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- PNAS: 网络分析揭示对溪水化学性质的多尺度控制
- Nature: 地下水枯竭可能引发地震
- 太湖等水环境质量演变规律研究获突破
- EPA 提出史上最大污染底泥清除计划
- 我国启动新一轮罗布泊大型科考活动
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Surveys in Geophysics：利用GPS改进全球水资源模型
太湖等水环境质量演变规律研究获突破
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蓝藻水华厌氧分解对湖泊微生物群落的影响研究获得进展

业界动态

UNESCO发布2014年世界水资源发展报告
EPA提出史上最大污染底泥清除计划
我国启动新一轮罗布泊大型科考活动
第四届中国湖泊论坛协办全国学会第一次协调会召开
国务院：实施江河治理骨干工程
“描绘地球”项目将预测变化的河流景观
湖北省全国首发湖泊管护白皮书
中德清洁水创新中心落户张江
三峡水位今年首次跌破158米
中意环保合作“湖南省洞庭湖富营养化防治技术项目”顺利通过验收
Network analysis reveals multiscale controls on streamwater chemistry


By coupling synoptic data from a basin-wide assessment of streamwater chemistry with network-based geostatistical analysis, we show that spatial processes differentially affect biogeochemical condition and pattern across a headwater stream network. We analyzed a high-resolution dataset consisting of 664 water samples collected every 100 m throughout 32 tributaries in an entire fifth-order stream network. These samples were analyzed for an exhaustive suite of chemical constituents. The fine grain and broad extent of this study design allowed us to quantify spatial patterns over a range of scales by using empirical semivariograms that explicitly incorporated network topology. Here, we show that spatial structure, as determined by the characteristic shape of the semivariograms, differed both among chemical constituents and by spatial relationship (flow-connected, flow-unconnected, or Euclidean). Spatial structure was apparent at either a single scale or at multiple nested scales, suggesting separate processes operating simultaneously within the stream network and surrounding terrestrial landscape. Expected patterns of spatial dependence for flow-connected relationships (e.g., increasing homogeneity with downstream distance) occurred for some chemical constituents (e.g., dissolved organic carbon, sulfate, and aluminum) but not for others (e.g., nitrate, sodium). By comparing semivariograms for the different chemical constituents and spatial relationships, we were able to separate effects on streamwater chemistry of (i) fine-scale versus broad-scale processes and (ii) in-stream processes versus landscape controls. These findings provide insight on the hierarchical scaling of local, longitudinal, and landscape processes that drive biogeochemical patterns in stream networks.

Decay of genetic markers for fecal bacterial indicators and pathogens in sand from Lake Superior

Eichmiller, Jessica J; Borchert, Andrew J; Sadowsky, Michael Jr; etal.

Beach sands impact water quality and pathogen loads, however, the comparative decay of the fecal indicator bacteria (FIB) Enterococcus spp. and Escherichia coli, and pathogens in freshwater sand have not been examined. In this study, freshwater sand microcosms were inoculated with sewage and pure cultures of bacterial pathogens to compare relative decay rates. The abundance of culturable Enterococcus spp. and E. coli, genetic markers for Enterococcus spp. (Entero1), total Bacteroides (AllBac), and human-specific Bacteroides (HF183), and genetic markers for the pathogens Campylobacter jejuni, methicillin-resistant Staphylococcus aureus (MRSA), Salmonella enterica subsp. enterica serovar Typhimurium, and Shigella flexneri were monitored over the course of two weeks using conventional culture methods and quantitative PCR (qPCR). The effect of moisture on the persistence of culturable FIB and all genetic markers was also determined. In addition, propidium monoazide (PMA) treatment was used to examine differences in the persistence of total genetic markers and those from live cells. Decay rates were statistically compared using Tukey’s test. Moisture had a significant (p≤0.05) effect on the decay rates of culturable indicator bacteria, total AllBac markers, and genetic markers for FIB, Salmonella, and MRSA from live cells. At 14% sand moisture, the decay rate of total markers was slower than that of live cells for all qPCR assays, but at 28% moisture, there was no difference in the decay rates of total and live markers for any assay. AllBac and MRSA markers increased in sand at 28% moisture, probably indicating cellular growth. Overall, culturable FIB and HF183 had decay rates that were more comparable to the bacterial pathogen markers examined in this study, whereas Entero1 and AllBac rarely exhibited decay rates similar to the bacterial pathogens in this study. The choice of FIB for assessment of fecal contamination in freshwater sand should take into account the pathogen of concern and sand moisture conditions.

Modifying the PEG model for Mediterranean lakes-no biological winter and strong fish predation

Moustaka-Gouni, Maria; Michaloudi, Evangelia; Sommer, Ulrich

The widely cited Plankton Ecology Group (PEG) model of plankton seasonal succession is often used as a template to explain the seasonal changes in plankton communities outside the cold temperate zone, where it was developed, but this may be inappropriate for lower-latitude lakes.
Lower-latitude lakes have high light availability in winter and less pronounced seasonal variations in fish predation on zooplankton. We might therefore expect higher phytoplankton crops in winter and much more predation on zooplankton by fish than in colder lakes. This might lead to less grazing in summer and relatively higher phytoplankton crops.

We compared data on phytoplankton biovolume, zooplankton biomass and body size from 18 German and 6 Greek lakes to test these hypotheses.

（来源：FRESHWATER BIOLOGY, 2014, 59(6): 1136-1144）

**Habitat coupling in a large lake system: delivery of an energy subsidy by an offshore planktivore to the nearshore zone of Lake Superior**

Stockwell, Jason D.; Yule, Daniel L.; Hrabik, Thomas R.; etal

We hypothesised that the autumn spawning migration of Lake Superior cisco (Coregonus artedi) provides a resource subsidy, in the form of energy-rich cisco eggs, from the offshore pelagic to the nearshore benthic community over winter, when alternate prey production is likely to be low.

We tested this hypothesis using fish and macroinvertebrate surveys, fish population demographics, diet and stable isotope analyses, and bioenergetics modelling.

The benthic, congeneric lake whitefish (C. clupeaformis) was a clear beneficiary of cisco spawning. Cisco eggs represented 16% of lake whitefish annual consumption in terms of biomass, but 34% of energy (because of their high energy density: >10kJg wetmass(-1)). Stable isotope analyses were consistent with these results and suggest that other nearshore fish species may also rely on cisco eggs.

The lipid content of lake whitefish liver almost doubled from 26 to 49% between November and March, while that of muscle increased from 14 to 26% over the same period, suggesting lake whitefish were building, rather than depleting, lipid reserves during winter.

In the other Laurentian Great Lakes, where cisco populations remain very low and rehabilitation efforts are underway, the offshore-to-nearshore ecological link apparent in Lake Superior has been replaced by non-native planktivorous species. These non-native species spawn in spring have smaller eggs and shorter incubation periods. The rehabilitation of cisco in these systems should reinstate the onshore subsidy as it has in Lake Superior.

（来源：FRESHWATER BIOLOGY, 2014, 59(6): 1197-1212）

**Species-specific separation of lake plankton reveals divergent food assimilation patterns in rotifers**

Burian, Alfred; Kainz, Martin J.; Schagerl, Michael; etal.

The analysis of functional groups with a resolution to the individual species level is a basic requirement to better understand complex interactions in aquatic food webs. Species-specific stable isotope analyses are currently applied to analyse the trophic role of large zooplankton or fish species, but technical constraints complicate their application to smaller-sized plankton.

We investigated rotifer food assimilation during a short-term microzooplankton bloom in the East African soda lake Nakuru by developing a method for species-specific sampling of rotifers.
The two dominant rotifers, Brachionus plicatilis and Brachionus dimidiatus, were separated to single-species samples (purity >95%) and significantly differed in their isotopic values (4.1 parts per thousand in delta C-13 and 1.5 parts per thousand in delta N-15). Bayesian mixing models indicated that isotopic differences were caused by different assimilation of filamentous cyanobacteria and particles.

A main difference was that the filamentous cyanobacterium *Arthrospira fusiformis*, which frequently forms blooms in African soda lakes, was an important food source for the larger-sized *B. plicatilis* (48%), whereas it was hardly ingested by *B. dimidiatus*. Overall, *A. fusiformis* was, relative to its biomass, assimilated to small extents, demonstrating a high grazing resistance of this species.

In combination with high population densities, these results demonstrate a strong potential of rotifer blooms to shape phytoplankton communities and are the first in situ demonstration of a quantitatively important direct trophic link between rotifers and filamentous cyanobacteria.

(Source: FRESHWATER BIOLOGY, 2014, 59(6): 1257-1265)

**Thermocline deepening and mixing alter zooplankton phenology, biomass and body size in a whole-lake experiment**

Gauthier, Joanna; Prairie, Yves T.; Beisner, Beatrix E.

Summer thermal stratification is thought to be one of the key structuring physical factors for north temperate lake zooplankton. Shifts associated with climate change may lead to altered thermocline depths in stratified lakes through changes to (i) wind stress and associated water column mixing or (ii) air temperature and precipitation. The effects of thermocline deepening through these two scenarios were simulated in a whole-lake experiment to assess the effects on the phenology, biomass and mean body size of the zooplankton.

The thermocline of a three-basin dimictic lake was deepened to 7-8m in one basin using a lake mixer. Through heat transfer, the thermocline of the adjacent basin was deepened to 6-7m, while the third basin served as an unmanipulated control (4-5m deep thermocline). Zooplankton community dynamics were followed weekly in a control year and in two experimental years. A before-after-control-impact (BACI) statistical protocol was used to assess the effects of two treatments: Deepening and Deepening+Mixing.

Thermocline depth was the main factor influencing zooplankton changes. The biomass and late-season dominance by smaller-bodied and more fish-evasive species were favoured by deepening, leading to a decline in mean community body size, but an increase in total biomass.

While many effects could be attributed to thermocline deepening, additional or exacerbated responses were observed when mixing was also present. This resulted mostly from a loss of the hypolimnetic refuge for zooplankton, which accentuated predation effects by warm-water fish on larger cladocerans. Overall, our treatments promoted top-down (predation) effects that increased over the 2 years of the experiment.

(Source: FRESHWATER BIOLOGY, 2014, 59(5): 998-1011)

**Evidence for iron-regulated cyanobacterial predominance in oligotrophic lakes**

Sorichetti, Ryan J.; Creed, Irena F.; Trick, Charles G.

Cyanobacterial harmful algal blooms (cyanoHABs) are most often associated with large eutrophic lakes.
In the past decade, an increase in the incidence of cyanoHABs in small oligotrophic lakes within the Laurentian Great Lakes-St. Lawrence River Basin has been documented. We explored macro- and micronutrient conditions during peak phytoplankton biomass that result in high cyanobacterial densities.

We hypothesised that the availability of biologically available iron (Fe) both limits the assimilation of phosphorus by competing taxa and selects for the predominance of cyanobacteria.

We tested this hypothesis with a comparative study of 25 oligotrophic lakes in central Ontario, Canada. These lakes were sampled during peak phytoplankton biomass for 3 years (from 2009 to 2011) for concentrations of total phosphorus (TP), total nitrogen (TN), ammonium (NH4+), nitrate (NO3-), total dissolved Fe (TDFe) and pH for comparison with phytoplankton community biomass and composition.

Correlation analyses indicated that predominance of cyanobacteria was assured at all TP levels when the availability of Fe was low. Proportionally high cyanobacterial density occurred at relatively low TP in lakes with a molar ratio of dissolved inorganic N (DIN):TP of 8:1 and a modelled ferric Fe concentration m at which cyanobacteria have been shown to be competitive for Fe in laboratory experiments. Regression tree analysis confirmed the minimal influence of P and N, implying that cyanobacteria thrive in low Fe environments.

Our findings suggest that an increased susceptibility of oligotrophic lakes to cyanobacterial bloom formation is based on the presence of cyanobacteria that have adapted sufficiently to low Fe environments and are able to multiply rapidly when pulses of P are made available to the ecosystem. Physiologically prepared transitionary cyanobacteria do not have to compete with the eukaryotic species but rather exploit the new P and replicate faster.

（来源：FRESHWATER BIOLOGY, 2014, 59(4): 679-691）
increase dissolved and particulate carbon (C) relative to phosphorus (P), thereby reducing algal food quality for P-limited cladocerans while not affecting N-limited copepods. Also, we expected alpine zooplankton to respond more strongly than those from warmer montane lakes to increased water temperature.

Plankton from two alpine lakes and two montane lakes were incubated in vitro for 30 days at 10 or 17 degrees C and with ambient or +80% DOC, which was achieved by concentrating humic substances from each lake via reverse osmosis.

Dissolved organic carbon amendments and warming significantly increase particulate C:P under montane, but not alpine conditions. While higher water temperature and DOC separately reduced phytoplankton abundance, together they increased phytoplankton by stimulating uptake of P. Warming stimulated only Daphnia while suppressing the abundance of the calanoid copepod Hesperodiaptomus when they originated from the three coldest lakes. Particulate C:P was positively correlated with Daphnia abundance and negatively correlated with Hesperodiaptomus, probably due to greater P-retention by Daphnia.

Our findings highlight the importance of interactions between the ecological effects of higher temperature and increased inputs of terrestrial organic matter to forecasts of the net impact of global warming on mountain lakes. Such predictions may be confounded if they are derived solely from the expected sum of single effects by each climatic factor.

（来源：FRESHWATER BIOLOGY, 2014, 59(5): 889-904）

Earlier and warmer springs increase cyanobacterial (Microcystis spp.) blooms in subtropical Lake Taihu, China
Deng, Jianming; Qin, Boqiang; Paerl, Hans W.; et al.

We examined the effects of regional warming and water quality on phytoplankton community succession, focussing on the bloom-forming cyanobacterial genus Microcystis in subtropical Lake Taihu, China. Daily air temperatures from 1991 to 2010 indicated that onset of the Microcystis growing season has advanced by approximately 20 days over the last two decades, and accumulated air temperature (from 1 March to 31 May) has increased significantly.

Since 2005, Microcystis blooms have begun in May more frequently than in June. An increase in degree days for growth indicated that the early warming trend in spring would have benefitted Microcystis populations that overwintered on the sediment surface, by allowing them to grow, gain buoyancy and float into water column earlier in the year.

Results of canonical correspondence analysis showed that both water quality (i.e. nutrient loading) and water temperature have affected phytoplankton community succession in spring over the past two decades. When nutrient concentrations are adequate to support Microcystis blooms, rising temperature promotes their earlier onset and proliferation, a phenomenon previously documented for temperate regions, and now demonstrated for this subtropical lake.

（来源：FRESHWATER BIOLOGY, 2014, 59(5): 1076-1085）
Similarity between contemporary vegetation and plant remains in the surface sediment in Mediterranean lakes
Levi, Eti E.; Cakiroglu, Ayse I.; Bucak, Tuba; et al.

Aquatic macrophytes are commonly used to assess the ecological condition of lakes. Little is known, however, about long-term macrophyte dynamics in shallow lakes. In the absence of historical data, the remains of macrophytes (fruits, seeds and vegetative fragments) found in lake sediments may provide just such information. In order to interpret confidently past change in aquatic plant communities from their sedimentary remains, it is vital to establish the similarity between the contemporary and fossil assemblages.

We investigated the relationship between present lake vegetation and plant macrophyte remains in surface sediments. Thirty-five shallow lakes, spanning around six degrees of latitude and mostly located in the semi-arid Mediterranean climatic zone of Turkey, were sampled for aquatic plants, surface sediment plant remains and a range of other key environmental variables.

Around 50% of the taxa recorded in the modern vegetation were represented in the sediment. Sedimentary macrofossils of some taxa were under- or over-represented relative to their frequency in the modern vegetation, for example Potamogeton spp. and Characeae, respectively. Despite this disparity, there was good agreement between the assemblage composition of the modern and sedimentary samples. Furthermore, conductivity and trophic state (as indicated by total nitrogen, total phosphorus and chlorophyll-a) were the environmental variables most clearly correlated with both the contemporary and macrofossil assemblages in these lakes.

We conclude that aquatic macrophyte macrofossils can be used as reliable indicators of ecological status and to determine qualitative changes in assemblages of aquatic plants consequent to environmental change (e.g. in lake trophic status and/or salinity). This may be especially useful for lakes in arid and semi-arid Mediterranean regions, which are particularly vulnerable to hydrological constraints under climate change.


Reconstructing long-term changes (150 years) in the carbon cycle of a clear-water lake based on the stable carbon isotope composition (delta C-13) of chironomid and cladoceran subfossil remains
Frossard, Victor; Verneaux, Valerie; Millet, Laurent; et al.

Long-term trends, spanning about 150 years, in delta C-13 values in the head capsules (HCs) of three chironomid taxa and pelagic cladoceran exoskeletons are reported for a reoligotrophicated, deep, clear-water lake using a multidepth approach. The trends were taxon specific, and Bayesian change point analyses defined three homogenous temporal sequences of HC delta C-13.

From the 1850s to the 1930s, the delta C-13 values were stable and similar in the littoral and deep zones, suggesting that littoral and deep chironomids relied on similar carbon sources; the HCs and cladoceran delta C-13 values were approximately -32 parts per thousand, providing no evidence of organic carbon reworking via microbial mineralisation. From the 1930s to the 1950s, the littoral HC and cladoceran delta C-13 values decreased by 2 parts per thousand. This decrease was probably related to an increase in respiration processes in the epilimnion following an increase in trophic state of the lake. The deep HC
delta C-13 values remained stable during this period, suggesting that most of the additional primary production due to eutrophication was transferred to higher trophic levels.

From the 1950s onward, the littoral HC and cladoceran delta C-13 values remained steady, whereas the deep HC values decreased substantially (-4 parts per thousand), despite the restoration of oligotrophic conditions in open water. This pattern suggests the existence of organic carbon accumulation and microbial mineralisation at the lake bottom as well as a possible increase in methane-derived carbon consumption by chironomids.

These processes were attributed to a lower trophic efficiency within the pelagic food web, decreasing the functional efficiency of the lake. Our results suggest that the functioning of the lake was characterised by low heterotrophic activities prior to the 1930s and that since the 1990s, the increase in heterotrophic activities has been supported by autochthonous organic carbon recycling.

Paleolimnological assessment of ecological integrity and eutrophication history for Lake Tiilaanjarvi (Askola, Finland)

Luoto, Tomi P.; Ojala, Antti E. K.

In this study, we aim to reconstruct long-term limnoecological development of the clay-turbid Lake Tiilaanjarvi in Askola, southern Finland, using fossil Chironomidae assemblages. The study lake suffers from hypereutrophic conditions and late-winter and end-of-summer anoxia. The retrieved sediment record revealed a succession from oligo-mesotrophic (similar to AD 1940-2000) to eutrophic community (similar to AD 2000-2010) that finally reached hypereutrophic climax community in the most recent sediments. The initial state of the record was characterized by stable ecological conditions, but the biological integrity (community and functional diversity) was completely lost in the upper part of the sediment profile. The number of taxa markedly decreased following the nutrient enrichment and only one taxon (Chironomus plumosus-type), tolerant of temporary anoxia, remained in the surface sample. During the period of available observational data (since AD 1978), variance in midge community composition was mostly explained by limnological factors, namely total phosphorus (TP), whereas the influence of climate was statistically insignificant, thus enabling quantitative midge-based reconstruction of autumnal epilimnetic TP. The midge-based reconstruction showed an identical trend compared to sediment characteristics, which correspond to increased lake productivity and anthropogenic activities in the catchment. The inferred values for the initial state indicated mesotrophic conditions, which are typical for non-disturbed clay-turbid lakes in southern Finland, and a subsequent increase to eutrophic conditions, with hypereutrophic state reached at the top of the core. This development corresponds with the instrumentally monitored development. In addition, when the reconstruction was compared with the instrumental values, the inferences were mostly (75 % of the samples) within the error estimates of the model. The present results provide invaluable information on the limnoecological development of Lake Tiilaanjarvi, and more generally, support the theory that fossil remains of chironomids provide a useful tool for assessments of eutrophication history and biological integrity.

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Nitrification in lake sediment with addition of drinking water treatment residuals
Wang, Changhui; Liu, Juanfeng; Wang, Zhixin; et al.

Drinking water treatment residuals (WTRs), non-hazardous by-products generated during potable water production, can effectively reduce the lake internal phosphorus (P) loading and improve water quality in lakes. It stands to reason that special attention regarding the beneficial reuse of WTRs should be given not only to the effectiveness of P pollution control, but also to the effects on the migration and transformation of other nutrients (e.g., nitrogen (N)). In this work, based on laboratory enrichment tests, the effects of WTRs addition on nitrification in lake sediment were investigated using batch tests, fluorescence in situ hybridization, quantitative polymerase chain reaction and phylogenetic analysis techniques. The results indicated that WTRs addition had minor effects on the morphologies of AOB and NOB; however, the addition slightly enhanced the sediment nitrification potential from 12.8 to 13.2 μg N g(-1)-dry sample h(-1) and also increased the ammonia oxidation bacteria (AOB) and nitrite oxidizing bacteria (NOB) abundances, particularly the AOB abundances (P < 0.05), which increased from 1.11 x 10(8) to 1.31 x 10(8) copies g(-1)-dry sample. Moreover, WTRs addition was beneficial to the enrichment of Nitrosomonas and Nitrosospira multiformis and promoted the emergence of a new Nitrospira cluster, causing the increase in AOB and NOB diversities. Further analysis showed that the variations of nitrification in lake sediment after WTRs addition were primarily due to the decrease of bioavailable P, the introduction of new nitrifiers and the increase of favorable carriers for microorganism attachment in sediments. Overall, these results suggested that WTRs reuse for the control of lake internal P loading would also lead to conditions that are beneficial to nitrification.

(来源: WATER RESEARCH, 2014, 56: 234-245)

古近纪湖相烃源岩形成的地球生物学过程
李国山, 王永标, 卢宗盛, 等

山东东营凹陷古近纪沙河街组下部普遍发育膏盐岩系和颗石藻钙质页岩。研究认为膏盐岩系形成于早期的盐湖环境，而膏盐岩系之上的颗石藻钙质页岩形成于咸度略低的咸化湖泊环境。通过古今湖泊环境和生物类群等的分析对比，认为蓝细菌是古近纪沙河街组下部膏盐层系形成过程中的主要生产力代表，生产力水平为1500~2000 g C m(-2) a(-1)。通过对钙质页岩中钙质超微化石的研究，发现颗石藻是钙质页岩形成时的主要生产力代表。根据钙质页岩的沉积速率、沉积纹层和纹层中颗石藻化石的计数统计，定量确定了颗石藻页岩形成时的古生产力水平为2250~3810 g C m(-2) a(-1)，平均为3120 g C m(-2) a(-1)。通过对地层中大量草莓状黄铁矿粒径的统计，发现膏盐岩系形成时的底层水体处于富硫化氢的缺氧状态，而钙质页岩形成时的底层水体为下贫氧状态。在此条件下，有机质均能有效保存。通过多参数的地球生物学模型的分析和计算，认为东营凹陷古近纪早期盐湖及咸化湖泊中有机碳的保存效率约为10%~15%。

Acidification of lake water due to drought
Mosley, L. M.; Zammit, B.; Jolley, A. M.; et al.

Droughts are predicted to increase in many river systems due to increased demand on water resources and climate variability. A severe drought in the Murray-Darling Basin of Australia from 2007 to 2009 resulted in unprecedented declines in water levels in the Lower Lakes (Ramsar-listed ecosystem of international importance) at the end of the river system. The receding water exposed large areas (>200 km²) of sediments on the lake margins. The pyrite (FeS₂) in these sediments oxidised and generated high concentrations of acidity. Upon rewetting of the exposed sediments, by rainfall or lake refill, surface water acidification (pH 2-3) occurred in several locations (total area of 21.7 km²). High concentrations of dissolved metals (Al, As, Co, Cr, Cu, Fe, Mn, Ni, Zn), which greatly exceeded aquatic ecosystem protection guidelines, were mobilised in the acidic conditions. In many areas neutralisation of the surface water acidity occurred naturally during lake refill, but aerial limestone dosing was required in two areas to assist in restoring alkalinity. However acidity persists in the submerged lake sediment and groundwater several years after surface water neutralisation. The surface water acidification proved costly to manage and improved water management in the Murray-Darling Basin is required to prevent similar events occurring in the future.

A simple model for predicting aluminum bound phosphorus formation and internal loading reduction in lakes after aluminum addition to lake sediment
Huser, Brian J.; Pilgrim, Keith M.

The conversion of mobile phosphorus (P) to aluminum bound P (Al-P) after addition of Al to over 300 sub-samples from 35 sediment cores collected from 20 lakes in the upper Midwest, United States was investigated in this study. Consistent relationships between mobile P reduction and Al-P formation were detected across a broad range of mobile sediment P contents (0.04-2.8 g P m⁻² cm⁻¹) or 0.083-2.8 mg P g⁻¹DW and lake types. The conversion of mobile P to Al-P was dependent on the initial mobile sediment P content and the amount of Al added to the sediment. An empirical model was then developed to predict the formation of Al-P based on the amount of Al added relative to the initial mass of mobile P in the sediment. The results were compared to sediment collected from an Al treated lake and good agreement was found between the model and in-situ changes to sediment P fractions caused by Al treatment. The model developed in this study, unlike previous models with extreme, singular endpoints, allows for a continuum of estimates for mobile P conversion to Al-P, along with efficiency of P binding by Al, as Al dose varies. Model results can be used in conjunction with mobile sediment P based predictions for internal P loading to calculate an Al dose required to meet internal phosphorus loading goals for lake management and restoration without the need for expensive, time consuming Al additions to sediment.

Whole-basin, mass-balance approach for identifying critical phosphorus-loading thresholds in shallow lakes
Kenney, William F.; Whitmore, Thomas J.; Buck, David G.; et al.
Lake Lochloosa, Florida (USA) recently underwent a shift from macrophyte to phytoplankton dominance, offering us the opportunity to use a whole-basin, mass-balance approach to investigate the influence of phosphorus loading on ecosystem change in a shallow, sub-tropical lake. We analyzed total phosphorus (TP) sedimentation in the basin to improve our understanding of the forcing factor responsible for the recent shift to phytoplankton dominance. We measured Pb-210 activity, organic matter (OM), organic carbon (OC) and TP in short sediment cores from 20 locations to develop a comprehensive, whole-basin estimate of recent mass sedimentation rates (MSR) for bulk sediment, OM, OC and TP. The whole-basin sedimentation models provided insights into historic lake processes that were not evident from the limited, historic water quality data. We used Akaike’s Information Criteria to differentiate statistically between constant MSR and exponentially increasing MSR. An eightfold, exponential increase in TP accumulation over the past century provided evidence for the critical role of increased P loading as a forcing factor in the recent shift to phytoplankton dominance. Model results show increased TP retention and decreased TP residence time were in-lake responses to increased TP loading and the shift from macrophyte to phytoplankton dominance in Lake Lochloosa. Comparison of TP loading with TP retention and historic, diatom-inferred limnetic TP concentrations identified the TP loading threshold that was exceeded to trigger the shift to phytoplankton dominance.


巴丹吉林沙漠诺尔图湖泊水化学特征与补给来源

吴月, 王乃昂, 赵力强, 等

选取巴丹吉林沙漠最大、最深的湖泊诺尔图作为研究对象，通过分析湖水和地下水八大离子、总溶解固体含量、稳定同位素 18O 和 2H 组成，地下水放射性同位素氚浓度，研究了诺尔图水平和垂直方向上湖水理化参数及同位素特征。结果表明，诺尔图湖水理化性质年际和季节变化明显大于附近地下水的变化，水平和垂直方向上湖水混合较均匀，不同深度湖水的水化学型一致，均为 Na-Cl-CO3-(SO4)。诺尔图湖水、地下水同位素沿着低于全球大气降水线斜率的当地蒸发线展布，较低的斜率表明研究区强烈的蒸发环境特征。湖水同位素大多位于蒸发线的右上角，地下水同位素大多位于蒸发线的左下角，结合湖水及地下水水位变化趋势，表征湖泊的主要补给来源为地下水。诺尔图钙华泉水（地下水）的年龄约为 75~80 a，说明湖泊水初始补给源可能为次现代~1952 年之间补给的混合或年代更老，有待进一步研究。

(来源: 科学通报, 2014, 59(12):1140-1147)

青海湖二郎剑钻孔的粘土矿物学研究

曾蒙秀, 宋友桂, 安芷生, 等

位于青藏高原东北边缘的青海湖盆地拥有巨厚的新生代沉积，较好地记录了湖盆形成以来的古气候和古环境演化历史，对认识青藏高原东北部隆升过程和东亚气
Hydrological investigation of a multi-stratified pit lake using radioactive and stable isotopes combined with hydrometric monitoring
Sanchez-Espana, Javier; Diez Ercilla, Marta; Perez Cerdan, Fernando; et al.

The internal configuration and hydrological dynamics of meromictic pit lakes is often complex and needs to be studied by different tools including stable and radiogenic isotopes. This study combines a multi-isotopic approach (H-3(w), delta H-2(w), delta O-18(w), delta S-34(SO4)) with meteorological, hydrological and hydrochemical monitoring to deduce the flooding history and hydrological dynamics of a meromictic and deeply stratified pit lake (Cueva de la Mora mine, SW Spain). The mine system is complex and includes horizontal galleries, shafts and large rooms physically connected to the mine pit. Specific conductance and temperature profiles obtained in the pit lake draw a physical structure with four monimolimnetic sub-layers of increasing density with depth. This characteristic stratification with m-scale layers separated by sharp transitional zones is rather unusual in other pit lakes and in most natural lakes. Tritium abundance in the different layers indicates that the deep lake water entered the pit basin between 1971 and 1972 which is coincident with the dates of mine closure. The oxygen and deuterium isotope composition of the different layers describes a marked and stable stratification, with an increasing evaporative influence towards the lake surface and a minimal influence of groundwater flow on the structure and composition of the monimolimnion. This study reveals that the initial stages of flooding (via influx of metal- and sulfate-loaded mine drainage from underlying galleries at different depths) may be essential to imprint a layered physical structure to pit lakes which would be very difficult to explain merely by physical processes. After reaching its present water level and morphology, the monimolimnion of this pit lake seems to have remained essentially isolated and chemically unmodified during decades.
Late Holocene hydrologic changes in northern New Zealand inferred from stable isotope values of aquatic cellulose in sediments from Lake Pupuke

Heyng, Alexander M.; Mayr, Christoph; Luecke, Andreas; etal.

Isotopic records of aquatic cellulose are becoming increasingly important for palaeohydrological reconstructions, but widespread application of this climate proxy is hampered by minerogenic contamination that affects oxygen isotope measures in cellulose. Few records of isotopes in aquatic cellulose are available from palaeoclimate archives in the Southern Hemisphere. In this study, we used a new bulk cellulose extraction method and determined the oxygen (delta O-18) and carbon (delta C-13) isotope values in cellulose from a Holocene lake sediment core segment (7.2-1.1 cal ka BP) from Lake Pupuke, Auckland, New Zealand. Isotope values from modern, potential sources of sedimentary cellulose revealed the aquatic origin of the cellulose extracted from the core, and hence enabled inference of past lake water delta O-18 values from the delta O-18 of measured cellulose in the core. A shift to a more positive water balance in the lake was identified around 2.8 cal ka BP by a decrease in inferred lake water delta O-18 values. At that time, greater epilimnetic primary productivity is indicated by the higher delta C-13 values of sedimentary cellulose. Greater divergence between the delta C-13 values of cellulose and bulk organic matter suggests stronger stratification of the lake, likely caused by greater freshwater input. We discuss a possible link to a solar minimum that occurred at that time.

Geochemical assessment of an annually laminated lake sediment record from northern Sweden: a multi-core, multi-element approach

Rydberg, J.; Martinez-Cortizas, A.

We used seven annually laminated (varved) sediment cores from Nylandssjön, a lake in northern Sweden, to assess between-core variation and diagenetic changes at annual resolution. By using several cores, multiple elements and employing principal components analysis (PCA), we also studied how the geochemical composition changed over time, and assessed to what extent these changes were related to variations in the weather. There are between-core differences for aluminum, silica, lead, titanium, zirconium and dry-mass accumulation rate. Diagenesis causes a decrease in bromine, as well as carbon, nitrogen and varve thickness, as reported in previous publications. In spite of anoxic bottom waters phosphorus is not lost from the sediment. In fact, there is an increase in phosphorus concentrations with time. The PCA identified four principal components (PCs). PC-1 accounts for the relative content of mineral and organic material; PC-2 represents mineral-particle grain size; PC-3 reflects phosphorus loading and PC-4 reflects atmospheric pollution. Variations in the weather partly explain the temporal patterns in PC-1 and PC-2: cold winters, i.e. more accumulation of snow, resulted in more mineral than organic matter (i.e. higher PC-1 scores), and increased the relative amount of coarse-grained mineral particles in the sediment (i.e. lower PC-2 scores). Increased spring precipitation had a weak positive effect on the PC-2 scores by promoting the transport of fine-grained material. However, the influence of weather is weak, explaining at most 30 % of the variance, and hence, other factors, e.g. land use and its effect on soil erosion, seem to be more important for the sediment geochemical composition. The importance of land use is also exemplified by an increase in PC-3 scores in the late 1970s, which can be attributed to a shift in agricultural practices that resulted in increased
phosphorus loading to the lake. In summary, our findings show that down-core trends are reproducible between cores, but between-core variability and diagenesis need to be considered when interpreting some elements. We also conclude that there is a need to constrain temporal changes in land use before using lake sediments to study changes in weather or climate.


Geomorphic legacy controls macrophyte distribution within and across disconnected floodplain lakes

Negishi, Junjiro N.; Soga, Masashi; Ishiyama, Nobuo; et al.

Degradation of floodplains continues with an increasing number of floodplain lakes disconnected from the fluvial dynamics of rivers. Limited understanding is available as to how historical geomorphic formation processes (i.e. geomorphic legacy) determine contemporary ecosystem structure and function. We tested the hypothesis that geomorphic legacy mediates morphometry and results in heterogeneity of macrophyte distributions in disconnected floodplain lakes.

The distribution of macrophyte cover was examined in relation to environmental factors, including water nutrient level, morphology of lakes and patch shelter level across and among three types of lakes along the Ishikari River, Japan. Artificial lakes (isolated by channelisation), natural oxbow lakes and marsh lakes have been disconnected for more than 40 years from natural flood pulses because of dyke construction.

The presence of macrophytes (in 5x5m areas) was predicted well by a combination of local water depth and bed slope. Lake average depth, higher values indicating lakes that are more deeply incised with a steeper-sloped littoral zone, had the strongest and most negative influence on total macrophyte cover across lakes. Cover was least in artificial lakes because of greater average depth.

Predicted area of macrophyte cover was significantly less than occupied by actual cover in artificial lakes compared with other lake types. Macrophyte cover in artificial lakes was particularly vulnerable to external factors such as waves and wind.

This study underscored the significance of geomorphic legacy in explaining a large proportion of heterogeneity of total macrophyte cover in the study lakes. Artificial lakes did not have the macrophyte habitat quality of natural lakes. When lake morphometry needs to be altered, local conditions as well as patch-scale properties should be carefully examined in the light of the geomorphic legacy left by dynamic river-floodplain interactions.

（来源：FRESHWATER BIOLOGY, 2014, 59(5): 942-954）

Accelerated lake expansion on the Tibetan Plateau in the 2000s: Induced by glacial melting or other processes?

Song, Chunqiao; Huang, Bo; Richards, Keith; et al.

Alpine lakes on the Tibetan Plateau are minimally disturbed by human activities and are sensitive indicators of climate variability. Accelerated lake expansion in the 2000s has been confirmed by both dramatic lake-area increases (for 312 lakes larger than 10 km(2)) derived from optical images, and rapid water-level rises (for 117 lakes with water-level data) measured by satellite altimetry. However, the
underlying climate causes remain unclear. This paper analyzes the relationship between the water-level changes of lakes on the plateau and the potential driving factors, such as the glacier meltwater supply and a dependency on precipitation and runoff over the whole plateau and in each zone. The results show that the rates of change of non-glacier-fed lakes in the 2000s were as high as those of glacier-fed lakes across the whole plateau and the lake-level changes were closely associated with the lake supply coefficients (the basin/lake area ratio). The lake variations agreed well with the spatial pattern of precipitation changes. However, in different zones, especially at around 33 degrees N north of the plateau, glacier-fed lakes did exhibit faster lake level increases than no-glacier-fed lakes, indicating that the presence of a glacier meltwater supply augmented the precipitation-driven lake expansions in these areas. Despite the absence of quantitative modeling due to limited data availability, this study provides qualitative support that the lake expansions on the Tibetan Plateau in the 2000s have been driven primarily by changes in precipitation and evapotranspiration and not solely by the effect of glacier wastage.


A simple approach to the evaluation of the actual water renewal time of natural stratified lakes
Pilotti, Marco; Simoncelli, Stefano; Valerio, Giulia

In natural lakes, where thermal stratification hinders complete mixing, the theoretical value $T_0$ of the water renewal time provides a low-order approximation to the time $T_{37}$ when 37% of the original water is still present within the lake; this time could be operatively regarded as the actual value of the water renewal time. In this paper, we present a simple nonparametric model to estimate the age distribution of water within stratified natural lakes, taking into account fundamental aspects of its mass exchange and thermal evolution. This distribution provides a straightforward way to compute $T_{37}$. The model is presented as a system of ordinary differential equations along with a MATLAB script for its numerical solution, so that it can be easily applied to lakes where a minimum of limnological data are available, without the need of extensive meteorological data set and modeling expertise that an hydrodynamic model would require to the same purpose. The case of a deep oligomictic Italian prealpine lake (Lake Lseo) is considered: after a positive comparison with the results obtained using a 1-D lake hydrodynamic model, the reiterated application to the available time series allows to approximate the water age probability distribution. This distribution is used to compute the actual value of the water renewal time, that resulted $T_{37}=1.6T(0)$.

(来源: WATER RESOURCES RESEARCH, 2014, 50(4): 2830-2849)

Persistent weak thermal stratification inhibits mixing in the epilimnion of north-temperate LakeOpeongo, Canada
Pernica, Patricia; Wells, Mathew G.; MacIntyre, Sally

Persistent weak temperature stratification characterizes the epilimnion of Lake Opeongo, Ontario, Canada, and reduces the magnitude of turbulent mixing. Throughout July and August 2009, the epilimnion was isothermal for only 34 % of the record, while for 28 % of the record there was at least a 2 A degrees C temperature difference across the 5 m deep epilimnion. During these stratified periods,
there were increases in gradient Richardson numbers (\(R_i (g)\)), and decreases in rates of dissipation of turbulent kinetic energy (\(\epsilon\)), the turbulence activity parameter (\(I = \epsilon / \nu N (2)\)), an indicator of active mixing, and vertical eddy diffusivity (\(K (z)\)) inferred from temperature microstructure profiles. During periods of shear induced mixing, values of \(\epsilon\) approached \(10^{-6} m^2 s^{-3}\) and decreased during periods of increasing \(R_i (g)\). For \(0 < R_i (g) < 1\), average values of \(I\) were similar to 1,000 and values of \(K (z)\) were slightly higher than \(10^{-4} m(2) s^{-1}\). For \(R_i (g) > 1\), average values of \(I\) were similar to 300 and \(K (z)\) was reduced by one to three orders of magnitude. Mixing during cold fronts occurred over time scales of minutes to hours, which worked to erode diurnal thermoclines. However, during periods of persistent secondary thermoclines, mixing was suppressed throughout the epilimnion.

On modeling the paleohydrologic response of closed-basin lakes to fluctuations in climate: Methods, applications, and implications

Liu, Ganming; Schwartz, Franklin W.

Climate reconstructions using tree rings and lake sediments have contributed significantly to the understanding of Holocene climates. Approaches focused specifically on reconstructing the temporal water-level response of lakes, however, are much less developed. This paper describes a statistical correlation approach based on time series with Palmer Drought Severity Index (PDSI) values derived from instrumental records or tree rings as a basis for reconstructing stage hydrographs for closed-basin lakes. We use a distributed lag correlation model to calculate a variable, \((t)\) that represents the water level of a lake at any time \(t\) as a result of integrated climatic forcing from preceding years. The method was validated using both synthetic and measured lake-stage data and the study found that a lake's memory of climate fades as time passes, following an exponential-decay function at rates determined by the correlation time lag. Calculated trends in \((t)\) for Moon Lake, Rice Lake, and Lake Mina from A.D. 1401 to 1860 compared well with the established chronologies (salinity, moisture, and Mg/Ca ratios) reconstructed from sediments. This method provides an independent approach for developing high-resolution information on lake behaviors in preinstrumental times and has been able to identify problems of climate signal deterioration in sediment-based climate reconstructions in lakes with a long time lag.

Inter-comparison of time series models of lake levels predicted by several modeling strategies


Five modeling strategies are employed to analyze water level time series of six lakes with different physical characteristics such as shape, size, altitude and range of variations. The models comprise chaos theory, Auto-Regressive Integrated Moving Average (ARIMA) - treated for seasonality and hence SARIMA, Artificial Neural Networks (ANN), Gene Expression Programming (GEP) and Multiple Linear Regression (MLR). Each is formulated on a different premise with different underlying assumptions. Chaos theory is elaborated in a greater detail as it is customary to identify the existence of chaotic signals by a number of techniques (e.g. average mutual information and false nearest neighbors) and future
values are predicted using the Nonlinear Local Prediction (NLP) technique. This paper takes a critical view of past inter-comparison studies seeking a superior performance, against which it is reported that (i) the performances of all five modeling strategies vary from good to poor, hampering the recommendation of a clear-cut predictive model; (ii) the performances of the datasets of two cases are consistently better with all five modeling strategies; (iii) in other cases, their performances are poor but the results can still be fit-for-purpose; (iv) the simultaneous good performances of NLP and SARIMA pull their underlying assumptions to different ends, which cannot be reconciled. A number of arguments are presented including the culture of pluralism, according to which the various modeling strategies facilitate an insight into the data from different vantages.

（来源：JOURNAL OF HYDROLOGY, 2014, 511: 530-545）

Mapping shallow lakes in a large South American floodplain: A frequency approach on multitemporal Landsat TM/ETM data
Borro, Marta; Morandeira, Natalia; Salvia, Mercedes; et al.

We propose a methodology to identify and map shallow lakes (SL) in the Parana River floodplain, the largest freshwater wetland ecosystem in temperate South America. The presence and number of SL offer various ecosystem services and habitats for wildlife biodiversity. Our approach involved a frequency analysis over a 1987-2010 time series of the Normalized Difference Vegetation Index (NDVI), derived from Landsat 5 and 7 TM/ETM data. Through descriptive statistics of samples of pixels and field work in different types of SL, we established an NDVI threshold of 0.34 below which we assumed the presence of water in each pixel. The standard deviation of the estimated SL area decreases with the number of images in the analysis, being less than 10% when at least 30 images are used. The mean SL area for the whole period was 112,691 ha (10.9% of the study area). The influence of the hydrological conditions on the resulting SL map was evaluated by analyzing twelve sets of images, which were selected to span the whole period and different time frames according to multiannual dry and wet periods and to relative water level within each period. The Kappa index was then calculated between pairs of resulting SL maps. We compared our maps with the available national and international cartographic documents and with other published maps that used one or a few Landsat images. Landsat images time series provide an accurate spatial and temporal resolution for SL identification in floodplains, particularly in temperate zones with a good provision of cloud free images. The method evaluated in this paper considers the dynamics of SL and reduces the uncertainties of the fuzzy boundaries. Thus, it provides a robust database of SL and its temporal behavior to establish future monitoring programs based on the recent launch of Landsat 8 satellite.

（来源：JOURNAL OF HYDROLOGY, 2014, 512: 39-52）

A 4D sedimentological approach to reconstructing the flood frequency and intensity of the Rhone River (Lake Bourget, NW European Alps)
Jenny, J.-P.; Wilhelm, B.; Arnaud, F.; et al.

A high-resolution sedimentological study of Lake Bourget was conducted to reconstruct the flood frequency and intensity (or magnitude) in the area over the last 350 years. Particular emphasis was placed on investigating the spatio-temporal distribution of flood deposits in this large lake basin. The
thicknesses of deposits resulting from 30 flood events of the Rhone River were collected over a set of 24 short sediment cores. Deposit thicknesses were compared with instrumental data for the Rhone River discharge for the period from 1853 to 2010. The results show that flood frequency and intensity cannot be reliably reconstructed from a single core because of the inhomogeneous flood-deposit geometry in such a large lake. From all documented flood-deposit thicknesses, volumes of sediment brought into the lake during each flood event were computed through a Kriging procedure and compared with the historical instrumental data. The results show, in this study, that reconstructed sediment volumes are well correlated to maximal flood discharges. This significant correlation suggests that the increase of embankment and dam settlements on the Rhone River during the last 150 years has not significantly affected the transport of the smallest sediment fraction during major flood events. Hence, assessment of the flood-sediment volumes deposited in the large Lake Bourget is the only way to reliably reconstruct the flood frequency and intensity.


Quantity and quality of groundwater discharge in a hypersaline lake environment


Geophysical and geochemical surveys were conducted to understand groundwater discharge to Great Salt Lake (GSL) and assess the potential significance of groundwater discharge as a source of selenium (Se). Continuous resistivity profiling (CRP) focusing below the sediment/water interface and fiber-optic distributed temperature sensing (FO-DTS) surveys were conducted along the south shore of GSL. FO-DTS surveys identified persistent cold-water temperature anomalies at 10 separate locations. Seepage measurements were conducted at 17 sites (mean seepage rate = 0.8 cm/day). High resistivity anomalies identified by the CRP survey were likely a mirabilite (Na2SO4 center dot 10H(2)O) salt layer acting as a semi-confining layer for the shallow groundwater below the south shore of the lake. Positive seepage rates measured along the near-shore areas of GSL indicate that a similar to 1-m thick oolitic sand overlying the mirabilite layer is likely acting as a shallow, unconfined aquifer. Using the average seepage rate of 0.8 cm/day over an area of 1.6 km(2), an annual Se mass loading to GSL of 23.5 kg was estimated. Determination of R/Ra values (calculated He-3/He-4 ratio over the present-day atmospheric He-3/He-4 ratio) <1 and tritium activities of 1.2-2.0 tritium units in groundwater within and below the mirabilite layer indicates a convergence of regional and local groundwater flow paths discharging into GSL. Groundwater within and below the mirabilite layer obtains its high sulfate salinity from the dissolution of mirabilite. The delta S-34 and delta O-18 isotopic values in samples of dissolved sulfate from the shallow groundwater below the mirabilite are almost identical to the isotopic signature of the mirabilite core material. The saturation index calculated for groundwater samples using PHREEQC indicates the water is at equilibrium with mirabilite. Water samples collected from GSL immediately off shore contained Se concentrations that were 3-4 times higher than other sampling sites >25 km offshore from the study site and may be originating from less saline groundwater seeps mixing with the more saline water from GSL. Additional evidence for mixing with near shore seeps is found in the delta D and delta O-18 isotopic values and Br:Cl ratios. Geochemical modeling for a water sample collected in the vicinity of the study area indicates that under chemically reducing conditions, arsenic- (As) bearing minerals could dissolve while Se-bearing minerals will likely precipitate out of solution, possibly explaining why the shallow groundwater below and within the mirabilite salt layer contains low
concentrations of Se (0.9-2.3 μg/L).

Topography-based spatial patterns of precipitation extremes in the Poyang Lake basin, China: Changing properties and causes

Zhang, Qiang; Xiao, Mingzhong; Li, Jianfeng; et al.

The Poyang lake is the largest freshwater lake in China. Monthly precipitation extremes defined by maximum one-day precipitation amount (Rx1 day) and maximum consecutive five-day precipitation amount (Rx5day) regimes were analyzed for precipitation data covering a period of 1957-2010. How the spatial patterns of these precipitation extremes are impacted by topographic characteristics was investigated using the max-stable method. Results indicated that a better performance of model can be identified if topographical influences were considered, showing the critical role of topography in the spatial distribution of precipitation extremes. Seasonal shifts of extreme precipitation events can be identified within the Poyang Lake basin: the Rx1 day generally increases from the west to the east parts during spring, from the south to the north parts during summer, from the east to the west parts during autumn and from the northwest to the southeast parts during winter. Besides, details and subtle traits of spatial patterns of precipitation extremes can be attained when altitude was taken into consideration. However, complex influences of topographical properties or the mountains on changes of Rx1 day and Rx5day were also detected: higher altitude tends to increase the Rx1 day in summer and autumn while decrease the Rx1 day in winter and spring, which should be attributed to propagation direction of water vapor flux and also different relations between water vapor flux and extreme precipitation processes during different seasons. When compared to Rx1day, the seasonal Rx5day regimes shift along the east-west direction and which may be attributed to the different seasonal movements of precipitation center for Rx5day when compared to those of Rx1 day. Results of this study may help to better understand the possible influence of topography on the spatial patterns of precipitation extremes.

Temporal and spatial variations in radiation and energy balance across a large freshwater lake in China

Wang, Wei; Xiao, Wei; Cao, Chang; et al.

The surface radiation and energy exchange processes are important drivers of lake evaporation and the associated hydrological cycle. In this paper, we investigated the temporal and spatial variations in evaporation and the associated radiation and energy fluxes across Lake Taihu, China with an eddy covariance mesonet consisting of three lake sites and one land site. The results indicate that on the diurnal scale, water heat storage showed a similar behavior to net radiation with comparable magnitudes and fueled the substantial nighttime evaporation (48% of annual evaporation). Unlike boreal deep lakes, the monthly sensible and latent heat flux was tightly coupled with seasonal variations in net radiation at this large (size 2400 km2), subtropical (30.9-31.6 degrees N) shallow (mean depth 1.9 m) Lake Taihu. On the monthly to annual scales, the radiation and energy fluxes showed little spatial variations across the lake, indicating a lack of sensitivity to wind speed, water depth, water quality and the presence of submerged macrophytes. The annual mean Bowen ratio (0.12-0.13) of the lake was lower than those found in the literature for subtropical and northern lakes and also much lower than that
observed at the adjacent land site (0.58). The experimental data were used to evaluate the performance of 19 lake evaporation models of varying complexities.

（来源：JOURNAL OF HYDROLOGY, 2014, 511: 811-824）

科学视点

**Nature：地下水枯竭可能引发地震**

2014年5月14日，Nature发表文章称，在过去150年里，从加利福尼亚农业中心-中央山谷抽取的水量足以引起地壳向上反弹，致使周边山脉抬升，其中内达华山和海岸山脉累积抬升了约15 cm。冬季降雨和夏季抽水造成内华达山及海岸山脉一年一次的升降运动，可能会诱发与之平行的圣安德烈斯断层的地震。

地球物理学家研究表明，类似程度的季节性应力，如太阳和月亮的运动产生的应力，增加了与山脉平行的圣安德烈斯断层的微震数目。如果微妙的季节载荷变化能够引起微震的产生，那么也能偶尔引发一场大地震。这种应力非常小，比诱发断层地震所需聚集的应力小得多，但在某些情况下，如此小的应力变化却能变成压断骆驼的那根稻草，刚好对断层施加了额外推力引发断层活动。

季节性降雨同样可以引起地壳回弹。冬季地壳向下挠曲可以将圣安德烈斯断层固定住，降低了地震风险，而夏季地壳向上弯曲释放了应力，增加了地震风险。因此，夏季地震的风险比冬季略高，说明气候和构造相互影响，水的变化最终也会影响地球深部。2007—2010年间，全球定位卫星（GPS）对加利福尼亚和内华达的测量结果显示，内华达山逐年稳步抬升1～2 mm，虽然抬升速率异常快，但最初认为是深部构造活动的结果。因此，地质学家也建议，可以每年使用GPS测量地壳形变，而非测量积雪层和水库水位，来获取更好的、或者至少可用的水资源数据。

（来源：《科学研究动态监测快报》2014-6-1，第11期总第185期）

**全球变暖可能增加淡水生态系统的甲烷排放**

一项由英国艾克赛特大学（University of Exeter）主导完成的合作研究，通过收集数百个实验室的实验数据与现场调查数据，并通过对产生甲烷菌的单一物种种群、微生物群落及整个生态系统的分析表明，随着温度的升高，甲烷通量也呈增加趋势。这一题为《在微生物到生态系统尺度上甲烷通量与温度存在一致的依存关系》（Methane Fluxes Show Consistent Temperature Dependence Across Microbial to Ecosystem Scales）的文章发表于2014年3月的Nature期刊上。

研究人员指出，甲烷是一种强效温室气体，全球变暖潜力比二氧化碳大25倍，
所以了解其排放会怎样随温度升高而改变对于气候预测非常重要。淡水生态系统中的甲烷主要由名为古菌（Archaea）的古老微生物群所排放，这些微生物群存在于没有氧气的水浸沉积物中，它们在分解生物质过程中起着非常重要的作用，在这一过程中产生了甲烷而非二氧化碳作为其代谢副产品。

研究同时指出，甲烷排放随温度升高而增加的速度要高于碳循环中另外两个关键过程：呼吸作用（产生二氧化碳）和光合作用（消耗二氧化碳）。这表明，与水生生态系统、陆地湿地与稻田等向全球排放二氧化碳的速度相比，全球变暖可能增加了甲烷的排放量。

与生产及消耗二氧化碳的呼吸作用与光合作用相比，甲烷通量对温度更为敏感，这一发现突出表明，全球碳循环对未来气候变化起着加速而非减缓的作用。

虽然生物甲烷通量是全球甲烷排放过程中的重要组成部分，但它们的规模与影响因素尚有不确定性，这对我们预测碳循环这一关键过程对全球变暖的响应造成一定的障碍。而这一研究为科学家研究生态系统中甲烷排放对全球变暖响应的控制机制提供了非常重要的线索。

（来源：《科学研究动态监测快报》2014-4-1, 第7期总第145期）

**Surveys in Geophysics: 利用 GPS 改进全球水资源模型**

2014年3月19日，Surveys in Geophysics 刊登《由用水量影响的水储量季节性变化：全球水文模型估算值与GRACE结合GPS观测值比较研究》（Seasonal Water Storage Variations as Impacted by Water Abstractions: Comparing the Output of a Global Hydrological Model with GRACE and GPS Observations）一文，指出全球水评价与预测模型（WaterGAP）低估了季节性变化的陆地水储量。因而实际的水储量值大于模型的估算值。

歌德大学自然地理研究所（Institute of Physical Geography at Goethe University）的水文学家Petra Döll教授通过利用GPS观测和由GRACE卫星获取的重力场数据，对WaterGAP模型进行了改进。本研究中，一方面，检测了约200个全球分布的受水团影响的GPS天线的位移，而这一点恰恰是WaterGAP模型在全球尺度简化过程中所忽略的。另一方面，利用从GRACE重力场中获取的陆地水储量的季节性变化数据，来验证WaterGAP模型的结果。结果表明，WaterGAP低估了陆地水储量的季节性变化，因而需要进一步改进模型。同时，发现地球引力场获取的季节变化的水储量不能用来衡量人类用水量，这是因为GPS布点稀疏和GEACE的低空间分辨率所做不到的。

（来源：《科学研究动态监测快报》2014-4-1, 第7期总第228期）
太湖等水环境质量演变规律研究获突破

近日，环境基准与风险评估国家重点实验室，在北京通过科技部组织的建设验收会。中国工程院院士、中国环境科学研究院院长孟伟说，实验室在太湖等重点湖泊水环境质量演变规律等方面获重要突破，研究了水体硬度、温度等与我国重金属、氨等典型污染物质毒性及水质参数的定量响应关系，支持了水环境基准阈值制定及地表水环境质量标准修订等。

孟伟说，当前我国环境管理理念已由污染控制向风险管理的重要战略转折，由化学指标控制向生态健康管理方向转变，但“基础不科学，质量标准就无法真实反映客观规律，环保难以达到理想效果”。

环境基准与风险评估国家重点实验室主任、中国环科院研究员吴丰昌说，目前实验室在太湖等重点湖泊水环境质量演变规律、水生态功能分区理论及相关环境要素的质量变化研究方面取得重要突破。揭示了太湖、辽河等重点流域及污染物多介质迁移转化规律，提出了我国河流健康综合评价方法，构建了我国流域水生态功能分区理论框架体系，系统阐述了我国酸雨污染的时空分布规律，为我国环境质量基准、风险评估与管理提供科学依据。

吴丰昌说，实验室还初步构建了我国水环境质量基准理论方法体系框架。率先开展了25种重金属水生生物毒性和基准模型预测研究，揭示了锌、镉、铬（VI）、苯、硝基苯等污染物的区域物种敏感度分布特征，研究了水体硬度和pH值等化学生理学要素对我国本土物种生物毒性与水质基准的定量响应关系，率先开展了重金属水生生物毒性和水质基准模型预测研究，针对PM2.5等大气颗粒物观测需求，研发了新型航测技术与仪器，揭示我国区域细颗粒物分布特征，为我国空气质量标准修订及PM2.5标准限值制定等提供了支持。

（来源：科技日报 2014-04-07）

湖泊热力循环及对全球气候变化响应研究获进展

湖泊热力学过程是湖泊生态系统中最基本的物理过程，与湖泊光学和水动力学过程紧密相关，同时对物质分解、浮游生物的生物化学及初级生产过程起着非常重要的作用，因此水温及其季节变化决定生物群落结构和水生生态系统生产力。而对于深水湖泊/水库而言，湖泊水温差形成的湖泊热力分层及循环还是引起水体各种理化过程（如溶氧分布、底泥营养盐释放）、上下层水流混合和对流等动力现象的主要因素。因此，全球变暖引起的湖泊增温首先会改变湖泊热力学结构，影响温跃层深度、厚度、强度、湖泊热力分层和热力循环，进而进一步影响湖泊生态系统其它物理、化学和生物过程，最终影响生态系统的结构和功能。在研究所“一三五”重点布局的湖泊光热过程耦合等项目的资助下，中国科学院南京地理与湖泊研究所张运
林研究小组与淳安县环境监测站、杭州市环境科学研究院在深水湖泊热力循环及对全球气候变化响应方面取得研究进展。

基于2010年至2013年千岛湖（新安江水库）3个站点水温垂直剖面月观测以及千岛湖周边5个气象站1951年至2012年月平均气温观测数据，研究发现从每年的3、4月到次年的1、2月千岛湖存在长期稳定热力分层，表层水温和透明度是影响湖泊热力分层的主导因素。在温跃层稳定及减弱阶段，表层水温与温跃层深度存在显著负相关，与温跃层厚度和强度存在显著正相关；透明度与温跃层深度存在显著正相关，与温跃层厚度存在显著负相关。过去62年千岛湖地区气温上升造成温跃层深度降低1.4m，厚度和强度增加1.1m和0.22℃/m；而过去26年千岛湖透明度下降造成温跃层深度降低2.72m，温跃层厚度增加1.62m。气温上升和透明度下降强化湖泊热力分层，延长分层时间，不利于上下层水体交换和溶解氧扩散，造成下层水体缺氧，影响湖泊水质。

以上研究结果发表在湖沼学期刊《湖沼学与海洋学》（Limnology and Oceanography）第4期。这是张运林研究小组第二次在该刊发表我国湖沼学方面的研究成果，2010年该刊曾刊登张运林研究小组关于云贵高原湖泊有色可溶性有机物特征和来源方面的研究成果。（来源：http://www.cas.cn 2014-06-17）

蓝藻水华厌氧分解对湖泊微生物群落的影响研究获得进展

细菌是湖泊生态系统中的一个组成部分，在营养盐的生物地球化学过程中起着十分重要的作用。富营养化湖泊中的蓝藻水华在高温、厌氧条件下，死亡分解常会引发“湖泛”，对湖泊生态系统结构产生很大的影响，并可能进一步影响到湖泊的水质安全。因此，认识蓝藻水华降解过程中细菌群落结构的变化对于了解揭示浅水湖泊营养盐的微生物循环机理、蓝藻水华暴发机制具有重要意义。

在南京地理与湖泊研究所“一三五”重点项目和国家太湖水专项等项目的资助下，中国科学院南京地理与湖泊研究所邵克强博士通过室内模拟实验及现代分子生物学手段，研究了太湖蓝藻水华厌氧降解过程中水体附着细菌群落结构的变化。研究结果发现：蓝藻水华厌氧分解对太湖水体中附着细菌种群组成有很大的影响；与水华暴发有关的优势异养细菌类群（Alphaproteobacteria、Betaproteobacteria和Bacteroidetes）在藻华降解后大量地增加，并且一些细菌的属（种）之间也发生了演替。特别是发现了一种分解微囊藻藻毒素的特异性细菌Sphingomonas在藻华分解后数量大量增加。

基于该研究的结果，研究人员认为：为了应对藻毒素污染所带来的环境风险，藻毒素的细菌降解过程应引起关注。目前，该研究成果发表在国际SCI期刊science of
the total environment上。

（来源：http://www.cas.cn，2014-05-30）

业界动态

UNESCO 发布 2014 年世界水资源发展报告


《世界水资源发展报告》（WWDR）是联合国水机制的一份重要报告，由联合国教科文组织主持下的世界水资源评估计划编撰完成。2014版《世界水资源发展报告》紧密围绕联合国“世界水日”（3月22日）的主题——“水和能源”展开讨论。水资源与能源密切相关且高度相互依存。在一个领域做出选择和采取行动，不论是正面还是负面，都会大大影响另一个领域。因此需要多方权衡共同管理，以限制负面影响并促进协同效应。

1 当今的挑战：需要不断扩展服务

地球淡水资源十分有限，而且在空间上分布非常不均，其中只有2.5%的淡水资源能够供人类、动物和植物利用。目前，全球有7.68亿人口仍在使用未经净化改善的饮用水源，据估算25亿人口未能使用得到改善的卫生设施，约有35亿人家庭没有安全可靠的自来水。同时，全球超过13亿人没电可用，大约26亿人家中仍在用生物质燃料（薪柴、稻草）做饭。事实上，全球因为空气污染导致室内呼吸系统疾病，供水不足和卫生状况不佳有关的患病人数（如腹泻）居高不下，也已有证据表明与上述缺乏水与能源的人数紧密相关。

2 未来的挑战：满足日益增长的需求

能源和水资源安全对人类发展和经济发展至关重要。目前，能源和水资源面临空前压力，人类、工业企业和生态系统发展中经济体对两种资源的争夺日益激烈。由于制造业（400%）、热电行业（140%）、农业和生活（130%）用水需求的增长，到2050年，世界范围内的淡水耗用量还会在目前基础上增加55%左右。因此，全球范围内淡水资源供应将日趋紧张。在此期间，预计40%以上的人口将要生活在水资源短缺的地区。现有准确的证据表明，地下水供应正在减少，估计世界范围内约20%的地下水蓄水层都被过度开发。世界各地的湿地正在消失和退化，大幅降低了生态系统净化水的能力。
到2035年，全球对能源的需求将会增加三分之一，尤其是印度、中国和中东国家为了满足经济发展对能源的需求增加大约占该增产率的60%。到2035年，电力需求预计将增长约70%。经合组织国家（OECD）电力市场建设和消费模式已经比较成熟，对电力需求增长率显著低于非经合组织国家。所以这种增长完全出现在非经合组织与发展中国家，而印度和中国占该增长率的一半以上。

3 能源的需求持续增长对水资源意味着什么

水资源和能源是相互依存、相互影响的。水资源提供能源开发的用水，世界90%的电力都是水资源密集型的。根据国际能源机构估计，2010年全球用于能源生产所抽取的水资源约为5830亿m3，约占世界上15%的总取用水量，其中水资源消耗量（即抽取后未返回）为660亿m3。预计到2035年水资源消耗量将提高85%，这反映了电力生产更加耗水和生物燃料不断扩张的趋势。

2035年，预计约16%的能源依赖水力发电，这是最具再生力的能源，且水力发电用水能够回流，维持水循环平衡。目前，全球发电量约80%来自热电厂，并且这些部门都是用水大户。热电厂需要大量的冷却水作为凝汽器或其他热交换器的冷却介质。其中，欧洲电厂冷却用水占总淡水抽取量的43%（部分欧洲国家可能要高于50%）。另据统计，火力发电每年造成大于150~180亿m3淡水污染。生物燃料生产也会与农业和粮食生产竞争和消耗大量水。

4 案例分析

该报告还通过13个典型的案例研究，诠释了通过一些措施可以减缓水和能源危机的微妙关系，并提供一些参考借鉴。下面就重点介绍中国长江流域的三峡工程：

为了防止长江流域的洪涝灾害，中国于1993年动工修建了长江三峡水利枢纽工程，并于2010年全部完工。该工程的主体结构是高181米的三峡大坝，它不仅调节河流的流量，也在发电、航运等方面发挥作用。三峡水电站是世界上规模最大的水电站，总装机容量为世界第一。

中国的中部和东部地区，洪水的周期性泛滥造成很大的经济损失。在长江中下游三峡工程已经显著提高了防洪能力。2003—2012年期间，三峡大坝累计拦蓄洪水750亿m3。其中2010年，三峡水库实施防洪调度运用，累计拦蓄洪水270亿m3。三峡大坝不仅是水利工程上的奇迹也是长江三峡旅游线上一道亮丽的人工风景。三峡大坝旅游区以三峡大坝为主体，自面向公众开放以来，每年都有大量来自世界各地的游客慕名前来参观游览。2012年，旅游区接待游客超过180万人。

三峡工程是水资源综合开发利用项目，施工的实际投资和移民安置费用约290亿美元。但是，这些投资成本将通过获得的累积效应很快就能够偿还，特别是减少长江流域的洪水影响等；其他方面，如航运（通过水库放水改善长江中下游地区在枯水季节的航运条件）、水力发电对于回收成本更具效益。该项目不仅运行水电站，而且还提高了航道的运输能力，这些都显著地减少了温室气体排放。
程也引起了新的环境问题：淹没了大面积的耕地和珍稀植物；长江流域部分干支流的水体自净能力减弱、水质下降；库区改变了长江中下游原来的水生生态系统。中国政府已经认识到这些新出现的问题并承诺采取措施解决这些问题。总之，水资源和能源对可持续发展来说都至关重要，人类必须认识到二者的重要性。能源生产和传输需要利用水资源，特别是水力发电、核电和火力发电。2010年能源生产占了世界提取的淡水水源的15%。相反，大约8%的能源被用于抽水、污水处理和输送水资源等。希望能源领域和水资源领域的政策制定者将能够有所借鉴，从而在将来采取更为综合性的方法来解决问题，加强合作伙伴关系，在解决水与能源挑战的同时，实现更大的经济和社会效益。希望世界能够找到同时解决水与能源双重挑战的办法。

（来源：《科学研究动态监测快报》2014-4-1，第7期总第228期）

**EPA 提出史上最大污染底泥清除计划**

2014年4月16日，美国环境保护署（EPA）正式提出方案，计划对受到严重污染的新泽西帕塞伊克河（Passaic River）8英里长的下游河段进行清理，主要清除高达430万m³的高度污染沉积物（底泥）。在经历了一个多世纪的工业活动之后，帕塞伊克河遭受了农药、重金属、二恶英、多氯联苯（PCBs）和其他污染物的侵蚀。

EPA为了提出河流清理建议，已经进行了七年的研究以帮助确定如何修复河流受污染区域的最佳途径。目前，EPA与新泽西环保局、美国陆军工程兵团等机构协商制定出可行性的研究方案。方案提议沿着河岸进行全面疏浚挖掘，这是有史以来挖泥量最大的一次。

在帕塞伊克河8英里的河段内约存有10英尺深的受污染底泥。此计划将受污染的底泥上层挖掘出来后，将540万m³的受污染的底泥下层留在河底，并精心设计覆盖一层保护盖。该层由深度2英尺的沙粒或者石头构成保护屏障，有效地阻挡受污染的沉积物再次迁移可能会污染食物链。但是沿岸地带深度将只有1英尺，另外再铺一层1英尺的保护层作为帮助鱼类与植物重建栖息地。EPA将对覆盖层进行监测与维护，以确保此清理工作能持续保护河流的生态健康。

（来源：《科学研究动态监测快报》2014-5-15, 第10期总第231期）

**我国启动新一轮罗布泊大型科考活动**

中国科学院日前在京召开《罗布泊地区自然与文化遗产综合科学考察》的项目启动会，为我国目前综合性与系统性最强的一次罗布泊科考活动揭幕。

此次科考项目在接下来的五年中将进行三次大规模野外科学调查，首次同时涵
盖罗布泊地区的自然与文化遗产，为进一步解读楼兰文明的消亡原因与罗布泊生态环境的演变收集更翔实的实物证据。

罗布泊地区曾孕育小河与楼兰文明，楼兰遗迹于十九世纪末被外国探险家首次发现。其后中外科学家对罗布泊及周边地区开展了多次科学调查，中科院也曾于上世纪50年代、80年代及最近几年多次组织考察。

此次科考项目负责人、中科院地质与地球物理研究所的秦小光表示，虽然此前有过多次科考活动，但受技术资金与自然环境的限制，大多时间短、考察内容单一，尤其缺乏同时涵盖自然与文化两方面的大型综合性科学考察。

秦小光说，此项目是在科技部科技基础性专项支持下开展的重点科考项目，计划组织多学科研究队伍，对罗布泊地区古湖泊、古河网、雅丹风蚀地貌等自然遗产，以及楼兰古国的农田农作物、灌渠和防洪水利设施、水陆交通、村落城池等一系列从未被关注过的社会基础设施遗迹等开展系统调查，相信会有重大突破。

据了解，此次科考项目以中国科学院地质与地球物理研究所为牵头单位，考察队总人数近50人。

参与本次科考项目的中科院遥感与数字地球研究所研究员邵芸表示，罗布泊水域对楼兰古国的兴盛曾起着关键作用，而水域为何消亡、消亡的过程、消亡前有怎样的生态作用，都非常值得探讨。在中央提出“美丽中国”、新丝绸之路经济带等构想的今天，研究罗布泊环境变迁与楼兰文明兴衰的关系有深远的现实意义。

第四届中国湖泊论坛协办全国学会第一次协调会召开

4月3日，学会学术部组织召开了第四届中国湖泊论坛协办全国学会第一次协调会，来自中国环境科学学会、中国水利学会、中国海洋湖沼学会等11个全国学会有关负责同志参加会议，学会学术部副部长宋军出席会议并讲话。

会议对第三届中国湖泊论坛全国学会协办情况进行了总结，重点围绕第四届中国湖泊论坛的主题、专题、组织机构、活动安排等筹备事项进行了研讨，并对协办学会的任务进行了部署。

宋军在讲话中对全国学会在论坛策划、论文征集、专家推荐、建议书起草等方面的积极参与和大力支持表示感谢。宋军强调，本届中国湖泊论坛要侧重突出“学、服、建”的特点。“学”指学术，主题鲜明，发挥学会优势，突出多学科交叉特色，显著出在学术交流方面的高水平；“服”指服务，要提升学术服务经济社会发展能力，积极为举办地服务，如可围绕巢湖生态问题进行研讨；“建”即专家建议，要通过专家建议，凸显论坛成果，引起各方重视，扩大论坛影响力。他指出，办好论坛，全国学会是主体，当地政府是支撑，行业专家是关键，规模要适度。

中国湖泊论坛于2011年设立，已成功举办三届。该论坛是中国科协围绕党和国家中心工作，精心打造的一个专家论坛项目。论坛旨在发挥科协组织的优势，依托
有关全国学会和地方科协，组织和动员全国湖泊保护与管理领域的专家学者、科研人员及从事此项工作的相关政府部门的领导，共同探讨中国湖泊面临的挑战与保护的对策，交流展示湖泊治理的新理念与新技术，分享湖泊保护与流域管理的成功经验，为我国的湖泊开发利用与保护，开展研讨，建言献策。其中，第三届中国湖泊论坛提出的专家建议得到了中央有关领导的批示。第四届中国湖泊论坛拟于10月下旬在安徽省合肥市举办，由中国科协主办，由安徽省科协、合肥市人民政府联合承办。


**国务院：实施江河湖泊治理骨干工程**

据中国政府网消息，国务院总理李克强5月21日主持召开国务院常务会议，部署加快推进节水供水重大水利工程建设。

会议确定，按照统筹谋划、突出重点的要求，在今明年和“十三五”期间分步建设纳入规划的172项重大水利工程。工程建成后，将实现新增年供水能力800亿立方米和农业节水能力260亿立方米，增加灌溉面积7800多万亩，使我国骨干水利设施体系显著加强。

会议要求实施江河湖泊治理骨干工程，综合考虑防洪、供水、航运、生态保护等要求，提高抵御洪涝灾害能力。


**“描绘地球”项目将预测变化的河流景观**

河流的化学或物理变化会对人类、野生生物和产业产生重要影响。科学地预测这些变化发生的时间和过程可为我们更好地管理河流提供依据。美国西北大学Aaron Packman教授领导的研究小组正在开展一项名为“描绘地球”（Earthcasting）的研究项目，该项目将跨越物理和化学的实验与理论边界，将自然环境中的观测与新数学模型的开发结合在一起，开发出预测河流水位、河道和毒性在未来如何变化的工具。

与其他系统相比，河流系统是很难预测的。当前的数学还不足以研究这一复杂的环境系统行为，但是将数学、物理学和地球化学结合起来可以创造出一个更好的模型来预测这一系统。研究小组不但关注于长期趋势和可变趋势；还考虑到人类活动如何改变河流景观。

为了预测河流环境的快速变化，该项目将结合数学建模、计算机模拟和环境观测，以创建一幅河流行为的全景图。该研究小组正积极地与美国和欧洲的其他研究
小组一起采集河道和洪泛区的水、土壤和沉积物样品。研究人员计划建立一个长时间记录，以评估河流变化的趋势。

该项目的最终结果将是一个软件包。随着更多数据的获得，该软件包将不断地得到更新。利用该软件，用户可模拟不同的环境或人为因素，以更好理解其感兴趣河流变化的基本过程，并预测未来情景。

来源：《科学研究动态监测快报》2014-5-15, 第10期总第231期

湖北省全国首发湖泊管护白皮书

6月20日，湖北省人民政府正式发布《湖北省湖泊保护与管理白皮书（2012-2013年）》，这是贯彻落实《湖北省湖泊保护条例》的具体举措，系国内首次组织编制和公开发布。

湖北省境内现有755个湖泊，湖泊水面面积2706.85平方公里。据介绍，此次发布的白皮书共分前言、湖泊保护体制机制和规章制度建设、湖泊保护责任制落实、湖泊保护基础工作进展、湖泊水质及生态修复、湖泊保护投入政策和生态补偿机制、湖泊巡查执法及日常监管、涉湖工程建设管理与监督、湖泊保护公共参与和附录等十个部分，比较全面、真实、客观地记载了2012-2013年全省湖泊保护与管理工作情况。

白皮书公告称，2012-2013年期间，湖北全省明确了湖泊保护管理主管部门的市6个、县（市、区）15个，人员编制数量290个，出台地方性湖泊保护规章61个。2013年，全省还对列入《湖北省第一批湖泊保护名录》中的308个湖泊展开了水质监测工作。监测结果显示，全省湖泊水质总体为中度污染。但统计中的98个城中湖泊水质总体为重度污染，富营养化较为严重。

据悉，2014年1月24日，湖北省湖泊保护与管理办公室向有湖泊保护任务的市、直管市、神农架林区人民政府发出《关于提供2013年度湖泊保护白皮书素材的函》（鄂湖泊办函〔2014〕1号）文，收集整理各地湖泊保护情况。2月下旬，省湖泊办组织三个专班分赴各地对湖泊保护情况进行检查督办，实地佐证相关数据、材料。3月上旬，《湖北省湖泊保护与管理白皮书（征求意见稿）》出炉，并寄送省湖泊保护与管理领导组成员单位征求意见。4月9日、5月5日，省湖泊办先后两次组织召开厅际湖泊保护联席会议，集中审议白皮书。后经反复征求意见、修改完善，最终形成《湖北省湖泊保护与管理白皮书（报审稿）》，并报省人民政府审定。6月湖北省政府主要领导签署同意正式发布。

来源：http://www.hb.xinhuanet.com 2014-06-21

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中德清洁水创新中心落户张江

4月30日，同济大学与上海张江高科技园区共同签署《战略合作协议》，结为战略合作伙伴关系，双方携手在协同创新领域开展战略合作。作为其中一项重点合作内容，由双方共建、共同致力于进一步推动中德“清洁水”领域技术研发及成果转化的“中德清洁水创新中心”，当天在张江高科技园区揭牌。

根据《战略合作协议》，同济大学和张江高科技园区将围绕节能环保、新能源、新材料、信息等战略新兴产业，构建共性技术研发基地，在重点产业领域建设技术创新平台，共同推动科技成果产业化、产业技术孵化基地建设，以及专业人才培养。

“中德清洁水创新中心”总部设于张江高科技园区内，计划在江苏宜兴和浙江嘉兴分别设立其分中心。该中心将每年吸引数家中德创新企业入驻，支持其技术研发推广应用，力争每年促进5至10项科技成果成功转化应用。记者了解到，现已有数十家中德环保创新企业和知名研究机构，表示出入驻“中德清洁水创新中心”的意向。

（来源：科技日报 2014-05-04）

三峡水位今年首次跌破 158 米

近期，三峡水库连续数日加大了下泄流量，目前库区水位已跌破至157.59米，这也是三峡水位今年首次跌破158米。据介绍，6月中旬，三峡水位将降至145米左右，以腾出防汛库容。

（来源：科技日报 2014-05-12）

中意环保合作-湖南省洞庭湖富营养化防治技术项目顺利通过验收

5月22日，中意环保合作-洞庭湖富营养化防治技术项目结项会在岳阳市顺利召开。环境保护部、意大利环境领土和海洋部、省环保厅、岳阳市环保局、省环科院、省洞庭湖生态环境监测中心、岳阳市环境监测中心以及意大利SGI公司的代表出席会议。

洞庭湖是我国第二大淡水湖，目前也面临生态系统退化与水体富营养化的问题，特别是2007年以来，局部湖区还出现了蓝藻水华。2010年该中意合作项目立项以来，项目选择岳阳南湖（洞庭湖湖汊）作为研究对象，通过引进意大利湖泊治理的先进理念和技术，制定区域的防治行动计划和水环境恢复与管理规划。

会上，省环科院代表项目组就岳阳南湖水质数据收集和监控系统（SCADA系统）、王家河水质改善实施方案等方面汇报了洞庭湖水系试点南湖应用的重要成果。与会领导和专家认真听取了项目组工作汇报，并实地考察和检验了王家河治理工程及
SCADA系统，认为项目成果实现了预期目标，一致同意该项目通过验收。

该中意合作项目在南湖试点成果的成功应用提高了试点地区湖泊富营养化防治能力，改善了南湖的水质，为同类湖泊富营养化防治提供了技术示范。