CHINESE-FRENCH SYMPOSIUM
ENVIRONMENT - BIODIVERSITY

As part of the 14e COMIX
Joint French-Chinese Committee for Science and Technology

ORGANIZATION

French part
Embassy of France in China
Ministry of Higher Education, Research and Innovation of France
CNRS (French National Center for Scientific Research)

Chinese part
Ministry of Sciences and Technology in China

Monday **November 4th –** Tuesday **November 5th, 2019**
at Xiyuan Hotel Beijing
1 Sanlihe Rd, Haidian District, Beijing China
北京海淀区 三里河路1号

The objective of the seminar is to take an overview of French-Chinese scientific cooperation in the field of the environment, to strengthen existing collaborations and the joint research structures concerned, and to identify new opportunities for cooperation

CHINESE-FRENCH SYMPOSIUM

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November 4th-5th 2019, Beijing

Proceedings of the Chinese-French Symposium on Environment and Biodiversity

4-5 November 2019, Beijing


The COMIX meeting (Joint French-Chinese Committee for Science and Technology), during its 14th session in February 2019, decided to organize a kick-off symposium on the theme of Environment and Biodiversity, to be held in Beijing on 4-5 November 2019. Scientists and governments are increasingly concerned about the potential catastrophic effects of climate change, the destruction and degradation of natural habitats and the current high rates of biodiversity loss. Given the complexity of ecosystems and their biological communities, it is not easy to directly assess the health of natural environments and how it changes over time. The ecological transition is one of the major public policies in France. It is also one of the priority objectives set by the Chinese government after 40 years of economic development. For these reasons, there is a growing importance of the environment in bilateral scientific cooperation.

The objective of the seminar is to take an overview of French-Chinese scientific cooperation in the field of the environment, more specifically on the following themes, Biodiversity and Global Change, Critical Zone and Soil Functioning and Ecohealth, to strengthen existing collaborations and the joint research structures concerned, and to identify new opportunities for cooperation. This symposium will also reinforce the existing scientific collaborations between French and Chinese researchers and allow the identification of new emerging topics on the theme of Environment. The seminar will also give visibility and open new perspectives to French-Chinese scientific cooperation in the field of biodiversity, one year before the fifteenth session of the Conference of the Parties (COP 15) on biodiversity in China is to be held in Kunming in November 2020.

The Organization Committee

Embassy of France in China
Ministry of Science & Technology in China
Ministry of High Education, Research & Innovation in France
French National Center for Scientific Research

Monday 4th Conference room 1rst floor

8:00 - 8:30	**Opening of the registration desk**
8:30 - 8:45	**Welcome speech** · Philippe GRIEU, Scientific Attaché, Embassy of France (2 min) · Yingshi WANG 王莹石, Deputy Consultant of division of European Affairs, Ministry of Science and Technology of China (6 min) · Joaquim NASSAR, Director of department of strategy, expertise and management of international cooperation programs, Ministry of Higher Education, Research and Innovation of France (6 min)
Session I	**Biodiversity and Global Change** **Chairman : FR : Yvon le Maho, ZH : Xuhui WANG**
8:45 - 9:10	**Impacts of climate change on biodiversity based on long-term series** · Zhibin ZHANG 张知彬, Institute of Zoology, Beijing, CAS, China
9:10 - 9:35	**Physiological adaptations of wild animals to climate change as a source of biomedical innovation** · Yvon Le Maho, Member of France Academy of sciences; Chairman of the French-Chinese Expert Committee, IPHC, Strasbourg, France, and Centre Scientifique de Monaco, Monaco Principality
9:35 - 10:00	**Biodiversity monitoring of desert ecosystem based on field stations** · Zhibin HE 何志斌, Northwest Institute of Eco-Environment and Resources (NIEER), CAS, China
10:00 - 10:20	**Figs and figwasps: model system to investigate biotic interaction network responses to global change** · Magali PROFFIT, Centre d'Ecologie Fonctionnelle et Evolutive, UMR5175, France · Yan-Qiong PENG 彭艳琼, Xishuangbanna Tropical Botanical Garden (XTBG), CAS, China
10:20 - 10:40	**Deep sea hydrothermal vents : biodiversity and adaptation to extreme conditions** · Mohamed JEBBAR & Karine ALAIN, IFREMER CNRS, Université de Brest, France · Zongze SHAO 邵宗泽, KLAMBR (State Key Laboratory of Marine Biogenetic Resources of the Third Institute of Oceanography of the SOA), Xiamen, China
10:40 - 11:10	**Coffee break**
11:10-11:30	**Microbial food web: functional dynamics at the single cell level** · Gerald GREGORI, Aix-Marseille University, Toulon University, CNRS, IRD, Mediterranean Institute of Oceanography UMR110, France · Yuan ZHAO 赵苑, CAS Key Laboratory of Marine Ecology and Environmental Sciences, Institute of Oceanology, Qingdao, China
11:30 - 11:55	**The central role of Museum collections / Botanical gardens in research on Biodiversity** · Cecile CALLOU, MDC MNHN, Paris, UMR 7209 Archéozoologie, Archéobotanique : sociétés, pratiques et environnements, France · Huabin HU 胡华斌, XTBG, CAS, China
11:55 - 12:10	**The value of long term observations and experimentations to tackle the effects of major environmental changes on biodiversity** · Dominique JOLY, Institute of Ecology and Environment, CNRS, Paris, France
12:10 - 12:25	**Can plant-soil feedback explain shiftes in plant community composition under global change?** · Hui GUO 郭辉, Nanjing Agricultural University, China
12:25 - 12:45	**SOFIE: the Sino-French Virtual Institute for Earth System Science** · Xuhui WANG 王旭辉, Department of Ecology, College of Urban and Environmental Science, Peking University, China
12:45 - 14:00	**Lunch**

Session II	**Critical zone - soil functioning** **Chairman : FR : Fatima LAGGOUN, ZH : Junsheng Nie**
14:00 - 14:20	**Introduction** **OZCAR : the French Research Infrastructure of the Critical zone** · Laurent LONGUEVERGNE, Géosciences Rennes, France
14:20 - 14:40	**Landscape Dynamics and Transport Properties: a journey through scales** · Clément NARTEAU, Université de Paris, Institut de Physique du Globe de Paris, CNRS, France · Jiubin CHEN 陈玖斌, ISESS (Institute of Surface-Earth System Science) - Tianjin University, China
14:40 - 15:00	**Weathering rate determination : implication of the analysis of Chinese and French granitic weathering profiles** · Damien LEMARCHAND, LHyGeS, France · Sheng XU 徐胜, ISESS- Tianjin University, China
15:00 - 15:20	**Tracking groundwater availability for human and ecosystems from space** · Laurent LONGUEVERGNE, Géosciences Rennes, France · Wei FENG 冯伟, Institute of Geodesy and Geophysics, CAS, Wuhan, China
15:20 - 15:40	**Chinese-French cooperation on environmental mercury pollution issues** · Jeroen SONKE, GET, Toulouse, France · Jiubin CHEN 陈玖斌, ISESS- Tianjin University, China
15:40 -16:00	**Microbial ecology in mining ecosystems** · Robert DURAN, Université de Pau et des Pays de l'Adour, France · Jun YAO 姚俊, China university of geosciences, Beijing, China
16:00 - 16:20	**Coffee break**
16:20 - 16:40	**Trace metal cycling in the rhizosphere-drilosphere. Implications for the phytoremediation of contaminated soils** · Romain MILLOT, ISTO UMR 7327 CNRS-Université d'Orléans-BRGM, France · Jun DAI 戴军, College of resources and environment, South China Agricultural University, Guangzhou, China
16:40 - 16:55	**Electrical resistance heating (ERH) remediation equipment and application in PAHs contaminated soil** · Wentao JIAO 焦文涛, Research center for Eco-Environmental Sciences, CAS, China
16:55 - 17:15	**Multi-scale Paleogene and Neogene climatic evolution linked to the formation of the Tibetan plateau : insights from continental sedimentary records** · Albert GALY, Centre de Recherches Pétrographiques et Géochimiques, UMR7358, CNRS, Université de Lorraine, France · Yibo YANG 杨一博, CAS Center for Excellence in Tibetan Plateau Earth Sciences, Beijing, China
17:15 - 17:30	**Pre-Quaternary decoupling between Asian aridification and high dust accumulation rates** · Junsheng NIE 聂军胜, Lanzhou University, China
17:30 - 17:50	**Influence of Three Gorges Dam impoundment on sediment source-to-sink and weathering processes in the mid-lower Changjiang (Yangtze) River catchment** · Shouye YANG 杨守业, State Key Laboratory of Marine Geology, Tongji University, Shanghai, China
18:30 - 20:30	**Dinner**

Tuesday 5th Conference room 4th floor

8:30 - 9:00	**Opening of the registration desk**
Session III	**EcoHealth** **Chairman : FR : Martine HOSSAERT, ZH : Maosheng YAO**
9:00 - 9:10	**Connecting the health of humans, animals and ecosystems: The One Health approach** · Martine HOSSAERT, Delphine DESTOUMIEUX-GARZON, Stéphane BLANC, Institut Ecologie Environnement - CNRS, France
9:10 - 9:25	**Research on Comprehensive Monitoring of Terrestrial Ecosystem Quality in China** · Daiqing LI 李岱青, Research Academy of Environmental Sciences, China
9:25 - 9:45	**Ecosystem health and environmental disease ecology: 25 years of Sino-French cooperation** · Patrick GIRAUDOUX, Chrono-environment, University of Bourgogne Franche-Comté/CNRS, Besançon, France · Li LI 李丽, Key Lab of Hazard Risk Management and Wildlife Management and Ecosystem Health (LWMEH), Yunnan Universi ty of Finance and Economics, Kunming, China
9:45 - 10:05	**Transmission and evolution of honeybee viruses between honeybees and their hornet predators / Hornet in ecology: pro and cons** · Eric DARROUZET, Institut de Recherche sur la Biologie de l'Insecte, UMR 7261, CNRS – Université de Tours, Tours, France · Chunsheng HOU 侯春生, Institute of Apicultural Research, Chinese Academy of Agricultural Sciences, Beijing, China
10:05 - 10:25	**Can wildlife conservation and ecotourism be conciliated? Lessons from the Yunnan snub-nosed monkey (Rhinopithecus bieti) in the Xiangguqing valley** · Eve AFONSO, Chrono-environment, University of Bourgogne Franche-Comté/CNRS, Besançon, France · Li LI 李丽, Key Lab of Hazard Risk Management and Wildlife Management and Ecosystem Health (LWMEH),Yunnan University of Finance and Economics, Kunming, China
10:25 - 10:55	**Coffee Break**
10:55 - 11:15	**Urban Quality Monitoring with Remote Sensing** · Thomas CORPETTI, UMR CNRS 6554 LETG – Littoral, Environnement, Télédétection, Géomatique, Rennes, France · Ping TANG 唐娉, Aerospace Information Research Institute of CAS, Beijing, China · Lihao ZHAO 赵立豪, Associate Professor, University of Tsinghua, China
11:15 - 11:35	**AirBioHealth project: Comparative study of biological aerosol communities and their effects on health between Paris and Beijing** · Maosheng YAO 要茂盛, College of Environmental Sciences and Engineering, Peking university, China
Session IV	**Workshops** As part of the preparations of the fifteenth session of the Conference of the Parties (COP 15) to the Convention on Biological Diversity (CBD) that will be hosted by China and held in Kunming, Yunnan, in November 2020, the objectives of the workshops are to take an overview of French-Chinese scientific cooperation, to strengthen existing collaborations and the joint research structures, and to identify new opportunities for cooperation.
11:35 - 12:35	**Workshop: Biodiversity and Global Change** **Chairman : Agence française pour la biodiversité (AFB), Cyrille Barnerias** **Chairman : Hui GUO**
12:35 - 14:00	**Lunch Break**
14:00 - 15:00	**Workshop: Critical zone / Soil functionning** **Chairman : Agence Nationale de la recherche (ANR): Anne-Hélène Prieur-Richard** **Chairman : Sheng XU**
15:10 - 16:10	**Workshop: EcoHealth** **Chairman : Agence Nationale de la recherche (ANR): Anne-Hélène Prieur-Richard** **Chairman : Ping TANG**
16:10 - 16:30	**Coffee Break**
16:30 – 17:30	**Main conclusions and perspectives** **Chairman : Fatima LAGGOUN and Martine HOSSAERT** **Chairman: Jiubin CHEN**
18:30 - 20:30	**Dinner**

SESSION I

BIODIVERSITY & GLOBAL CHANGE

IMPACTS OF CLIMATE CHANGE ON BIODIVERSITY BASED ON LONG-TERM SERIES

Zhibin ZHANG

Institute of Zoology, Chinese Academy of Sciences

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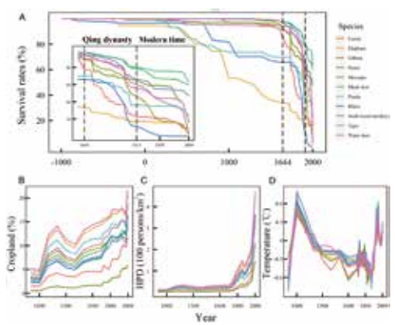
Abstract

The earth is facing great challenge of species extinction, biological invasion, disease transmission and pest outbreaks under the accelerated global change. Climate change and human disturbance are often blamed for causing these problems. However, quantitative evaluations on their distinctive effects are rare, due to the lack of long-term spatial-temporal data. This prevents us to take effective measures for biodiversity conservation, pest or disease prevention and control. Using long-term historical records or monitoring data covering periods from decades, centuries to millennia, we investigated the impacts of climate change and human disturbance on population dynamics of various animal species or their borne diseases including rodent-borne plague, human epidemic, locust, small rodent, large mammal (e.g. rhinos, elephant, panda, mammoth, deer, lynx, primates) and other vertebrates. We found that the effects of global change are complex, and often non-monotonic, highly depending on the study scale, region and taxa. Both climate warming and cooling may increase prevalence of pests or diseases, and cause biodiversity loss. Sustained climate change and human disturbances have significantly altered biodiversity and population dynamic patterns of animals, and are imposing high pressure on biodiversity conservation, agriculture production, ecological safety and human health. There is an urgent need to take more effort for studying the biological response to the rapid increase of global climate change and human impacts.

Millennia historical records provide cues of impacts of climate change on biodiversity



Both extreme climate change and human disturbance caused population decline and local extinctions of mammals in China

PHYSIOLOGICAL ADAPTATIONS OF WILD ANIMALS TO CLIMATE CHANGE AS A SOURCE OF BIOMEDICAL INNOVATION

Yvon LE MAHO

Institut Pluridisciplinaire Hubert Curien, CNRS/University of Strasbourg,

France & Scientific Center of Monaco, Monaco Principality

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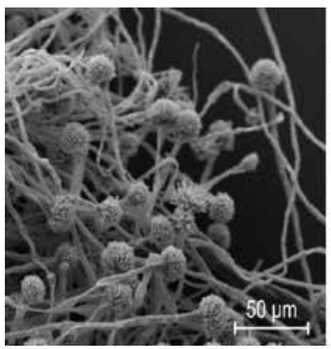
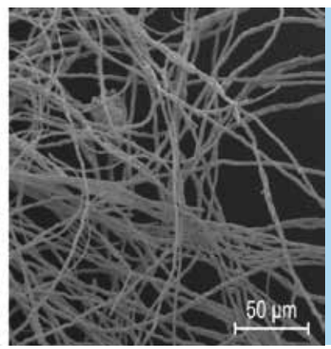
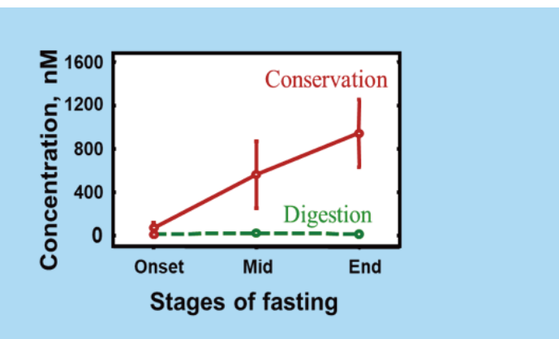
Abstract

Most resources in medical research are concentrated on the so-called standard model of laboratory mice. However, recent findings show that more resources should support research on wild animals. They are indeed a fantastic source of biomedical innovation since those many mechanisms that enable them to cope with environmental constrains or diseases are very successful. Indeed, they have allowed them to survive and breed over millions of years under conditions that are often extreme. We can decipher these mechanisms by simply bringing wild animals in the laboratory, such as for the naked mole rat. It allowed discovering anti-cancer mechanisms that would not have been found in mice, since they lack these… But there are also many physiological adjustments that can only been shown when the animals are freely ranging under natural conditions and are engaged in specific activities, such as breeding, foraging or migrating. For example, in the king penguin, both mates alternate in foraging at sea and fasting in the colony for the incubation of the egg. Usually, the male is assuming the task of the last 2-3 weeks and the female returns from the sea with food in her stomach to feed the newly hatched chick. However, the female may be delayed due to a larger distance for foraging because of climate variability. We have found that the male is then able to feed the chick with food that has been preserved during the 2-3 weeks at about 37°C in its stomach. This allowed us to discover a small antimicrobial protein that we have called spheniscin. Produced by technology, it was found to be very efficient against the agents of the main nosocomial diseases, Staphylococcus aureus and Aspergillus fumigatus. Found in a marine bird, this molecule has the particularity to remain efficient in a saline medium, opening new perspectives for ocular infections.





Effects of 6 µM spheniscin on the spores of Aspergillus fumigatus



Spheniscin in penguin stomach

BIODIVERSITY MONITORING OF DESERT ECOSYSTEM BASED ON FIELD STATIONS

Zhibin HE Longfei CHEN Jun DU

Linze Inland River Basin Research Station,Northwest Institute of Eco-Environment and Resources, CAS

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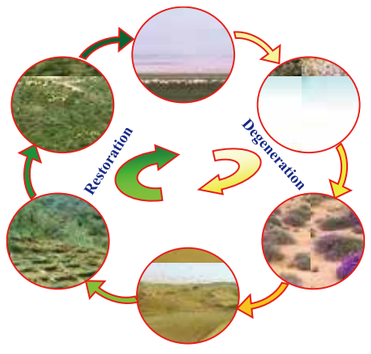
Abstract

Deserts harbour unique species resources that are found nowhere else in the world. However, threats to these specie resources are rising due to increasing levels of accessibility, human population and exploitation of natural resources, including climate change. In order to understand the biodiversity dynamics of desert ecosystem, long-term monitoring of biodiversity including both plants and animals has been carried out for decades in the field stations of Chinese ecosystem research network (CERN). We summarize the related research results as follows : (i) Species-richness and biomass of desert plant communities are very sensitive to rain pulses, especially the annual plants; species-richness only has strong spatial scale-dependence at scales less than 100 m2, that is different from the results for the grassland and woodland communities. (ii) Long-term monitoring of sand-binding vegetation diversity shows that herbaceous species increased from no observations at the initial stage to 13 species after 50 years of recovery, whereas shrub sand-binding species decreased from 10 species to 2 species. Shrub cover decreased from the highest average of about 33% to the current 9%, whereas cover and biomass of herbaceous species increased throughout the process during this period. (iii) Soil animals community was strongly affected by short-term rain pulses, and the diversity and community composition have obvious response to land-use changes. (iv) Soil salinity is also one of the main limiting factors of desert biodiversity. With the increase of soil total dissolved salts, the species richness declined with exponential rate.

Sand-binding vegetation



Restoration and degradation process of desert ecosystem

FIGS AND FIG-WASPS: MODEL SYSTEM TO INVESTIGATE BIOTIC INTERACTION NETWORKRESPONSES TO GLOBAL CHANGE

Magali PROFFIT[1] Yan-Qiong PENG[2] Hui YU[3]

Martine Hossaert-McKey[1]

1 CEFE UMR5175, FRANCE

2 Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences

3 South China Botanical Garden, Chinese Academy of Sciences

Abstract

Within the general context of global change, little attention has been paid to the consequences of ongoing changes on plant-insect communication for pollination. The potential consequences of increasing atmospheric pollution and in particular of increasing ozone (O_3) concentration are largely unknown but could be devastating, because O_3 can affect plant-insect communication through volatile organic compounds (VOCs). The aim of our current project is to produce background knowledge on the elusive question of the impact of increasing O_3 levels on the stability of insect-plant interaction networks, including pollination services. We use a model system, the obligate species-specific mutualism between *Ficus* and fig wasps. This interaction represents a unique example of co-speciation and co-evolution between plants and pollinators where partners encounter is mediated by the emission by the *Ficus* and the specific recognition by their pollinators of VOCs. There are about 800 species of fig trees, which are thought to be keystone species in tropical forests. The Xishuangbanna Tropical Botanical Garden (XTBG), the South China Botanical Garden (SCBG) and the “Centre d’Ecologie Fonctionnelle et Evolutive” (CEFE) are the main actors of the study of fig-fig wasp communication through VOCs. In South China fig diversity is high while air pollution is highly contrasted between XTBG and SCBG. We are currently investigating how the attraction of insects by VOCs produced by their specific host plant is affected by high O_3 concentration. Comparative studies among sites within region and between regions of the impact of variation in O_3 concentrations on a series of *Ficus* species will provide important results for understanding the resilience of plant-insect confronted with increasing air pollution.

Effect of ozone on the attraction of fig-wasps towards fig VOCs

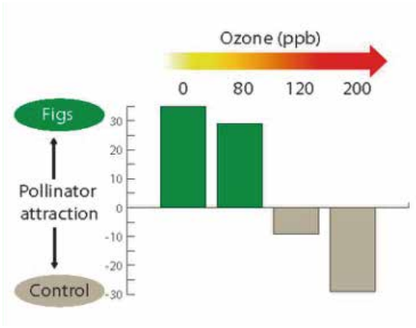


Fig and pollinating fig-wasp interaction

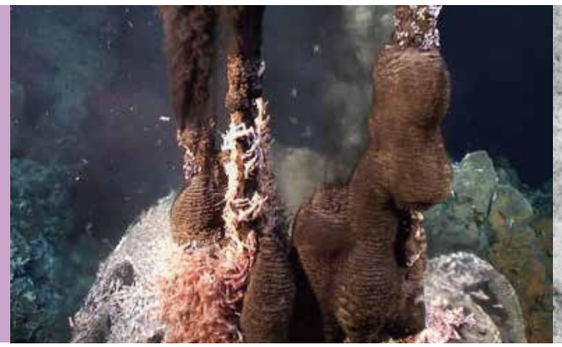
DEEP-SEA HYDROTHERMAL VENTS: MICROBIAL DIVERSITY AND ADAPTATION TO EXTREME CONDITIONS

Karine ALAIN[1,2] Zongze SHAO[1,3] Mohamed JEBBAR[1,2] & Members of the LIA MicrobSea[1]

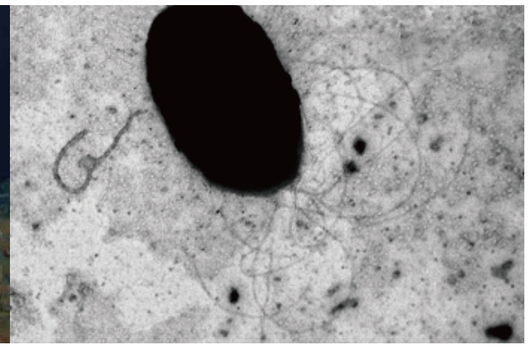
❶LIA1211 MicrobSea, Sino-French Laboratory of Deep-Sea Microbiology, Xiamen-Plouzané ❷CNRS, Univ Brest, IFREMER, UMR 6197 Laboratoire de Microbiologie des Environnements Extrêmes LM2E, IUEM, Rue Dumont d'Urville, F-29280 Plouzané, France ❸ Key Laboratory of Marine Biogenetic Resources, the Third Institute of Oceanography SOA, Xiamen, Fujian 361005, China

Abstract

Deep-sea hydrothermal vents represent one of the most extreme environments on Earth. If some hydrothermal fields were subjected to numerous microbiological investigations, hydrothermal fields remain still largely underexplored at the planetary scale. Deep-sea vents are populated by dense and highly productive biological communities over a wide range of physical and chemical conditions (pressure, pH, metals, presence of radiation, high temperatures...), extreme for some of them. Microbial communities inhabiting these environments are phylogenetically diverse and encompass notably a great diversity of archaeal and bacterial lineages with no cultivated representatives, as well as viruses. These microbial taxa are adapted to the extreme physical-chemical parameters of these singular habitats and represent a reservoir of biological innovation. In this still maturing field, the issue of exploration, inventory, characterization and mapping of extreme environments can be seen as an overarching priority. The overall goal of the MICROBSEA LIA, inaugurated one year ago, is to gain insights into the diversity and biology of microorganisms at deep-sea hydrothermal vents -with a special effort on the cultivation of yet-uncultured microorganisms- and to better understand the functioning of this singular remote ecosystem, from the microbial community to the molecule scale. Our LIA addresses the specific following issues: (i) Assessment of the metabolic potential of uncultured Archaea and Bacteria using (meta)-omics; (ii) Cultivation, isolation and characterization of yet uncultured microorganisms; (iii) Viral ecology and characterization of genetic mobile elements; (iv) Functioning, interactions and biogeography; (v) Characterization of cellular processes involved in adaptation to extreme conditions. To date, our work has led (i) to the discovery and physiological/genomic characterization of a dozen of new microbial taxa, (ii) to the understanding of the functioning of symbiotic associations, and (iii) to the study of pressure adaptation mechanisms



Deep-sea hydrothermal vent smoker (©Ifremer)



Microphotograph of Pyrococcus yayanosii, the unique hyperthermophilic and obligate piezophilic microorganism known so far (©UMR 6197 LM2E)

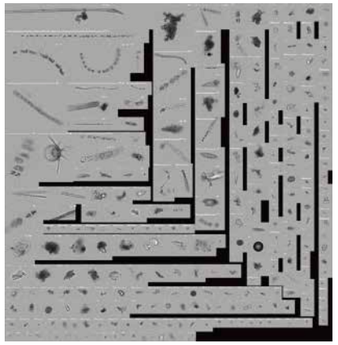
MICROBIAL FOOD WEB: FUNCTIONAL DYNAMICS AT THE SINGLE CELL LEVEL

Yuan ZHAO[1] Gérald GRÉGORI[2] Li ZHAO[1] Wuchang ZHANG[1] Tian XIAO[1] Andrea DOGLIOLI[2] Francesco d'OVIDIO[3]

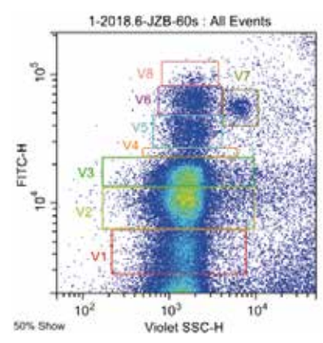
❶ CAS Key Laboratory of Marine Ecology and Environmental Sciences, Institute of Oceanology, Chinese Academy of Sciences, Qingdao 266071, PR China; ❷ Aix-Marseille University, Toulon University, CNRS, IRD,Mediterranean Institute of Oceanography UM110, Marseille 13288, France; ❸ Laboratory LOCEAN, UPMC, Paris, France

Abstract

The planktonic microbial food web is fundamental to the functioning of the marine ecosystem. The phytoplankton is at the basis of the trophic network. Heterotrophic "bacteria" are the major mineralizers of the organic matter, responsible for the regeneration of nutrients. Small predators (nanoflagellates, ciliates) are responsible for the top-down control of the phyto- and bacterio-plankton. Viruses are also present and responsible for the control of various prokaryotic and eukaryotic abundances. The microbial assemblages constitute one of the most important source of unknown biodiversity. In the context of global change, it is necessary to improve our knowledge in microbial ecology to better understand the role and evolution of the various planktonic groups. We characterize the marine microbial diversity thanks to high frequency observation of the microorganisms performed by flow cytometry. We aim at studying the spatial distribution and the dynamics of marine microorganisms in open sea, in contrasted areas (Mediterranean Sea, Yellow Sea, Pacific Ocean), thanks to discrete samples or automated measurements performed according to a Lagrangian strategy during cruises onboard a research vessel. One of our objectives is to investigate the impact of sub-mesoscale and mesoscale physical structures (fronts, filaments, eddies) on the microorganism distributions. We combine in situ high frequency measurements performed at the single cell level by flow cytometry with altimetry and observations (ocean color, Temperature) made by satellites. Our collaboration has reached a new level in the context of the Surface Water Ocean Topography (SWOT) satellite project (2021). We will contribute to the study of 2 cross sections of SWOT tracks (Mediterranean Sea and Western Pacific) during the first 6 months after SWOT launch, using for the French and Chinese cruises the same strategy and tools.



The fabulous nebula of planktonic microorganisms (all the pictures are at the same scale)



Improvement of the marine viruses analysis by flow cytometry thanks to the violet (405 nm) right angle light scatter

THE ROLE OF MUSEUM COLLECTIONS AND BOTANICAL GARDENS IN RESEARCH ON BIODIVERSITY

Cécile CALLOU[1] **Huabin HU**[2]

❶ Archéozoologie, archéobotanique : sociétés, pratiques et environnements (AASPE), Muséum national d'Histoire naturelle, CNRS, Paris, France

❷ Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences

Other contributors : AFONSO Eve, France ; GIRAUDOUX Patrick, France ; Li li, Yunnan, China ; Li Weiwei, Yunnan, China ; Chen Jin, XTBG, China ; China Conservation and Research Center for the Giant Panda

Abstract

The national Museum of Natural History (Paris, France) holds a very important position among global museum and its fully engaged in the study and conservation of the biological, geological and cultural diversity and in the relationships between the human societies and nature. Through collaborative research projects, using its extremely rich collection, the Museum is studying the effects of climate change on biological diversity and impacts of human activities on Biodiversity, working at different time scales, interacting as much with the past history (palaeoenvironment, palaeontology, zooarchaeology, archaeobotany and prehistory) as with the contemporary period (ecology, biology, systematics, chemistry, geology, anthropology, human genetics, ethnology, ethology, social sciences and history of collections). It is within this framework that several partnerships between the French Museum and different Chinese institutions belonging to institute of the Chinese Academy of Sciences (i.e. XTBG, KIB, KIZ) exist. A focus will be made on several collaborative projects: type specimens of mammals including chinese species and specimens such as the giant Panda and two species of snub-nosed monkeys (golden and black-and-white snub-nosed monkeys) ; Xishuangbanna Tropical Botanical Garden holds over 13,000 species of plants in its living collections, it is a leading botanical garden in China, and hosts as the secretariat of Chinese Union of Botanical Gardens (www.cubg.cn) with 107 members. Major research focus including forest ecosystem ecology, sustainable use of tropical plant resources, and conservsation biology. Collaborative potentials may cover palaeo-biology, climate change, ethnobotany and environmental education, etc.

Museum of tropical rainforest and ethnic forest culture in Xishuangbanna Tropical Botanical Garden, CAS

Skull of black-and-white snub-nosed monkey Rhinopithecus bieti (Holotype, ZM-MO-1897-72 ; © MNHN – RECOLNAT - Laura Flamme, 2014)

THE VALUE OF LONG-TERM OBSERVATIONS AND EXPERIMENTATIONS TO TACKLE THE EFFECTS OF MAJOR ENVIRONMENTAL CHANGES ON BIODIVERSITY

Dominique JOLY

Institute of Ecology and Environment

French National Centre for Scientific Research, Paris, France

Abstract

The last 50 years have seen the most rapid transformation of the human relationship with the natural world in the history of humankind. Many human activities reached take-off points sometime in the twentieth century and have accelerated sharply towards the end of the century. Nowadays we have reached a point where many biological indicators have clearly moved beyond the bounds of Holocene variability. Scientific research plays an essential role to consolidate our knowledge on biodiversity changes and their impact on socio-ecosystems. Understanding the key processes underlying the interaction dynamics between these complex systems may help to manage populations as well as ecosystems and to address conservation issues.

Long-term ecological research sites offer operational tools to study the past and present ecological components. They are very powerful to monitor many biophysical components of the ecosystems, for decades, building programs on site-based data, experiments, and models across time and space in diverse regions differing in intensities of human influences, degrees of intent, and levels of connectedness. Some of them address more largely the human-environment interactions through the study of the social-ecological system. By defining explicit coupling processes, they may help to propose adaptive management and ecosystem services to promote sustainability and resilience for both wild and human populations. Through French examples, some of them in connection with Chinese initiatives, we illustrate recent programs providing knowledge to limit the impact of environmental changes on biodiversity.

Elephant within the Hwange National Park (Zimbabwe): collaborative management strategy at the human-nature interface

The conceptual framework of the social ecological system within the French long-term social-ecological research platforms

CAN PLANT-SOIL FEEDBACK EXPLAIN SHIFTES IN PLANT COMMUNITY COMPOSITION UNDER GLOBAL CHANGE ?

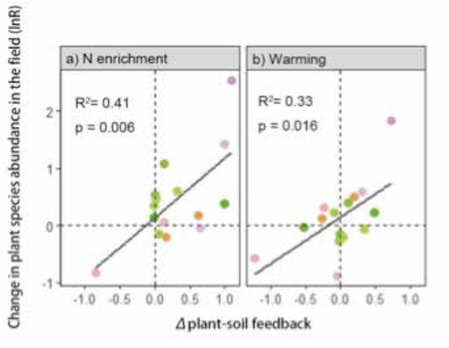
Hui GUO & Kailing HUANG

College of Resources and Environmental Sciences, Nanjing Agricultural University, Nanjing, China

Abstract

Evidence has shown that plant-soil feedback (PSF) may play a crucial role in maintaining species diversity and predicting the patterns of plant relative abundance in natural communities. However, there is rare information about how PSF can be influenced by altered environments and whether the change of plant relative abundance is associated with the change of PSF. We hypothesized that global change factors (i.e. warming, N enrichment) may alter the strength and direction of PSF by changing soil nutrients, soil community, and plant interactions, further driving the change of plant relative abundance. To test this hypothesis, we conducted a greenhouse experiment to test the net effects of soil biota on 11 plant species under N enrichment and warming. Then, we investigated the relative abundance of these species in a Tibetan alpine meadow. We found that, under ambient condition, PSF was generally negative, and was negatively correlated with plant relative abundance, indicating that dominant species suffered more negative PSF than rare species. Furthermore, the change in PSF was positively correlated with the change in species abundance caused by N enrichment and warming in field. Our findings indicate that soil biota may play a critical role in facilitating species coexistence by constraining dominant species due to the negative PSF. This study first provides evidence showing the importance of PSF in predicting the change of plant relative abundance caused by elevated temperature and added N availability. The present study highlights the need to integrate PSF into plant community assembly in a changing world.

Global change experiment in a Tibetan alpine meadow



Linear regression of the change in PSF and the change of plant relative abundance under nitrogen addition and warming

SOFIE: TEN YEARS OF JOINT RESEARCH ON EARTH SYSTEM SCIENCE BETWEEN FRANCE AND CHINA

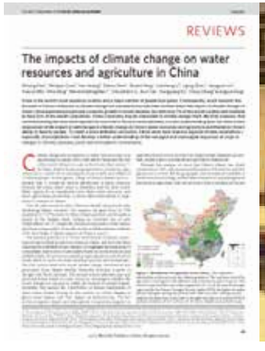
Philippe CIAIS[1] Shilong PIAO[2] Catherine OTTLE[1] Feng ZHOU[2] Zun YIN[1] Shushi PENG[2] Laurent LI[1] & Xuhui WANG[2]

1 LSCE Laboratoire des Sciences du Climat et de l'Environnement, Gif sur Yvette, France

2 Beijing University, College of Ecology and Urban Planning, Beijing, China

Abstract

SOFIE is a common research institute between Beijing University in China and the Laboratoire des Sciences du Climat et de l'Environnement (LSCE) a joint research laboratory of CNRS, CEA and UVSQ located in the Campus of Paris Saclay in France. Addressing the challenge of quantifying and understanding the key interactions in the Earth System between biogeochemical cycles, the physical climate system and human induced impacts on the environment requires a global integrated approach relying on ground based and satellite observations, land ecosystem models, climate models and emerging machine learning methods. The scientific focus of SOFIE is on the study of regional and global feedback loops between the terrestrial carbon cycle, atmospheric composition changes, environmental impacts and climate variability and trends at global scale, with a focus on impacts in China. The joint institute has delivered during the past ten years of its operation more than 200 peer reviewed publications including 50 in high profile journals (Nature, Science, PNAS…) with SOFIE as main affiliation, facilitated the exchange of young scientists between the different institutions with the training of 20 PhD students and 20 post-doctoral associates, and strengthened fundamental research leadership Peking University and Laboratoire des Sciences du Climat et de l'Environnement in Earth System studies. Spinoff projects include four successful applications to the Thousand Talent Program in China and a joint ANR-NSFC project, China Trend Stream, that helped to elucidate how global change drivers affected the discharge of large rives in China. SOFIE was established in China as a National Center for International Research certified by the Ministry of Science & Technology. The presentation will provide a summary of the main results and strategic objectives of the institute in the coming years.


REVIEWS

The impacts of climate change on water resources and agriculture in China

SESSION II

CRITICAL ZONE - SOIL FUNCTIONING

OZCAR, THE FRENCH INITIATIVE FOR ADVANCING CRITICAL ZONE SCIENCE

Gaillardet, J.[1] Braud, I.[2] Longuevergne, L.[3] Chabaux, F.[4]

1 IPGP, Sorbonne Paris Cité, Univ. Paris Diderot, CNRS, Paris 75231

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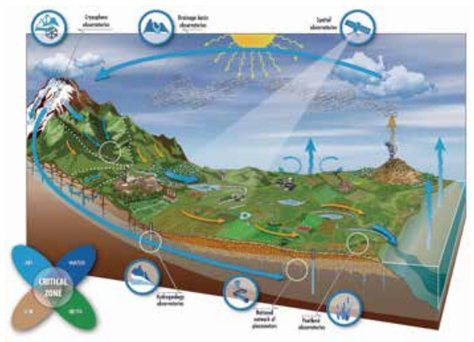
3 Géosciences Rennes, UMR 6118, CNRS, Univ. Rennes, 1 Rennes, France

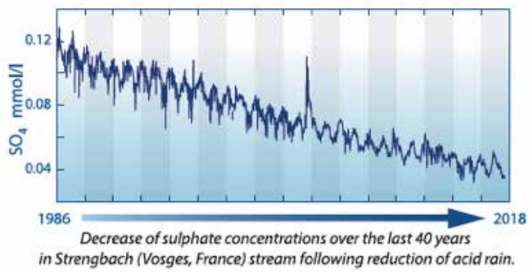
4 UMR LHyGeS, EOST, Univ. of Strasbourg, Strasbourg, France

Abstract

The French critical zone initiative, called OZCAR (Critical Zone Observatories–Application and Research) is a National Research Infrastructure (RI). OZCAR-RI is a network of instrumented sites, bringing together 21 pre-existing research observatories monitoring over the long term different compartments of the critical zone (CZ), the zone situated between "the rock and the sky," the Earth's skin. The diversity of OZCAR-RI observatories and sites is representative of the heterogeneity of the CZ, of the scientific communities studying it and of their regional research questions. Despite this diversity, all OZCAR-RI sites share a main overarching objective, which is to monitor, understand, and predict ("earthcast") the fluxes of water and matter of the Earth's near surface and how they will change in response to the "new climatic regime." The vision for OZCAR strategic development aims at designing an open infrastructure, building a national CZ community able to share a systemic representation of the CZ, and educating a new generation of scientists more apt to tackle the wicked problem of the Anthropocene. OZCAR articulates around: (i) a set of common scientific questions (the dynamic architecture of the CZ; the biogeochemical cycles, sediment and contaminant propagation through the CZ; and their response to global change) and cross-cutting interdisciplinary scientific activities using the wealth of OZCAR-RI observatories, (ii) an ambitious instrumental development program, and (iii) a better interaction between data and models to integrate the different time and spatial scales. Internationally, OZCAR-RI aims at strengthening the CZ community by providing a model of organization for pre-existing observatories and by offering CZ instrumented sites. OZCAR is one of two French mirrors of the EuropeanStrategy Forum on Research Infrastructure (eLTER-ESFRI) project; and is member of the Critical Zone Exploration Network.



OZCAR-RI (2018)



Decrease of sulphate concentrations over the last 40 years in Strengbach (Vosges, France) stream following reduction of acid rain.

Adapted from Pierret et al., VZJ, 2018

LANDSCAPE DYNAMICS AND TRANSPORT PROPERTIES : A JOURNEY THROUGH SCALES

Clément NARTEAU[1] & JiuBin CHEN[2] on behalf of the french Chinese International laboratory SALADYN

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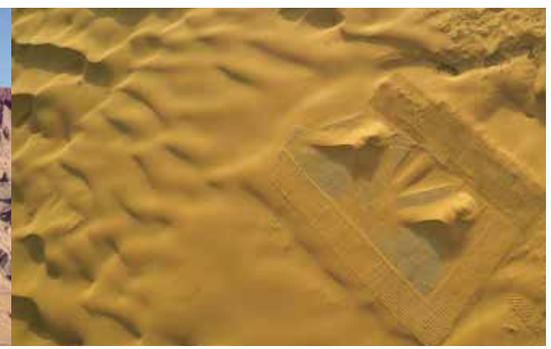
❷ Tianjin University, jbchen@tju.edu.cn

Abstract

China and Central Asia offer an exceptional setting for studying tectonics, erosion, weathering, sediment transport, hydrology and wind dynamics, which are the main agents of landscape evolution. Over the past six years, within the International laboratory SALADYN, French and Chinese scientists have together explored various natural environments to document diverse geomorphic processes, develop experiments and confront new theoretical and numerical predictions with unique sets of data. Here, we discuss the range of geophysical and geochemical methods that have been used to describe the genesis of landforms and sediment transport properties from active mountain ranges to arid deserts and the mouths of China's largest rivers. All these works offer a non-exhaustive panorama of the mechanisms that drive landscape dynamics from the particulate to the continental length scales over human and geological time scales. In a context of climate change, they are new step toward a better understanding of the environmental vulnerability, especially where economic and social impacts are increasing (e.g. cultivation, overgrazing, infrastructures).

Simultaneous expression of tectonic faulting, erosion and aeolian transport in the Taklamakan desert (Xinjiang, China)



Incipient dune patterns in a landscape scale experiment in the Tengger desert (Ningxia, China)

WEATHERING AND DENUDATION RATE DETERMINATION: IMPLICATION OF THE ANALYSIS OF CHINESE AND FRENCH GRANITIC WEATHERING PROFILES

D. Lemarchand[1] F Chabaux[1] J. van der woerd[2] E. Pelt[1] R. di Chiara[1] J. Ackerer[1] G. Jia[2] Z-Q Zhao[4] S. Xu[2] C-Q Liu[2]

❶ Laboratoire d'Hydrologie et de Géochimie de Strasbourg (LHyGeS), Université de Université de Strasbourg, CNRS, 1 rue Blessig, 67000 Strasbourg, France ❷ Institute of Surface-Earth System Science, Tianjin University, Tianjin 300072,ChinaBeichen Xilu, Chaoyang ❸ Institut de Physique du Globe de Strasbourg, Université de Strasbourg, CNRS, 5 rue René Descartes, Strasbourg, France ❹ School of Earth Science and Resources, Chang'an University, Xi'an 710054, China

E-mail : fchabaux@unistra.fr liucongqiang@vip.skleg.cn

Abstract

Regolith production and denudation rates are key parameters to be determined in order to properly assess the response of continental Earth surfaces to environmental modifications, be they anthropic, climatic or tectonic in origin. The work carried out by the Strasbourg and Tianjin groups has contributed to the development and application of chronometric tools for studying these rates, by the U-series nuclides for determination of the regolith production rates, and by the cosmonuclides for the determination of the denudation rates. The recent study performed on the Strengbach catchment site (Ackerer et al., 2016), has clearly highlighted the benefit to combine on the same profile both the in-situ cosmonuclide analysis and the radioactive disequilibria on whole rock, to establish the long-term stability of the alteration system. The Tinajin and Strasbourg groups have decided to join their efforts to evaluate the applicability of this combined isotopic approach on thick alteration profiles, developed on granitic bedrocks, not well studied so far although being present in various climatic settings from tropical to temperate condition (Jia et al., Submitted).

Ackerer J., Chabaux F., Van der Woerd J., Viville D., Pelt E., Kali E., Lerouge C., Ackerer P., Di Chiara R., Négrel P. (2016). Regolith evolution on the millennial timescale from combined U-Th-Ra isotopes and in situ cosmogenic 10Be analysis in a weathering profile (Strengbach catchment, France). Earth and Planetary Science Letters 453 (2016) 33–43

Guo-Dong Jia, François Chabaux, Jérôme van der Woerd, Eric Pelt, Raphaël di Chiara, Julien Ackerer, Zhi-Qi Zhao, Ye Yang, Sheng Xu, Cong-Qiang Liu. Regolith production rates from 238U-234U-230Th disequilibrium in a deep granitic weathering profile (Longnan, SE China). Chemical Geology (submitted)

TRACKING GROUNDWATER AVAILABILITY FOR HUMAN AND ECOSYSTEMS FROM SPACE

Laurent LONGUEVERGNE[1] **Wei FENG**[2]

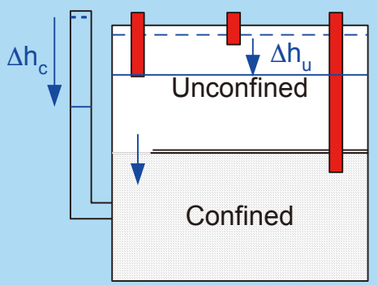
1 CNRS, Université de Rennes 1

2 Chinese Academy of Sciences, Institute of Geodesy and Geophysics, Wuhan

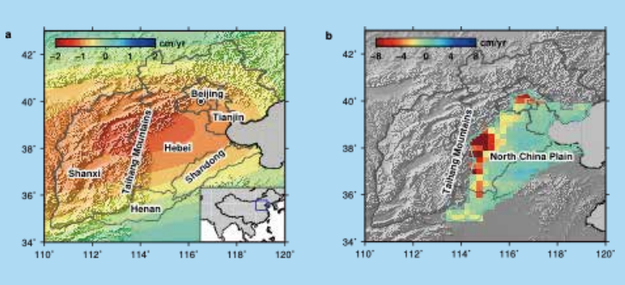
Abstract

Water is both a key component of life and ecosystems and a key actor transporting solutes and energy. In particular, the question on how water flow shapes ecosystems and ecosystemic services remain a daunting challenge. With increasing anthropogenic and climate pressures on water resources, the understanding on how water is transiently stored and flows in the subsurface is crucial. Water management need to answer the sustainability challenge, i.e. resolve the compromise which encompasses climate variability, ecosystem preservation, economic and public domain activities. Groundwater, as the world's largest accessible freshwater storage, has a considerable importance within the water cycle, feeding aquatic and terrestrial ecosystems and contributing to food security. Because of these vital contributions, there is a critical need to improve our knowledge of aquifer systems, their connection with the surface and how these linkages will be impacted in the future.

In this project, we explore how surface or remote sensing observations can bring information on “invisible” water storage changes in the subsurface, including groundwater. Indeed, water storage changes, as a mass applying a pressure! on geological layers, affect the Earth’s shape and gravity field in a subtle, but measurable way, even if water masses are located far below the surface. The applicability and accuracy of these method is exemplified on the North China Plain, where we combine several remote sensing and ground surface observations to track groundwater storage changes in complex aquifer systems.



Conceptual model for data interpretation



Total water storage changes from GRACE satellite mission (left), groundwater storage variations from borehole observation networks (right)

CHINESE-FRENCH COOPERATION ON ENVIRONMENTAL MERCURY POLLUTION ISSUES

Jeroen SONKE[1] **Jiubin CHEN**[2]

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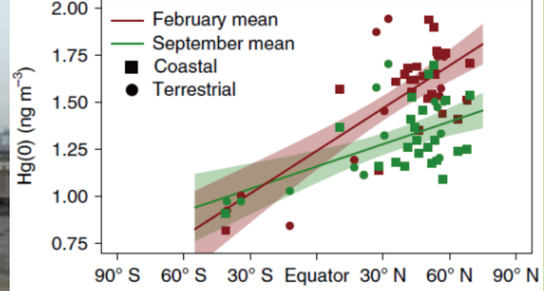
2 Tianjin University, jbchen@tju.edu.cn

Abstract

Mercury is a heavy metal that causes neurotoxic effects in infants and children, and cardiovascular disease in adults at lower levels of exposure. Most of us are exposed to mercury when we consume sea food, since mercury bioaccumulates in fish and is biomagnified along the marine food chain to high levels. In China, mercury exposure can also take place through consumption of contaminated rice. Over the past 150 years anthropogenic mercury emissions to air have been 10x larger than natural volcanic emissions. Anthropogenic mercury emissions are mostly unintentional, as a by-product of coal fire power plants, cements production and mining. The emitted mercury stays in atmosphere for about one year, spreading globally, even to pristine environments such as the Arctic, before depositing to marine and terrestrial ecosystems. Since 2013, the UNEP Minamata Convention has been ratified by over 130 countries, and aims to reduce global mercury use and emissions. Earlier environmental efforts in N-America and Europe have successfully cut mercury emissions and atmospheric levels in half since the 1980’s. Important efforts, using modern emission control technology are made in China since a decade and should help lower mercury emissions substantially. China and France have a long history of cooperation in mercury science, and we will show examples of results obtained on atmospheric mercury chemistry, soil science, mercury isotope geochemistry and polar mercury science. We will illustrate in particular the role of the plant mercury pump in sequestering, along with CO_2, atmospheric Hg in the critical zone (Figure below). Ongoing cooperation investigates how global climate change will alter the mercury cycling and exposure to wildlife and humans.

Installing atmospheric mercury samplers in urban Guiyang, 2012 (ERC, CNSF projects; ©J.Sonke)



Summertime (Sep) atmospheric mercury (Hg) in the northern hemisphere is lower than in winter (Feb) due to active vegetation uptake of mercury (Jiskra et al., NGEO, 2018)

MICROBIAL ECOLOGY IN MINING ECOSYSTEMS

Robert DURAN[1] Jianli LIU[2] Jun YAO[2]

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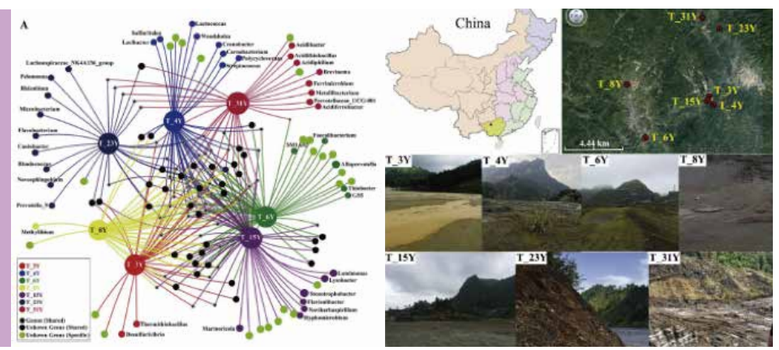
2 School of Water Resource and Environment Engineering, Research Center of Environmental Sciences and Engineering, China University of Geosciences (Beijing), 29 Xueyuan Road, Haidian District, Beijing 100083, China

Abstract

Mining activities produce large quantities (~200,000 tons) of tailings daily worldwide threatening the environment and human health. Sustainable mining activities require the management and treatment of the mine tailings in order to mitigate their environmental impact. Microorganisms are the main actors in the functioning of ecosystems owning metabolic capacities to transform and degrade contaminants, whether metallic or organic. It is thus of paramount importance to understand the organisation, the diversity and the ecology of microbial communities inhabiting mining ecosystems. Such knowledge will provide new insights to manage the microbial resources for the implementation of bioremediation processes as well as microbial tools to follow their efficiency. The collaboration between the University of Pau and Pays de l'Adour (UPPA) and the Chinese University of Geosciences of Beijing (CUGB) aimed to investigate microbial communities in nonferrous mine tailings in China. We determined the diversity and composition of microbial communities of mine tailings in the mining site of Guangxi (China). Following a macro-ecology approach, the comparison of the microbial community structure of mine tailings with different ages allowed to determine the geochemical factors shaping the organization of microbial communities. Also, the implementation of a bio-augmentation treatment with sulphate reducing bacterial consortium provided the opportunity to understand the bacterial colonization and the community coalescence in heavily metal-contaminated sites as well as the ecological succession during the bio-treatment. Our studies provide useful information for the management of bacterial resources leaving in non ferrous-metal(loid) tailings and technical guidance for the pollution prevention.



TRACE METAL CYCLING IN THE RHIZOSPHERE-DRILOSPHERE. IMPLICATIONS FOR THE PHYTOREMEDIATION OF CONTAMINATED SOILS

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2 College of resources and environment, South China Agricultural University, 510642 Guangzhou, China

Abstract

The biogeochemical mechanisms of earthworm-accumulator plants combined system for the remediation of metal contaminated soils is an important theoretical basis for building earthworm bioremediation technology which has still to be established. Our project aim is to build the earthworm-accumulator plant combined bioremediation system for trace metals (im)mobilization. Plant roots are in fact the direct carrier of interactions of plants and soil micro-environments. The rhizospheric soil corresponds to a geochemical micro-environment influenced by plants (roots exudates composed of organic acids and siderophores, respiration, etc.) and microorganism's activities (mineralization of organic matter). This activity influences locally the ecodynamics of trace metals, either directly (precipitation, complexation, adsorption) and indirectly (effects of the rhizosphere on pH and redox potential, dissolution of minerals). On this basis, the study of rhizosphere-related processes on mobility, availability and transfer of trace metals in soils based, in particular, on the role of the root-mycorrhiza-bacteria associations in the speciation, is a major challenge to understand the ecodynamics of the potentially toxic elements. Moreover, processes of bioturbation by earthworm activity generate an overhaul of the primary structure of the soil also possibly changing the distribution of trace metals and thus their physical and chemical reactivity. During the processes of swallowing, digging, and draining in soils, earthworms produce casts and build a galley system, which greatly accelerate aggregates formation and stabilize formation of macro-porosity. These processes play an essential role in the transformation of organic matter, nutrients and trace metals that underpin many soil processes. Additionally, soil characteristics in the drilosphere (area for earthworm activities in soil), rhizosphere and their overlap areas therefore play an extremely important role on trace metals transformation and cycling.

ELECTRICAL RESISTANCE HEATING (ERH) REMEDIATION EQUIPMENT AND APPLICATION IN PAHS CONTAMINATED SOIL

Wentao JIAO Ziyu HAN

State Key Laboratory of Urban and Regional Ecology

Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences

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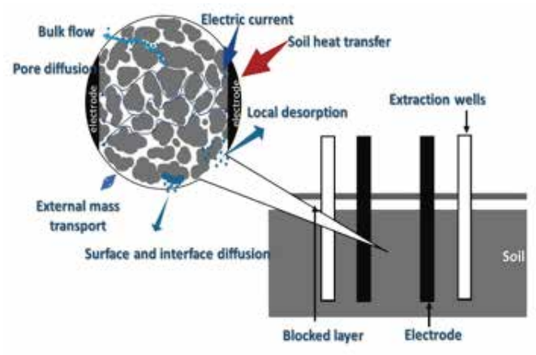
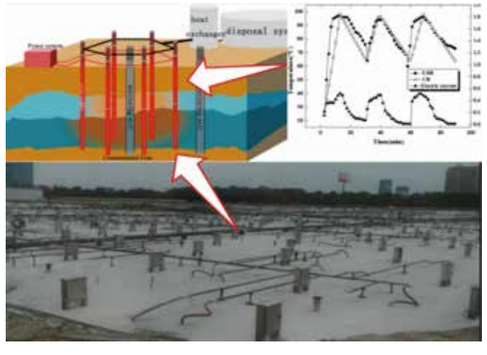
Abstract

Electrical resistance heating (ERH) is a promising thermal remediation method for treating soil and groundwater which contaminated by volatile and semi-volatile pollutants . The remediation of soil contaminated by polycyclic aromatic hydrocarbons (PAHs) based on lab-scale ERH devices must be extensively studied to determine the factors affecting application parameter of the remediation. Therefore, this study used a lab-scale ERH equipment designed by our laboratory to investigate the influence factors of ERH, removal efficiency of soil PAHs, and changes in soil properties through the treatment process. The results suggested that moisture and salinity were basic controlling factors affecting electric conductive capability. Heating 15 g of soil to the target temperature required at least 4 g solution of 0.1% salt. Meanwhile, higher electric strength can ensure heating rate and maximum temperature. The initial theoretical content of simulated soil with 16 US Environmental Protection Agency PAHs was about 1.75 mg·kg-1, after 1-week of aging, higher amounts of PAHs with higher boiling points remained in the soil. The removal efficiency of soil PAHs, which is highly related to boiling point, was significantly affected by its benzene rings and bond structure. During 90 mins' ERH treatment, more than 40% of the pollutants were removed synchronously with the evaporation of water. Hence, co-boiling with water was confirmed to be the primary mechanism of ERH. The influence of the treatment on soil properties (organic matter, particle size, fertility, enzymatic activity) was limited, suggesting that soil functionality can be retained by ERH.



Mechanism of electrical resistance heating (ERH) remediation technology



Typical ERH remediation site and temperature fluctuation

MULTI-SCALE PALEOGENE AND NEOGENE CLIMATIC EVOLUTION LINKED TO THE FORMATION OF THE TIBETAN PLATEAU: INSIGHTS FROM CONTINENTAL SEDIMENTARY RECORDS

Albert GALY[1] Xiaomin FANG[2,3] Yibo YANG[2,3]

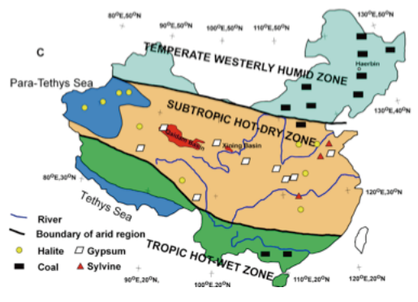
① Centre de Recherches Pétrographiques et Géochimiques, UMR7358, CNRS, Université de Lorraine, 54500 Nancy, France

② CAS Center for Excellence in Tibetan Plateau Earth Sciences, Chinese Academy of Sciences, Beijing 100101, China

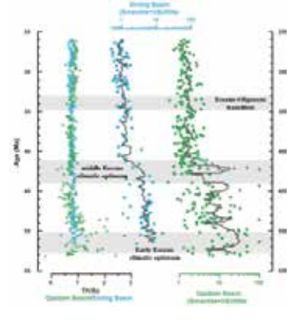
③ Key Laboratory of Continental Collision and Plateau Uplift, Institute of Tibetan Plateau Research, Chinese Academy of Sciences, Beijing 100101, China

Abstract

Plate-tectonic processes have long been thought to be the major cause of the Cenozoic (the last 65 Ma) global carbon cycle, and global cooling by uplift of the Tibetan Plateau through enhancing silicate weathering and organic carbon burial and/or by weathering of obducted ophiolites during the closure of the Neo-Tethys Ocean. However, the imbalance resulting from accelerated CO_2 consumption and a relatively stable CO_2 input from volcanic degassing during the Cenozoic should have depleted atmospheric CO_2 within a few million years; therefore, a negative feedback mechanism must have stabilized the carbon cycle. In addition, the Paleogene-Neogene boundary climatic reorganisation in subtropical China induced the northward advance of East Asian monsoon. This is a potentially important but poorly constrained atmospheric carbon dioxide (CO_2) sink. Our studies have taken advantages of the Cenozoic continental sedimentary basins formed on the Northern and Eastern hedges of the Tibetan plateau, that have recorded the mineralogy and the chemistry of sediments transported by rivers draining the different mountain belts at the N-E border of the Tibetan Plateau. We have focus our research on the largest basin, the Qaidam basin, covering the last 53Ma, the Xining and Linxia basins, at the NE tip of the plateau. The different locations and different time spans covered by the studies of these basins allow us to reconstruct a spatio-temporal evolution of the weathering history of the Northern border of the Plateau. In particular, we have shown the growing influence of the aridification in the generation of aeolian material in thoses basins, with an older onset (14Ma) than the beginning of the loess accumulation in the Central Loess Plateau. For the older time, we have shown that the weathering conditions (recorded by the mineralogy of clays and oxides) were in tune with the global climatic variations (Figs).



Climate zones during the Eocene in China and showing the Qaidam Basin, and the Xining Basin.



Selected mineralogy and geochemistry of Paleogene sediments in the Qaidam (green) and Xining (blue) Basins.

PRE-QUATERNARY DECOUPLING BETWEEN ASIAN ARIDIFICATION AND HIGH DUST ACCUMULATION RATES

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2 Department of Environmental Engineering and Earth Sciences, Clemson University, Clemson, SC 29634, USA

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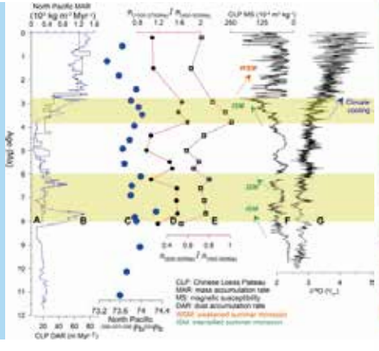
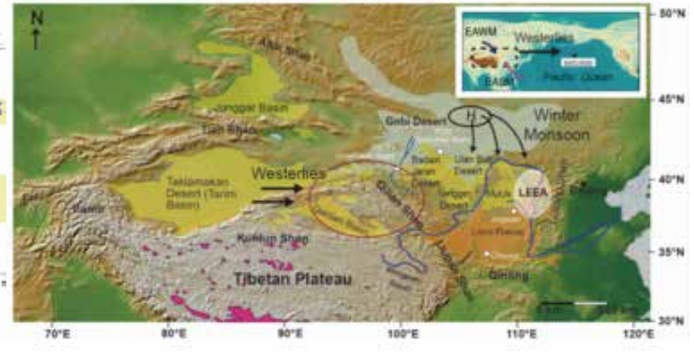
Abstract

Theories of late Cenozoic climate cooling assume that central Asian aridification and high dust accumulation rates in the Chinese Loess Plateau and the North Pacific Ocean are genetically related. Based on detailed sediment provenance analysis, we show that high dust accumulation rates in the Chinese Loess Plateau and the North Pacific Ocean during the late Miocene-Pliocene were mainly caused by increased erosion in the Qilian Mountains and low elevation eastern Asia areas, driven by the effects of East Asian summer monsoon intensification. We conclude that precipitation-driven erosion increased dust input to the North Pacific Ocean and may have played a pivotal role in late Cenozoic climate cooling.



A comparison of North Pacific, Chinese Loess Plateau, and global paleoenvironmental records



Map of the Chinese Loess Plateau and potential dust source regions, with inset map showing the North Pacific Ocean

INFLUENCE OF THREE GORGES DAM IMPOUNDMENT ON SEDIMENT SOURCE-TO-SINK AND WEATHERING PROCESSES IN THE MID-LOWER CHANGJIANG (YANGTZE) RIVER CATCHMENT

Chengfan YANG[1,2] Nathalie VIGIER[2] Lei BI[1] Shouye YANG[1]

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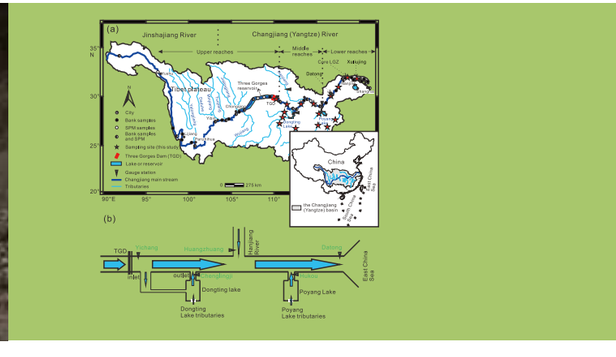
2 Oceanography Laboratory of Villefranche (LOV), CNRS, Sorbonne University, 06230 Villefranche-sur-Mer, France

Abstract

The Changjiang (Yangtze River) as one of the largest rivers in the world transports tremendous sediments mostly sourced from the eastern Tibet into the East China Sea, which has overall governed the development of a large delta, shelf sedimentation and biogeochemical cycling in the East Asian marginal seas. Nevertheless, the sediment source-to-sink transport process of the Changjiang has been greatly altered by the rapidly increasing strong human activities in the large catchment over the last several decades. The Changjiang basin is one of the most populated areas in the world, with 15–20% of total dissolved solids coming from anthropogenic inputs. In particular, more than 50,000 dams have been constructed within the catchment, among which the Three Gorges Dam (TGD) is the world's largest hydroelectric engineering project that was completed in 2006. The rapid decline of sediment flux downstream the TGD and its influence on the deltaic and coastal deposition has been intensively investigated over the last decade. However, whether the chemistry of sediments into the sea after the TGD impoundment has also been changed is still an open question. In this work, we combine the new collected geochemical data and published data ranging from 1997 to 2018, in order to investigate the temporal variability of river sediment chemistry downstream the TGD. Our data suggest after the TGD construction, strong mid-lower riverbed erosion changed the roles of the mid-lower reaches from important sinks to major sources of sediments delivered to the sea, which resulted in a progressive change of the sediment chemistry because the eroded mid-lower riverbed sediment was more deeply weathered. This study reveals the complex sediment source-to-sink and weathering processes in a large river catchment that is subject to strong human disturbance on nature environment.

Strong river bank erosion downstream the TGD



The TGD construction changed the sediment transport process

SESSION III

ECOHEALTH

CONNECTING THE HEALTH OF HUMANS, ANIMALS AND ECOSYSTEMS: THE ONE HEALTH APPROACH

Martine HOSSAERT, Delphine DESTOUMIEUX-GARZON & Stéphane BLANC

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Abstract

The spread of infectious agents has increased significantly over the past decade. This largely results from global changes related to industrialization, the globalization of trade, as well as the increased movement of species (including ours) and their pathogens, itself driven by climate change and political and social crises. The risk of pandemics is therefore increasing. Human and animal health is also threatened by resistance to antibiotics and environmental pollution. The globalization of health risks highlights the importance of human-animal-ecosystem interactions in the evolution and development of pathogens. Better understanding of the causes and consequences of given human activities, lifestyles and behaviours in ecosystems is crucial for the accurate interpretation of disease dynamics and the orientation of public policies. It is therefore important to consider together the environmental, evolutionary and ecological sciences to better understand and forecast the occurrence and recurrence of infectious diseases and to address issues related to antibiotic resistance. In this context the one health concept is a unified health vision which helps to remove the cross-cutting barriers that continue to separate human and veterinary medicine from environmental, evolutionary and environmental sciences. The development of integrated approaches should be promoted to link the underlying determinants of stress reactions to their effects on the functioning and development of ecosystems. Such an approach will lay the foundation for more integrated operational initiatives in the near future.

AIRBIOHEALTH PROJECT : COMPARATIVE STUDY OF BIOLOGICAL AEROSOL COMMUNITIES AND THEIR EFFECTS ON HEALTH BETWEEN PARIS AND BEIJING

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Abstract

With the rapid development of social economy in China and the intensification of global climate change , the problem of ecosystem degradation is becoming more and more prominent. It is urgent to strengthen the ability of ecological monitoring to scientifically understand the ecological quality and its changing trend in China. Although the relevant industry departments have established an independent ecosystem observation and research network, there are significant differences in index system, technical means and data specifications. At the same time, there is a lack of effective site-to-region comprehensive observation technology. It is urgent to develop multi-level and standardized ecosystem comprehensive monitoring standards and technical specifications to effectively meet the scientific and technological needs of long-term monitoring of ecological environment and dynamic assessment of ecological quality at the national level.

Therefore, by integrating the observation network resources of ecosystem in different departments, this paper puts forward the key indexes and techniques to support the monitoring and evaluation of ecological quality from monitoring stations, ecological functions, ecological types and regional scope, so as to provide scientific basic support for the construction of national ecological environment monitoring network.

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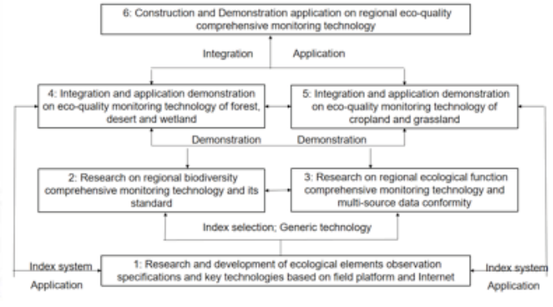

Framework

ECOSYSTEM HEALTH AND ENVIRONMENTAL DISEASE ECOLOGY: 25 YEARS OF SINO-FRENCH COOPERATION

Patrick GIRAUDOUX[1,2] & Li LI[2] for the IRN EHEDE

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❷ Key Lab of Hazard Risk Management and Wildlife Management and Ecosystem Health (LWMEH), Yunnan University of Finance and Economics, Kunming, China

* Main contributors: AFONSO Eve, France; CALLOU Cécile, France; CLAUZEL Céline, France; CLEMENTS Archie, Australia; CRAIG Phil S., UK; DANSON Mark, UK; ITO Akira, Japan; JIA WanZhong, Gansu, China; JING Tao, Gansu, China; LI DaYong, Sichuan, China; LI DiQiang, Beijing, China; LI TiaoYing, Sichuan, China; LONG YongCheng, Yunnan, China; MARSTON Christopher, UK; PLEYDELL David, UK, France; QIU JiaMin, Sichuan, China; RAOUL Francis, France; ROMIG Thomas, Germany; SHI DaZhong, Gansu, China; VUITTON Dominique Angèle, France; WANG Qian, Sichuan, China; WANG ZhengHuan, Shanghai, China; WEN Hao, Xinjiang, China; YANG Yurong, Ningxia China; ZHANG Li, Beijing, China; ZHANG WenBao, Xinjiang, China; ZHAO YuMin, Guanxi and Gansu, China et al. and countless local people who provided invaluable aid in the field.

Abstract

Based on landscape ecology and ecohealth concepts, multidisciplinary research has been carried out by our group since 1994 initially in order to understand the transmission ecology of Echinococcus multilocularis, an emerging parasite causing one of the most potentially pathogenic helminthic zoonoses in Europe and in China. Comparative field studies and modelling in the Zone atelier Arc Jurassien, France, in poor upland agricultural communities in South Gansu and Ningxia, on the Eastern Tibetan Plateau of Sichuan and Qinghai, and in northern Xinjiang, showed how anthropogenic land use and behavioural changes can modify emergence events and the long-term transmission of this parasite, and subsequently the importance of considering socio-ecosystems as a whole, in order to understand multiscale parasite and disease distribution and infection risks. Similar approach combining spatial modelling and population genetics has been successfully applied since 2012 to conservation issues such as reconnecting discrete populations of the endangered Black-and-White Snub-Nosed Monkey in North Yunnan. This led to the foundation of the LWMEH at the Yunnan University of Finance and Economics, Kunming, in 2013. This research is ongoing and extends to wild Asian elephant – human conflicts in South Yunnan (https://gdri-ehede.univ-fcomte.fr).

Health ecology and conservation from Yunnan tropical mountains to Tibetan plateau

Socio-ecological elimination of Alveolar Echinococcosis in South Gansu

TRANSMISSION AND EVOLUTION OF HONEYBEE VIRUSES BETWEEN HONEYBEES AND THEIR HORNET PREDATORS

Eric DARROUZET[1] Philippe GAYRAL[1] Diane BIGOT[1] Elisabeth HERNIOU[1] Hongxia ZHAO[2] Sa YANG[3] Chunsheng HOU[3]

1 Institut de Recherche sur la Biologie de l'Insecte, UMR 7261, CNRS – Université de Tours, Tours, France.

2 Guangdong Key Laboratory of Animal Conservation and Resource Utilization, Guangdong Public Laboratory of Wild Animal Conservation and Utilization, Guangdong Institute of Applied Biological Resources, Guangzhou, China.

3 Institute of Apicultural Research, Chinese Academy of Agricultural Sciences, Beijing, China.

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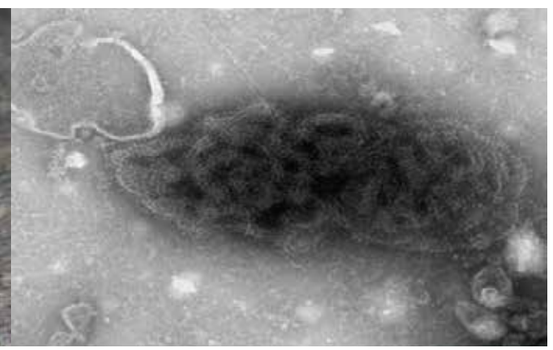
Abstract

Since the discovery of honeybee viruses, major breakthroughs have been achieved on viral pathology and infection processes in honeybees. Transmission patterns and the study of virus vectors have drawn great concern to manage honeybee health issues. However, little is known about the occurrence and prevalence of honeybee viruses in bee predators, like hornets. For example, the invasive hornet Vespa velutina nigrithorax is a main threat of honeybee colonies and beekeepers activities in Europe. However, it could be a major bee stressor, not only by predation, but also by transferring bee viruses.
In the present study, we thus investigated the occurrence of 14 honeybee viruses in 5 hornet species from 4 provinces of China and 2 hornet species from 4 locations of France. A particular focus was made on V. velutina, in France (its main invasive area in Europe) and in China (its native area). The results showed that all hornet species from China and France carried different types of honeybee viruses (for example Apis mellifera filamentous virus (AmFV), Deformed wing virus (DWV), Israeli acute paralysis virus (IAPV)…). Some hornets carried more than 4 viruses simultaneously.
These results (1) suggest that hornets could be an important reservoir of insect viruses, and (2) could serve as a basis for further investigations of transmission pathway and origin of honeybee virus in hornet species. In such conditions, hornets could have multiple impacts on insects, especially wild pollinators for example.

The invasive hornet, Vespa velutina nigrithorax, killing a honeybee



The Apis mellifera filamentous virus (AmFV) found in the hornet V. velutina in China

HORNET IN ECOLOGY : PROS AND CONS

Sa YANG[1] Yaojun WU[2] Xuejian JIANG[2] Eric DARROUZET[3] Philippe GAYRAL[3] Jingan WANG[4] Yawen OU[4] Diane BIGOT[3] Elisabeth HERNIOU[3] Chunsheng HOU[1]

1 Institute of Apicultural Research, Chinese Academy of Agricultural Sciences, Beijing, China.

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3 Institut de Recherche sur la Biologie de l'Insecte, UMR 7261, CNRS – Université de Tours, Tours, France.

4 Guangdong Huxin biological technology Company, Taishan, China.

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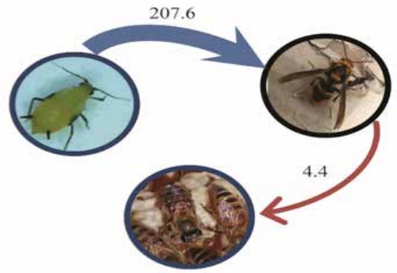
Abstract

Virus vector can enhance the titer and virulence of virus by recombination or mutation during the course of evolution. Among the honey bee virus vector, hornets is not only a predator to honey bee or other pollinator but also transfer bee virus among honey bee and pollinators. In the present study, we thus investigated the occurrence of 14 honeybee viruses in 5 hornet species from 4 provinces of China and 2 hornet species from 4 locations of France. The results showed that all hornet species from China and France carried different types of honeybee viruses, even some of them carried more than 4 viruses simultaneously. Further, we found also that hornet carried the aphid lethal paralysis virus and suggesting that hornet is an important reservoir of insect viruses and have potentially risk impacts on insects, especially wild pollinators. In addition, we had achieved the preliminary results on the utilization hornet as an important control approach for agricultural pest, and then provide a perspective strategy for biological control in agriculture. These results could serve as a basis for further investigations of migration pathway and origin of honeybee virus in hornet species, especially their potential role as reservoir of pollinator pathogens and pose a serious threat to pollination ecology and biodiversity. More important, hornet can not only as an important biological means to clear the pest without any environmental pollution but also can pollinate for plants that honey bee can not do.



Hornet transmit aphid lethal paralysis

Hornet catch honey bee virus

Hornet kill agricultural pest

Hornet pollinate for tree

CAN WILDLIFE CONSERVATION AND ECOTOURISM BE CONCILIATED? LESSONS FROM THE YUNNAN SNUB-NOSED MONKEY (RHINOPITHECUS BIETI) IN THE XIANGGUQING VALLEY

Eve AFONSO[1] **Li LI**[2]

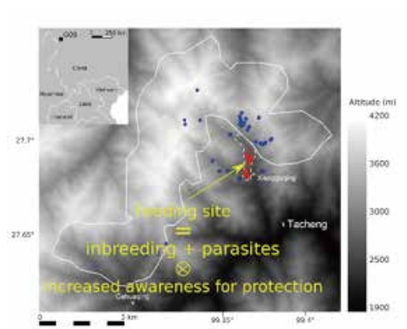
❶ Chrono-environment, University of Bourgogne Franche-Comté/CNRS, Besançon, France

❷ Key Lab of Hazard Risk Management and Wildlife Management and Ecosystem Health (LWMEH), Yunnan University of Finance and Economics, Kunming, China

Other contributors: GIRAUDOUX Patrick, France; CALLOU Cécile, France; LI DaYong, Sichuan, China; LONG YongCheng, Yunnan, China; and countless local people who provided invaluable aid in the field.

Abstract

Among the wide variety of opportunities for people to interact with nature, permanent viewing sites where wildlife is “ready-to-view” have become very popular. Feeding sites increase the chances for tourists to observe wildlife, but can also have potential to achieve conservation goals as well as financial and educational benefits for local communities. However, although the benefits of such sites are easily understandable, many studies reported that ecotourism is not an impact-free activity and sometimes failed to achieve conservation goals in areas visited by tourists. The provision of food to wildlife generally results in the modification of behavioural, physiological and ecological patterns of fed populations. Moreover, one can expect that the impacts of feeding wildlife populations arise on consequences on population genetic structure. Feeding sites might attract only a part of a population, and act on gene flow through altering random mating in the distribution area. Because endangered species have, by definition, small or declining population sizes, feeding sites might increase their risk to face genetic diversity depletion and inbreeding, so decrease chances to survive simple periods of high mortality, for example following a disease outbreak. The endangered Yunnan snub-nosed monkey (Rhinopithecus bieti) is a typical example of the contradictions between the need to conserve biodiversity and the development of ecotourism. In the Xiangguqing valley (Yunnan, China), feeding sites are used to maintain regular individuals in a restricted area, while the rest of the group is spread in a large mountainous area. We present results suggesting that feeding sites might be fast founder effect inducers, and creates opportunities for livestock-monkey interfaces areas which influence parasite transmission cycles. We discuss recommendations to conciliate the implementation of feeding sites and the conservation of endangered animal species.



Feeding site faeces in red, "wild" in blue

Model: R. bieti population

URBAN QUALITY MONITORING WITH REMOTE SENSING

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❷Aerospace Information Research Institute of Chinese Academy of Sciences, Beijing, China

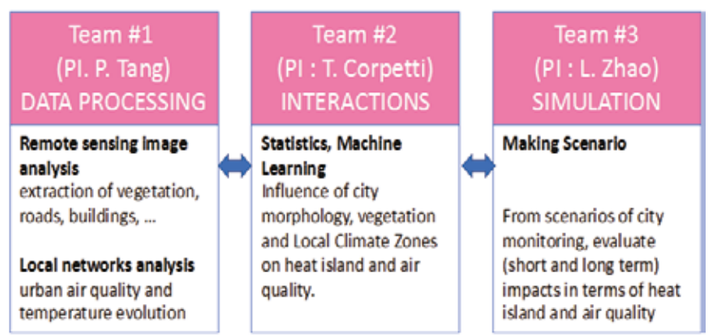
❸ School of Aerospace Engineering, Department of Engineering Mechanics, Tsinghua Univ., Beijing, China

Abstract

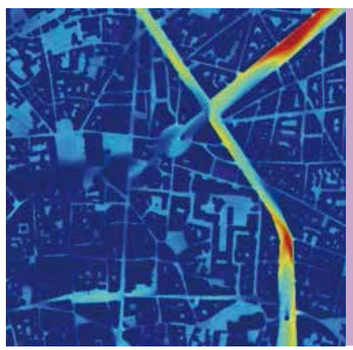
Today, cities are submitted to drastic transformations (internal modifications / sprawl). Under a climate change context, these modifications strengthen environmental inconveniences (heat waves, strong pollution events) and hence, inequalities in terms of economy.

In practice cities are composed of different areas in terms of density of buildings, vegetation, imperviousness, ... that are not subjected uniformly to these inequalities, yielding spatial amplifications of housing prices and hence augmentations of social inequalities (areas more or less expensive because of their environmental quality).

As prospective scenarios expect that 70% of the world population will live in cities in 2050, it becomes urgent to understand and control the spatial impacts of local city morphology on urban climate and air quality. This is the scope of our researches where the aim is not only to propose tools to model these relations but we also ambition to provide methods able to evaluate the impacts of any scenario of city transformation (new area, vegetation/transport plan, construction with recent materials) in terms of urban climate and air quality. To do so, we have developed various sino-french international and pluridisciplinary programs with researches that mix remote sensing, geography, computer sciences and fluid mechanics. In this presentation, we will present various results of our researches.



Organization of our researches



Example of pollution dispersion in cities

COMPARATIVE STUDY OF BIOLOGICAL AEROSOL COMMUNITIES AND THEIR EFFECTS ON HEALTH BETWEEN PARIS AND BEIJING: AIRBIO-HEALTH PROJECT

Yao M.[1] **Da G.**[2] **Ting Z.**[1] **Desboeufs K.**[3] **Gehin E.**[2]

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2 EA 3481 CERTES, UPEC

3 UMR 7583 LISA CNRS, UPEC, UPD

Abstract

People constantly breathe at an average rate of 12.5 L/min per an adult rate, so a total of 18 m3 of air will be inhaled per day. There are a large amount of bacteria and fungi in the air, therefore there are correspondingly a large number of microbial particles inhaled into human lung system. Three campaigns were conducted in Beijing and in Paris between 2017 and 2018. For each campaign, contrasted situations were considered as follows: peak of pollution, haze episodes and clear days. In total, more than 60 samples of PM2.5 and PM10 were collected in China, and about 25 samples (PM10) were collected in Paris. Filter samples were divided into two parts for chemical and microbiological analysis respectively. The sampling strategy included also human EBC (Exhaled breath condensate) collection for investigating the human source of bioaerosols. EBC Sampling has been performed on a cohort on 93 people (smokers and non smokers) at the Beijing third hospital in 2017. This sampling required a specific device, the so-called EBC-sampler developed by Maosheng Yao at PKU.

The results from this collaboration reveal relevant differences, identifying the dominant bacterial species for each part.

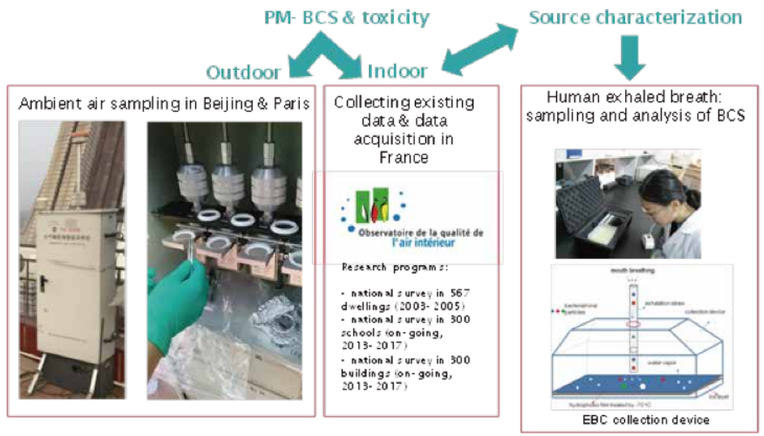

Fig and pollinating fig-wasp interaction

Effect of ozone on the attraction of fig-wasps towards fig VOCs

SESSION IV

Workshops

As part of the preparations of the fifteenth session of the Conference of the Parties (COP 15) to the Convention on Biological Diversity (CBD) that will be hosted by China and held in Kunming, YunnanF, in November 2020, the objectives of the workshops are to take an overview of French-Chinese scientific cooperation, to strengthen existing collaborations and the joint research structures, and to identify new opportunities for cooperation

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