

Issue Contents



Volume 39, Issue 21

November 2012

Brief Detailed

Atmospheric Science

The effect of energetic electron precipitation on middle mesospheric night-time ozone during and after a moderate geomagnetic storm

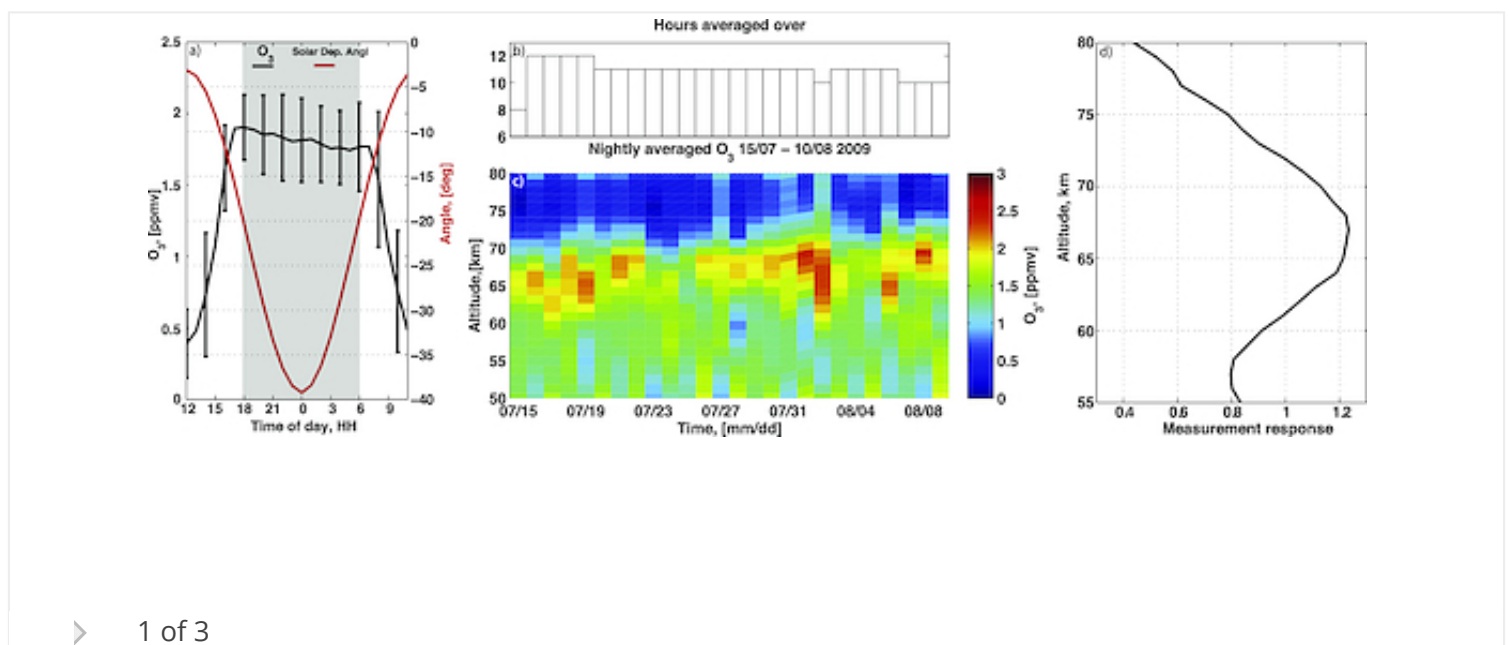
M. Daae, P. Espy, H. Nesse Tyssøy, D. Newnham, J. Stadsnes, F. Søråas

First Published: 14 November 2012 Vol: 39, L21811 | DOI: 10.1029/2012GL053787

KEY POINTS

- EEP in moderate geomagnetic storms causes large atmospheric chemistry effects
- Mesospheric NO enhanced and O₃ substantially reduced following an EEP event
- EEP produced O₃ loss in mesosphere can be common throughout the Solar Cycle

Highlight

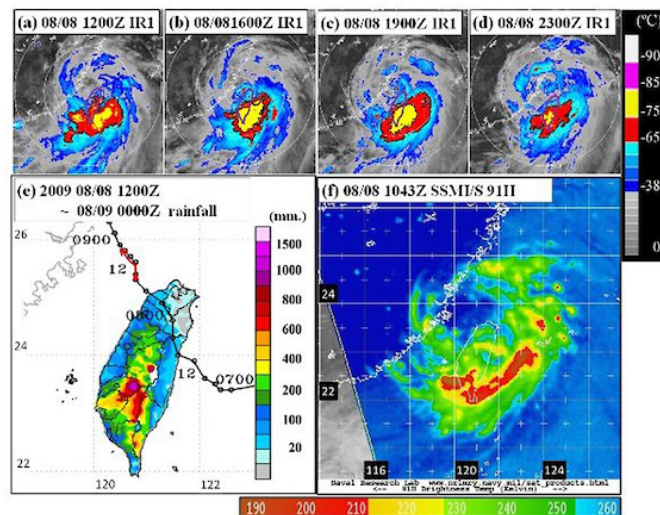


Long-lasting convective systems in the outer region of tropical cyclones in the western North Pacific

Cheng-Shang Lee, Buo-Fu Chen, Russell L. Elsberry

KEY POINTS

- Outer mesoscale convective systems in 22% of typhoons
- Outer-MCS heavy rainfall as in Typhoon Morakot
- Low-level jets contribute to continuous convection



➤ 1 of 4

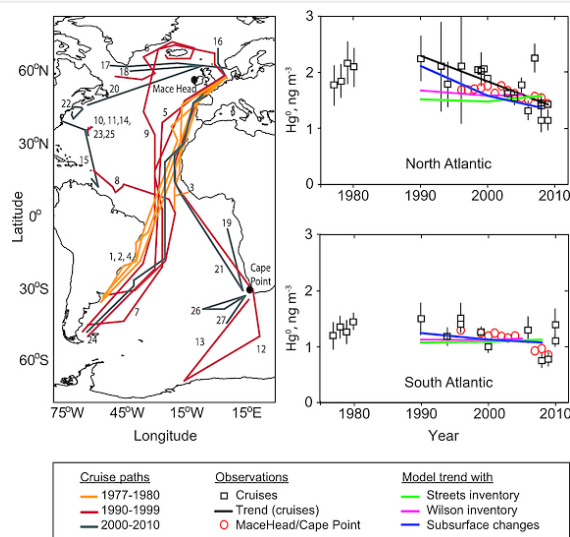
Multi-decadal decline of mercury in the North Atlantic atmosphere explained by changing subsurface seawater concentrations

Anne L. Soerensen, Daniel J. Jacob, David G. Streets, Melanie L. I. Witt, Ralf Ebinghaus, Robert P. Mason, Maria Andersson, Elsie M. Sunderland

First Published: 13 November 2012 Vol: 39, L21810 | DOI: 10.1029/2012GL053736

KEY POINTS

- The atmospheric Hg decrease is confined to the Northern Hemisphere
- Decreasing subsurface seawater Hg can explain the Northern Hemisphere decrease
- Historical input of Hg from effluents are more important than currently believed



➤ 1 of 2

First satellite identification of volcanic carbon monoxide

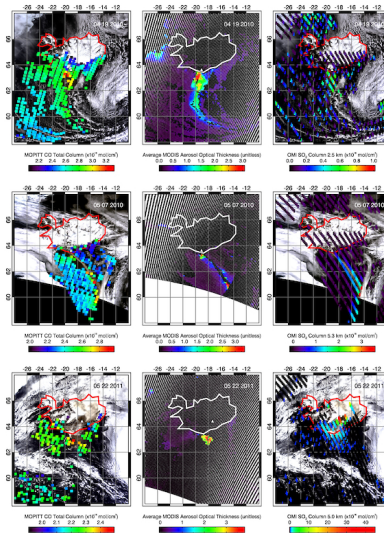
Sara Martínez-Alonso, Merritt N. Deeter, Helen M. Worden, Cathy Clerbaux, Debbie Mao, John C. Gille

First Published: 9 November 2012 Vol: 39, L21809 | DOI: 10.1029/2012GL053275

KEY POINTS

- Satellite identification of volcanic CO has been achieved for the first time
- We estimate that global annual volcanic CO emissions are non-negligible
- Volcanic CO emissions are relevant to climate models and volcanic forecasting

Highlight



> 1 of 2

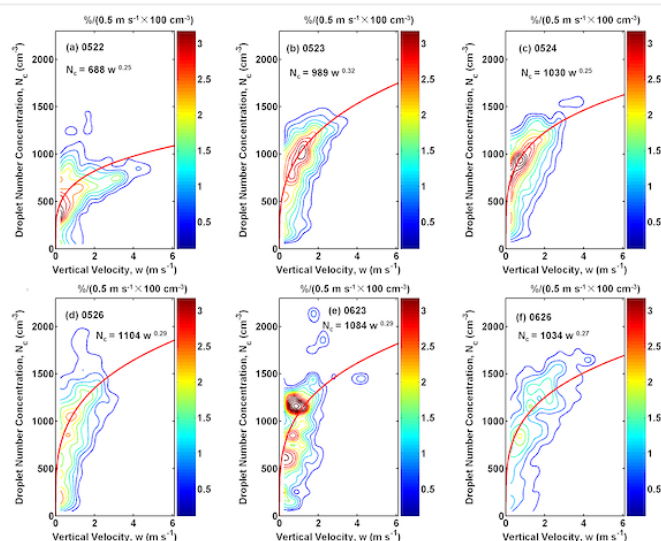
Observed impacts of vertical velocity on cloud microphysics and implications for aerosol indirect effects

Chunsong Lu, Yangang Liu, Shengjie Niu, Andrew M. Vogelmann

First Published: 8 November 2012 Vol: 39, L21808 | DOI: 10.1029/2012GL053599

KEY POINTS

- Vertical velocity effects on cloud microphysics are confirmed observationally
- Vertical velocity effects on cloud microphysics are opposite to aerosol effects
- The empirical relationships can be fitted well with power law functions



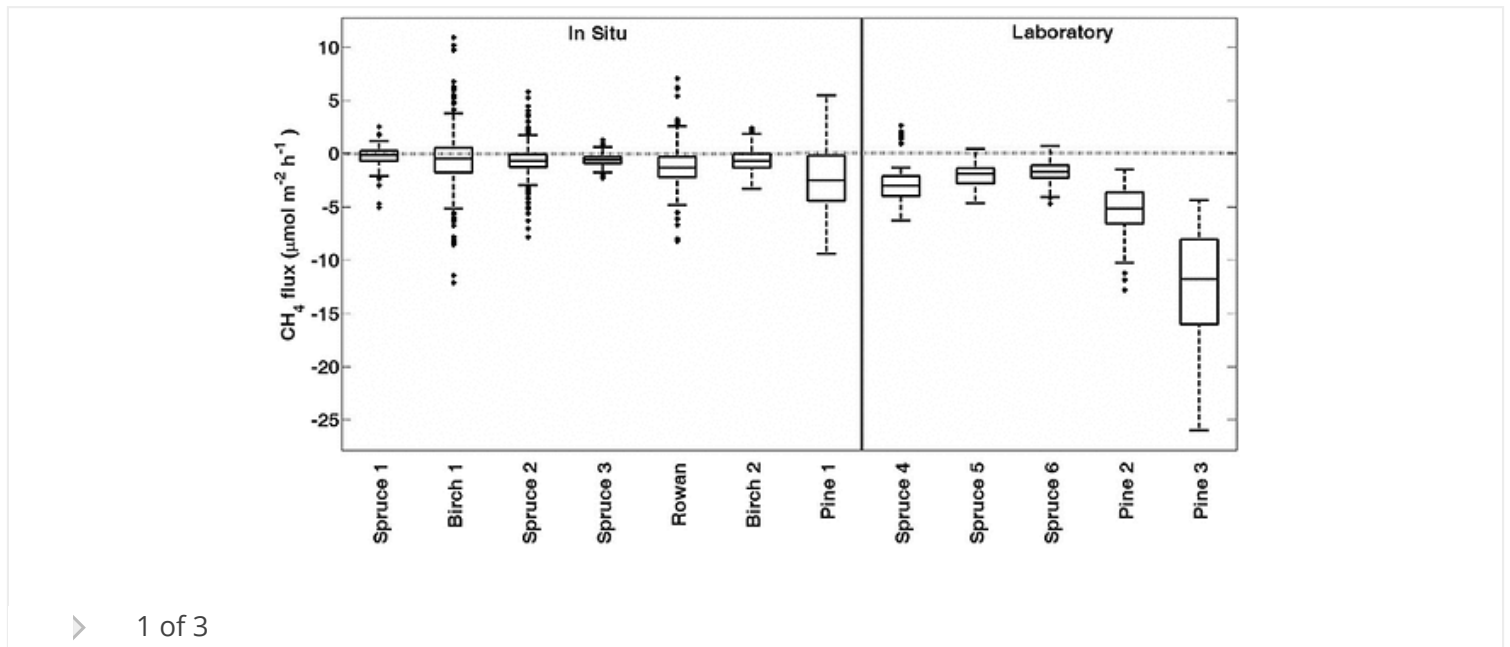
Atmospheric methane removal by boreal plants

Elin Sundqvist, Patrick Crill, Meelis Mölder, Patrik Vestin, Anders Lindroth
 First Published: 6 November 2012 Vol: 39, L21806 | DOI: 10.1029/2012GL053592

KEY POINTS

- In situ measurements show that boreal plants are a significant sink of methane

Highlight

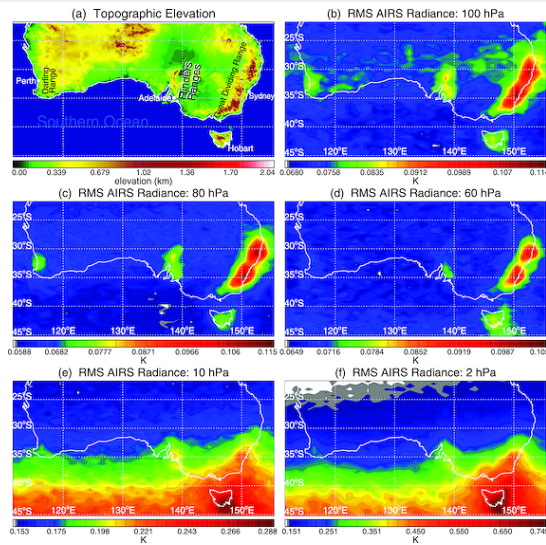


Satellite detection of orographic gravity-wave activity in the winter subtropical stratosphere over Australia and Africa

S. D. Eckermann, D. L. Wu
 First Published: 6 November 2012 Vol: 39, L21807 | DOI: 10.1029/2012GL053791

KEY POINTS

- First observations of orographic waves in southern subtropical stratosphere
- Waves from Australian and African mountains propagate deep into stratosphere
- Activity varies with winds according to orographic gravity-wave theory



> 1 of 4

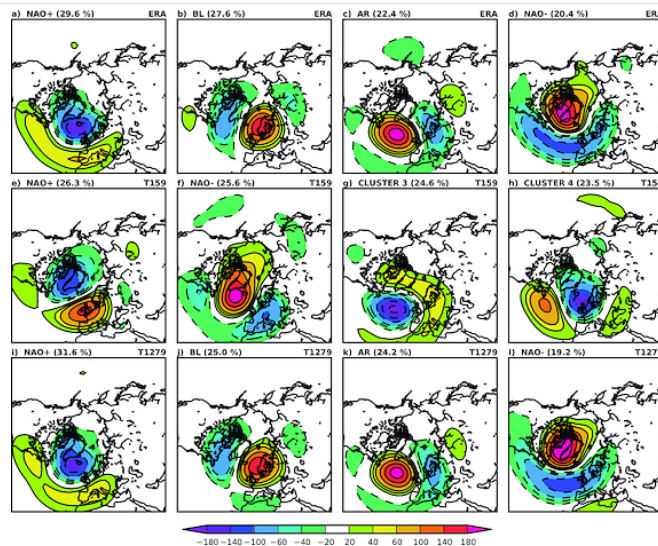
Simulating regime structures in weather and climate prediction models

A. Dawson, T. N. Palmer, S. Corti

First Published: 3 November 2012 Vol: 39, L21805 | DOI: 10.1029/2012GL053284

KEY POINTS

- Regimes not represented in an atmosphere model at typical climate resolution
- Skillful representation of regimes at higher weather model resolution



> 1 of 2

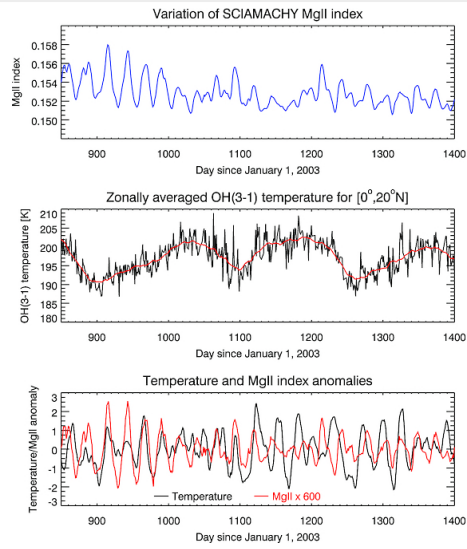
Sensitivity of equatorial mesopause temperatures to the 27-day solar cycle

C. von Savigny, K.-U. Eichmann, C. E. Robert, J. P. Burrows, M. Weber

First Published: 2 November 2012 Vol: 39, L21804 | DOI: 10.1029/2012GL053563

KEY POINTS

- Evidence for a solar driven 27-day signature in mesopause temperature
- Sensitivities for 27-day and 11-year solar cycle agree
- Our results are in good agreement with recent model simulations



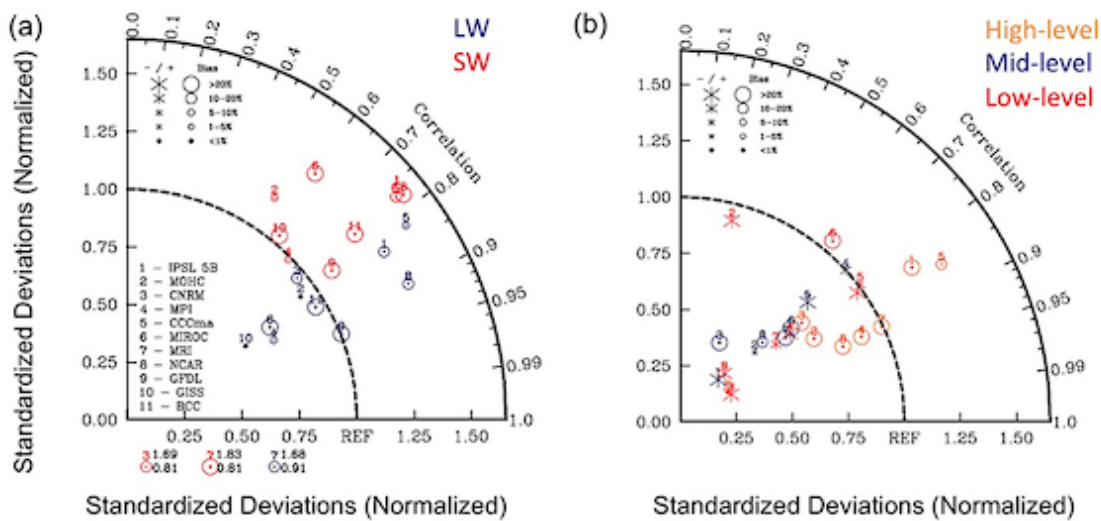
The 'too few, too bright' tropical low-cloud problem in CMIP5 models

C. Nam, S. Bony, J.-L. Dufresne, H. Chepfer

First Published: 1 November 2012 Vol: 39, L21801 | DOI: 10.1029/2012GL053421

KEY POINTS

- Low clouds too optically thick; particularly shallow cumulus clouds
- Compensating errors: underestimate low-cloud & overestimate high-cloud fraction
- Relative frequency of stratocumulus & shallow cumulus clouds not captured well



Regime-based analysis of aerosol-cloud interactions

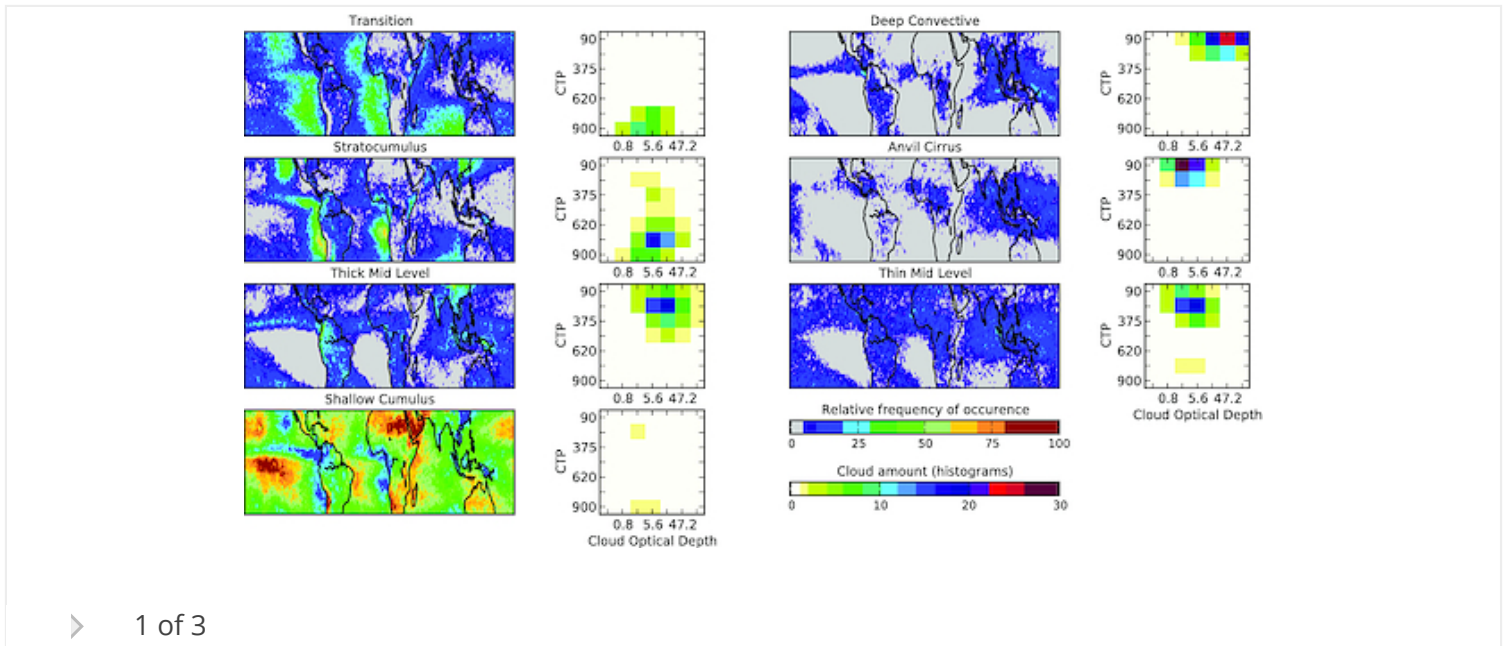
Edward Gryspeerdt, Philip Stier

First Published: 1 November 2012 Vol: 39, L21802 | DOI: 10.1029/2012GL053221

KEY POINTS

- Sensitivity of cloud droplet number to aerosol optical depth differs by regime
- The negative sensitivity observed over land is from low cloud fraction regimes

- High cloud fraction regimes are the largest proportion of the total sensitivity



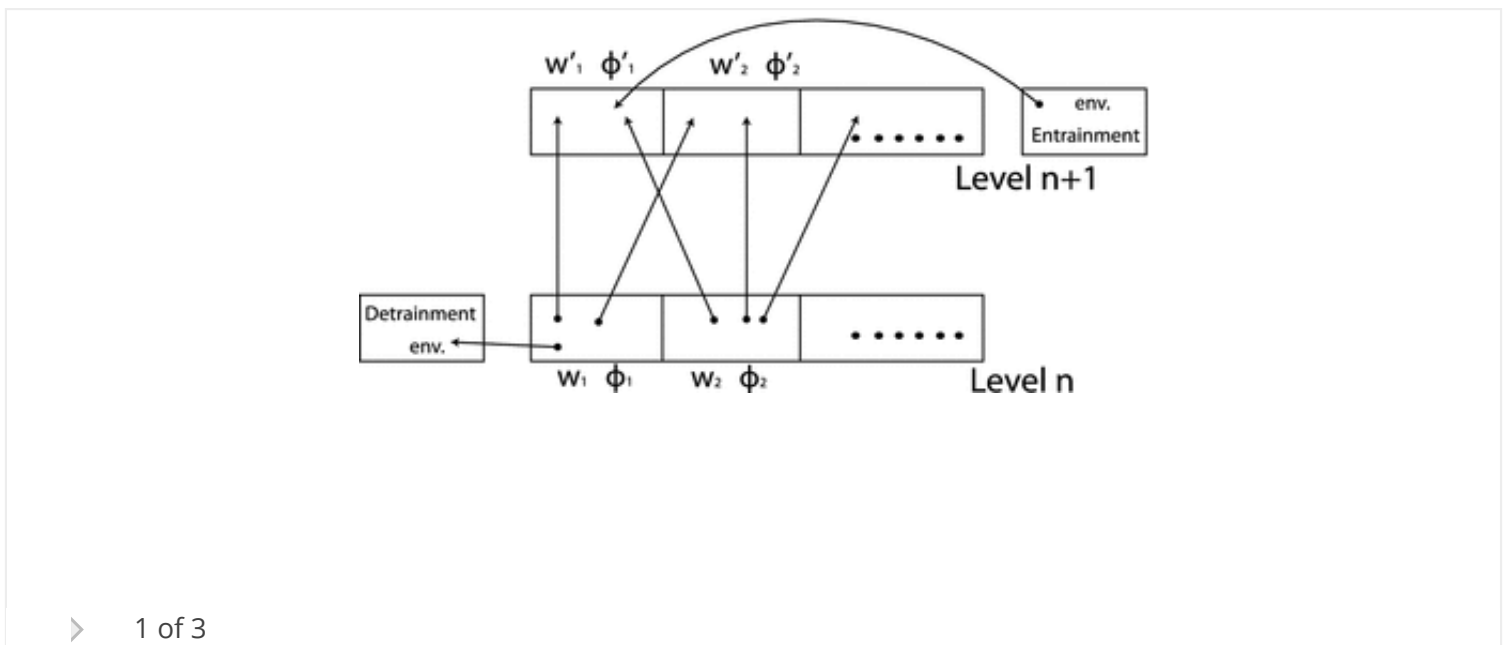
Beyond bulk entrainment and detrainment rates: A new framework for diagnosing mixing in cumulus convection

Ji Nie, Zhiming Kuang

First Published: 1 November 2012 Vol: 39, L21803 | DOI: 10.1029/2012GL053992

KEY POINTS

- A new framework for diagnosing mixing in cumulus convection is proposed
- It provides a reference against which simple models can be compared
- It is applied to examine the response of convection to a small perturbation



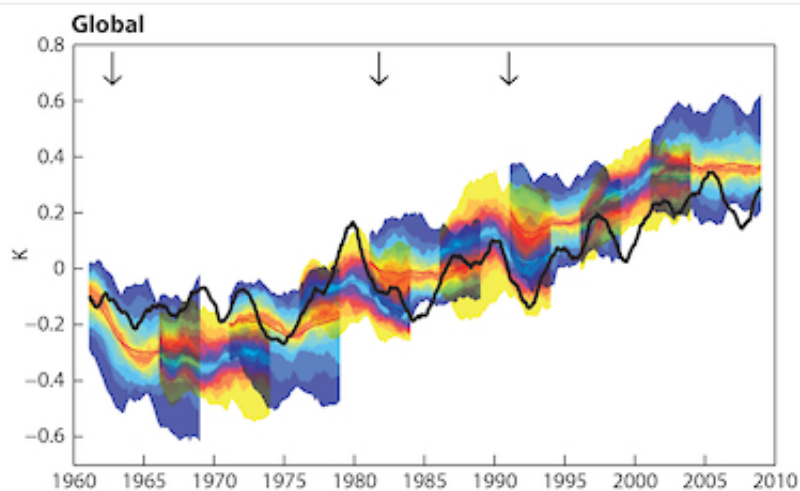
Climate

Reliability of decadal predictions

KEY POINTS

- A reliability analysis has been applied to probabilistic decadal predictions
- Multi-annual temperature forecasts in the ECMWF model are, in general, reliable
- Long-term climate trends are a major but not the only source of skill

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➤ 1 of 3

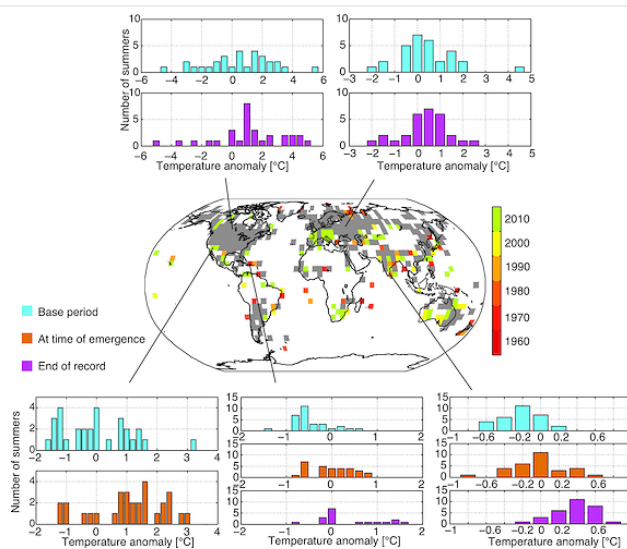
Emerging local warming signals in observational data

Irina Mahlstein, Gabriele Hegerl, Susan Solomon

First Published: 14 November 2012 Vol: 39, L21711 | DOI: 10.1029/2012GL053952

KEY POINTS

- Significant shift in observed temperatures
- Large parts of the Earth have seen a significant change



➤ 1 of 3

Relationship between the Pacific and Atlantic stepwise climate change during the 1990s

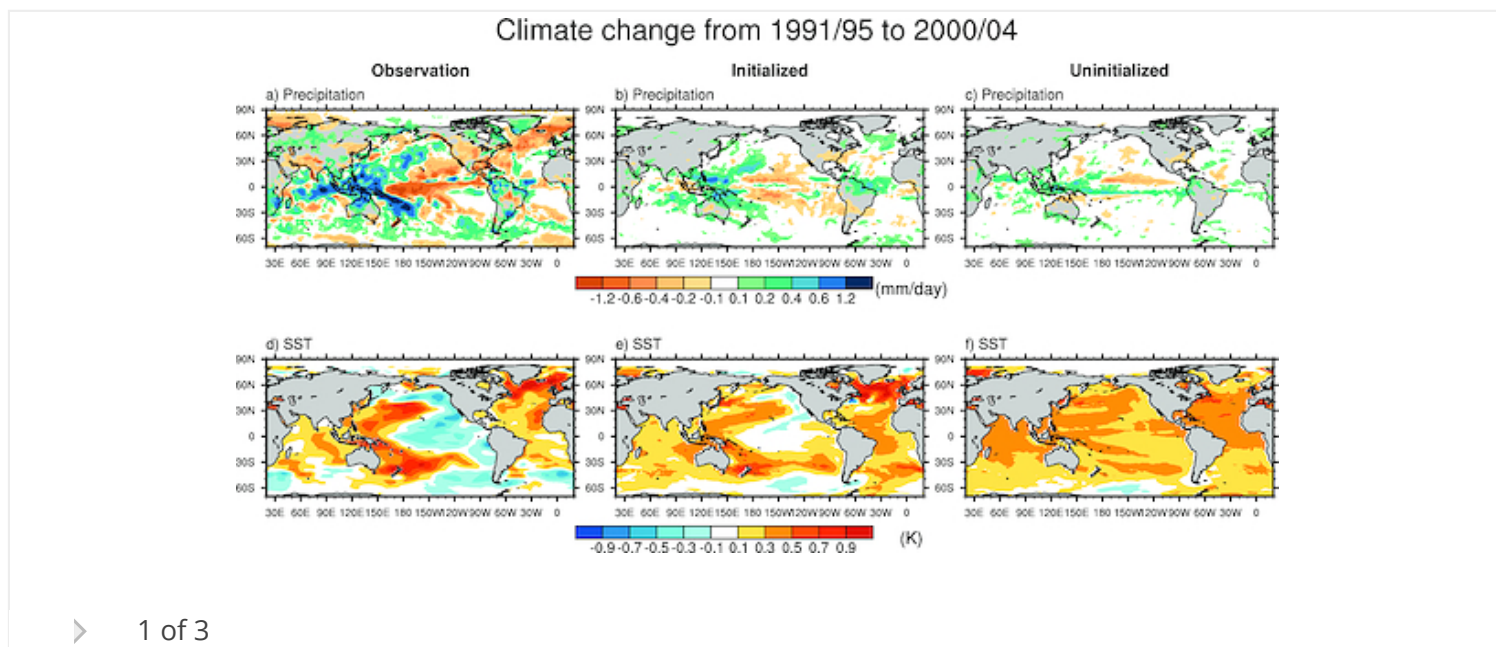
Y. Chikamoto, M. Kimoto, M. Watanabe, M. Ishii, T. Mochizuki

First Published: 10 November 2012 Vol: 39, L21710 | DOI: 10.1029/2012GL053901

KEY POINTS

- Pacific decadal climate change is predictable with a help of North Atlantic
- Decadal ENSO variability is predictable beyond 1 year
- Initialization contributes to the accurate temperature change

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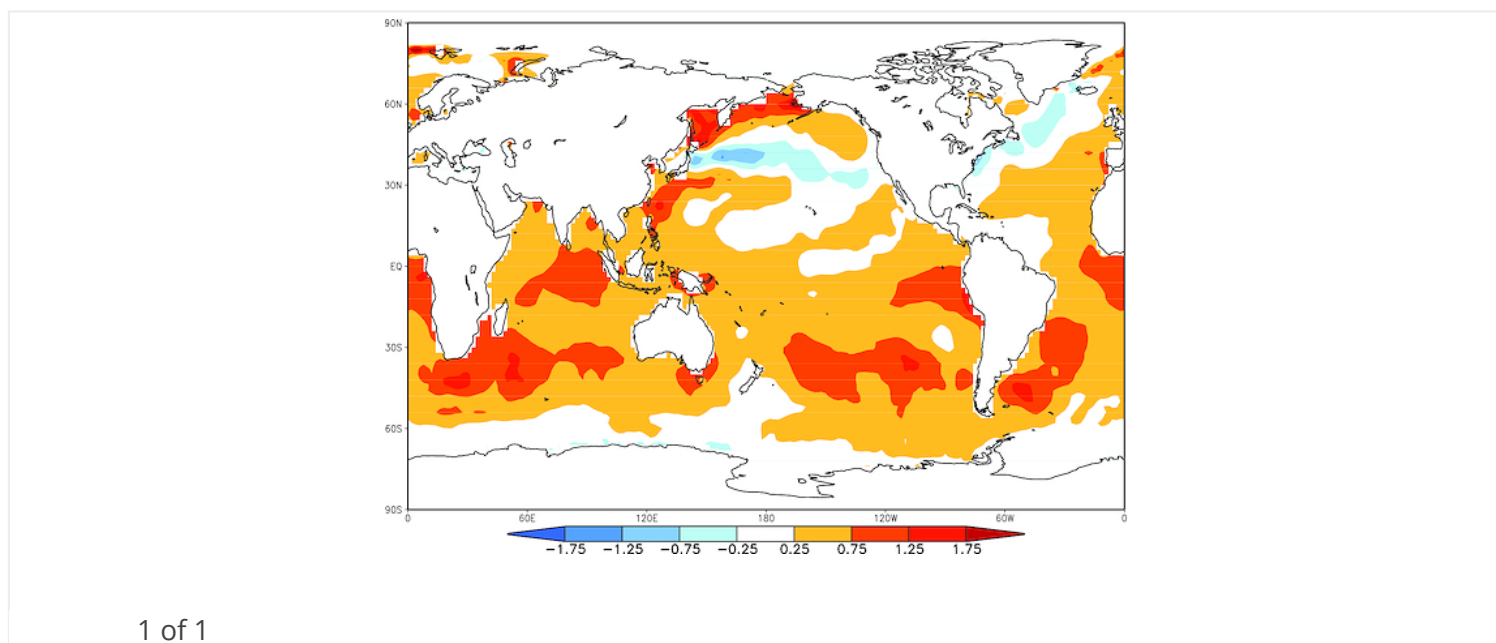


Correction to “Are tropical SST trends changing the global teleconnection during La Niña?”

Arun Kumar, Bhaskar Jha, Michelle L'Heureux

First Published: 9 November 2012 Vol: 39, L21709 | DOI: 10.1029/2012GL054139

Free



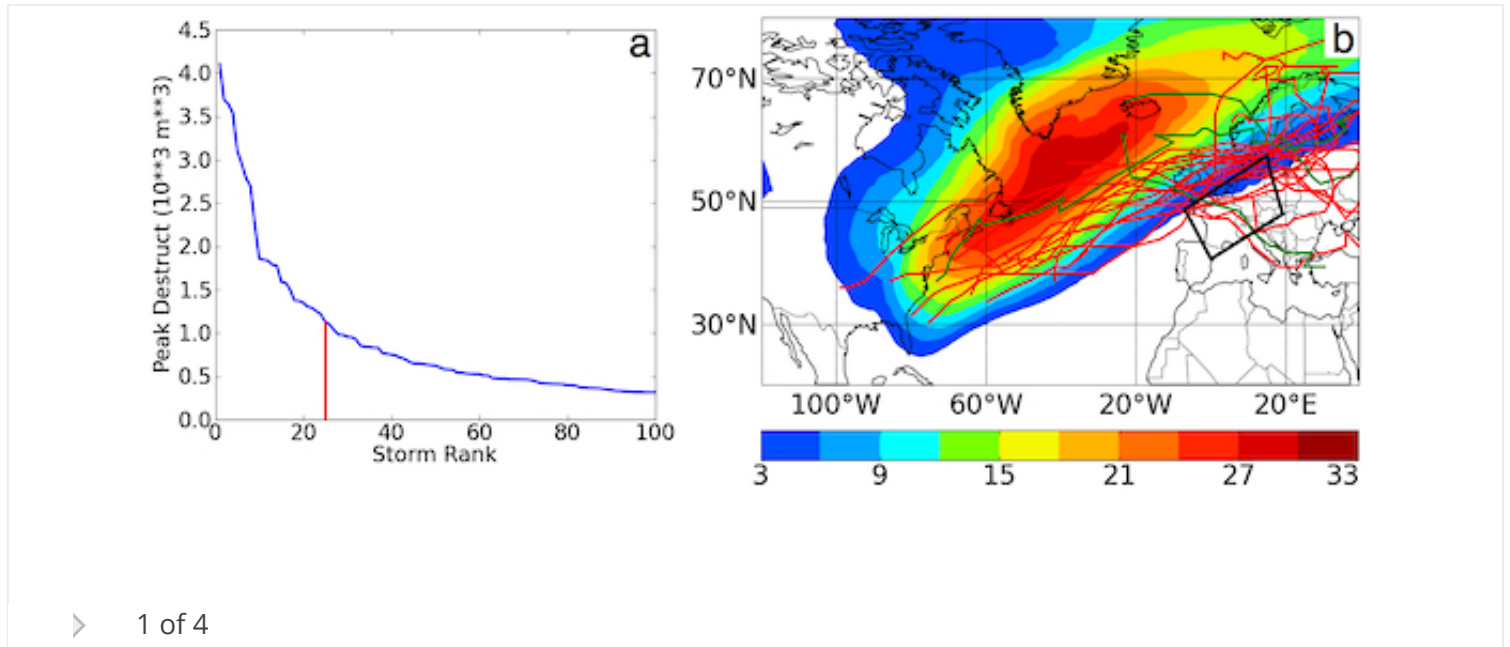
The role of large-scale atmospheric flow and Rossby wave breaking in the evolution of extreme windstorms over Europe

John Hanley, Rodrigo Caballero

First Published: 8 November 2012 Vol: 39, L21708 | DOI: 10.1029/2012GL053408

KEY POINTS

- 22 of the top 25 most destructive European windstorms have a similar evolution
- They occur during exceptionally persistent, high NAO events which shift eastward
- These conditions can be dynamically interpreted using Rossby wave breaking



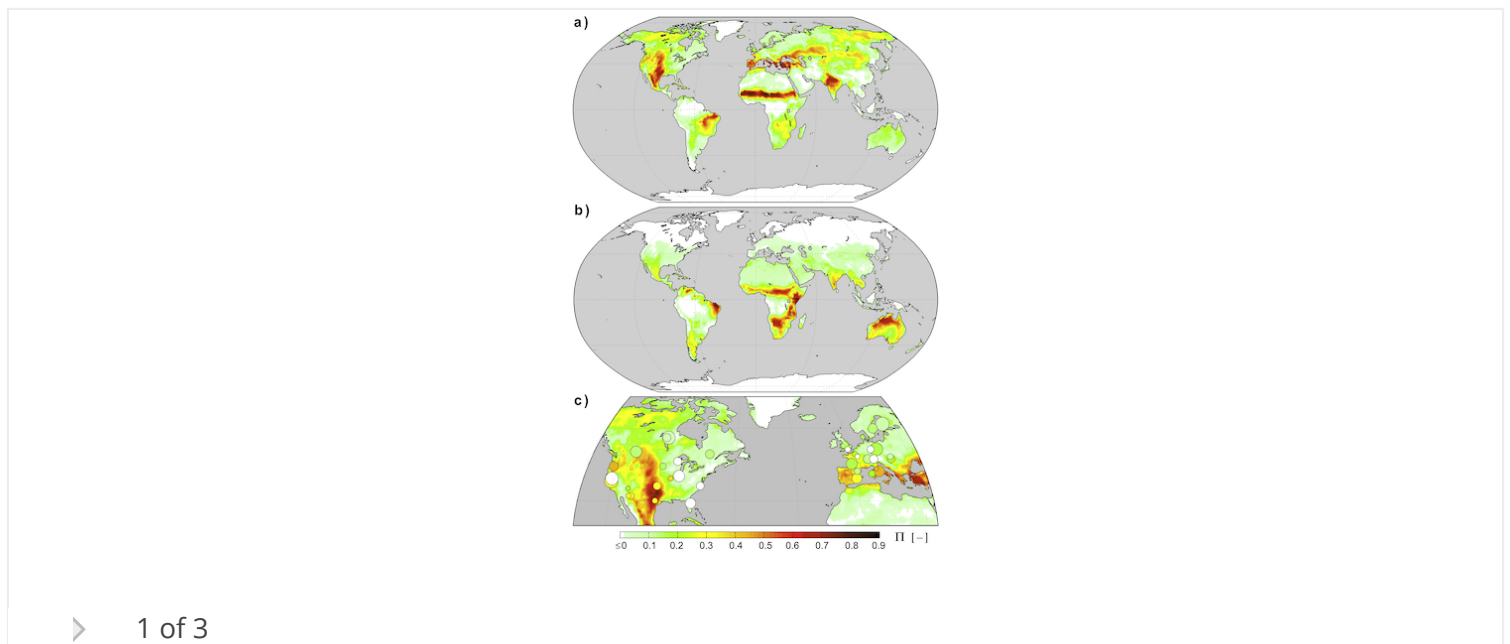
Soil moisture-temperature coupling: A multiscale observational analysis

D. G. Miralles, M. J. van den Berg, A. J. Teuling, R. A. M. de Jeu

First Published: 6 November 2012 Vol: 39, L21707 | DOI: 10.1029/2012GL053703

KEY POINTS

- Soil moisture-temperature coupling at different timescales using new diagnostic
- New field of global satellite evaporation to study land-atmosphere interaction
- Transitional climate zones as hotspots and variable coupling during heatwaves



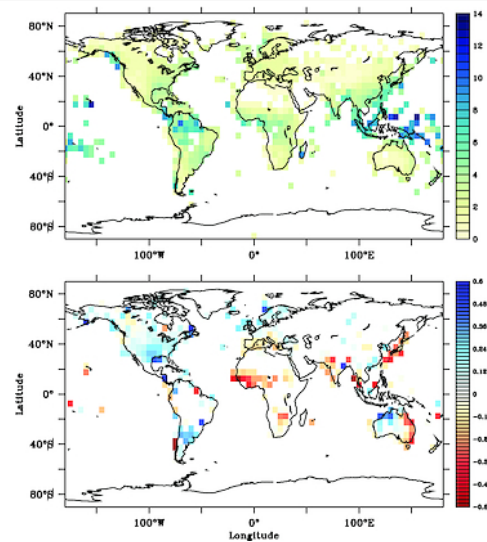
Fingerprints of changes in annual and seasonal precipitation from CMIP5 models over land and ocean

Beena Balan Sarojini, Peter A. Stott, Emily Black, Debbie Polson

First Published: 3 November 2012 Vol: 39, L21706 | DOI: 10.1029/2012GL053373

KEY POINTS

- Humans have increased global and regional precipitation over land and oceans
- The greatest moistening has occurred in the Arctic and north subtropical oceans
- Observed global and regional trends could be misleading due to sparse coverage



> 1 of 3

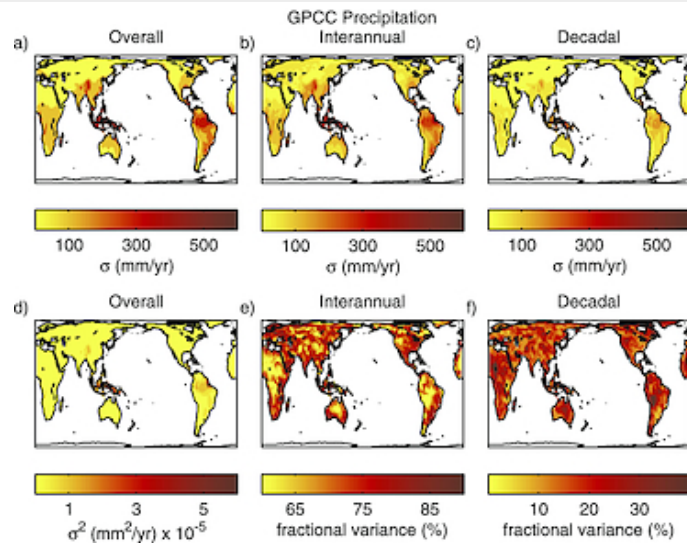
The amplitude of decadal to multidecadal variability in precipitation simulated by state-of-the-art climate models

T. R. Ault, J. E. Cole, S. St. George

First Published: 3 November 2012 Vol: 39, L21705 | DOI: 10.1029/2012GL053424

KEY POINTS

- Decadal to multidecadal (D2M) variability is prominent in observed precipitation
- CMIP5 simulations underestimate the amplitude of D2M precipitation variability
- Projected risks of prolonged droughts and pluvials may also be underestimated



> 1 of 3

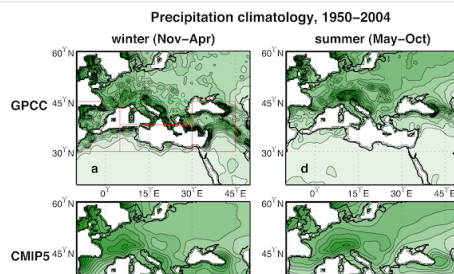
Mediterranean precipitation climatology, seasonal cycle, and trend as simulated by CMIP5

Colin Kelley, Mingfang Ting, Richard Seager, Yochanan Kushnir

First Published: 2 November 2012 Vol: 39, L21703 | DOI: 10.1029/2012GL053416

KEY POINTS

- The new CMIP5 models are slightly improved in simulation of climatology
- The new models underestimate the annual cycle of precipitation and its trend
- External forcing is more dominant in the eastern Mediterranean



> 1 of 3

Decadal variability of the NAO: Introducing an augmented NAO index

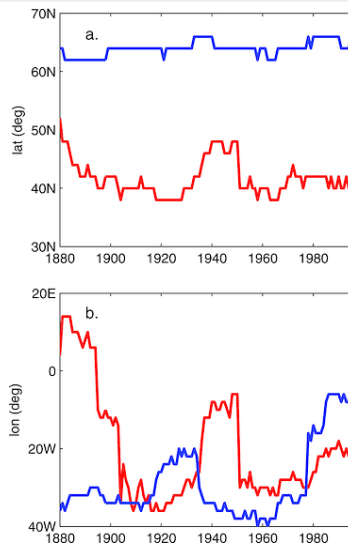
Y.-H. Wang, Gudrun Magnusdottir, H. Stern, X. Tian, Y. Yu

First Published: 2 November 2012 Vol: 39, L21702 | DOI: 10.1029/2012GL053413

KEY POINTS

- The centers of action of the NAO can be seen to shift on decadal time scales
- The Angle index describes the relative location of the NAO centers of action

- The Angle index gives added information over the smooth NAO index



➤ 1 of 5

The fingerprint of human-induced changes in the ocean's salinity and temperature fields

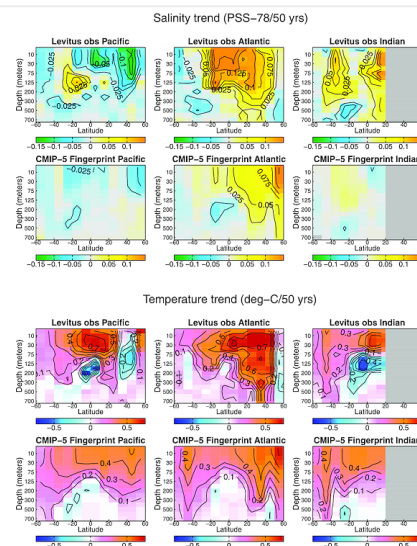
David W. Pierce, Peter J. Gleckler, Tim P. Barnett, Benjamin D. Santer, Paul J. Durack

First Published: 2 November 2012 Vol: 39, L21704 | DOI: 10.1029/2012GL053389

KEY POINTS

- Climate change has altered the salinity field of the world's oceans
- Changes match model predictions over the top 125 m
- The signal is even stronger when salinity is taken jointly with temperature

Highlight



➤ 1 of 3

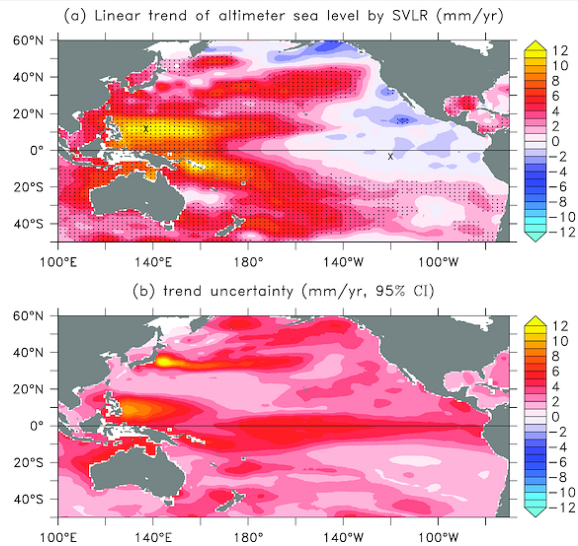
Sea level trends, interannual and decadal variability in the Pacific Ocean

Xuebin Zhang, John A. Church

First Published: 1 November 2012 Vol: 39, L21701 | DOI: 10.1029/2012GL053240

KEY POINTS

- Sea level linear trend over short period is complicated by climate variability
- We separate interannual and decadal sea level variability from trend in Pacific
- Decadal sea level variability can be erroneously aliased into sea level trend



➤ 1 of 4

Oceans

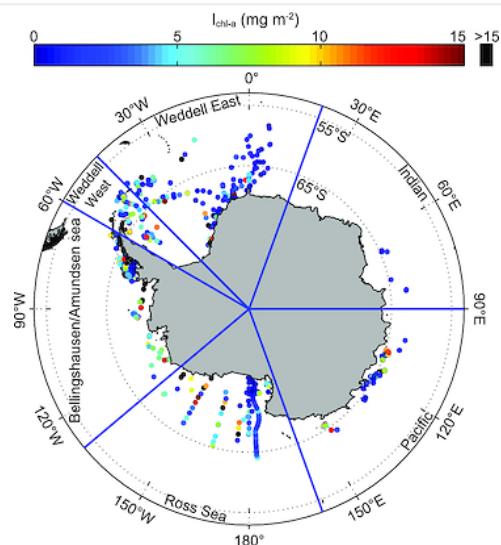
Chlorophyll *a* in Antarctic sea ice from historical ice core data

K. M. Meiners, M. Vancoppenolle, S. Thanassekos, G. S. Dieckmann, D. N. Thomas, J.-L. Tison, K. R. Arrigo, D. L. Garrison, A. McMinn, D. Lannuzel, et al

First Published: 10 November 2012 Vol: 39, L21602 | DOI: 10.1029/2012GL053478

KEY POINTS

- Antarctic sea ice chlorophyll *a* shows maxima in early spring and late summer
- Surface, internal and bottom ice layers contribute equally to integrated biomass
- The vertical distribution of chlorophyll *a* critically depends on ice thickness



➤ 1 of 3

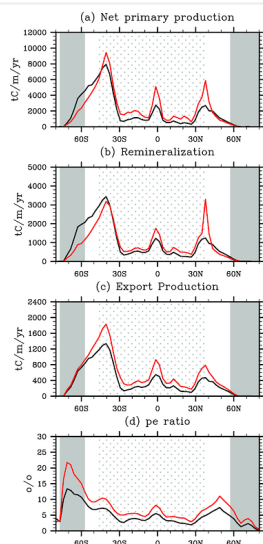
Temperature-induced marine export production during glacial period

M. O. Chikamoto, A. Abe-Ouchi, A. Oka, S. Lan Smith

First Published: 8 November 2012 Vol: 39, L21601 | DOI: 10.1029/2012GL053828

KEY POINTS

- Phytoplankton growth and remineralization are sensitive to glacial cooling
- Less remineralization than production in polar region enhances export production
- High export production can be simulated even under glacial stratified conditions



➤ 1 of 3

Planets

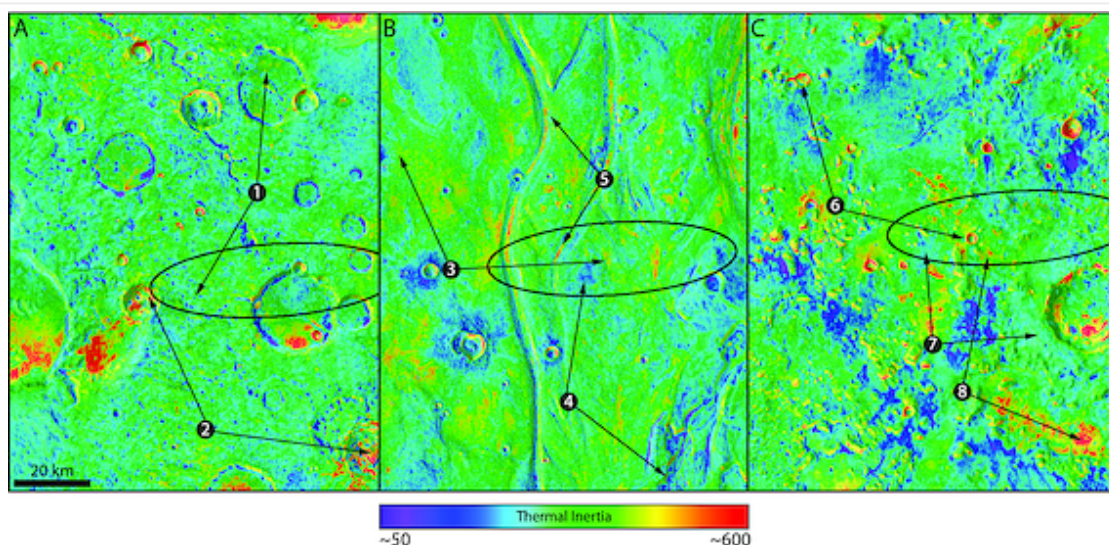
Visible and thermal infrared observations of the Martian surface during three Phobos shadow transits

Sylvain Piqueux, Philip R. Christensen

First Published: 14 November 2012 Vol: 39, L21203 | DOI: 10.1029/2012GL053352

KEY POINTS

- THEMIS VIS and IR observations of 3 Phobos transits show no surface cooling
- Thermal modeling requires that the top material is coarser than dust
- No surface dust is consistent with other remote sensing techniques



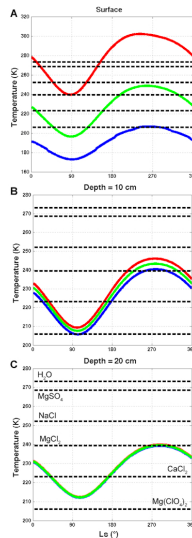
Formation of recurring slope lineae by liquid brines on present-day Mars

Vincent F. Chevrier, Edgard G. Rivera-Valentin

First Published: 10 November 2012 Vol: 39, L21202 | DOI: 10.1029/2012GL054119

KEY POINTS

- Melting of salt-ice mixtures forms liquids on Mars in sufficient amounts
- These melts can accumulate in the subsurface in the summer to form flow features
- Rapid evaporation and freezing makes these features small scale and seasonal



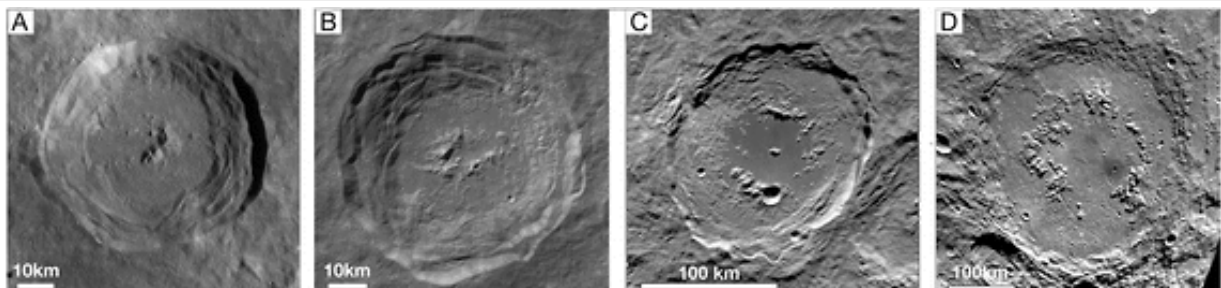
Investigating the transition from central peak to peak-ring basins using central feature volume measurements from the Global Lunar DTM 100 m

Veronica J. Bray, Corwin Atwood-Stone, Alfred M. McEwen

First Published: 3 November 2012 Vol: 39, L21201 | DOI: 10.1029/2012GL053693

KEY POINTS

- Peak and peak ring volumes show similar trends
- Volume data better support peak-collapse model of peak-ring formation
- Some peak-ring volume is hidden by inner crater melt and other infill



Solid Earth

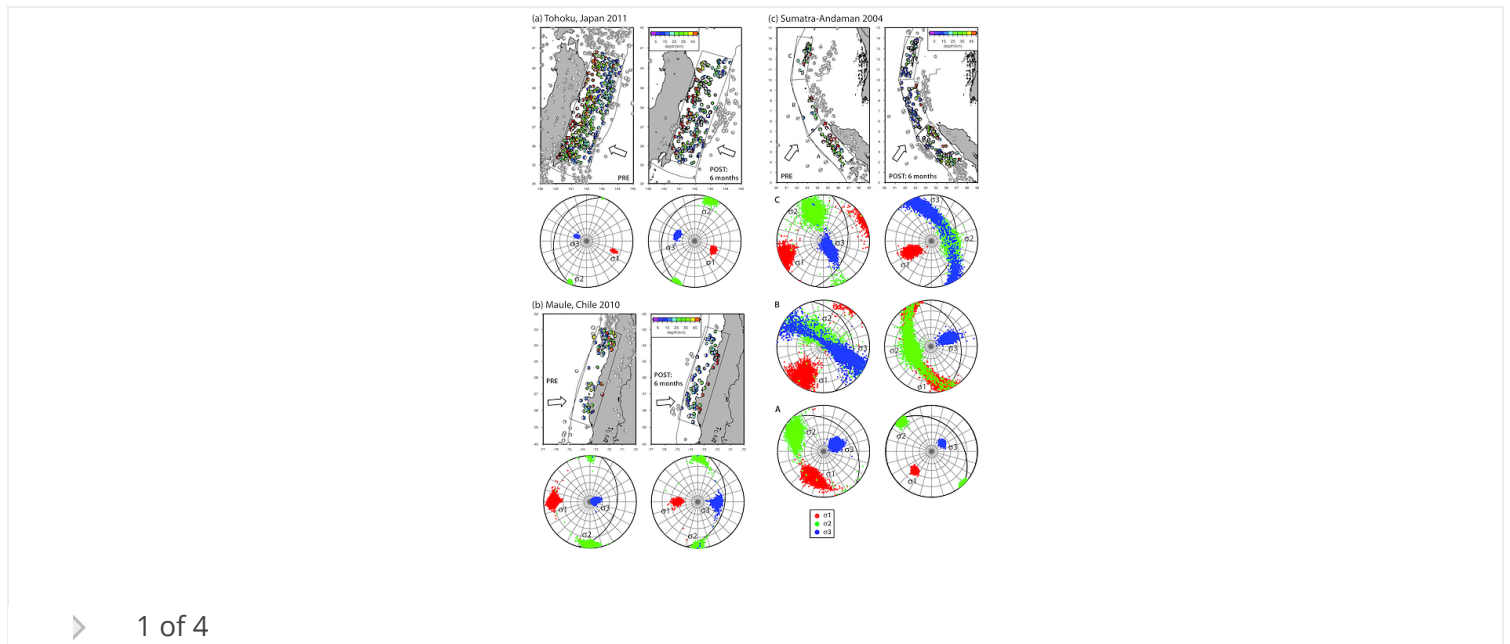
Coseismic and postseismic stress rotations due to great subduction zone earthquakes

Jeanne L. Hardebeck

First Published: 14 November 2012 Vol: 39, L21313 | DOI: 10.1029/2012GL053438

KEY POINTS

- Subduction zone earthquakes cause coseismic and postseismic stress rotations
- Coseismic and postseismic stress rotations imply low stress and weak faults
- Post-mainshock stress field explains observed normal faulting aftershocks



Detecting hidden volcanic explosions from Mt. Cleveland Volcano, Alaska with infrasound and ground-coupled airwaves

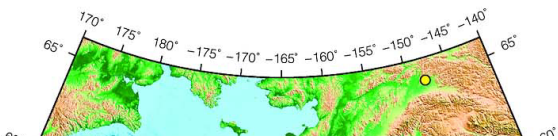
Silvio De Angelis, David Fee, Matthew Haney, David Schneider

First Published: 13 November 2012 Vol: 39, L21312 | DOI: 10.1029/2012GL053635

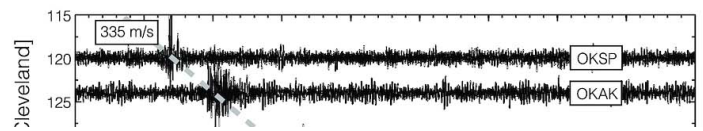
KEY POINTS

- Strong atmospheric ducts enhance long-range infrasound propagation
- Distant infrasonic detection are effective to monitor volcanoes
- Air-to-ground coupling of acoustic waves is observed at regional distances

(a)



(b)



> 1 of 3

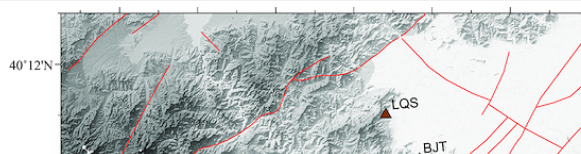
Comparisons of dynamic triggering near Beijing, China following recent large earthquakes in Sumatra

Jing Wu, Zhigang Peng, Weijun Wang, Xuan Gong, Qifu Chen, Chunquan Wu

First Published: 10 November 2012 Vol: 39, L21310 | DOI: 10.1029/2012GL053515

KEY POINTS

- The 2012 Mw8.6 Sumatra earthquake triggered in Beijing, but not the Mw8.2
- Amplitude and frequency content of the triggering waves control triggering
- The elapsed time since last trigger may affect the triggering potential



> 1 of 5

Precursory inflation of shallow magma reservoirs at west Sunda volcanoes detected by InSAR

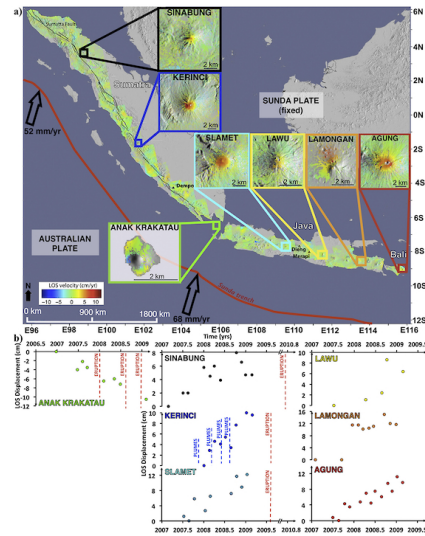
Estelle Chaussard, Falk Amelung

First Published: 10 November 2012 Vol: 39, L21311 | DOI: 10.1029/2012GL053817

KEY POINTS

- We present the first InSAR time-series survey covering an entire volcanic arc
- Unambiguous evidence of inflation of multiple arc volcanoes prior to eruptions

- Shallow magma reservoirs suggesting regional trends in magma storage



➤ 1 of 3

Challenges of anticipating the 2011 Tohoku earthquake and tsunami using coastal geology

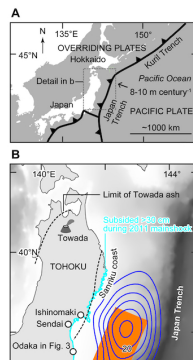
Yuki Sawai, Yuichi Namegaya, Yukinobu Okamura, Kenji Satake, Masanobu Shishikura

First Published: 9 November 2012 Vol: 39, L21309 | DOI: 10.1029/2012GL053692

KEY POINTS

- Even excellent geology can't lead conclusion of the largest possible earthquake
- These efforts showed recurrence intervals shorter than previously inferred
- Geological data for coastal subsidence aids in modeling source of AD869 tsunami

Highlight



➤ 1 of 4

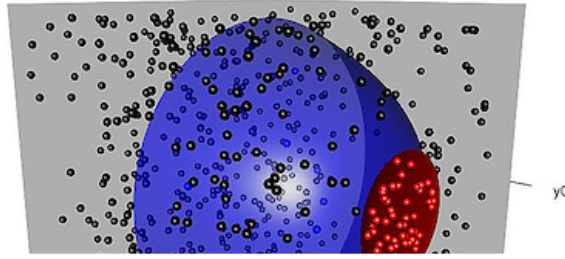
Seismicity precursors to large earthquakes unified in a stress accumulation framework

Arnaud Mignan

First Published: 8 November 2012 Vol: 39, L21308 | DOI: 10.1029/2012GL053946

KEY POINTS

- All seismicity precursors can be explained by static stress accumulation
- Coupling of different precursory patterns or non-occurrence of any is possible
- Microseismicity is crucial in the emergence of precursory patterns



> 1 of 3

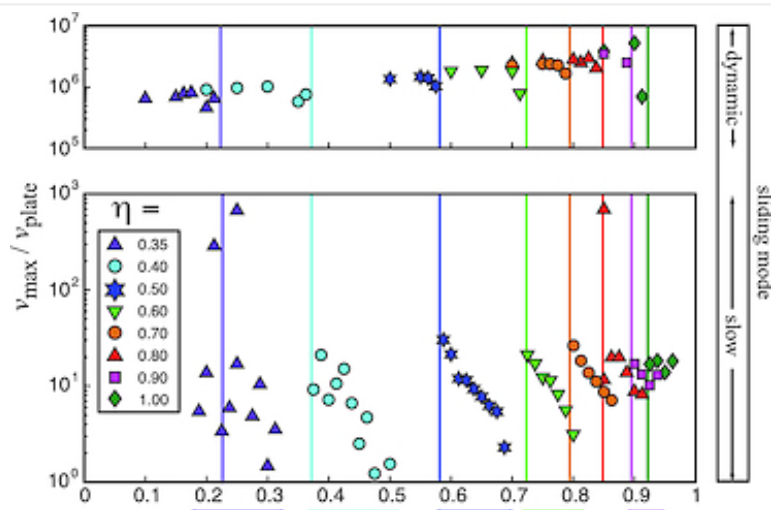
Geologic heterogeneity can produce aseismic slip transients

R. M. Skarbek, A. W. Rempel, D. A. Schmidt

First Published: 7 November 2012 Vol: 39, L21306 | DOI: 10.1029/2012GL053762

KEY POINTS

- Aseismic slip is produced by a balance between frictional heterogeneities
- Varying the abundance of heterogeneities produces stable, slow, or fast sliding
- Model stability is well described by a double spring-slider system



> 1 of 4

KEY POINTS

- Tensional bulk strength of rock is much lower than laboratory estimates
- New method to estimate bulk strength of rocks is presented
- InSAR observations used to derive 3D displacement and strain

> 1 of 4

Supershear rupture on multiple faults for the M_w 8.6 Off Northern Sumatra, Indonesia earthquake of April 11, 2012

Dun Wang, Jim Mori, Takahiko Uchide

First Published: 7 November 2012 Vol: 39, L21307 | DOI: 10.1029/2012GL053622

KEY POINTS

- This is one of the most complicated earthquakes, with 4 separate faults
- The rupture speed is faster than local S-wave velocity
- Some oceanic events with fast speeds may have been overlooked in the past

> 1 of 4

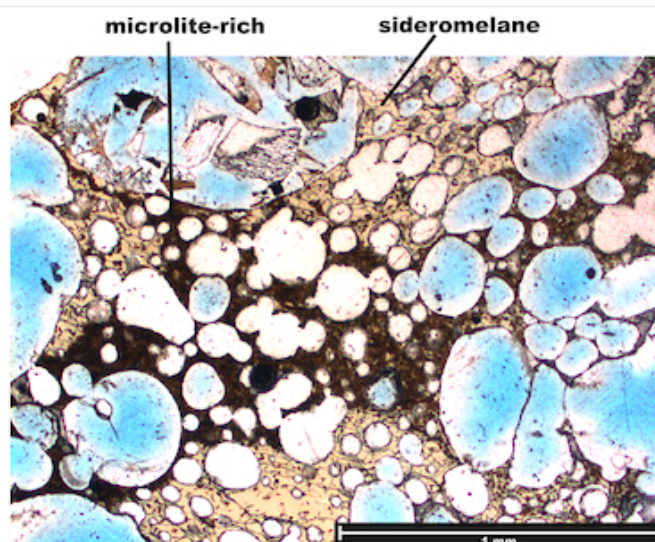
Shallow magma-mingling-driven Strombolian eruptions at Mt. Yasur volcano, Vanuatu

Simon Kremers, Yan Lavallée, Jonathan Hanson, Kai-Uwe Hess, Magdalena Oryaëlle Chevrel, Joachim Wassermann, Donald B. Dingwell

First Published: 7 November 2012 Vol: 39, L21304 | DOI: 10.1029/2012GL053312

KEY POINTS

- We sampled the eruptive products of Strombolian activity at Mt. Yasur
- First observation of multiple glass transition peaks in a homogeneous sample
- The multiple peaks can be explained by the bimodal oxidation state of iron



> 1 of 3

Effect of grain size distribution on the development of compaction localization in porous sandstone

Cecilia S. N. Cheung, Patrick Baud, Teng-fong Wong

First Published: 6 November 2012 Vol: 39, L21302 | DOI: 10.1029/2012GL053739

KEY POINTS

- Grain size distribution is key parameter controlling compaction localization
- Elucidating process inhibits strain localization in a poorly sorted rock
- Our laboratory results in good agreement with recent field analysis

Amorphization of quartz by friction: Implication to silica-gel lubrication of fault surfaces

Yu Nakamura, Jun Muto, Hiroyuki Nagahama, Ichiko Shimizu, Takashi Miura, Ichiro Arakawa

First Published: 6 November 2012 Vol: 39, L21303 | DOI: 10.1029/2012GL053228

KEY POINTS

- Frictional strength of quartz was reduced by amorphization and hydration
- Velocity-weakening occurred at aseismic slip rates under low normal stresses
- Detailed amorphization process was clarified by Raman spectroscopic imaging

“Equator Crossing” of Shatsky Rise?: New insights on Shatsky Rise tectonic motion from the downhole magnetic architecture of the uppermost lava sequences at Tamu Massif

Masako Tominaga, Helen F. Evans, Gerardo Iturrino

First Published: 3 November 2012 Vol: 39, L21301 | DOI: 10.1029/2012GL052967

KEY POINTS

- Visualization of the volcanic plateau formation and the plate motion over time
- Documentation of a new insight on the plateau formation using magnetic logging
- Determining the hemisphere origin, timing of volcanism, and plateau motion

Space Sciences

D region meteoric smoke and neutral temperature retrieval using the poker flat incoherent scatter radar

J. T. Fentzke, V. Hsu, C. G. M. Brum, I. Strelnikova, M. Rapp, M. Nicolls

First Published: 15 November 2012 Vol: 39, L21102 | DOI: 10.1029/2012GL053841

KEY POINTS

- First meteor smoke and Tn variability at high latitude derived by HPLA radar
- Observational evidence needed for PMC and microphysics of ice particle formation
- New technique for height resolved daytime neutral temperatures at the mesopause

Gravity waves in the thermosphere during a sudden stratospheric warming

Erdal Yiğit, Alexander S. Medvedev

First Published: 7 November 2012 Vol: 39, L21101 | DOI: 10.1029/2012GL053812

KEY POINTS

- Gravity wave effects are modeled during a stratospheric warming
- Gravity wave activity and drag increase dramatically in the thermosphere
- Gravity wave effects in the thermosphere are extremely variable during an SSW

The Cryosphere

Seasonal forecasts of Arctic sea ice initialized with observations of ice thickness

R. Lindsay, C. Haas, S. Hendricks, P. Hunkeler, N. Kurtz, J. Paden, B. Panzer, J. Sonntag, J. Yungel, J. Zhang
First Published: 8 November 2012 Vol: 39, L21502 | DOI: 10.1029/2012GL053576

KEY POINTS

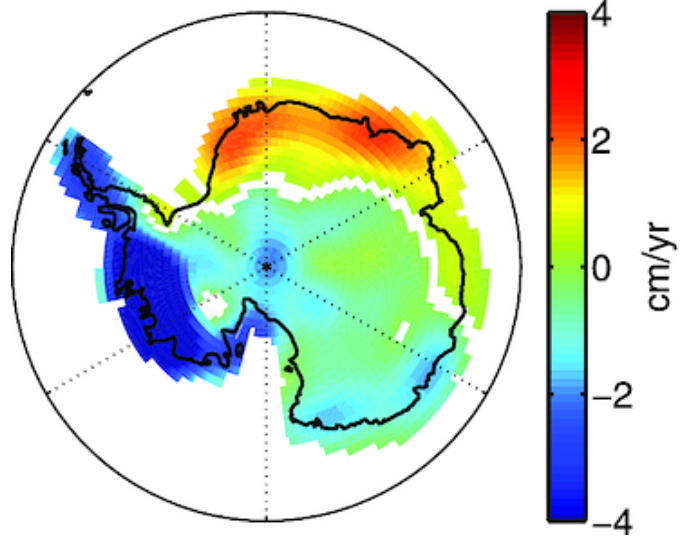
- New ice thickness observations are now available in near real time
- These observations can be used to improve seasonal sea ice prediction efforts
- Even with the new observations there is large uncertainty in ice predictions

Snowfall-driven mass change on the East Antarctic ice sheet

Carmen Boening, Matthew Lebsock, Felix Landerer, Graeme Stephens
First Published: 2 November 2012 Vol: 39, L21501 | DOI: 10.1029/2012GL053316

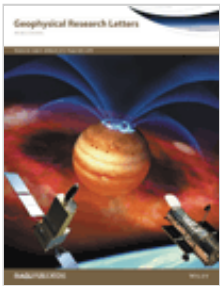
KEY POINTS

- Mass increase (GRACE) equal to snow accumulation (CloudSat)
- Unprecedented snowfall events in over 3 decades
- Snowfall associated with anomalous wind patterns



> 1 of 3

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