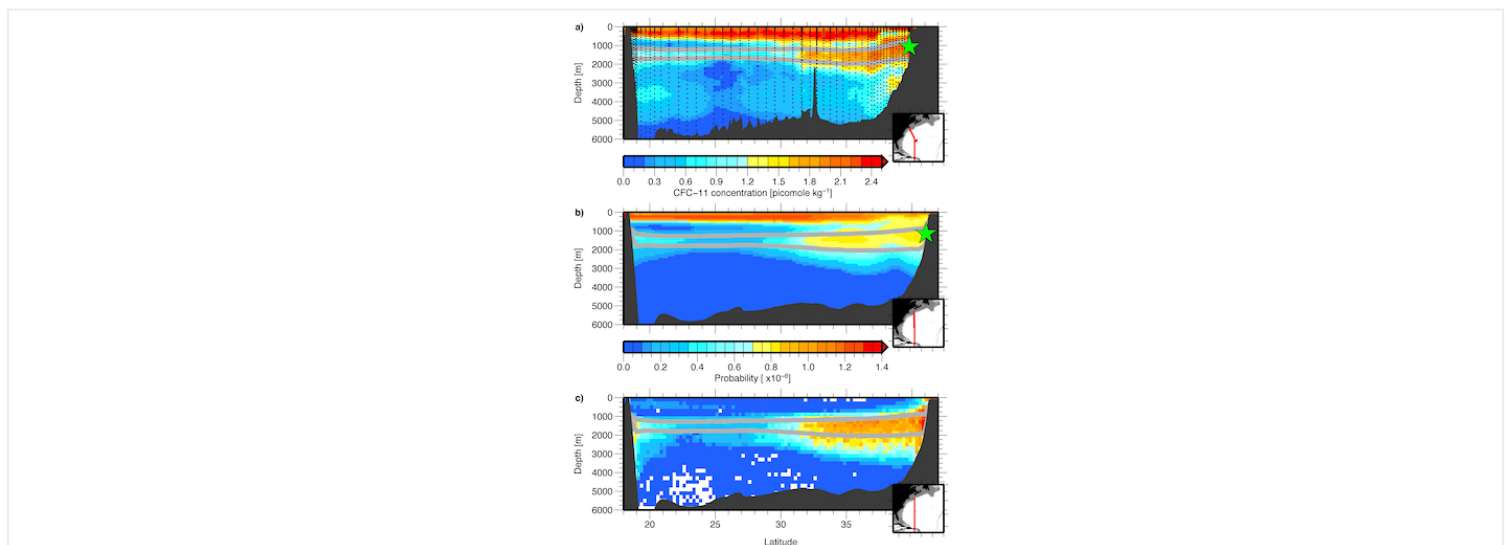
# Reconciling tracer and float observations of the export pathways of Labrador Sea Water

S. F. Gary, M. S. Lozier, A. Biastoch, C. W. Böning

First Published: 22 December 2012 Vol: 39, L24606 | DOI: 10.1029/2012GL053978

## KEY POINTS

- Lagrangian observations of Labrador Sea Water match Eulerian observations
- There is deep equatorward flow in the basin interior
- This interior pathway is significant compared to the pathway along the boundary



## Vorticity generation by short-crested wave breaking

David B. Clark, Steve Elgar, Britt Raubenheimer

First Published: 21 December 2012 Vol: 39, L24604 | DOI: 10.1029/2012GL054034

### KEY POINTS

- Short-crested breaking waves generate vertical vorticity in the surfzone
- Breaking transfers wave motions into lower frequency vortical motions



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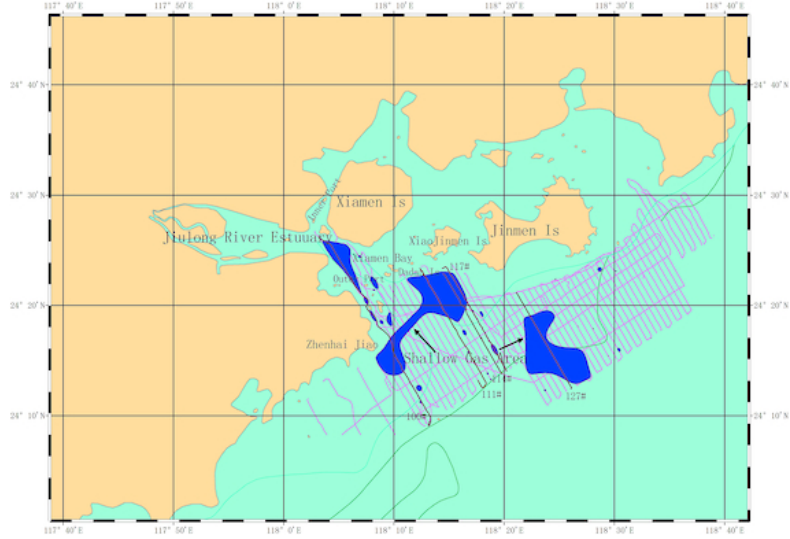
## Shallow gas accumulation in a small estuary and its implications: A case history from in and around Xiamen Bay

Yi Hu, Haidong Li, Jiang Xu

First Published: 21 December 2012 Vol: 39, L24605 | DOI: 10.1029/2012GL054478

### KEY POINTS

- Propose using chemical sampling methods to evaluate methane flux is deficiencies
- Revealed the methane flux in a small estuary in the upper 30 m of the seabed
- Small rivers in methane escape processes play a significant role



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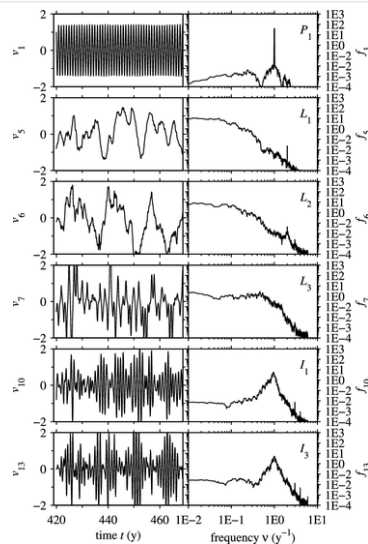
## Limits of predictability in the North Pacific sector of a comprehensive climate model

Dimitrios Giannakis, Andrew J. Majda

First Published: 18 December 2012 Vol: 39, L24602 | DOI: 10.1029/2012GL054273

### KEY POINTS

- Modulated forcing by intermittent modes produces interannual variability
- Triple and quadruple correlations inform structure of regression models
- Data should not be seasonally detrended prior to analysis



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## Assessment of fine-scale parameterizations of turbulent dissipation rates near mixing hotspots in the deep ocean

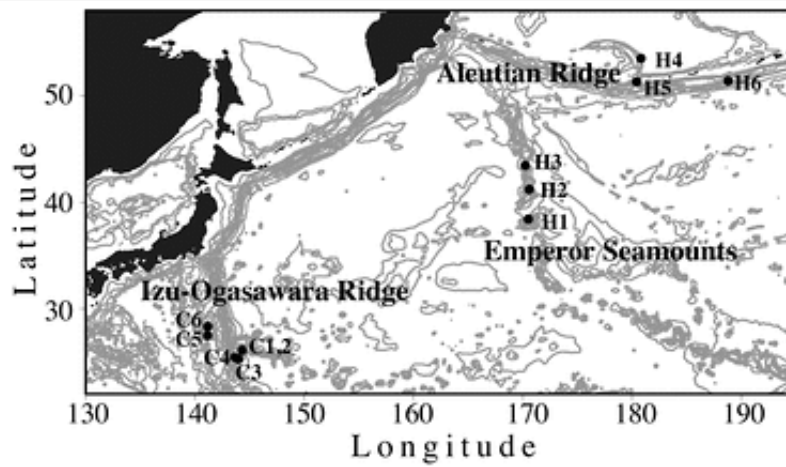
Toshiyuki Hibiya, Naoki Furuichi, Robin Robertson

First Published: 18 December 2012 Vol: 39, L24601 | DOI: 10.1029/2012GL054068

### KEY POINTS

- Internal wave spectra in mixing hotspots are distorted from the universal model

- Shear- or strain-based turbulence predictions are erroneous in mixing hotspots
- Turbulence predictions in mixing hotspots need both values of shear and strain



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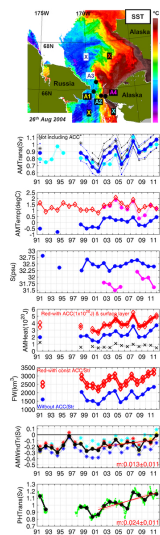
## Observed increases in Bering Strait oceanic fluxes from the Pacific to the Arctic from 2001 to 2011 and their impacts on the Arctic Ocean water column

Rebecca A. Woodgate, Thomas J. Weingartner, Ron Lindsay

First Published: 18 December 2012 Vol: 39, L24603 | DOI: 10.1029/2012GL054092

### KEY POINTS

- Bering Strait volume, heat and freshwater fluxes increase ~50% from 2001-2011
- Most of this is due to a ~30% increase in the Pacific-Arctic pressure-head
- Near constant maximum summer salinities set Arctic cold halocline properties



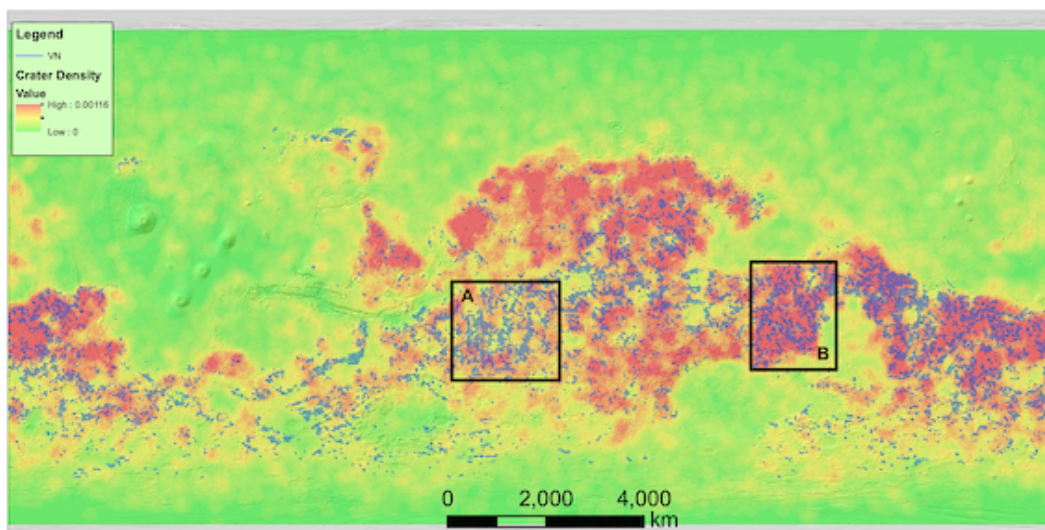
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## Planets

### Orientation of valley networks on Mars: The role of impact cratering

**KEY POINTS**

- Martian valley network orientations do not exactly match topographic aspect
- Impact cratering (plus weak fluvial erosion) is responsible for this mismatch
- Our finding corroborates an arid early climate even with possible rainfall



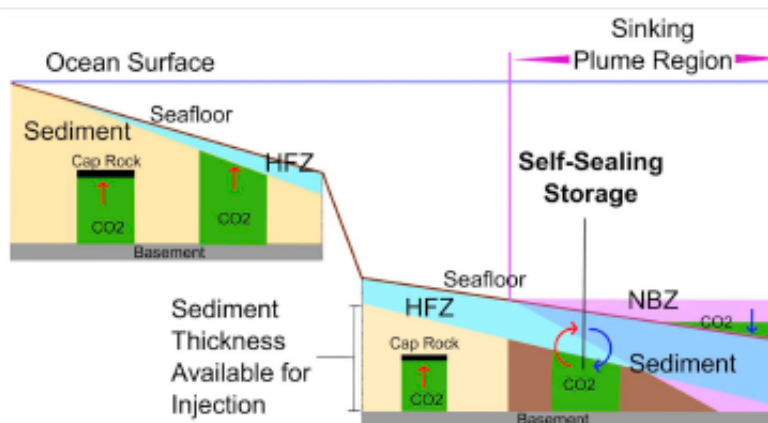
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**Retraction**

**WITHDRAWN: Global CO<sub>2</sub> Storage Potential of Self-Sealing Marine Sedimentary Strata**

Jordan K Eccles, Lincoln Pratson

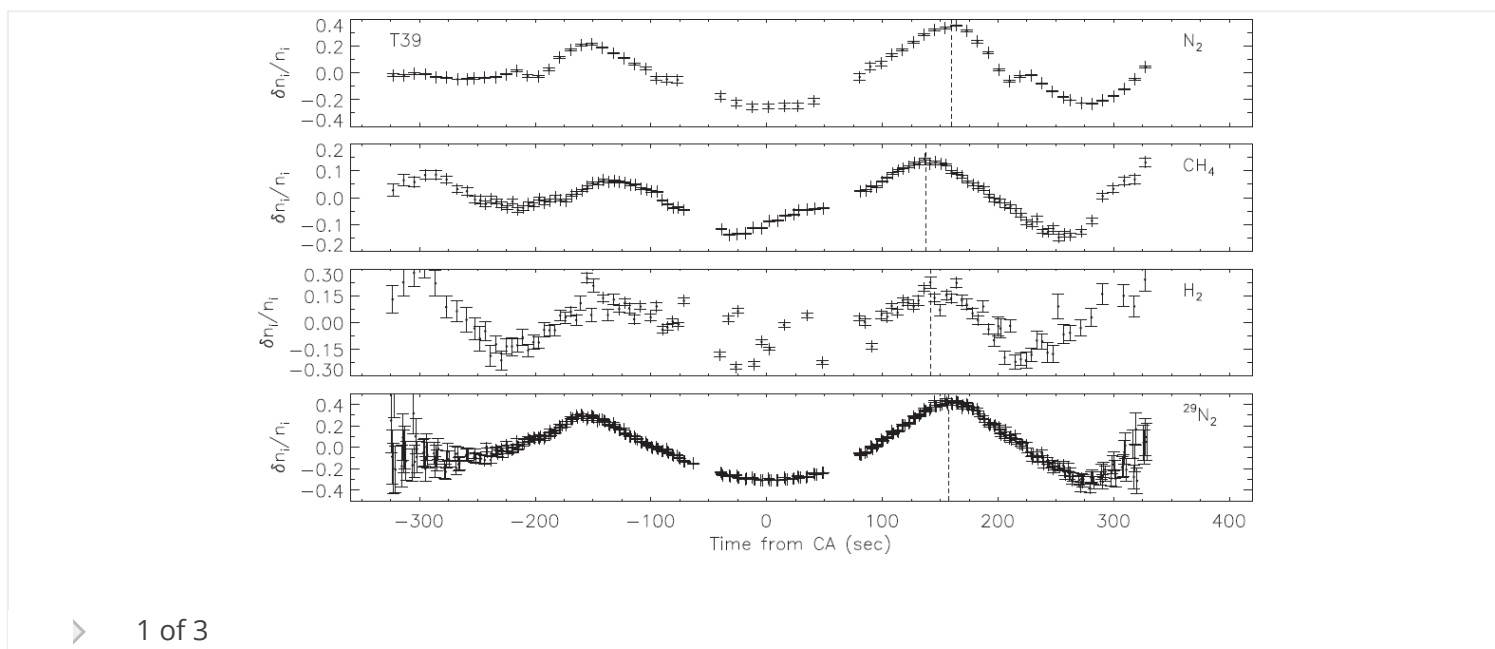
First Published: 20 December 2012 | DOI: 10.1029/2012GL052291



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**WITHDRAWN: Compositional Effects in Titan's Thermospheric Gravity Waves**

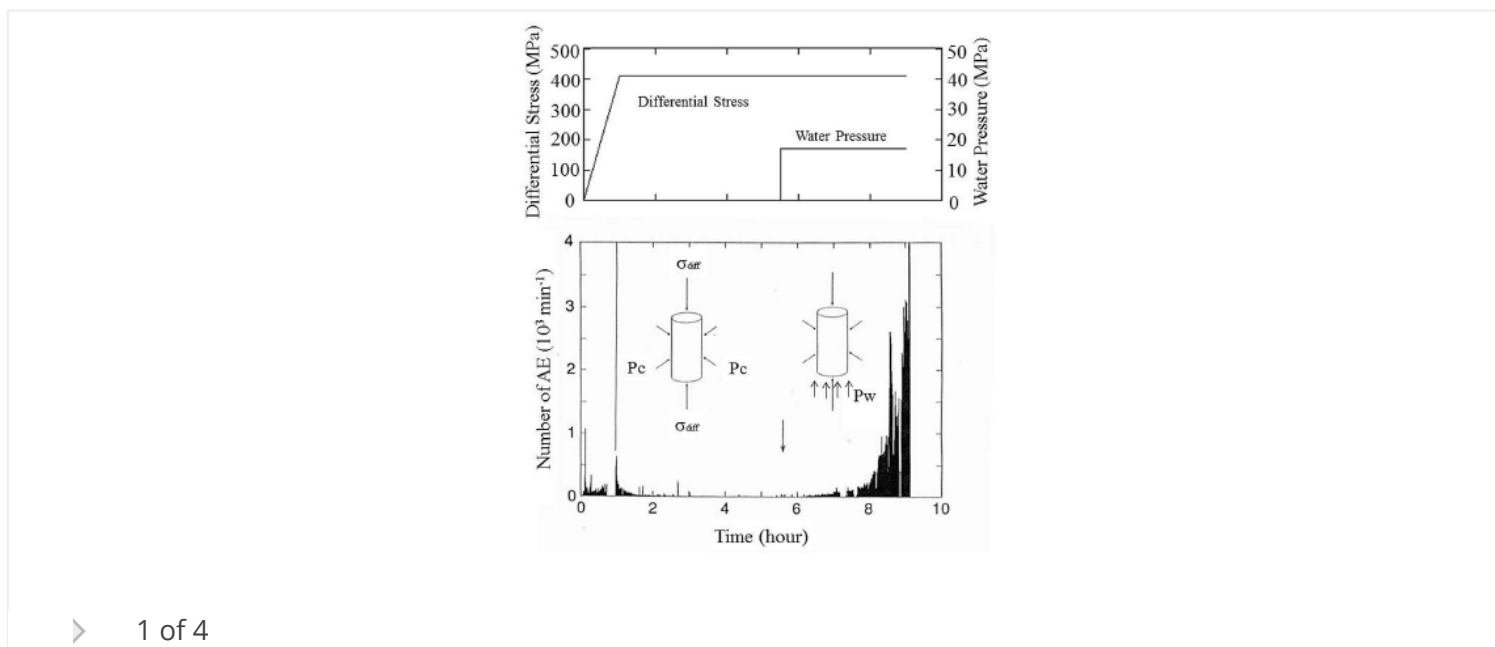




**WITHDRAWN: Source Duration of Stress- and Water-Induced Seismicity as Derived from Experimental Analysis of P Wave Pulse Width in Granite**

Koji Masuda, Takashi Satoh

First Published: 19 December 2012 | DOI: 10.1029/2012GL054025



**Solid Earth**

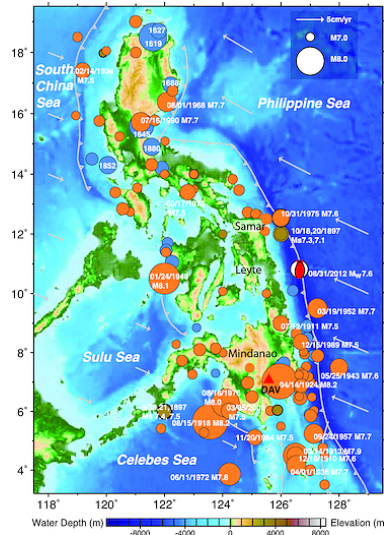
**Intraplate and interplate faulting interactions during the August 31, 2012, Philippine Trench earthquake ( $M_w$  7.6) sequence**

Lingling Ye, Thorne Lay, Hiroo Kanamori

First Published: 28 December 2012 Vol: 39, L24310 | DOI: 10.1029/2012GL054164

### KEY POINTS

- August 31, 2012 Mw 7.6 earthquake is in the subducting plate
- The event may indicate strong plate boundary coupling
- Distinct intraplate and interplate fault systems had aftershocks



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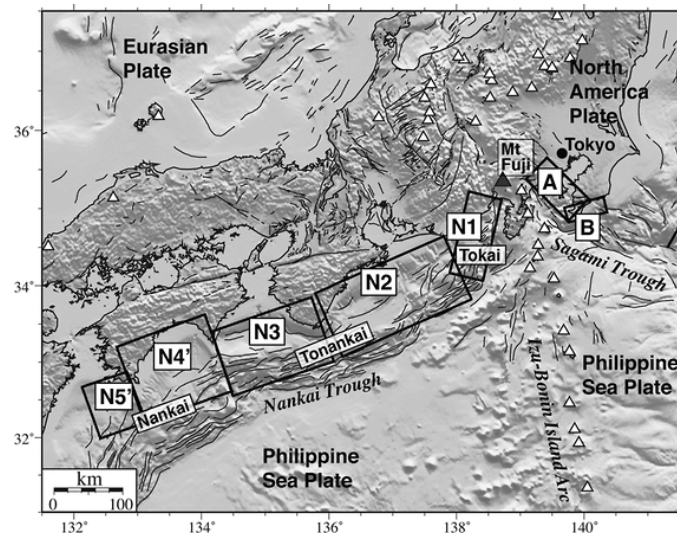
## The 1707 $M_w$ 8.7 Hiei earthquake triggered the largest historical eruption of Mt. Fuji

Christine Chesley, Peter C. LaFemina, Christine Puskas, Daisuke Kobayashi

First Published: 22 December 2012 Vol: 39, L24309 | DOI: 10.1029/2012GL053868

### KEY POINTS

- The 1707 M8.7 Hiei earthquake triggered Mt. Fuji's most explosive eruption
- The 1703 M8.3 Genroku earthquake did not trigger Mt. Fuji's 1707 eruption
- The 2011 Tohoku-Oki earthquake unclamped the Mt. Fuji magmatic system



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#### KEY POINTS

- We measure ground deformation at a geyser in Calistoga, CA
- Pressure changes exponentially in time leading up to an eruption
- The ground deformation can be explained by a poroelastic or elastic model



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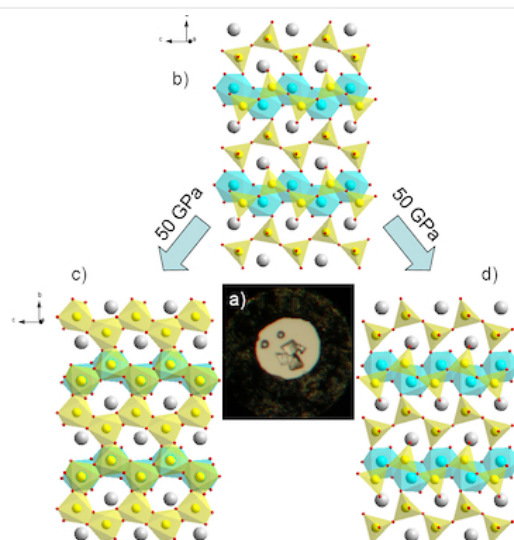
### $\beta$ -diopside, a new ultrahigh-pressure polymorph of $\text{CaMgSi}_2\text{O}_6$ with six-coordinated silicon

Anna M. Plonka, Przemyslaw Dera, Peyton Irmen, Mark L. Rivers, Lars Ehm, John B. Parise

First Published: 21 December 2012 Vol: 39, L24307 | DOI: 10.1029/2012GL054023

#### KEY POINTS

- Above 50 GPa diopside transforms to a phase with half of Si sites 6-coordinated
- Reversible transformation shown in situ
- Transformation most probably applicable to all clinopyroxenes



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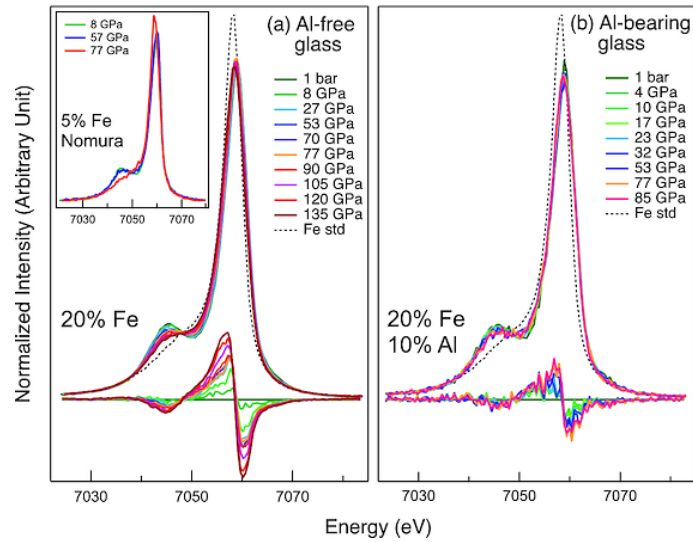
## Electronic structure of iron in magnesium silicate glasses at high pressure

Chen Gu, Krystle Catalli, Brent Grocholski, Lili Gao, Ercan Alp, Paul Chow, Yuming Xiao, Hyunchoe Cynn, William J. Evans, Sang-Heon Shim

First Published: 20 December 2012 Vol: 39, L24304 | DOI: 10.1029/2012GL053950

### KEY POINTS

- Iron in disordered silicate systems undergoes a gradual spin transition
- Iron never reaches a low spin state at mantle pressures in disordered systems
- Iron may not induce a sharp change in the properties of mantle melts



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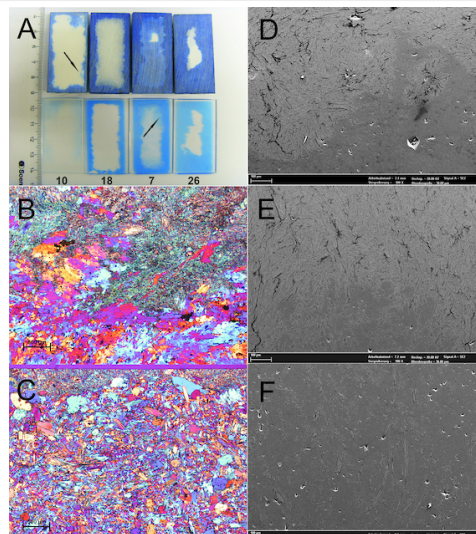
## Evolution of microstructure and elastic wave velocities in dehydrated gypsum samples

Harald Milsch, Mike Priegnitz

First Published: 20 December 2012 Vol: 39, L24305 | DOI: 10.1029/2012GL053674

### KEY POINTS

- P and S-wave velocities unequivocally and linearly relate to porosity
- Dehydration progresses via a sharp reaction front
- An empirical model including a critical porosity term replicates the data



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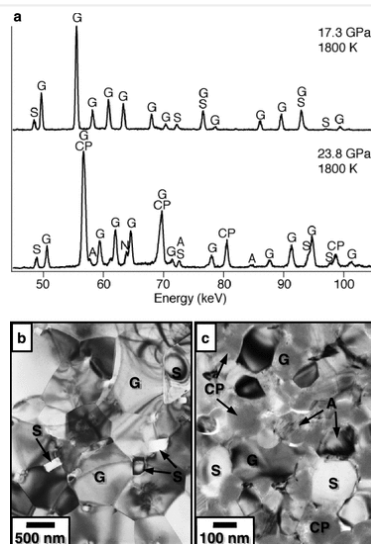
## Sound velocities of MORB and absence of a basaltic layer in the mantle transition region

Yoshio Kono, Tetsuo Irifune, Hiroaki Ohfuji, Yuji Higo, Ken-ichi Funakoshi

First Published: 20 December 2012 Vol: 39, L24306 | DOI: 10.1029/2012GL054009

### KEY POINTS

- Sound velocities of MORB were measured at the PT of the mantle transition region
- Sound velocities of MORB were lower than those of seismological models
- Existence of a basaltic layer in the mantle transition region is unlikely



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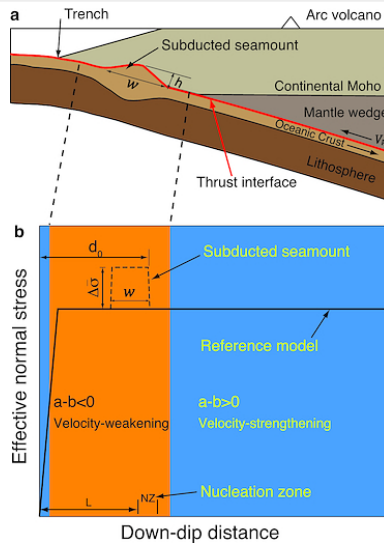
## Effects of subducted seamounts on megathrust earthquake nucleation and rupture propagation

Hongfeng Yang, Yajing Liu, Jian Lin

First Published: 19 December 2012 Vol: 39, L24302 | DOI: 10.1029/2012GL053892

### KEY POINTS

- A seamount can be a barrier
- Seamount-trench distance is a key parameter
- The barrier can turn into asperity



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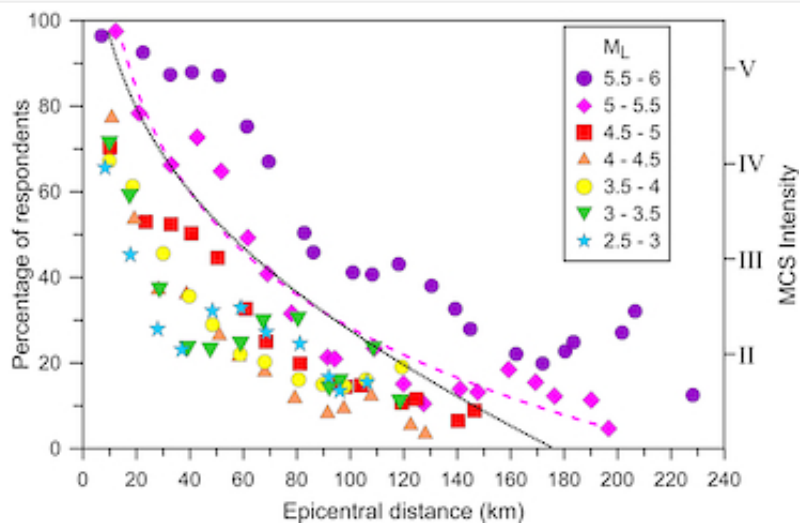
## Earthquake sound perception

Patrizia Tosi, Paola Sbarra, Valerio De Rubeis

First Published: 19 December 2012 Vol: 39, L24301 | DOI: 10.1029/2012GL054382

### KEY POINTS

- A large amount of experimental data is analyzed
- Earthquake sound attenuation is characterized
- Relationship between sound audibility and macroseismic intensity



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## Character of the Caribbean-Gônave-North America plate boundaries in the upper mantle based on shear-wave splitting

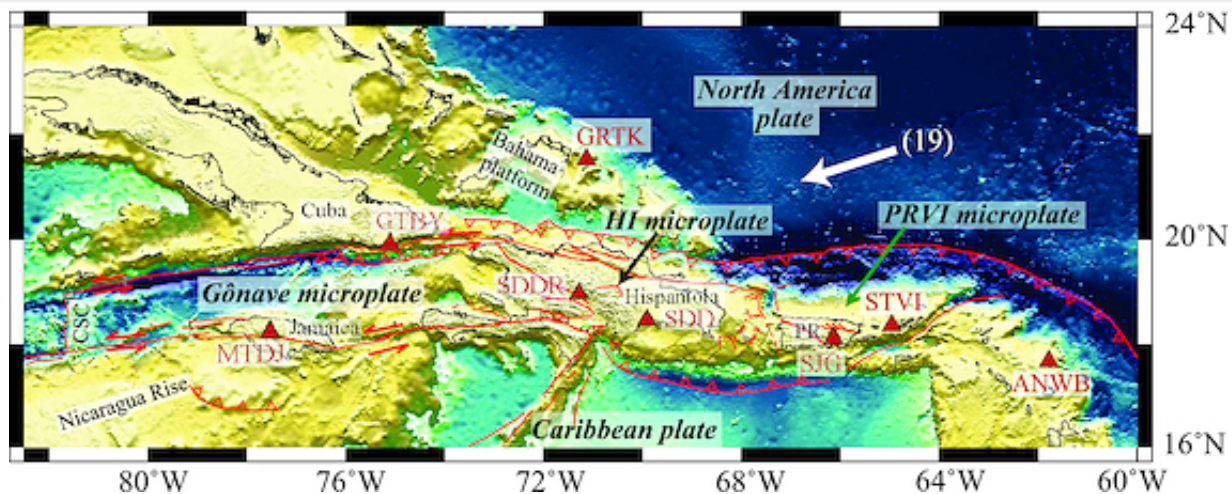
B. Benford, B. Tikoff, C. DeMets

First Published: 19 December 2012 Vol: 39, L24303 | DOI: 10.1029/2012GL053766

### KEY POINTS

- Upper mantle anisotropy occurs at northern Caribbean plate boundary

- Microplate boundaries extend into the upper mantle
- Anisotropy is trench parallel beneath the northern Lesser Antilles trench



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## Space Sciences

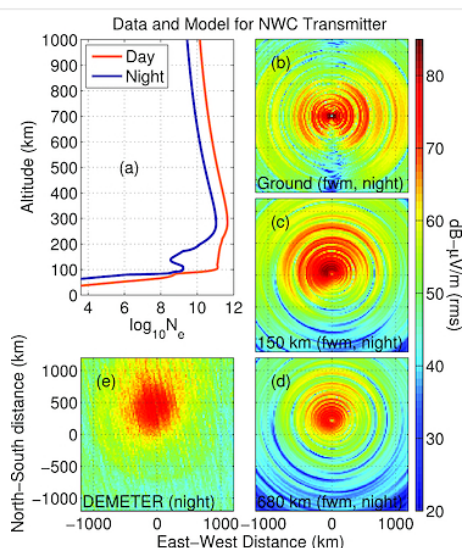
### Models of ionospheric VLF absorption of powerful ground based transmitters

M. B. Cohen, N. G. Lehtinen, U. S. Inan

First Published: 29 December 2012 Vol: 39, L24101 | DOI: 10.1029/2012GL054437

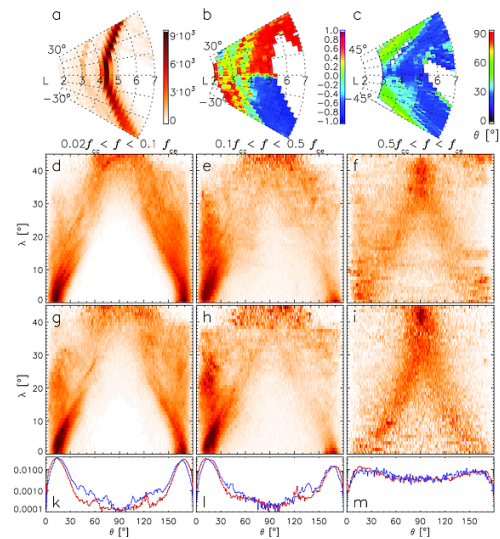
#### KEY POINTS

- Models of VLF transmitter ionospheric absorption reproduce observed features
- Total power calculated matches observations within a few dB at all power levels
- Theory-data comparison is robust against latitude and uncertainty in ionosphere



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## The Cryosphere

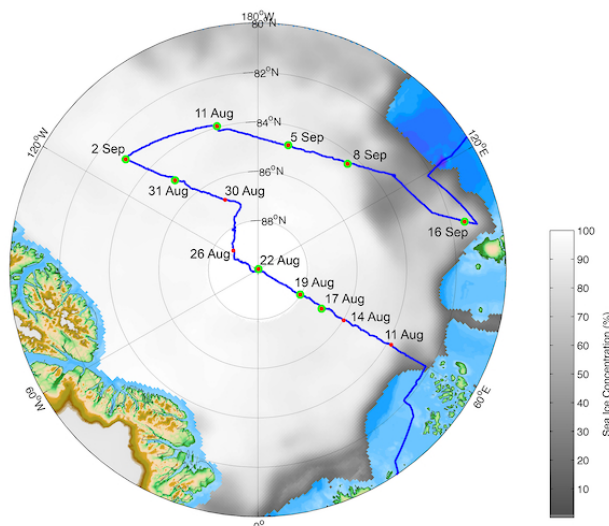
### Changes in Arctic sea ice result in increasing light transmittance and absorption

M. Nicolaus, C. Katlein, J. Maslanik, S. Hendricks

First Published: 29 December 2012 Vol: 39, L24501 | DOI: 10.1029/2012GL053738

#### KEY POINTS

- Light penetration into the ocean will increase in a changing Arctic
- Transmittance through first-year ice is 3x larger than through multi-year ice
- Energy absorption is 50% larger in first-year ice than in multi-year ice



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