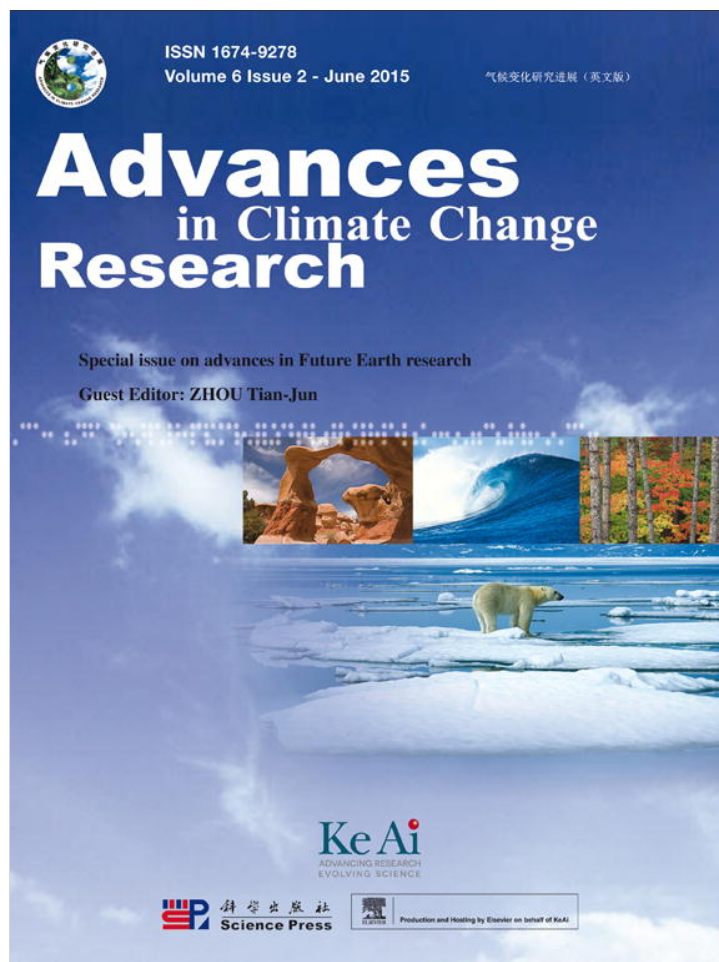


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## Editorial

## Implementation of the Future Earth programme in China: Chinese scientists at the forefront

As a 10-year international research programme jointly initiated by ICSU (International Council for Science), ISSC (International Social Science Council) and others, Future Earth aims to provide critical knowledge required for societies to face the challenges posed by global environmental change and to identify opportunities for a transition to global sustainability (FE, 2013). The launching of Future Earth is the outcome of step change in global environment change research and funding strategy and meet the demands for connecting research and responses to societal challenges. In the past few decades, there has been an enormous international research effort to understand the Earth system and global change. The Global Environmental Change (GEC) programmes—the World Climate Research Programme (WCRP), the International Geosphere–Biosphere Programme (IGBP), *DIVERSITAS* (the Latin word for diversity), and the International Human Dimensions Programme (IHDP) have made essential advances in understanding the causes and consequences of global environmental change. Given the urgency of global environmental change challenges and the multidisciplinary nature of environmental change science, a broad consensus is reached that it is of vital importance to integrate existing science resources, co-design with stakeholders and co-produce knowledge that society needs for coping with the challenges and transforming to sustainability. The step change unfolded as the GEC programmes jointly established in 2001 the Earth System Science Partnership (ESSP) and issued the Amsterdam Declaration on Global Change which called for drawing upon the disciplinary base of global change science and integration across disciplines and international boundaries. The review of the ESSP in 2008 and subsequent reviews of individual programmes confirmed the need for a holistic strategy for Earth system research. In June 2012 Future Earth was formally

launched at the United Nation (UN) Conference on Sustainable Development (Rio + 20).

Future Earth defines three themes: dynamic planet, global development and transitions towards sustainability. The most remarkable aspect about the programme is the integration of sciences and the principle of co-design, co-produce and co-deliver. Different from in traditional linear model of research which might create a deep gap between the science and its supposed end-users, this new approach involves stakeholders from the very beginning and throughout the entire research to application process. Future Earth is to fulfill its vision by building on and integrating existing GEC programmes and developing new broader initiatives. So far the merge of GEC projects into Future Earth is going smoothly. Future Earth Strategic Research Agenda 2014 identifying eight grand challenges for global environment change and further suggested 69 key priorities for global environmental change and sustainability research for the next 3–5 years is a valuable reference for research and funding priority-setting.

Establishing Future Earth national committee is a feasible way of accomplishing Future Earth missions at national level. Recognizing the trend of global environmental change research and realizing the potential importance of Future Earth, Chinese scientists supported by Chinese Academy of Sciences (CAS), China Association for Science and Technology (CAST) and others are proactively in the led-in and advance of the new initiative.

Under the auspices of China Association for Science and Technology, the international Workshop on Future Earth in China was held in September, 2013 in Beijing. Attendees all agree to establish the Chinese National Committee for Future Earth (CNC-FE) to strengthen the collaborations among existing global/regional environmental change programs and develop science-policy platform at regional and national levels. Preliminary science priorities of implementing Future Earth in China and Asia were also suggested. On 21 March 2014, the CNC-FE was established in Beijing. The inauguration of CNC-FE signaled China's full participation in Future Earth. CNC-FE commits to organizing Chinese scientists and stakeholders to participate in the Future Earth and making full

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use of international resources to boost China's technological level and policymaking in the construction of eco-civilization.

Identification of priority research areas is at the top of CNC-FE agenda. So far CNC-FE has identified 12 priorities and set up 12 work groups accordingly. These areas range from pollutions linked with environmental and climate change, urbanization and social harmonic development, sustainable development of ocean and coastal zone to Tibetan Plateau and global climate change. All are major subjects of public and government concerns and vital for the building of eco-civilization. The evolution of priorities reflects Chinese attempt in incorporating Future Earth themes with Chinese science reality and development demands. Since its establishment, CNC-FE has conducted a series of activities to fulfill its missions. The committee currently undertakes two 3-year projects to explore co-designing an implementation plan of Future Earth in China and science advice for societal transfer to sustainability. It is also actively engaged in joint application for sustainable-related international initiatives, for example Belmont Forum call for collaborative research actions on Mountains as Sentinels of Change, and Climate Predictability and inter-regional Linkages. A dozens of meetings, either international ones for high level exchange with Future Earth or domestic ones about work group progress provide insightful suggestions for committees' development. By translating related documents like Future Earth Initial Design Report, CNC-FE is making continuous efforts in co-delivery knowledge.

With CNC-FE organization and coordination, sustainability research scientists are gathered under the umbrella of Future Earth and work of the 12 work groups are progressing well. Future Earth Strategic Research 2014 refined specific priorities areas for future global sustainability research. Motivated by this guiding document and also to summarize the latest advances Chinese Future Earth community has achieved, we decided to compile a special issue on Advances in Future Earth Research. In our call for papers we emphasized a focus on climate and environment change in East Asia, multidisciplinary integration approach and practical science advice for social sustainable development. Members of the 12 CNC-FE work groups actively responded to the call.

The volume covers a wide spectrum of areas, such as variability, air quality, cryosphere, energy economy to marine ecosystems, to name but a few.

In general, the articles fall into three categories as follows.

- (1) The majority of articles present advances concerning the impact of human activities and natural drivers on global and regional climate change and related mitigation and adaptation suggestions for social sustainability. Zhang (2015a) examines natural and human-induced changes of East Asian summer monsoon and summer climate over eastern China in recent half century. Based on the IPCC Fifth Assessment, Zhang (2015b) reflects on the role of air quality in climate change and its socioeconomic impact and suggests future air pollution research foci for China's transition towards green and low-carbon development. Shi et al. (2015) quantitatively recognize
- the change of wind speed using the trend value and variability value of wind speed from 1961 to 2012 and regionalize the wind speed change in China on a county-level basis. He (2015) explores the objectives, impact and strategies of CO<sub>2</sub> emission reduction in the context of China's energy revolution to fulfill its Intended Nationally Determined Contributions (INDC) goals. Jiao et al. (2015) examine climate change and anthropogenic impacts on marine ecosystems and countermeasures in China. In a multidisciplinary perspective and taking Poyang Lake (PYL) region in China as an example, Huang et al. (2015) present a participatory integrated assessment (PIA) to provide an effective means to mainstream wetland climate change adaptation in rural sustainable development strategies.
- (2) One article is concerned with international initiative or project led by CNC-FE members which are allied to Future Earth themes. Guo et al. (2015) review the advancement of climate change studies based on Earth Observation Big Data, and provide examples of case studies on the use of Earth Observation Big Data in climate change research. The supporting role Earth Observation Big Data can play in Future Earth implementation, academia and decision-making is also investigated.
- (3) Wang et al. (2015) provide an overview to Future Earth activities carried out by CNC-FE, highlighting its identifying of priority areas and further discuss implications of the committee's work for developing countries on similar mission to adapt to climate change and address the challenges for the national sustainable development. Zhou et al. (2015) compare the global change studies in the USA, EU, and China, and introduce co-design plan in implementing Future Earth at national level.

The compilation of this issue is part of CNC-FE co-delivery effort. It is our hope that this collection, while timely summaries CNC-FE work, can be a helpful resource stimulating further sustainability-related research. Finally, I should thank my colleague Ms. Wang Chuan-Yi and the editor Ms. Wang Xiao-Ling for their assistances in organizing this special issue.

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