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**Source limitation of carbon gas emissions in high-elevation mountain streams and lakes**

Photograph of Black Lake illustrating the high topographic relief and lack of organic matter sources in high-elevation catchments.


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## RESEARCH ARTICLES

**Comparison of the data-driven top-down and bottom-up global terrestrial CO<sub>2</sub> exchanges: GOSAT CO<sub>2</sub> inversion and empirical eddy flux upscaling** 1

Masayuki Kondo, Kazuhito Ichii, et al

First Published: 16 July 2015

## KEY POINTS

- Data-driven top-down and bottom-up global CO<sub>2</sub> exchange estimates were compared
- Seasonality of CO<sub>2</sub> exchange by the two approaches agreed in Northern Hemisphere
- Seasonality of CO<sub>2</sub> exchange showed large differences in Southern Hemisphere

## RESEARCH ARTICLES

**The relative influence of land cover, hydrology, and in-stream processing on the composition of dissolved organic matter in boreal streams** 2

Dolly N. Kothawala, Xing Ji, et al

First Published: 6 August 2015

## KEY POINTS

- Land cover has a dominating influence on the composition of stream DOM
- Hydrological controls on stream DOM composition are minor
- There was no evidence of in-stream transformations to DOM composition

## RESEARCH ARTICLES

**Arctic Freshwater Synthesis: Summary of key emerging issues** 3

T. Prowse, A. Bring, et al

First Published: 3 October 2015

## KEY POINTS

- The domain of the Arctic Freshwater System is broader than previously thought
- New hydroecological regimes have developed in the Arctic Freshwater System
- New approaches are required to study changes in the Arctic Freshwater System

## REGULAR ARTICLES

**Analysis of daily, monthly, and annual burned area using the fourth-generation global fire emissions database (GFED4)** 4

Louis Giglio, James T. Randerson, et al

First Published: 22 March 2013

## KEY POINTS

- The area of the land surface burned annually has been decreasing since 2000.
- This trend is in part due to a decline in burning in Northern-Hemisphere Africa.
- The area burned in some regions has been increasing, however.

## RESEARCH ARTICLES

**Chesapeake Bay nitrogen fluxes derived from a land-estuarine ocean biogeochemical modeling system: Model description, evaluation, and nitrogen budgets** 5

Yang Feng, Marjorie A. M. Friedrichs, et al

First Published: 28 August 2015

## KEY POINTS

- A estuarine biogeochemical model was developed for Chesapeake Bay
- Interannually varying nitrogen fluxes were computed for 2001–2005
- N export to the shelf was mostly organic, even when DIN input was high

## RESEARCH ARTICLES

**Distinct patterns of microbial metabolism associated to riverine dissolved organic carbon of different source and quality** 6

Martin Berggren, Paul A. del Giorgio

First Published: 3 June 2015

## KEY POINTS

- Riverine DOC is associated to patterns in microbial metabolic responses
- These metabolic responses are strongly linked to both DOC quality and DOC source
- Changes in DOC source affect aquatic ecosystem functioning

## RESEARCH ARTICLES

**Abrupt shifts in phenology and vegetation productivity under climate extremes** 7

Xuanlong Ma, Alfredo Huete, et al

First Published: 21 October 2015

## KEY POINTS

- Climate extremes resulted in abrupt change in phenology and productivity
- Ecosystem sensitivity to hydroclimatic variations peaked in semiarid regions
- Drying trend in semiarid ecosystems will result in loss of carbon sink in future

## RESEARCH ARTICLES

**Interactive effects of wildfire and climate on permafrost degradation in Alaskan lowland forests** 8

Dana R. N. Brown, M. Torre Jorgenson, et al

First Published: 18 August 2015

## KEY POINTS

- Lowland forests are susceptible to ecosystem change if ice-rich permafrost thaws
- Fire can cause permafrost thaw, thaw settlement, and water impoundment
- Permafrost is now more vulnerable to thawing after fire due to climate warming

## RESEARCH ARTICLES

**Modeling actual evapotranspiration with routine meteorological variables in the data-scarce region of the Tibetan Plateau: Comparisons and implications** 9

Ning Ma, Yinsheng Zhang, et al

First Published: 22 August 2015

## KEY POINTS

- Routine meteorological variables aid ET<sub>a</sub> estimation in data-scarce region
- CR and Penman-Monteith approaches were evaluated against measured ET<sub>a</sub> in TP
- Nonlinear-CR model is preferred when measured ET<sub>a</sub> is unavailable

## RESEARCH ARTICLES

**Evaluating stomatal models and their atmospheric drought response in a land surface scheme: A multibiome analysis** 10

Jürgen Knauer, Christiane Werner, et al

First Published: 3 October 2015

## KEY POINTS

- Stomatal conductance models are evaluated against eddy covariance data
- Models give similar results across vegetation types
- Stomatal VPD response is important regardless of climatic conditions

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 21 Feb 2016  
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