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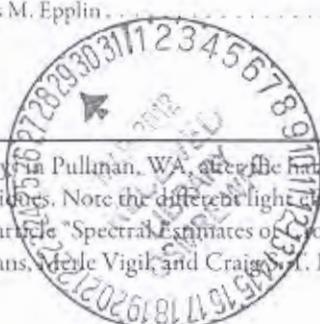
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*Cover:* The experimental plots (Cook Agronomy Farm, Washington State University) in Pullman, WA, after the harvest season of 2010 depicts the complexity of remotely assessing the landscape in terms of crop residues. Note the different light effects due to cloud shadow plus the different crops then the different positions of the stubbles. See the article "Spectral Estimates of Crop Residue Cover and Density for Standing and Flat Wheat Stubble," by Jonathan Aguilar, Robert Evans, Merle Vigil, and Craig S. Daughtry, pages 271–279. Photo credit: Jonathan Aguilar.



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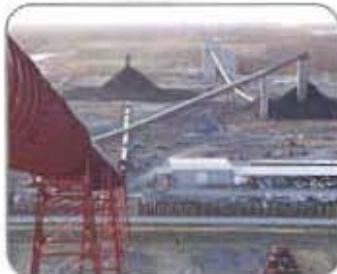
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# THIS ISSUE

*In addition to the annual U.S. longwall census, which provides technical details on some of America's most productive underground mines, Coal Age also offers an eye-opening report on the decaying infrastructure along the Ohio River. The Ohio River is a major coal artery and a major blockage could give the grid a stroke.*



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# EARTH

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## FEATURE

### DANGER IN PARADISE

The hidden hazards of volcano geotourism

Globally, injuries and deaths at volcanoes are on the increase, driven by the rise in popularity of touring active volcanoes, from Japan to Hawaii to Costa Rica to Italy. Surprisingly, lava is not usually to blame.

Sara E. Pratt



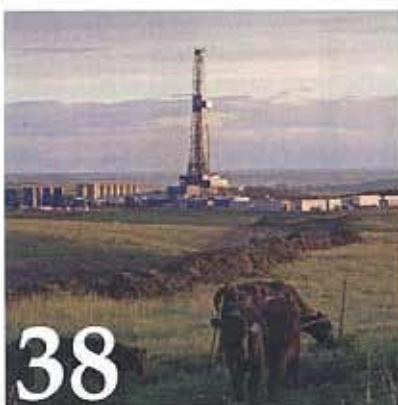
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## FEATURE

### MANAGING THE SEISMIC RISK POSED BY WASTEWATER DISPOSAL

Earthquakes can be triggered by the injection of wastewater underground. But with proper planning, monitoring and response, the associated risks can be effectively managed.

Mark D. Zoback



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## FEATURE

### TRAVELS IN GEOLOGY:

Chile: Exploring the Archaeology, Volcanoes and Hot Springs of the Northern Atacama Desert

Although some regions of the Atacama are stark and barren, the northern section of this vast desert contains diverse ecosystems, a rich archaeological history and intriguing geologic features.

John Van Hoesen



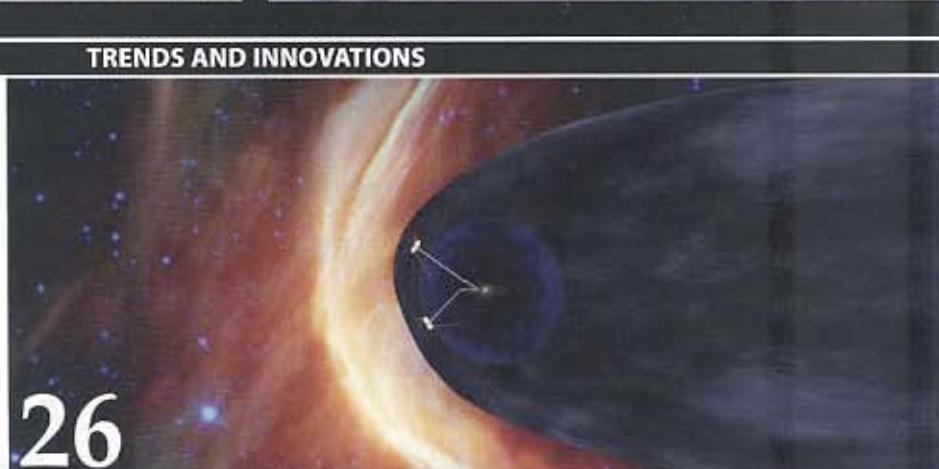
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### VOYAGER 1: Probing the Limits of the Solar System

The two Voyager spacecraft have been exploring the reaches of outer space for decades, teaching us about the outer planets. Now they are uncovering secrets of the heliopause, the region that marks the boundary between the solar system and interstellar space.

Harvey Leifert



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**ON THE COVER:** Geoscience students from Lillestrøm high school in Norway watch the 2010 eruption of Eyjafjallajökull volcano in Iceland from a safe distance, as determined by geologists. Lillestrøm geoscience students travel to Iceland every year to study the geology, learning about plate tectonics, plate spreading, hot spots, volcanic systems, glaciers and earthquakes. Photo is courtesy of Helene Eide.

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**THE GIVING SEA**

Following the lead of Shel Silverstein, who wrote the touching tale "The Giving Tree" in 1964, the authors wrote a similar story about the Giving Sea. Will the oceans give all before we realize what we've taken?

**Sheril Kirshenbaum and Michael E. Webber**

**72 GEOLOGIC COLUMN**

**A STEP FURTHER: FLYING, WRITING, GEOLOGIZING, PHOTOGRAPHING ... AND iPADING?**

The author has been covering geology for years using an airplane, camera and pen and paper (and more recently, a computer). But an iPad? Where does that contraption fit in?

**Michael Collier**

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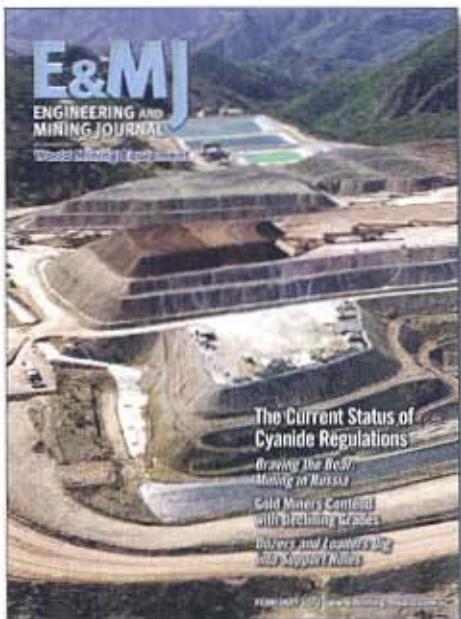
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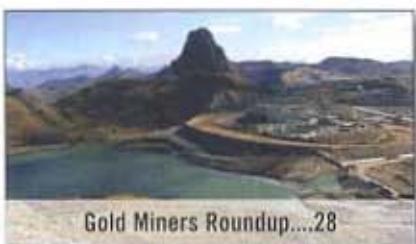
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This month E&MJ covers the gold mining business. An annual roundup provides useful information on gold mining companies while an article on cyanide provides an update on the current status of regulations. On the cover, gold ore is stacked on a leach pad at the Alamos mine. (Photo courtesy of Alamos Gold)

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ENGINEERING AND  
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*World Mining Equipment*

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—Mobile Carrier Allows  
Miners to Move Rigs Quickly  
Tips for Fleet Management  
Aluminum Markets Encounter  
Structural Shifts  
Chile Maintains its Position  
as a Mining Leader

MARCH 2012 | www.mining-media.com

A well-known contract drilling company conducting exploration core drilling at a large Canadian mine was able to increase its drilling footage per year simply by mounting its rig on a wheeled carrier, thus significantly reducing the time spent on relocating the rig and its ancillary equipment from one area to another. See article on p. 81. (Photo courtesy of Atlas Copco)

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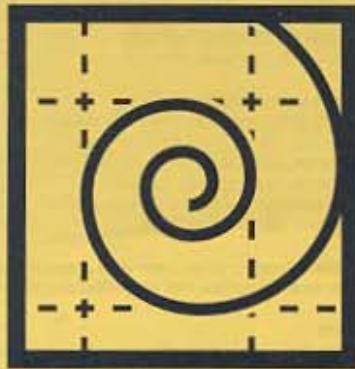


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Cover illustration by Richard Demler / ENR



Midwest span nears green light. Page 12

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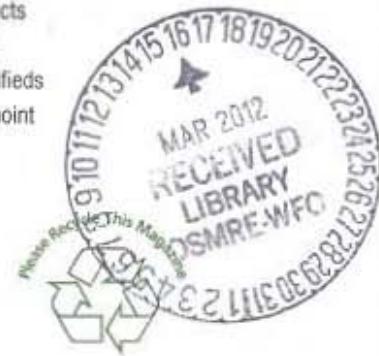
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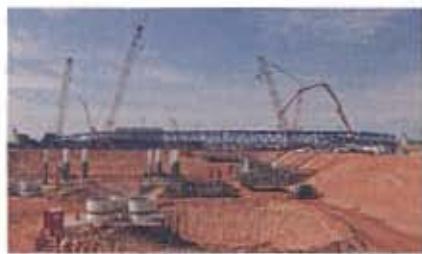
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Special Issue

European Coal Conference 2010

edited by

Dierk Juch<sup>a</sup> and Ralf Littke<sup>b</sup><sup>a</sup>Krefeld, Germany<sup>b</sup>Aachen, Germany

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# EXPLOSIVES ENGINEERING

Volume 29 Number 2

March/April 2012

## FEATURES

**1 Call for Papers**

ISEE's Conference Program Committee has issued its Call for Papers for the 39th Annual Conference in Ft. Worth, TX.

**6 Oversize Reduction Project at the Iron Ore Company of Canada**

The Mining and Operations Department at the Iron Ore Company of Canada expressed an interest in reducing the amount of oversize material and its downstream effects including in-pit sorting and reduction, damage to mobile equipment, and significant delays in the loading pockets and the primary crushers. To achieve this goal an oversize reduction project was undertaken. This article describes the steps taken and subsequent improvements.

**16 Highlights of the 38th Annual Conference in Nashville, Tennessee**

**34 Full-Scale Trials Involving the Open Detonation of Large Bombs Close to Structures**

To commemorate the 70th anniversary of the London Blitz, a television series was commissioned that required the open detonation of World War II equivalent bombs close to purpose built structures constructed using period design and materials. The structures were built on a remote test facility in the North of England that is able to fire large quantities of explosive in the air. This article details the monitoring undertaken and the resulting structural damage. The levels of air overpressure generated are also analyzed to validate the open detonation prediction curves given in the ISEE Blasters' Handbook.

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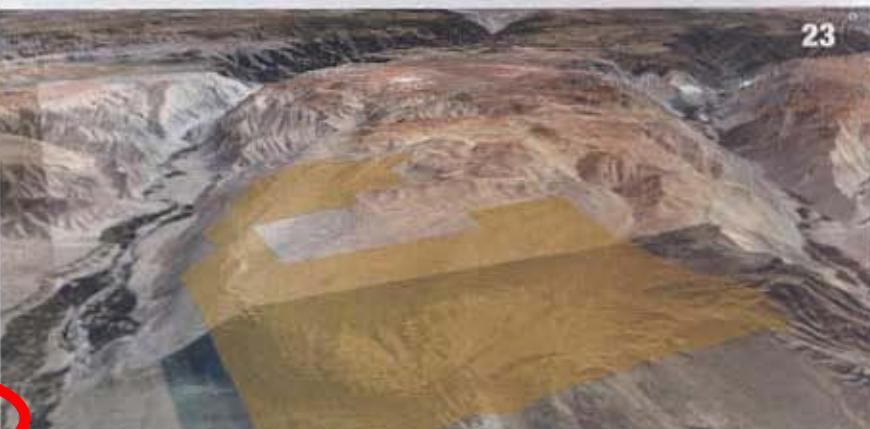


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*Cover art is from Jordan and Swan, this issue.*

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## Regular Articles

**W01501** *Athanassios Paschalidis, Peter Molnar, and Puerto Hurtado*

Temporal dependence structure in weights in a multiplicative cascade model for precipitation  
 (doi 10.1029/2011WR010679)

**W01502** *Rebecca L. Nelson*

Assessing local planning to control groundwater depletion: California as a microcosm of global issues  
 (doi 10.1029/2011WR010927)

**W01503** *A. Tilmant and W. Kinzelbach*

The cost of noncooperation in international river basins (doi 10.1029/2011WR011034)

**W01504** *Fiona Johnson and Ashish Sharma*

A nesting model for bias correction of variability at multiple time scales in general circulation model precipitation simulations (doi 10.1029/2011WR010464)

**W01505** *Davina Pollock and Olaf A. Cerpka*

Fully coupled hydrogeophysical inversion of a laboratory salt tracer experiment monitored by electrical resistivity tomography (doi 10.1029/2011WR010779)

**W01506** *Mark S. Raleigh and Jessica D. Lundquist*

Comparing and combining SWE estimates from the SNOW-17 model using PRISM and SWE reconstruction  
 (doi 10.1029/2011WR010542)

**W01507** *B. A. Forman, R. H. Reichle, and M. Rodell*

Assimilation of terrestrial water storage from GRACE in a snow-dominated basin (doi 10.1029/2011WR011219)

**W01508** *Martin Larsson, Auli Niemi, and Chin-Fu Tsang*

A study of flow-wetted surface area in a single fracture as a function of its hydraulic conductivity distribution  
 (doi 10.1029/2011WR010686)

**W01509** *A. Viglione, A. Castellarin, M. Rogger, R. Merz, and G. Blöschl*

Extreme rainstorms: Comparing regional envelope curves to stochastically generated events  
 (doi 10.1029/2011WR010515)

**W01510** *K. S. Barnhart and T. H. Illangasekare*

Automatic transport model data assimilation in Laplace space (doi 10.1029/2011WR010955)

**W01511** *Darren L. Fieldkin, Yichou Lin, Iris T. Stewart, and Edwin P. Maurer*

Development and application of a hydroclimatological stream temperature model within the Soil and Water Assessment Tool (doi 10.1029/2011WR011256)

**W01512** *B. Majone, C. I. Bovolo, A. Bellin, S. Blenkinsop, and H. J. Fowler*

Modeling the impacts of future climate change on water resources for the Gallego river basin (Spain)  
 (doi 10.1029/2011WR010985)

**W01513** *Fabio Santsacchi, Vladimir I. Nikora, and Jochen Aberle*

Plant patch hydrodynamics in streams: Mean flow, turbulence, and drag forces (doi 10.1029/2011WR011050)

**W01514** *A. Raoof and S. M. Hassanizadeh*

A new formulation for pore-network modeling of two-phase flow (doi 10.1029/2010WR010780)

**W01515** *Trenton E. Franz, Kelly K. Taylor, Elizabeth G. King, Jar M. Nordbotten, Michael A. Celia, and Ignacio Rodriguez-Iturbe*

An ecohydrological approach to predicting hillslope-scale vegetation patterns in dryland ecosystems  
 (doi 10.1029/2011WR010524)

**W01516** *Alexander N. Sakhnoddarov*

Structure of turbulent flow in a meander bend of a lowland river (doi 10.1029/2011WR010765)

**W01517** *John A. Christ, Kurt D. Pennell, and Linda M. Abriola*

Quantification of experimental subsurface fluid saturations from high-resolution source zone images  
 (doi 10.1029/2011WR010400)

**W01518** *E. Rigon, F. Comiti, and M. A. Lenzi*

Large wood storage in streams of the Eastern Italian Alps and the relevance of hillslope processes  
 (doi 10.1029/2010WR009854)

**W01519** *Diana I. Karwan and James E. Sauer*

Hypothetic exchange and streambed filtration of suspended particles (doi 10.1029/2011WR011173)

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 (doi 10.1029/2010WR010148)

**W01521** *Nina E. Kilham, Dar Roberts, and Michael B. Singer*

Remote sensing of suspended sediment concentration during turbid flood conditions on the Feather River, California—A modeling approach (doi 10.1029/2011WR010391)

**W01522** *Gabrielle J. M. De Lammer, Rolf H. Reichle, Kristi R. Arsenault, Paul H. Houser, Nujay Kumar, Niko E. C. Verhoest, and Valentijn R. N. Pauwels*

Multiscale assimilation of Advanced Microwave Scanning Radiometer–EOS snow water equivalent and Moderate Resolution Imaging Spectroradiometer snow cover fraction observations in northern Colorado  
 (doi 10.1029/2011WR010588)

**W01523** *William Kleiber, Richard W. Katz, and Balaji Rajagopalan*

Daily spatiotemporal precipitation simulation using latent and transformed Gaussian processes  
 (doi 10.1029/2011WR011105)

**W01524** *R. Arora, B. P. Mohanty, and J. T. McGuire*

Uncertainty in dual permeability model parameters for structured soils (doi 10.1029/2011WR010500)

**W01525** *Eric R. Lutz, Alan F. Hamlet, and Jeremy S. Litell*

Paleoreconstruction of cool season precipitation and warm season streamflow in the Pacific Northwest with applications to climate change assessments (doi 10.1029/2011WR010687)

**W01526** *Eric Laloy and Jasper A. Vrugt*

High-dimensional posterior exploration of hydrologic models using multiple-trial DREAM<sub>SM</sub> and high-performance computing (doi 10.1029/2011WR010608)

**W01527** *Jack A. Puleo, Thomas E. McKenna, K. Todd Holland, and Joseph Calantonio*

Quantifying riverine surface currents from time sequences of thermal infrared imagery (doi 10.1029/2011WR010770)

**Cover.** In-channel large wood is a fundamental component of aquatic ecosystems but it can represent a substantial hazard during flood events. Its storage in mountain basins shows tremendous variations, both spatially and temporally, and it has long been observed that colluvial processes, such as landslides and debris flows, are responsible for its recruitment in lower-order mountain streams. Rigon et al. (2012W01518) use analyses of extensive field measurements to understand the determinants of its storage and transport. The picture shows a debris-flow fan (center) formed in 2006 by a steep tributary entering the Upper Cordevole river in the Italian Alps. Several logs are still visible on the fan, but many were immediately transported downstream along the Cordevole river where log mobility is high due to its relative wide (compared to log length) channel section (photo by F. Comiti). See Rigon, Comiti, and Lenzi (W01518).



- W01528** *Jan Adamowski, Hiu Fung Chan, Shiv O. Prajher, Bogdan Ozga-Zielinska, and Anna Sliusarieva*  
Comparison of multiple linear and nonlinear regression, autoregressive integrated moving average, artificial neural network, and wavelet artificial neural network methods for urban water demand forecasting in Montreal, Canada  
(doi 10.1029/2010WR009945)
- W01529** *Audrey H. Sawyer, M. Bayani Cardenas, and Jim Battles*  
Hyporheic temperature dynamics and heat exchange near channel-spanning logs (doi 10.1029/2011WR011200)
- W01530** *B. J. Eck, M. E. Barrett, and R. J. Charbeneau*  
Fouilleulme flow in gently sloping layers: Application to drainage of porous asphalt (doi 10.1029/2011WR010837)
- W01531** *Markus Hofer, Peter Lehmann, Manfred Stähli, Stefan Seifert, and Manfred Krapfzyk*  
Two approaches to modeling the initiation and development of rills in a man-made catchment  
(doi 10.1029/2011WR010719)
- W01532** *J.-R. de Dreuzy, J. Carrera, M. Dentz, and T. Le Borgne*  
Asymptotic dispersion for two-dimensional highly heterogeneous permeability fields under temporally fluctuating flow (doi 10.1029/2011WR011129)
- W01533** *Robert Humphries, Jeremy G. Verditti, Lennard S. Sklar, and John K. Wooster*  
Experimental evidence for the effect of hydrographs on sediment pulse dynamics in gravel-bedded rivers  
(doi 10.1029/2011WR010419)
- W01534** *Vinod Mahat and David G. Tarboton*  
Canopy radiation transmission for an energy balance snowmelt model (doi 10.1029/2011WR010438)
- W01535** *Seth Westra, Rajeshwar Mehrotra, Ashish Sharma, and Ratnasingham Srikanthan*  
Continuous rainfall simulation: 1. A regionalized subdaily disaggregation approach (doi 10.1029/2011WR010489)
- W01536** *Rajeshwar Mehrotra, Seth Westra, Ashish Sharma, and Ratnasingham Srikanthan*  
Continuous rainfall simulation: 2. A regionalized daily rainfall generation approach (doi 10.1029/2011WR010490)
- W01537** *Liangping Li, Haiyan Zhou, Harry-Jan Hendricks Franssen, and J. Jaime Gómez-Hernández*  
Modeling transient groundwater flow by coupling ensemble Kalman filtering and upscaling  
(doi 10.1029/2010WR010214)
- W01538** *Ramon C. Naranga, Richard G. Newwanger, Mark Stone, Clinton Davis, and Alan McKay*  
The use of multiobjective calibration and regional sensitivity analysis in simulating hyporheic exchange  
(doi 10.1029/2011WR011179)
- W01539** *Duan Herckenrath, Esben Auker, Lars Christiansen, Ahmad A. Behroozmand, and Peter Bauer-Gottwein*  
Coupled hydrogeophysical inversion using time-lapse magnetic resonance sounding and time-lapse gravity data for hydraulic aquifer testing: Will it work in practice? (doi 10.1029/2011WR010411)
- W01540** *Tongtiegang Zhao, Dawen Yang, Ximing Cai, Jianshi Zhao, and Hao Wang*  
Identifying effective forecast horizon for real-time reservoir operation under a limited inflow forecast  
(doi 10.1029/2011WR010623)
- W01541** *E. M. Yager, W. E. Dietrich, J. W. Kirchner, and R. W. McArden*  
Prediction of sediment transport in step-pool channels (doi 10.1029/2011WR010829)
- W01542** *Delphine Roubinet, J.-R. de Dreuzy, and Daniel M. Tartakovsky*  
Semi-analytical solutions for solute transport and exchange in fractured porous media (doi 10.1029/2011WR011168)
- W01543** *N. Kleinfelder-Domelle and J. H. Cushman*  
The role of connectivity in the theory of saturated/unsaturated flow through swelling media  
(doi 10.1029/2011WR011612)
- W01544** *Piotr K. Kuras, Younes Alia, and Markus Weller*  
Forest harvesting effects on the magnitude and frequency of peak flows can increase with return period  
(doi 10.1029/2011WR010705)
- W01545** *Kevan B. Moffett and Steven M. Gorelick*  
A method to calculate heterogeneous evapotranspiration using submeter thermal infrared imagery coupled to a stomatal resistance submodel (doi 10.1029/2011WR010407)
- W01546** *John D. Pisaniello, Joanne Tingey-Holyoak, and Roger L. Burrill*  
Appropriate small dam management for minimizing catchment-wide safety threats: International benchmarked guidelines and demonstrative cases studies (doi 10.1029/2011WR011155)

- W01547** *T. J. Sullivan, B. J. Cosby, C. T. Driscoll, T. C. McDonnell, A. T. Herlihy, and D. A. Burns*  
Target loads of atmospheric sulfur and nitrogen deposition for protection of acid sensitive aquatic resources in the Adirondack Mountains, New York (doi 10.1029/2011WR011171)

## Technical Notes

- W01601** *A. Chandhuri, H. Rajaram, and H. Viswanathan*  
Fracture alteration by precipitation resulting from thermal gradients: Upscaled mean aperture-effective transmissivity relationship (doi 10.1029/2011WR010983)

## Commentaries

- W01801** *Keith J. Beven and Hannah L. Cloke*  
Comment on "Hyperresolution global land surface modeling: Meeting a grand challenge for monitoring Earth's terrestrial water" by Eric F. Wood et al. (doi 10.1029/2011WR010982)  
*Eric F. Wood, Joshua K. Roundy, Tara J. Troy, Rens van Beek, Marc Bierkens, Eleanor Blyth, Ad de Roo, Petra Döll, Mike Ek, James Famiglietti, David Gochis, Nick van de Giesen, Paul Houser, Peter Jaffé, Stefan Kollet, Bernhard Lehner, Dennis P. Lettenmaier, Christa D. Peters-Lidard, Murugesu Sivapalan, Justin Sheffield, Andrew J. Wade, and Paul Whitehead*
- W01802** Reply to comment by Keith J. Beven and Hannah L. Cloke on "Hyperresolution global land surface modeling: Meeting a grand challenge for monitoring Earth's terrestrial water" (doi 10.1029/2011WR011202)

## Special Sections in Progress

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