



Volume 38, Issue 23

December 2011

Brief Detailed

Atmospheric Science

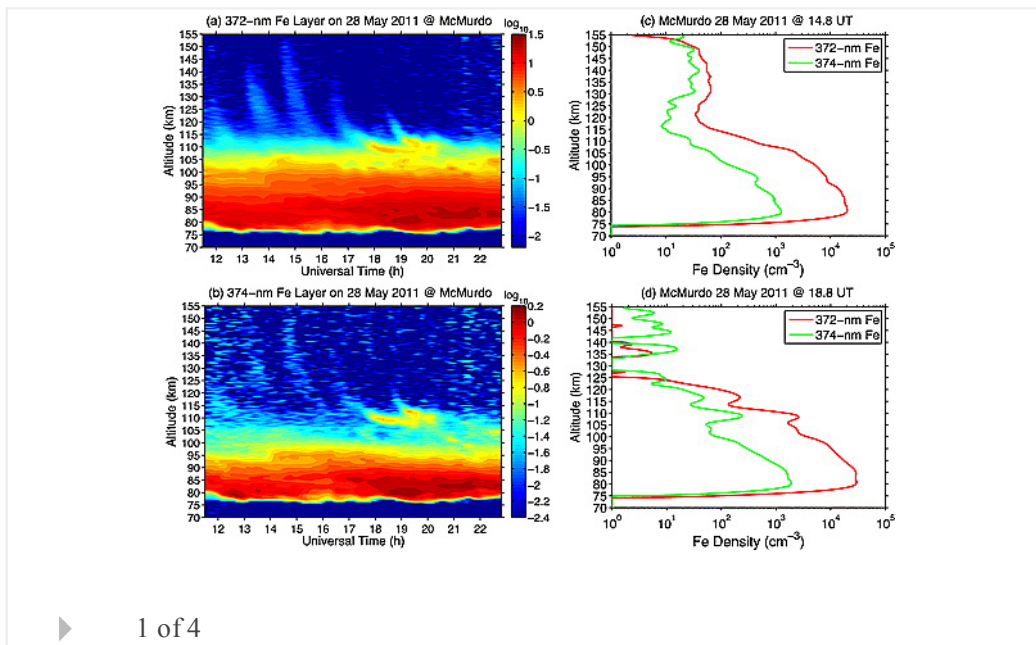
Lidar observations of neutral Fe layers and fast gravity waves in the thermosphere (110–155 km) at McMurdo (77.8°S, 166.7°E), Antarctica

Xinzhao Chu, Zhibin Yu, Chester S. Gardner, Cao Chen, Weichun Fong

First Published: 15 December 2011 Vol: 38, L23807 | DOI: 10.1029/2011GL050016

KEY POINTS

- First report of thermospheric neutral Fe layers with gravity waves up to 155 km
- Elevated thermosphere temperatures related to Joule heating enhanced by aurora
- Neutralization of converged Fe⁺ descending with gravity wave phase progression



▶ 1 of 4

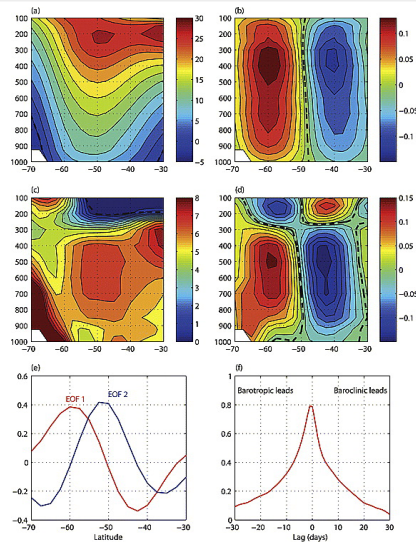
The driving of baroclinic anomalies at different timescales

Javier Blanco-Fuentes, Pablo Zurita-Gotor

First Published: 13 December 2011 Vol: 38, L23805 | DOI: 10.1029/2011GL049785

KEY POINTS

- The leading mode of baroclinicity variability represents a meridional shift
- Baroclinic variability is driven by the eddy momentum fluxes at low frequency
- The eddy heat flux may drive or damp the variability depending on frequency



► 1 of 3

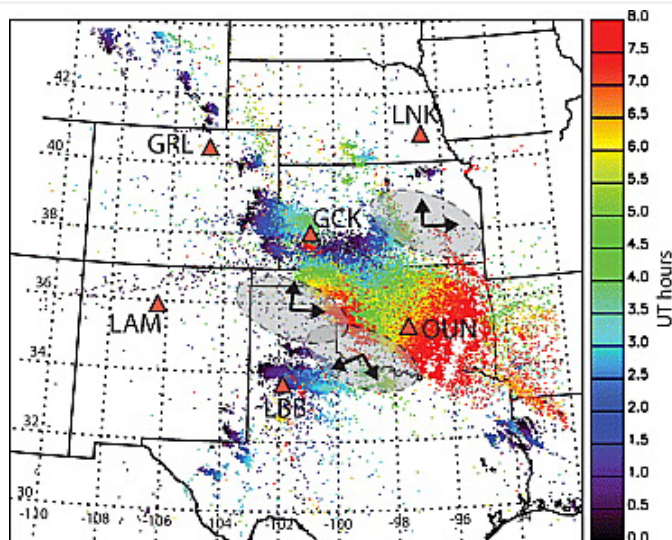
Multi-station probing of thunderstorm-generated D-layer fluctuations by using time-domain lightning waveforms

E. H. Lay, X.-M. Shao

First Published: 13 December 2011 Vol: 38, L23806 | DOI: 10.1029/2011GL049790

KEY POINTS

- D-layer disturbances are detected propagating outward from thunderstorm region
- A new VLF probing technique is used with high temporal and spatial-resolution
- Background atmospheric gravity waves cause large scale disturbances in D-layer



► 1 of 4

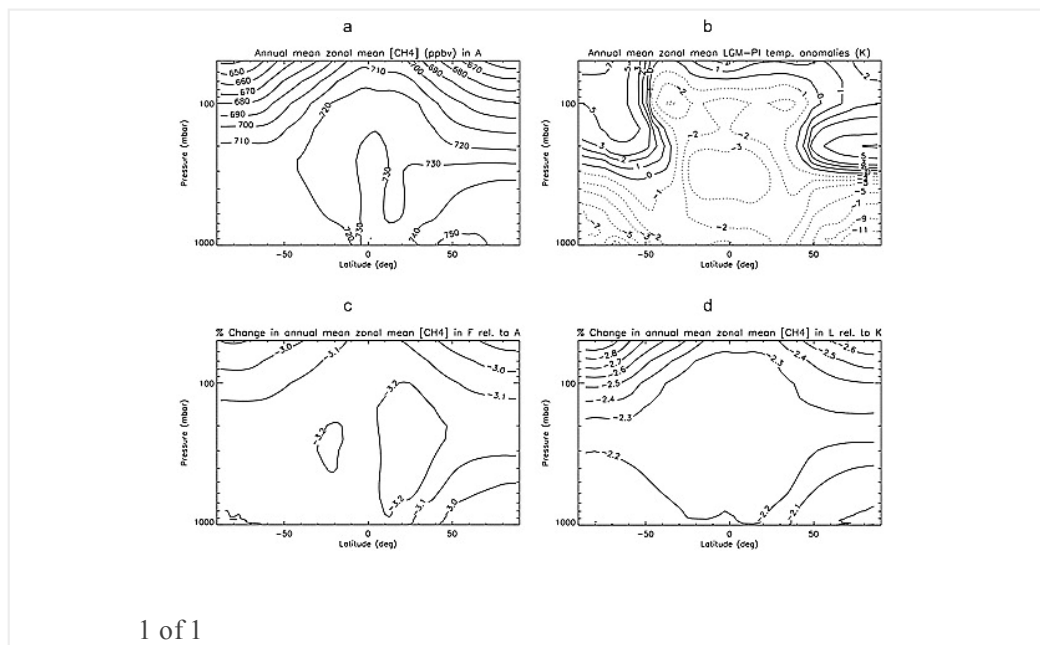
Reconciling the changes in atmospheric methane sources and sinks between the Last Glacial Maximum and the pre-industrial era

J. G. Levine, E. W. Wolff, A. E. Jones, L. C. Sime, P. J. Valdes, A. T. Archibald, G. D. Carver, N. J. Warwick, J. A. Pyle

First Published: 8 December 2011 Vol: 38, L23804 | DOI: 10.1029/2011GL049545

KEY POINTS

- Subject to uncertainties, the LGM-PI change in oxidizing capacity was negligible
- This implies the LGM-PI change in [CH₄] was almost entirely source-driven
- This finding is consistent with recent estimates of LGM-PI CH₄ source changes



1 of 1

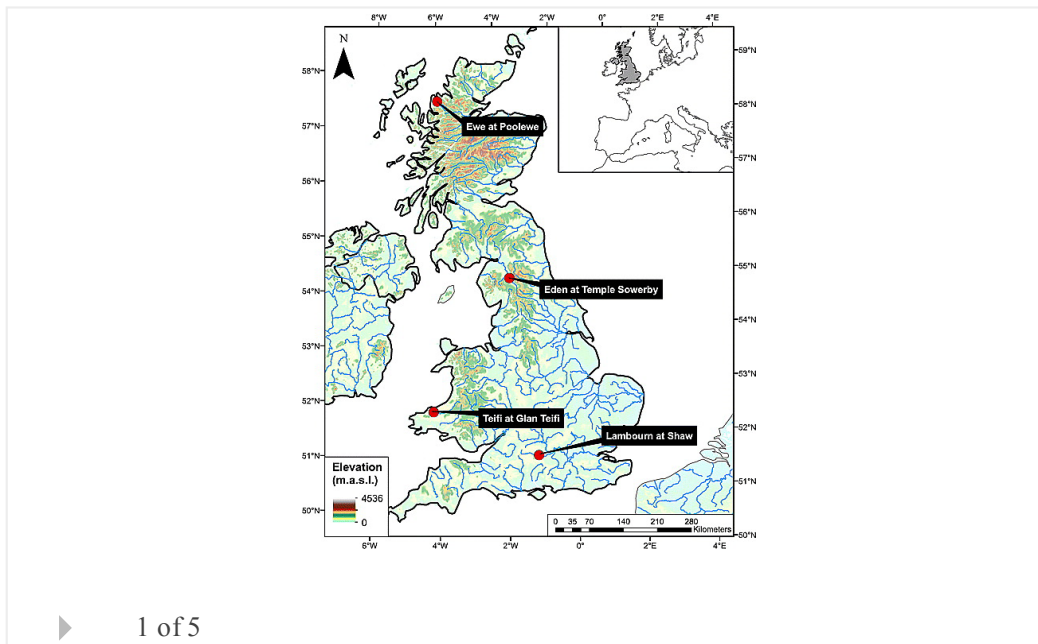
Winter floods in Britain are connected to atmospheric rivers

David A. Lavers, Richard P. Allan, Eric F. Wood, Gabriele Villarini, David J. Brayshaw, Andrew J. Wade

First Published: 6 December 2011 Vol: 38, L23803 | DOI: 10.1029/2011GL049783

KEY POINTS

- Linked a damaging UK flooding event with AR occurrence
- Linked persistent ARs with the top 10 floods in a range of UK basins
- Shown the atmospheric circulation that leads to AR occurrence in western Europe



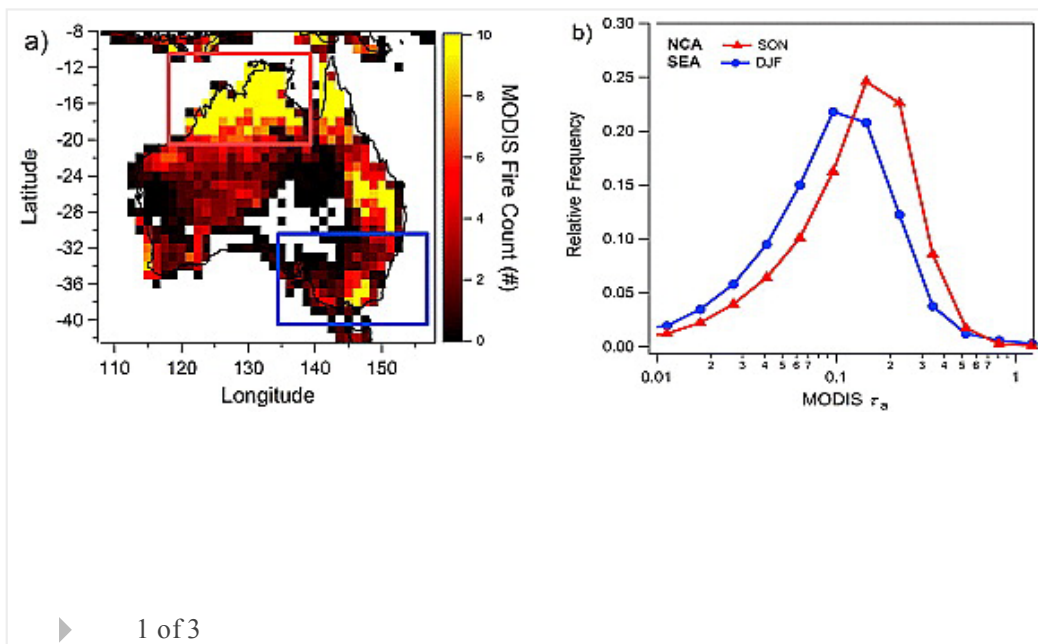
Relationship between aerosol and cloud fraction over Australia

Jennifer D. Small, Jonathan H. Jiang, Hui Su, Chengxing Zhai

First Published: 2 December 2011 Vol: 38, L23802 | DOI: 10.1029/2011GL049404

KEY POINTS

- Cloud fraction can increase and decrease in the presence of aerosols
- A simple empirical model approximates the observed relationships
- Dynamics need to be considered to predict response of cloud fraction to aerosol



Observed and modelled record ozone decline over the Arctic during winter/spring 2011

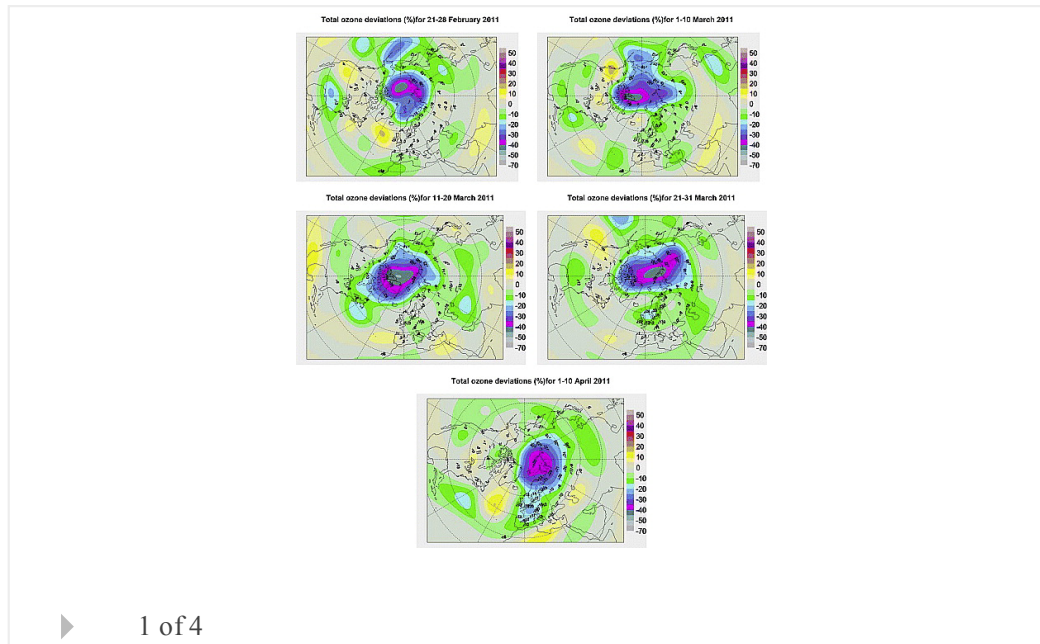
D. Balis, I. S. A. Isaksen, C. Zerefos, I. Zyrichidou, K. Eleftheratos, K. Tourpali, R.

Bojkov, B. Rognerud, F. Stordal, O. A. Søvde, et al

First Published: 1 December 2011 Vol: 38, L23801 | DOI: 10.1029/2011GL049259

KEY POINTS

- Record low ozone decline over the Arctic
- Good agreement between model and observations
- High correlation between stratospheric temperatures and total ozone



Climate

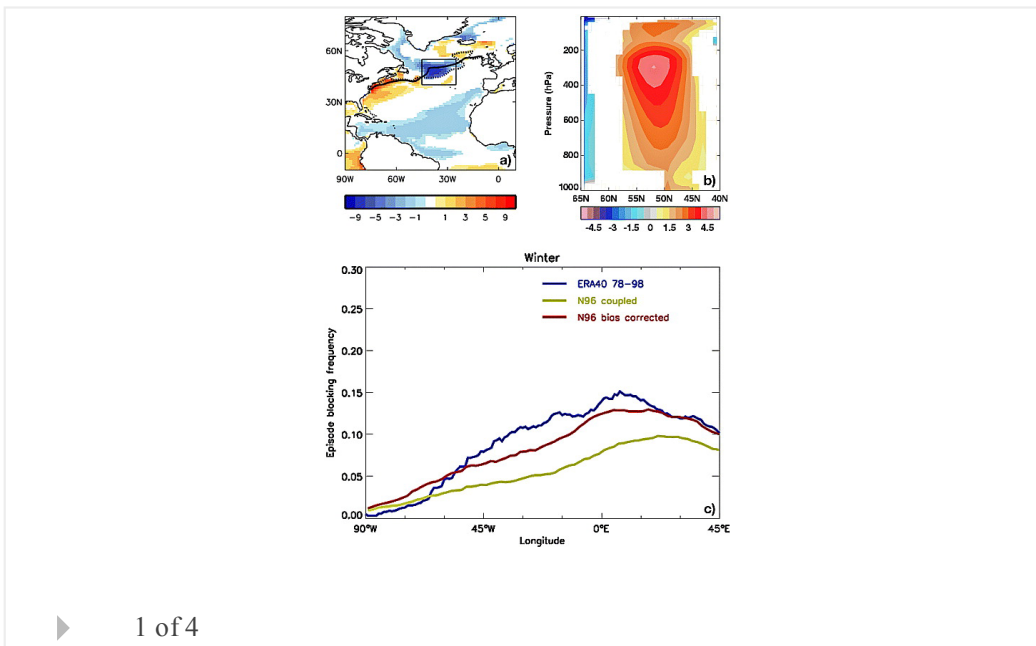
Improved Atlantic winter blocking in a climate model

Adam A. Scaife, Dan Copsey, Chris Gordon, Chris Harris, Tim Hinton, Sarah Keeley, Alan O'Neill, Malcolm Roberts, Keith Williams

First Published: 15 December 2011 Vol: 38, L23703 | DOI: 10.1029/2011GL049573

KEY POINTS

- Atlantic blocking deficit is caused by Atlantic SST error
- Atlantic SST errors are corrected in our improved model
- Atlantic blocking is much improved



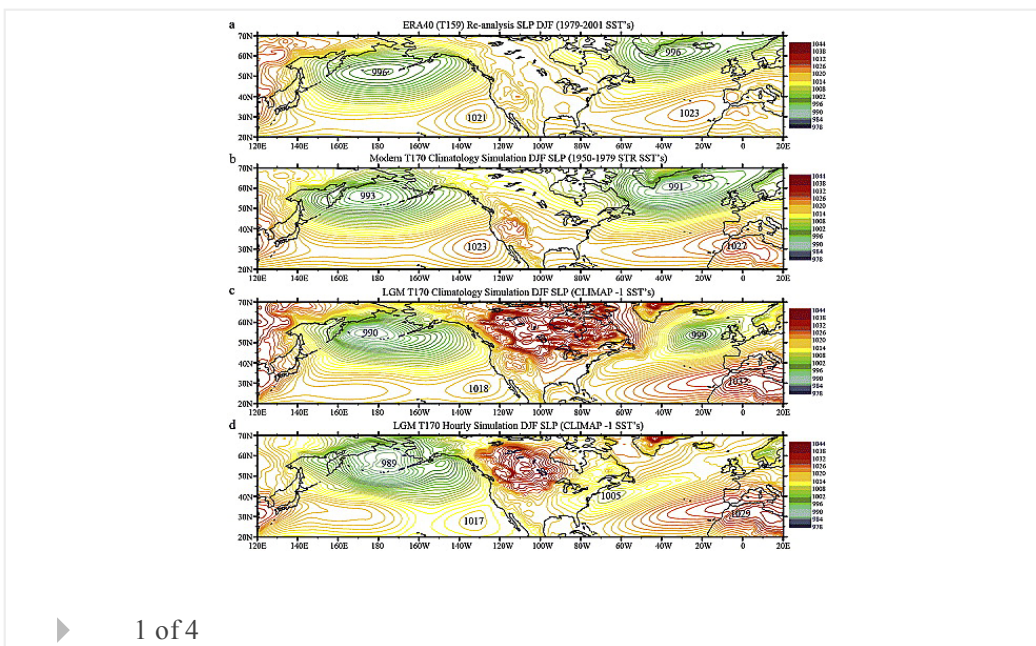
Paleometeorology: High resolution Northern Hemisphere wintertime mid-latitude dynamics during the Last Glacial Maximum

M. B. Unterman, T. J. Crowley, K. I. Hodges, S.-J. Kim, D. J. Erickson

First Published: 14 December 2011 Vol: 38, L23702 | DOI: 10.1029/2011GL049599

KEY POINTS

- A reduction in N. Atlantic and increase in N. Pacific LGM cyclogenesis
- Increased hourly wind velocities over dust source areas during the LGM
- LGM N. Pacific storms create conditions appropriate for early warming signals

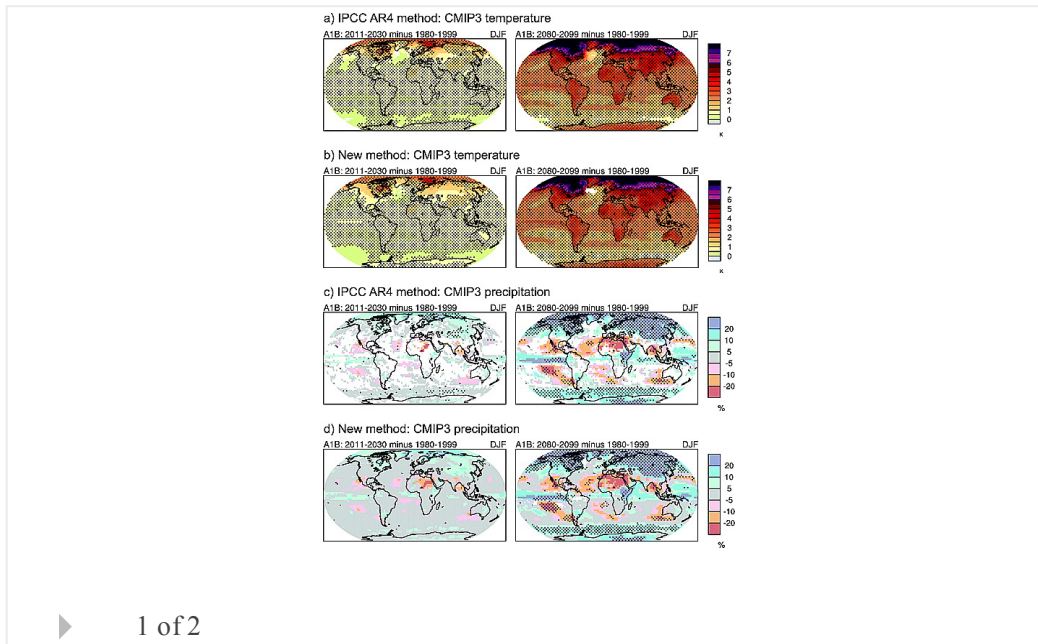


Mapping model agreement on future climate projections

Claudia Tebaldi, Julie M. Arblaster, Reto Knutti

KEY POINTS

- Analyze significance of the change first, then worry about model consensus
- Regions where model disagree are often simply regions of low signal-to-noise
- Impact and physical researchers need to be aware of the difference



Hydrology and Land Surface Studies

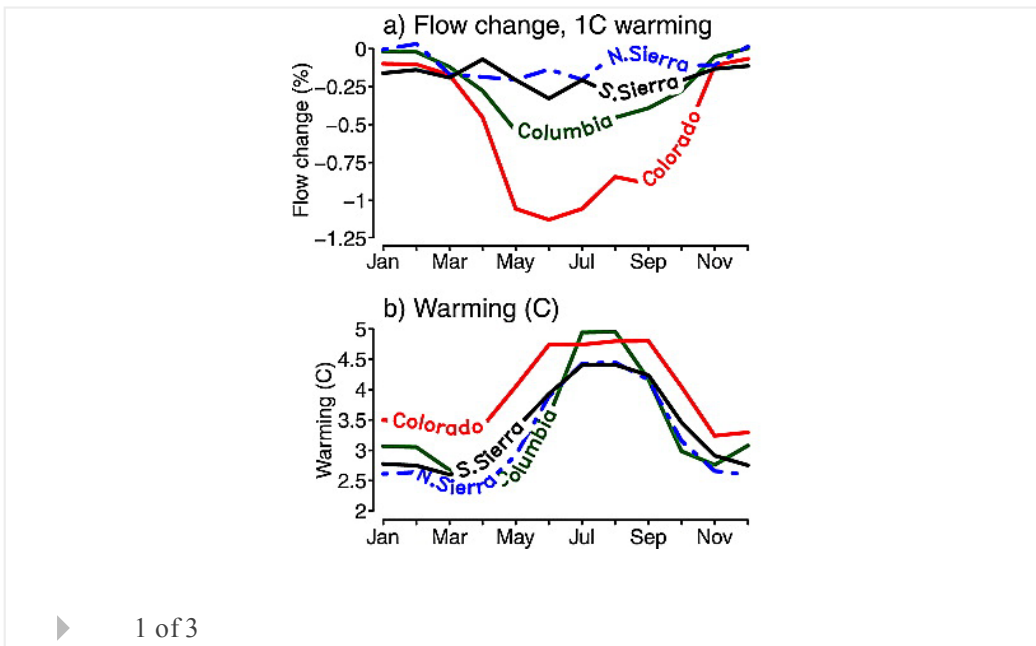
The importance of warm season warming to western U.S. streamflow changes

Tapash Das, David W. Pierce, Daniel R. Cayan, Julie A. Vano, Dennis P. Lettenmaier

First Published: 15 December 2011 Vol: 38, L23403 | DOI: 10.1029/2011GL049660

KEY POINTS

- Climate warming reduces streamflow in all four major watersheds in western US
- Warm season warming streamflow reduction often exceeds that from cool season
- Response varies amongst watersheds with Colorado experiencing greatest reduction



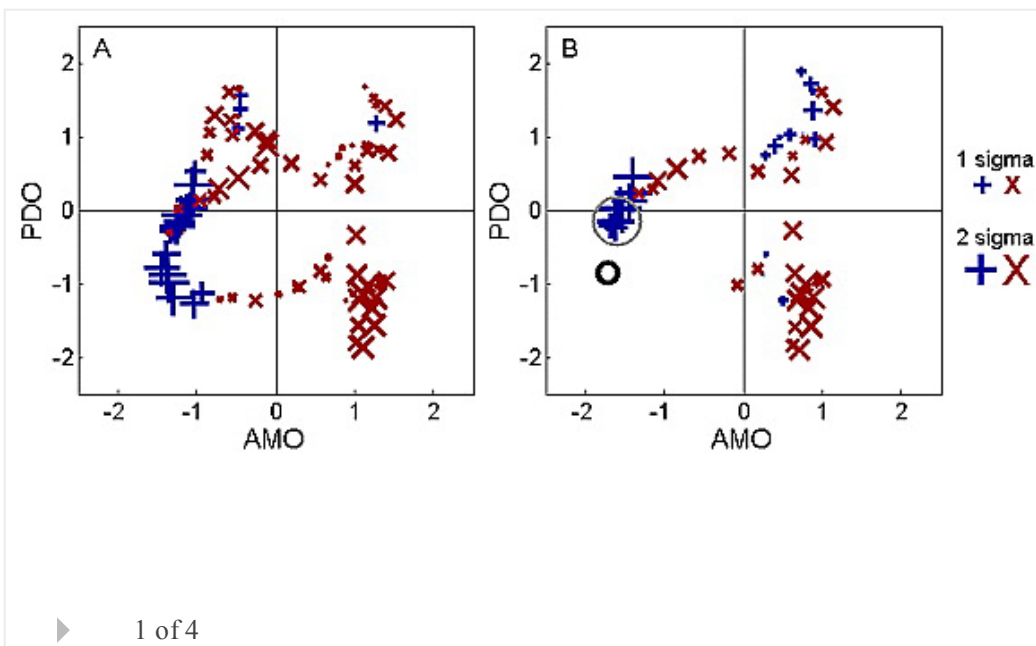
Decadal prediction of Colorado River streamflow anomalies using ocean-atmosphere teleconnections

Matthew B. Switanek, Peter A. Troch

First Published: 15 December 2011 Vol: 38, L23404 | DOI: 10.1029/2011GL049644

KEY POINTS

- AMO and PDO indices can skillfully predict decadal Colorado streamflow
- Skill in predicting decadal streamflow does not hold up using reconstructions
- Dominant frequencies in observed records are not persistent in reconstructions



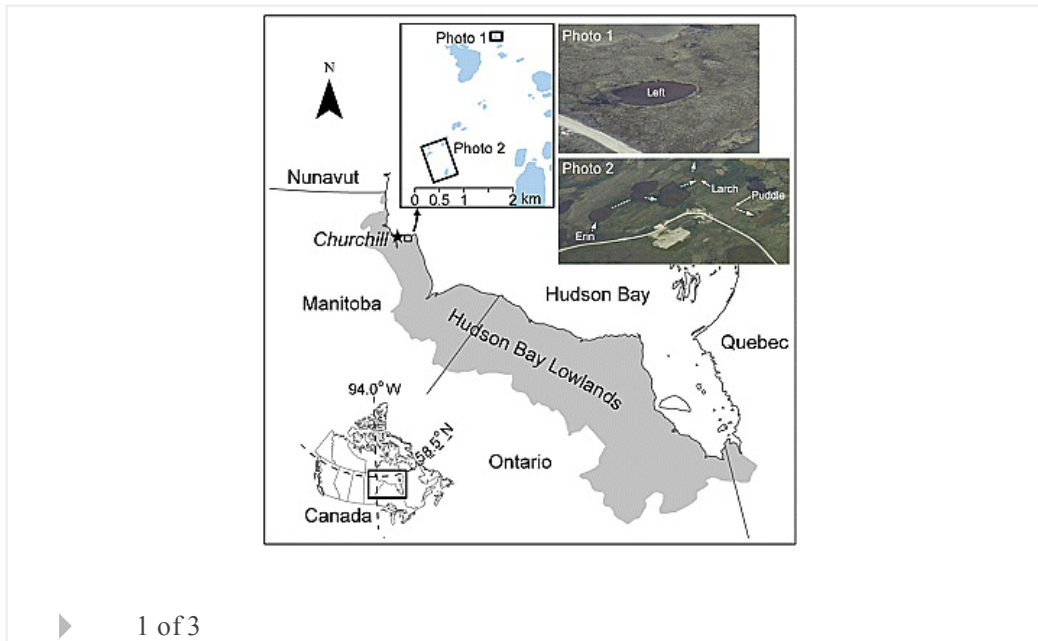
Divergent hydrological responses to 20th century climate change in shallow tundra ponds, western Hudson Bay Lowlands

Brent B. Wolfe, Erin M. Light, Merrin L. Macrae, Roland I. Hall, Kaleigh Eichel, Scott Jasechko, Jerry White, LeeAnn Fishback, Thomas W. D. Edwards

First Published: 14 December 2011 Vol: 38, L23402 | DOI: 10.1029/2011GL049766

KEY POINTS

- The western HBL has become increasingly dynamic during the 20th century
- Widely differing hydrological responses to recent warming has occurred
- Interaction of climate and hydrological connectivity determines water balance



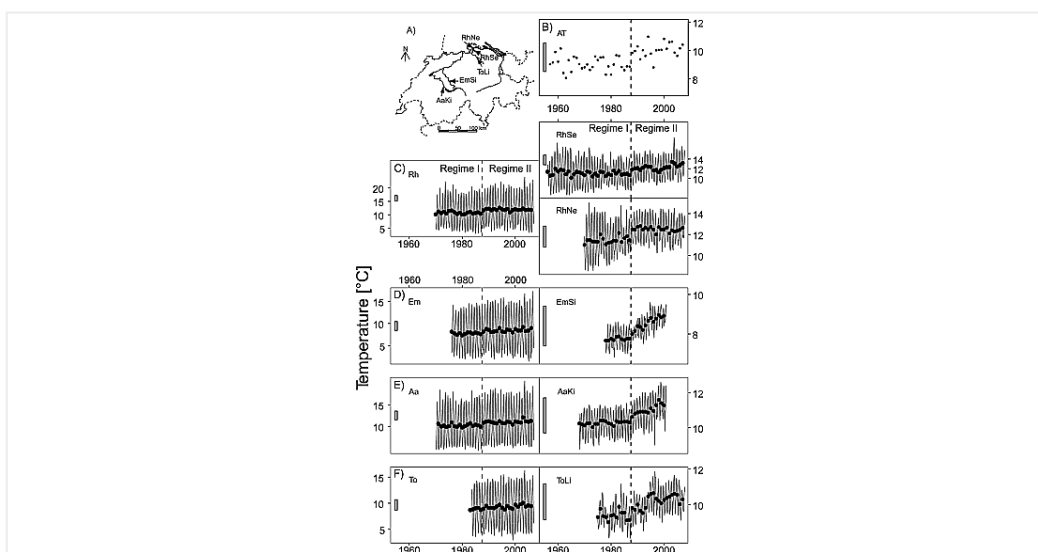
Regime shift in groundwater temperature triggered by the Arctic Oscillation

Simon Figura, David M. Livingstone, Eduard Hoehn, Rolf Kipfer

First Published: 9 December 2011 Vol: 38, L23401 | DOI: 10.1029/2011GL049749

KEY POINTS

- Large-scale atmospheric phenomenon reflected in groundwater temperature
- The article provides unique long-term groundwater temperature data
- Aquifers recharged by rivers will strongly respond to climate change



Oceans

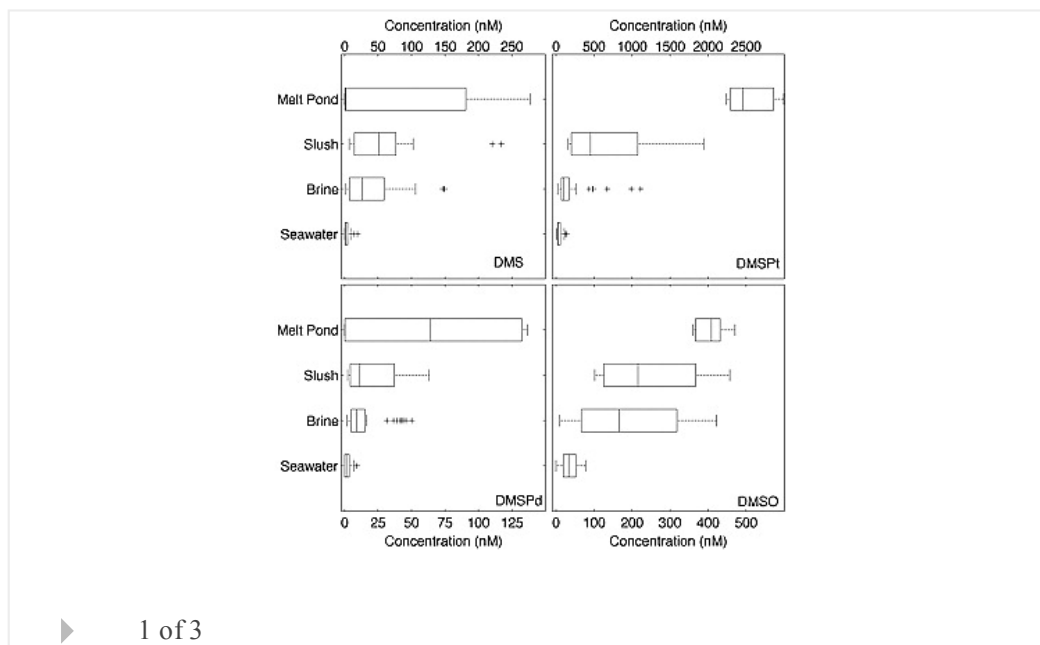
High concentrations and turnover rates of DMS, DMSP and DMSO in Antarctic sea ice

Elizabeth C. Asher, John W. H. Dacey, Matthew M. Mills, Kevin R. Arrigo, Philippe D. Tortell

First Published: 14 December 2011 Vol: 38, L23609 | DOI: 10.1029/2011GL049712

KEY POINTS

- Rapid DMSO reduction occurs in Antarctic sea ice
- Comparatively rapid S cycling and high DMS concentrations occur in sea ice
- This analytical technique identifies multiple DMS production pathways



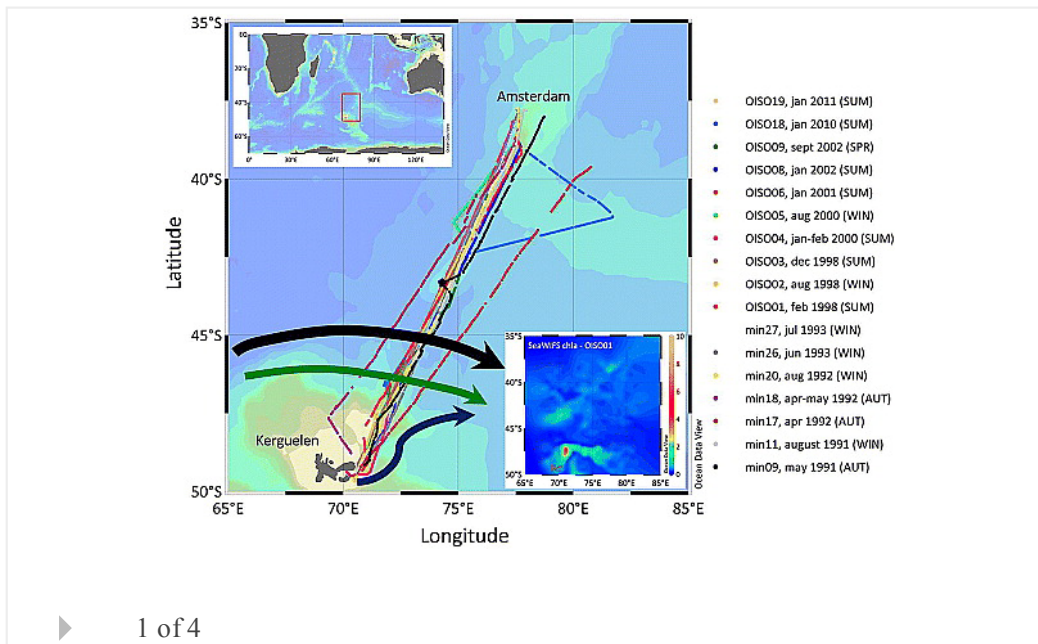
Decadal evolution of carbon sink within a strong bloom area in the subantarctic zone

Anna Laurantou, Nicolas Metzler

First Published: 13 December 2011 Vol: 38, L23608 | DOI: 10.1029/2011GL049614

KEY POINTS

- Reduction of atmospheric CO₂ sink in an intense sink region
- Space-restricted studies are essential, before extrapolating fluxes
- Role of frontal position in determining an oceanic area as source/sink of CO₂



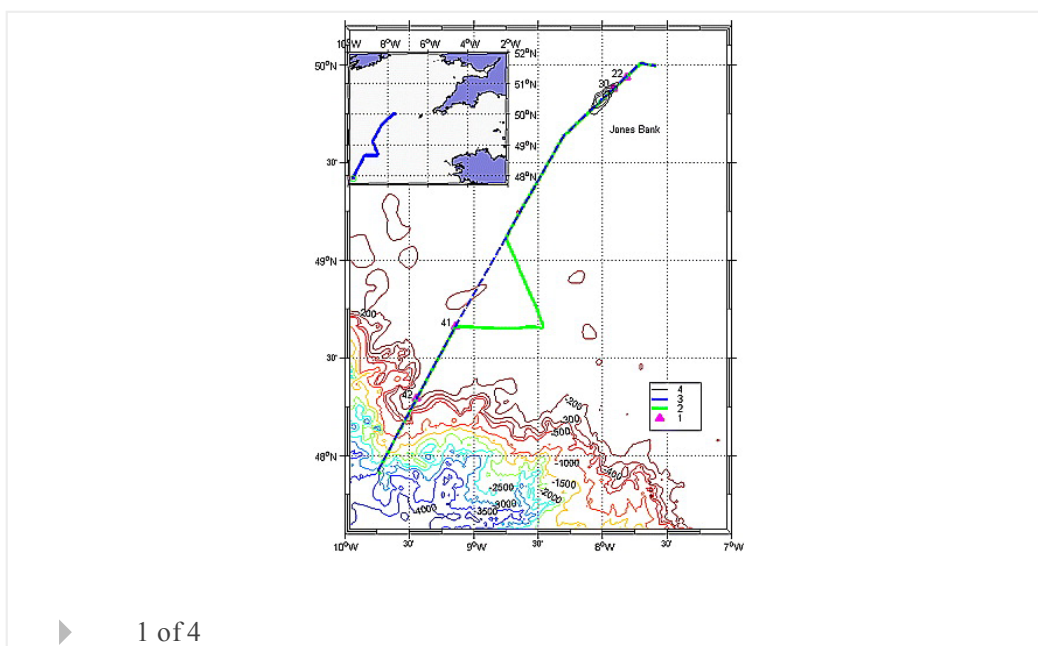
Internal tide coherence and decay over a wide shelf sea

Mark Inall, Dmitry Aleytnik, Tim Boyd, Matthew Palmer, Jonathan Sharples
 First Published: 10 December 2011 Vol: 38, L23607 | DOI: 10.1029/2011GL049943

KEY POINTS

- Internal tides propagate coherently over many hundreds of kilometers
- Internal tide decay rate can be computed by quasi-synoptic measurement
- An energy based parameterisation of internal tide mixing can be developed

Highlight



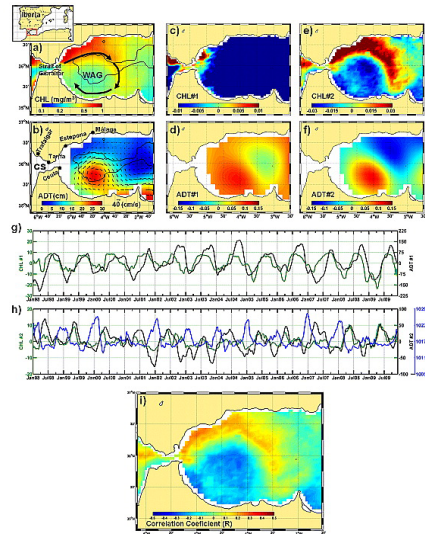
Understanding the patterns of biological response to physical forcing in the Alborán Sea (western Mediterranean)

Gabriel Navarro, Águeda Vázquez, Diego Macías, Miguel Bruno, Javier Ruiz

First Published: 9 December 2011 Vol: 38, L23606 | DOI: 10.1029/2011GL049708

KEY POINTS

- Novel analysis of satellite data discloses strong hydrodynamic forcing
- W. Mediterranean pelagic ecosystem controlled by the inverse barometer response
- Atmospheric impacts on the biogeochemistry of straits revealed



1 of 1

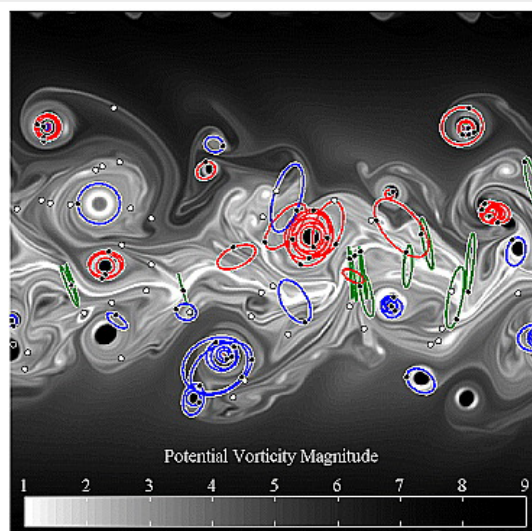
Extracting waves and vortices from Lagrangian trajectories

J. M. Lilly, R. K. Scott, S. C. Olhede

First Published: 7 December 2011 Vol: 38, L23605 | DOI: 10.1029/2011GL049727

KEY POINTS

- Currents associated with vortices can be automatically extracted from data
- Waves and vortices can be clearly distinguished, even if they appear similar
- A new representation of a vortex signal as a time-varying ellipse is validated



Assessing the potential for tropical cyclone induced sea surface cooling to reduce thermal stress on the world's coral reefs

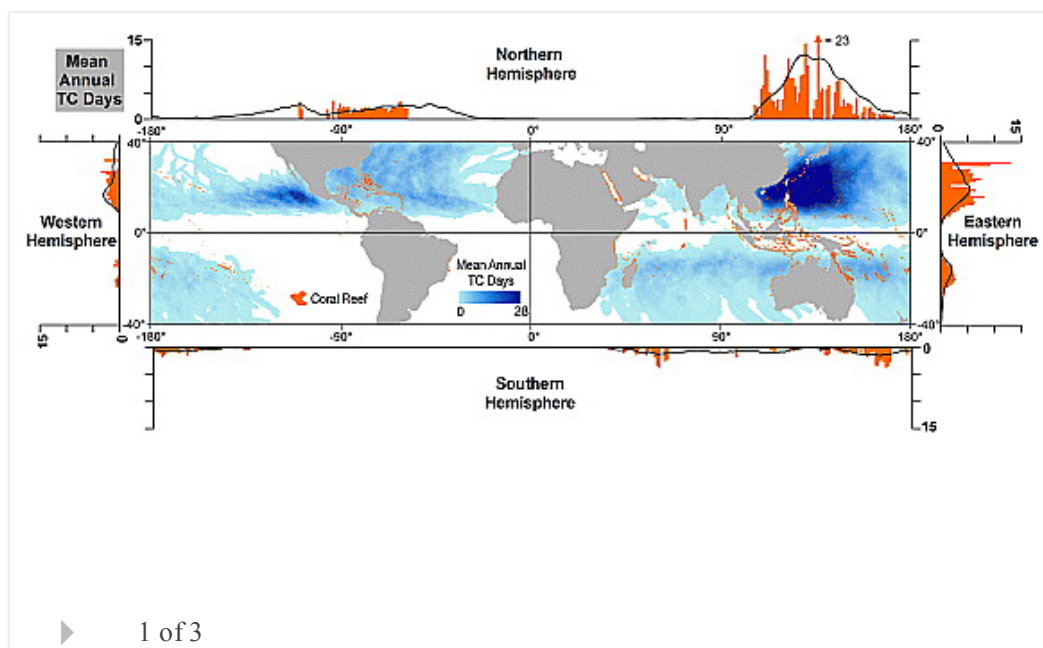
A. D. Carrigan, M. L. Puotinen

First Published: 3 December 2011 Vol: 38, L23604 | DOI: 10.1029/2011GL049722

KEY POINTS

- The coincidence of TC activity and thermal stress varies for reefs globally
- Frequent cyclone activity reduced thermal stress significantly in the Caribbean
- Examination at local scales revealed a similar effect in other reef regions

Highlight



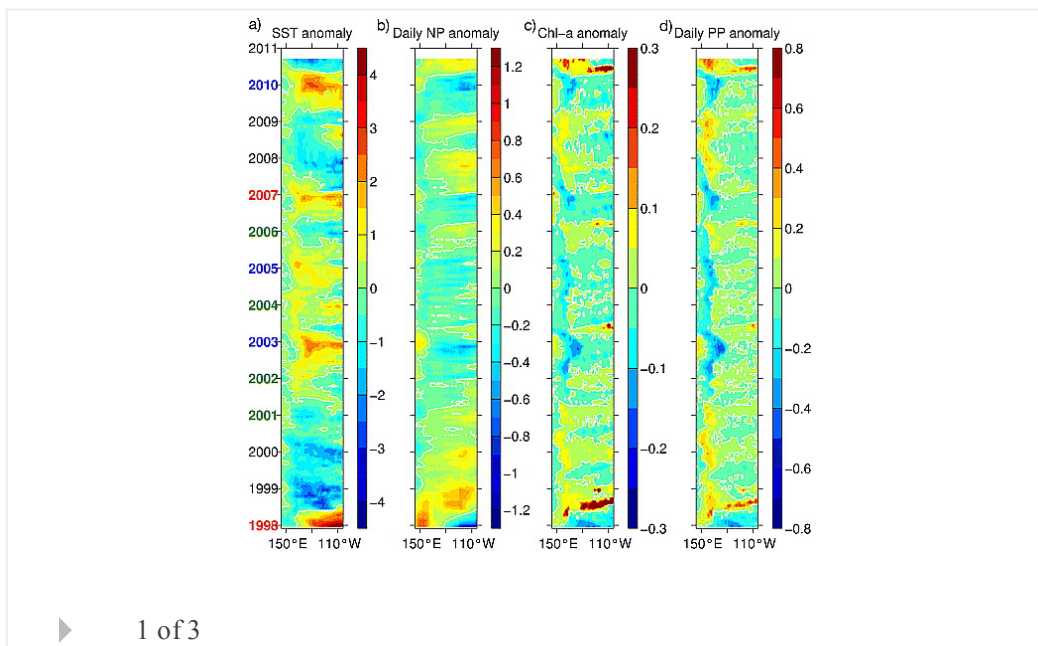
Implications of changing El Niño patterns for biological dynamics in the equatorial Pacific Ocean

D. Turk, C. S. Meinen, D. Antoine, M. J. McPhaden, M. R. Lewis

First Published: 3 December 2011 Vol: 38, L23603 | DOI: 10.1029/2011GL049674

KEY POINTS

- Newly discovered central Pacific El Niño induce a distinct biological response
- Satellite observations show decreases in Chl-a, new and primary productivity
- Under global warming, central Pacific's biological productivity may be lower



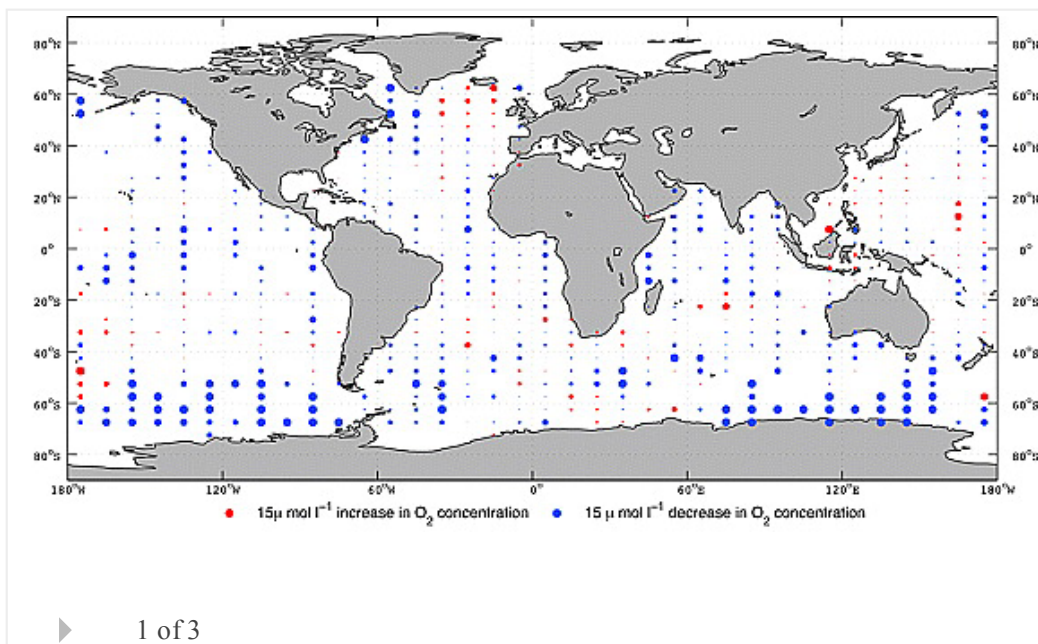
Observed decreases in oxygen content of the global ocean

Kieran P. Helm, Nathaniel L. Bindoff, John A. Church

First Published: 2 December 2011 Vol: 38, L23602 | DOI: 10.1029/2011GL049513

KEY POINTS

- Observations reveal a clear global pattern of oxygen decreases in the ocean
- Most decreases appear to be associated with increased ocean stratification
- This matches model projections of a global reduction in water mass renewal rates



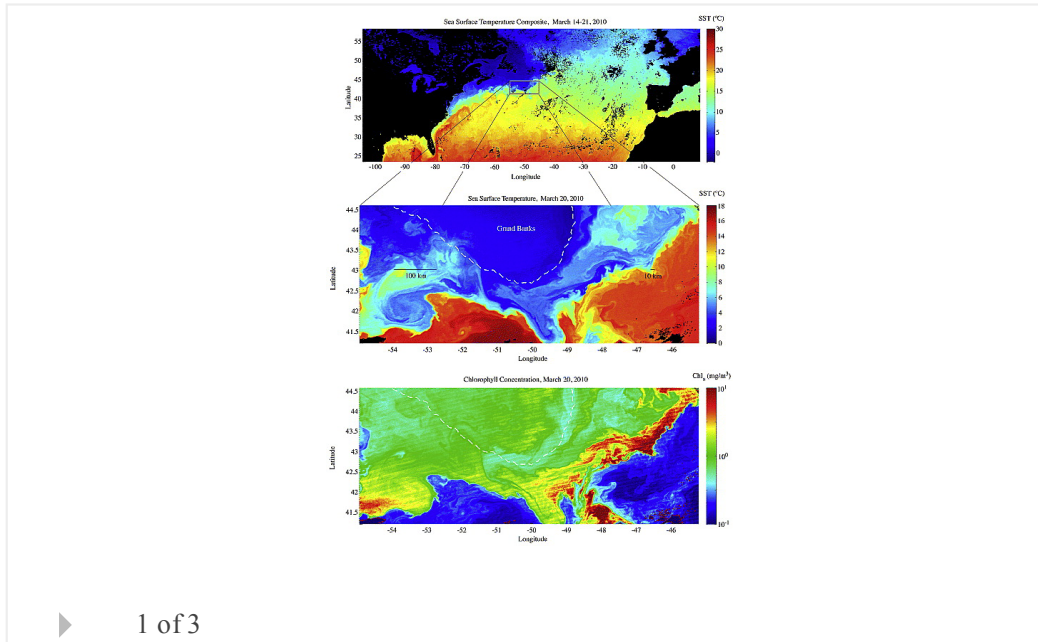
Ocean fronts trigger high latitude phytoplankton blooms

J. R. Taylor, R. Ferrari

First Published: 2 December 2011 Vol: 38, L23601 | DOI: 10.1029/2011GL049312

KEY POINTS

- Oceanic fronts reduce turbulent mixing in the upper ocean
- Reduced turbulent mixing at fronts triggers high-latitude phytoplankton blooms
- Fronts act as hotspots for primary productivity

**Planets****The global energy balance of Titan**

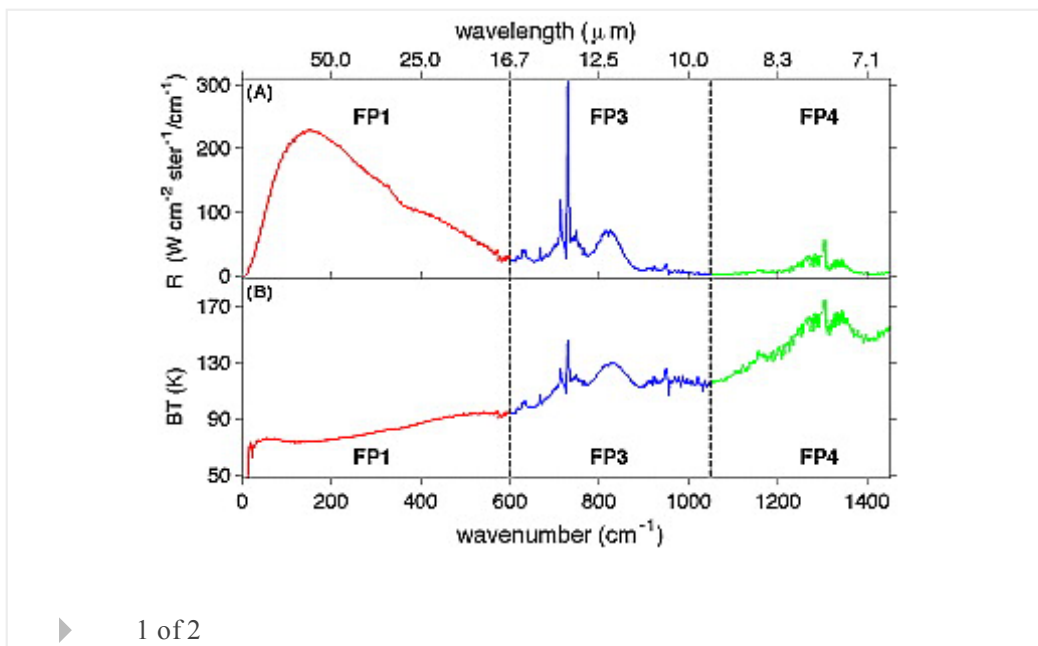
Liming Li, Conor A. Nixon, Richard K. Achterberg, Mark A. Smith, Nicolas J. P. Gorius, Xun Jiang, Barney J. Conrath, Peter J. Gierasch, Amy A. Simon-Miller, F. Michael Flasar, et al

First Published: 15 December 2011 Vol: 38, L23201 | DOI: 10.1029/2011GL050053

KEY POINTS

- First measurement of global emitted power on Titan
- Our study suggests that the global energy budget on Titan is in equilibrium
- The uncertainty places an upper limit on the energy imbalance of 6.0%

Highlight



▶ 1 of 2

Solid Earth

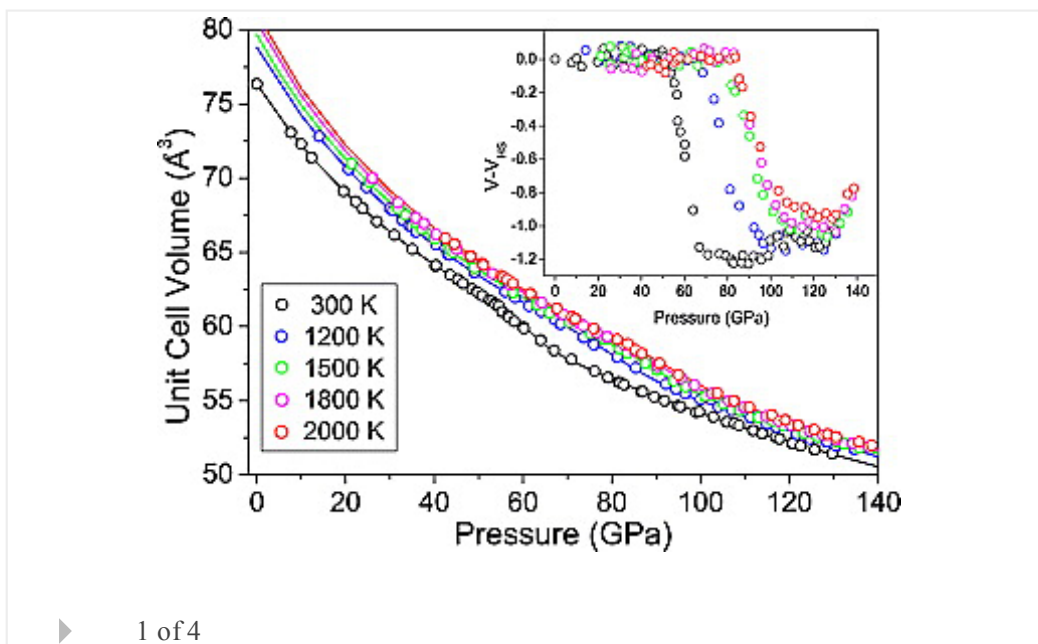
Thermal equation of state of lower-mantle ferropericlasite across the spin crossover

Zhu Mao, Jung-Fu Lin, Jin Liu, Vitali B. Prakapenka

First Published: 15 December 2011 Vol: 38, L23308 | DOI: 10.1029/2011GL049915

KEY POINTS

- We have determined the thermal equation of state of ferropericlasite
- The spin crossover of Fe in ferropericlasite widens at elevated temperatures
- We have modeled the effect of spin crossover on various physical properties



▶ 1 of 4

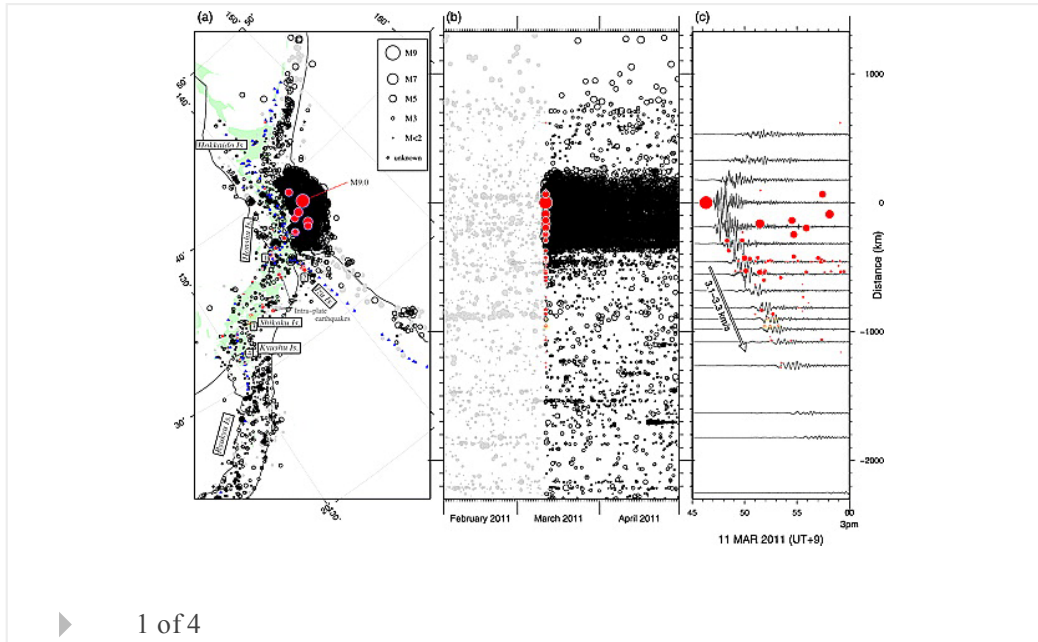
Propagation of an earthquake triggering front from the 2011 Tohoku-Oki earthquake

Masatoshi Miyazawa

First Published: 15 December 2011 Vol: 38, L23307 | DOI: 10.1029/2011GL049795

KEY POINTS

- Early post-seismicity was detected from continuous seismic records
- Dynamic stress changes should work for early triggered earthquakes
- Threshold necessary for triggering is ~ 500 kPa in stress or $\sim 10e^{-6}$ in strain



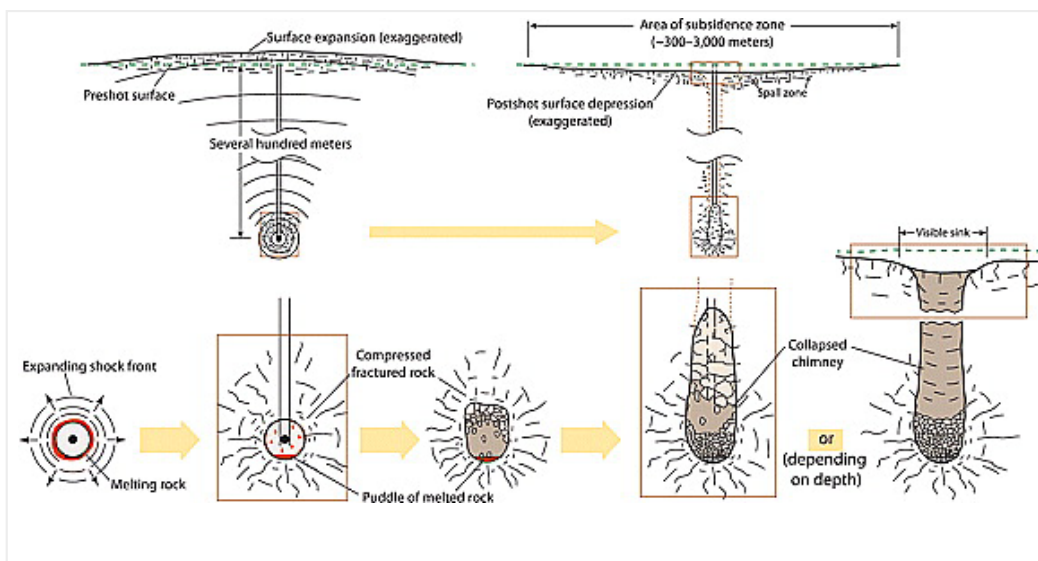
Anomalous transient uplift observed at the Lop Nor, China nuclear test site using satellite radar interferometry time-series analysis

P. Vincent, S. M. Buckley, D. Yang, S. F. Carle

First Published: 14 December 2011 Vol: 38, L23306 | DOI: 10.1029/2011GL049302

KEY POINTS

- A new phenomena (transient post-nuclear test uplift) has been discovered
- Residual nuclear test-related heat can cause uplift at the surface 4 yrs later
- This uplift was not observed at NTS because it requires near-surface water table



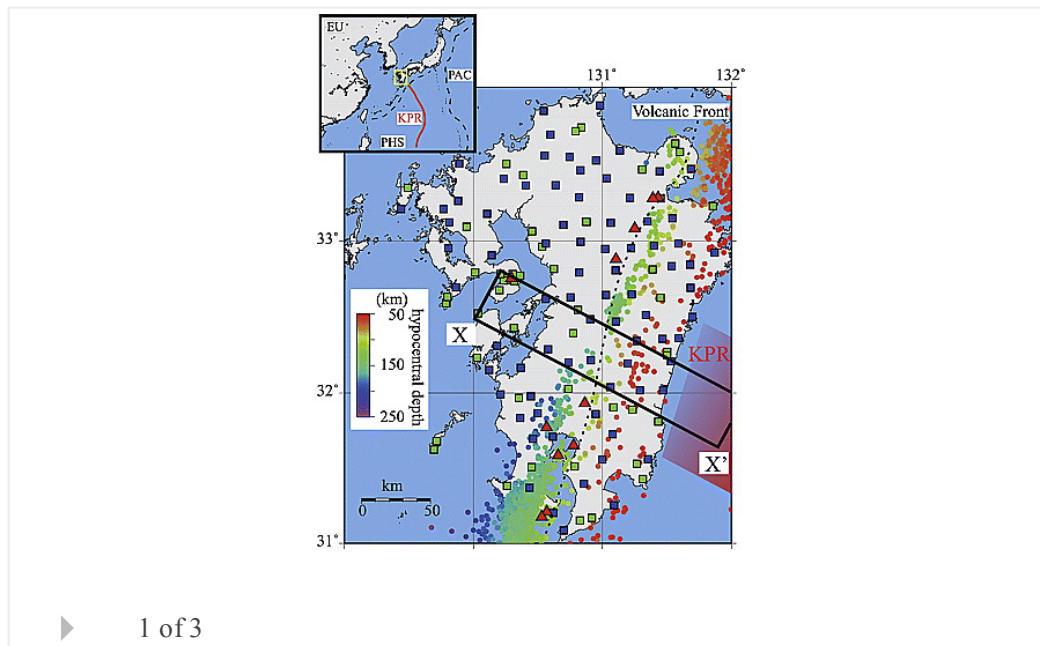
Water transportation through the Philippine Sea slab subducting beneath the central Kyushu region, Japan, as derived from receiver function analyses

Y. Abe, T. Ohkura, K. Hirahara, T. Shibutani

First Published: 13 December 2011 Vol: 38, L23305 | DOI: 10.1029/2011GL049688

KEY POINTS

- Oceanic crust subducting beneath Kyushu brings water down to 90 km in depth
- The forearc mantle of Kyushu contains serpentinite and/or free water



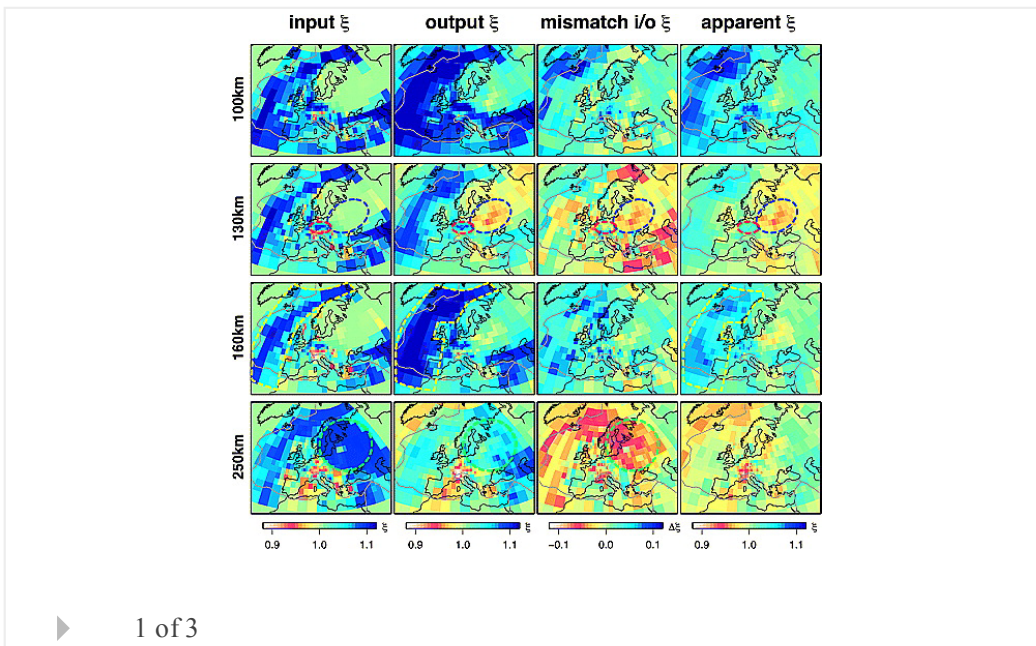
Radial anisotropy in the European mantle: Tomographic studies explored in terms of mantle flow

J. F. Schaefer, L. Boschi, T. W. Becker, E. Kissling

First Published: 10 December 2011 Vol: 38, L23304 | DOI: 10.1029/2011GL049687

KEY POINTS

- Adaptively parametrized surface-wave tomography
- Radial anisotropy in European/Mediterranean region
- Correlation with estimates from a flow model



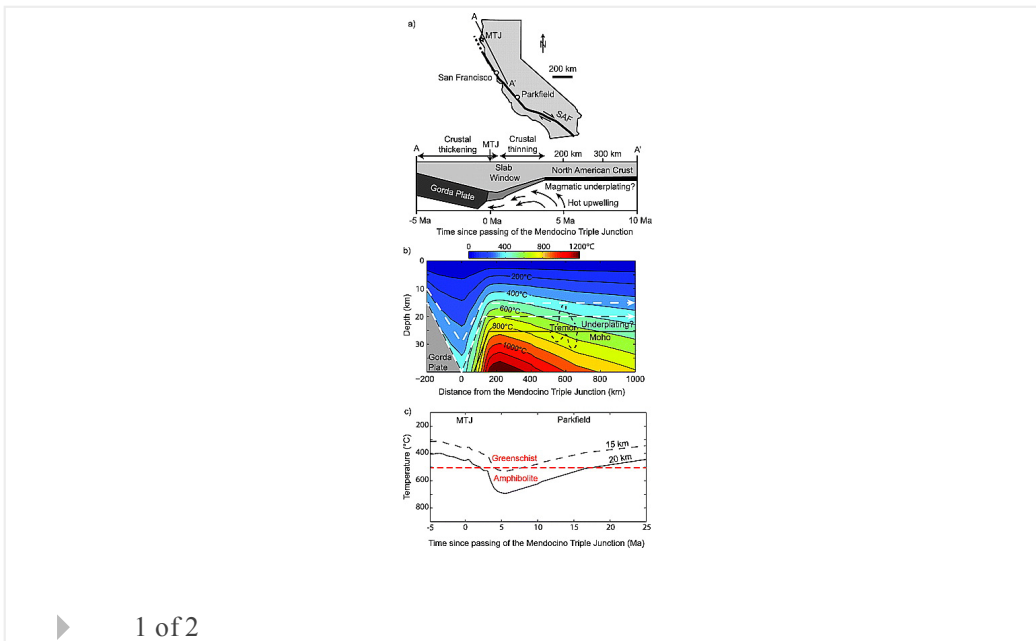
San Andreas Fault tremor and retrograde metamorphism

Åke Fagereng, Johann F. A. Diener

First Published: 8 December 2011 Vol: 38, L23303 | DOI: 10.1029/2011GL049550

KEY POINTS

- Tremor on the San Andreas Fault occurs during retrograde metamorphic conditions
- Tremor on the San Andreas Fault is not related to fluid production in the fault
- Tremor may relate to a mantle-derived fluid or a change in frictional properties

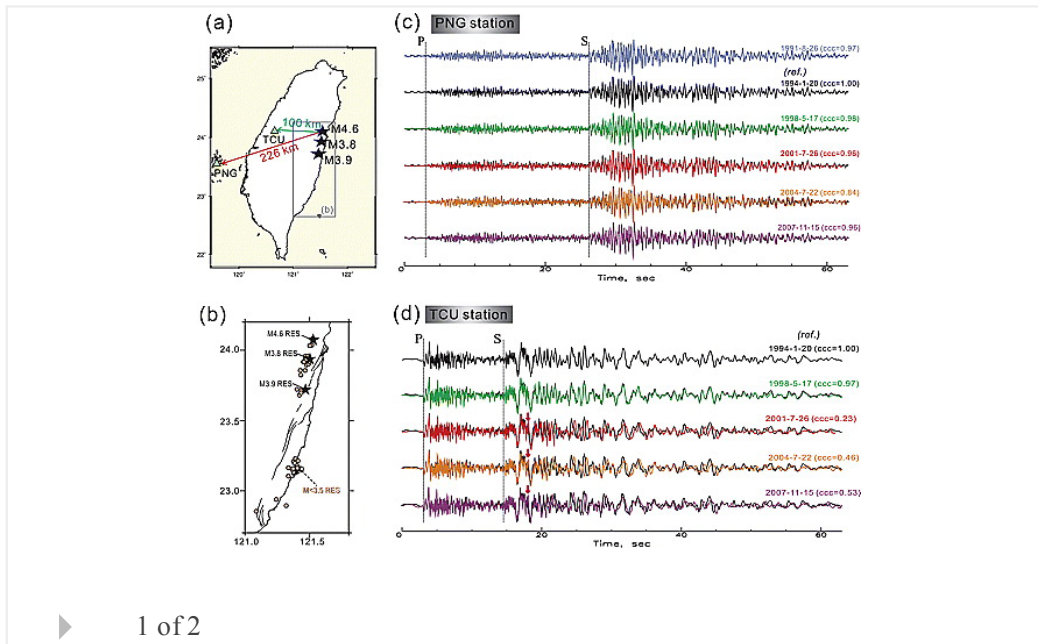


Observations of changes in waveform character induced by the 1999 M_w 7.6 Chi-Chi earthquake

Kate Huihsuan Chen, Takashi Furumura, Justin Rubinstein, Ruey-Juin Rau

KEY POINTS

- The spatio-temporal extent of subsurface damage due to Chi-Chi event is shown
- The velocity change is limited to paths that cross the 70 x 100 km region
- The healing may not be complete within a time interval of 8 year



▶ 1 of 2

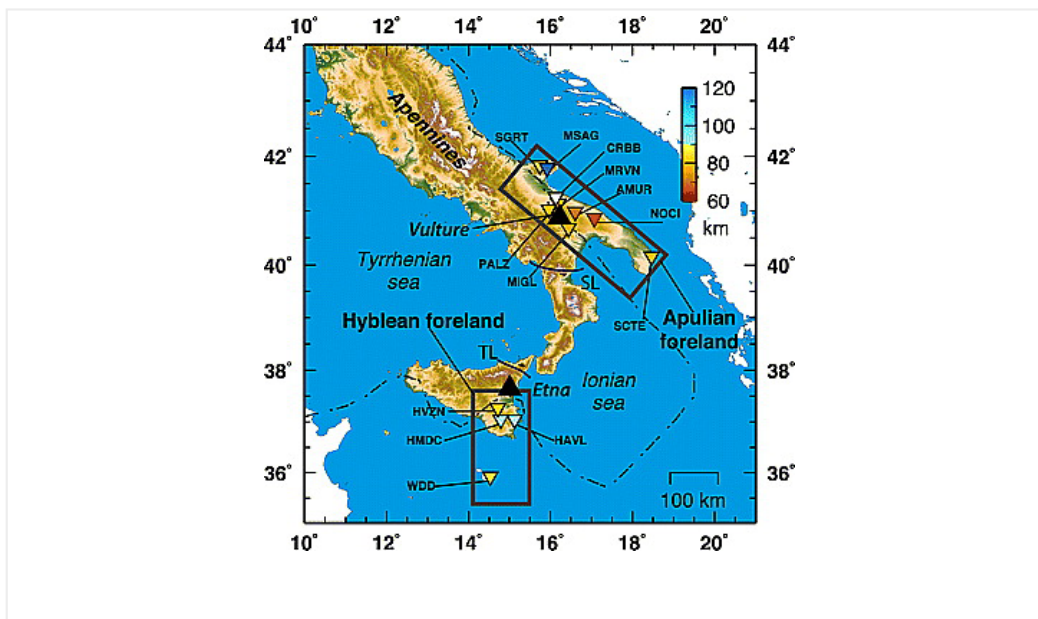
Erosion of the continental lithosphere at the cusps of the Calabrian arc: Evidence from *S* receiver functions analysis

Meghan S. Miller, Nicola Piana Agostinetti

First Published: 2 December 2011 Vol: 38, L23301 | DOI: 10.1029/2011GL049455

KEY POINTS

- Mantle flow is mechanically and thermally eroding continental lithosphere
- The Apulian and Hyblean platforms are more complex than previously imaged
- Lithospheric thickness in the Peri-Calabrian region



▶ 1 of 2

Space Sciences

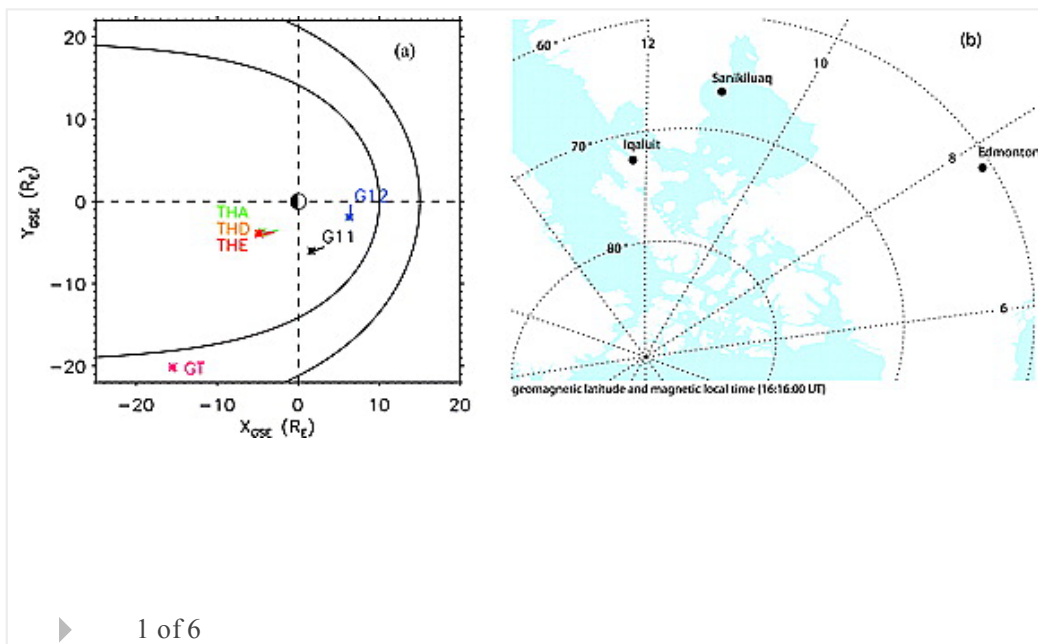
High-latitude GPS TEC changes associated with a sudden magnetospheric compression

P. T. Jayachandran, C. Watson, I. J. Rae, J. W. MacDougall, D. W. Danskin, R. Chadwick, T. D. Kelly, P. Prikryl, K. Meziane, K. Shiokawa

First Published: 15 December 2011 Vol: 38, L23104 | DOI: 10.1029/2011GL050041

KEY POINTS

- Propagating TEC change due to magnetospheric compression
- Related to travelling convection vortex
- GPS triangulation technique



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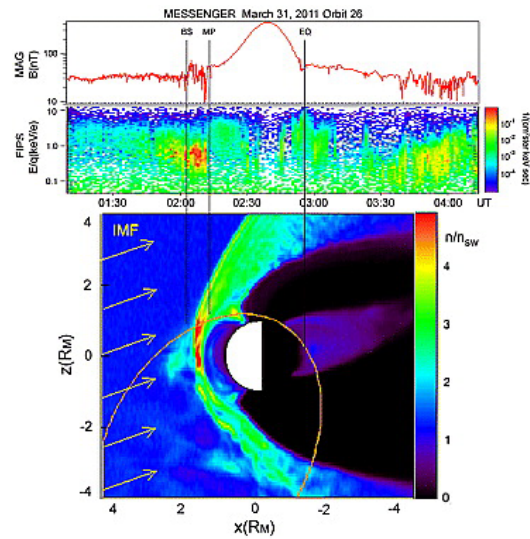
Quasi-trapped ion and electron populations at Mercury

David Schriver, Pavel M. Trávníček, Brian J. Anderson, Maha Ashour-Abdalla, Daniel N. Baker, Mehda Benna, Scott A. Boardsen, Robert E. Gold, Petr Hellinger, George C. Ho, et al

First Published: 14 December 2011 Vol: 38, L23103 | DOI: 10.1029/2011GL049629

KEY POINTS

- Mercury has a quasi-trapped particle population
- Mercury's quasi-trapped particle energies are lower than other planets
- Particle precipitation plays an important role in exosphere formation at Mercury



▶ 1 of 3

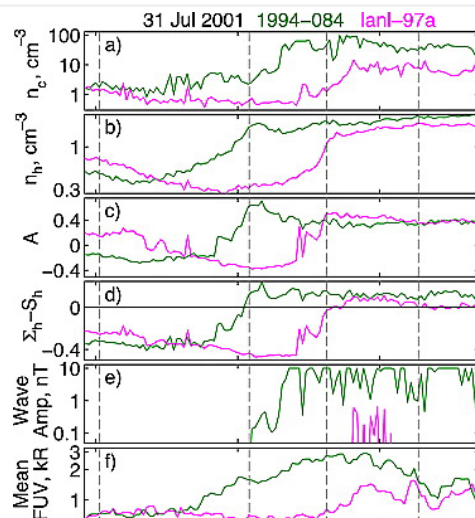
Correspondence between a plasma-based EMIC wave proxy and subauroral proton precipitation

M. Spasojevic, L. W. Blum, E. A. MacDonald, S. A. Fuselier, D. I. Golden

First Published: 13 December 2011 Vol: 38, L23102 | DOI: 10.1029/2011GL049735

KEY POINTS

- Plasma measurements are used to predict EMIC wave growth and estimate amplitudes
- The predicted onset of wave growth corresponds to the onset of precipitation
- There is correlation between predicted wave amplitude and FUV brightness



▶ 1 of 3

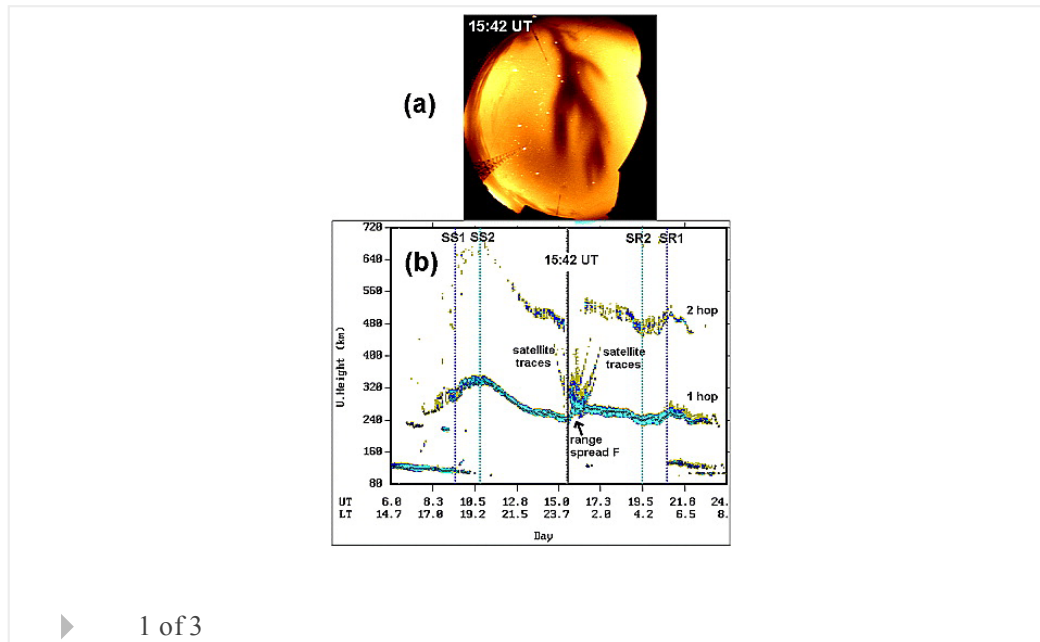
Simultaneous observations at Darwin of equatorial bubbles by ionosonde-based range/time displays and airglow imaging

K. J. W. Lynn, Y. Otsuka, K. Shiokawa

First Published: 7 December 2011 Vol: 38, L23101 | DOI: 10.1029/2011GL049856

KEY POINTS

- Moving spread F event identified with an optical depletion
- New form of ionosonde display provides bubble/spread F connections
- Bubble drift bubble velocity can be measured from historic ionograms



▶ 1 of 3

The Cryosphere

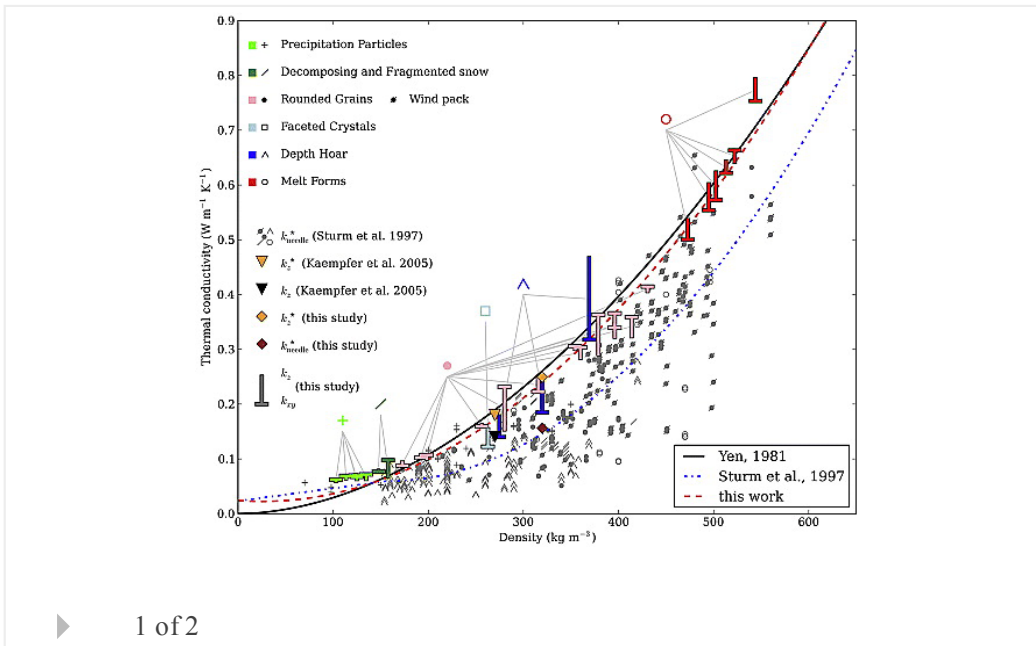
Numerical and experimental investigations of the effective thermal conductivity of snow

N. Calonne, F. Flin, S. Morin, B. Lesaffre, S. Rolland du Roscoat, C. Geindreau

First Published: 1 December 2011 Vol: 38, L23501 | DOI: 10.1029/2011GL049234

KEY POINTS

- Thermal conductivity of snow computed from 3D images is correlated with density
- Heated-needle probe measurements are likely biased low
- Heat transfer in pores plays a vital role in conduction through snow



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- **What Causes Sunspot Pairs?**
- **Water Beneath the Surface of Mars, Bound up in Sulfates**
- **When Predicting Drought Risk, Do Not Overlook Temperature**
- **Changing Patterns in U.S. Air Quality**

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14-19 June 2015

Hong Kong SAR, China

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