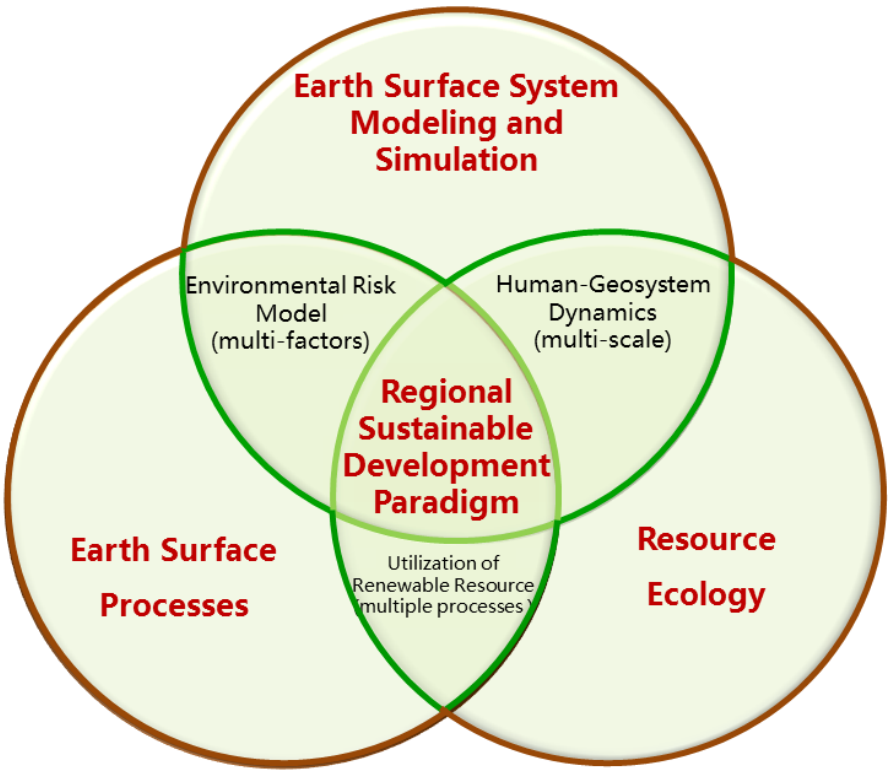
State Key Laboratory of Earth Surface Processes and Resource Ecology

1. Goals and Research Divisions

1) Goals and Orientation

Based on the study of earth surface processes and their effects on the recycling mechanism of renewable resources, the lab tries to establish and improve earth surface models of multi-factors under multiple processes and in multi-scale as well as create a simulation platform of Human-Geosystem dynamics, and finally attempts to build a sustainable utilization paradigm of regional natural resource.

2) Research Divisions



2. Introduction to the Team Goal

1) Earth Surface Processes

a) Aeolian process

Contacts： Prof. ZHANG Chunlai（张春来），Email：clzhang@bnu.edu.cn

This team is committed to solving the following issues on aeolian processes: sand movement mechanism, soil wind erosion, complex erosion by wind and water, aeolian geomorphology, and environmental changes in desert regions. The studies aim to clarify the processes of soil wind erosion under the circumstance of environmental changes and to establish a common model of soil wind.

b) Soil erosion process

Contacts：Prof. ZHANG Guanghui（张光辉），Email：ghzhang@bnu.edu.cn

The team mainly focus on topics of response of soil erosion to global change and biological project, soil loss drived soil carbon migration and transformation, multi-scale soil erosion modelling, regional soil loss evaluation and mapping, identifying and simulating eroding sediment source, and potential effects of soil loss on land productivity.

Recruitment of 'the Thousand Talents Plan for Young Professionals': Soil Erosion.

c) Ecohydrological Processes

Contacts：Prof. LI Xiaoyan（李小雁），Email：xyli@bnu.edu.cn

Core objectives: The core objectives of this field covers a number of key issues relevant to ecohydrology, including: 1) to develop multi-scale comprehensive observing system for watershed eco-hydrological processes; 2) to understand the interactions and feedbacks between ecological and hydrological processes of terrestrial ecosystems; 3) to uncover the underlying mechanisms of the terrestrial adaptation and vulnerability to climate change; 4) to study the scale effects within the terrestrial ecohydrological processes, develop the theory and methods for scaling; 5) and to develop the integrated coupling model of ecology, hydrology, and economy system for a sustainable management of watershed water resource.

Current Research focus: Current research focuses on the following issues, including: building the comprehensive observing system for eco-hydrological

processes in the Heihe River and Qinghai Lake watershed; investigating the underlying mechanisms of the interactions between ecological and hydrological processes in water-limited areas and the climate adaptation; and enhancing the applicability of remote sensing in integrated eco-hydrological studies and targeting a comprehensive analyses for multiple eco-hydrological processes in water-limited regions.

Recruitment of 'the Thousand Young Talents Plan for Young Professionals': Ecology, hydrology and social-economic coupling system development and simulation

2) Resource Ecology

a) Biodiversity

Contacts：Prof. ZHANG Dayong（张大勇），Email：zhangdy@bnu.edu.cn

Objectives: To understand the mechanisms of the origin, maintenance, and loss of biodiversity, and biodiversity-ecosystem functioning relationship, with crucial implications for sustainable management of natural biological resources and creation of ecological civilization. The integrative nature of the scientific questions requires research projects of multiple scales and multiple processes, and will lead to research work with a combination of approaches of filed observations, theoretical modelling and laboratory experiments.

b) Team of Vegetation-Environment Mutual Feedback and Ecosystem Parameters Surveying and Measurement

Contacts：Prof. CHEN Jin（陈晋），Email：chenjin@bnu.edu.cn

Core research objectives: Based on the measurement data through field surveying and the 3S techniques, the Team focuses its main researches on the following fields, i.e., probing into the mechanisms of mutual feedback between the vegetation and the environmental system; constructing multi form and multi scale inversion models for parameterizing ecosystem features; and revealing the mechanisms of spatial-temporal changes of vegetation resources driven by various micro processes.

Key research emphases at present: Analyzing the dynamic annual growth of forest and grassland ecosystems and partitioning the mechanical responses of this

dynamic growth to climate change and human activities; constructing the parameter inversion models of ecosystems through remote sensing data..

Recruitment of 'the Thousand Talents Plan for Young Professionals':
Ecological Remote Sensing / Plant Ecology and Vegetation Science

c) Landscape Ecology and Ecological Service

Contacts：Prof. ZHU Wenquan（朱文泉），Email：zhuwq75@bnu.edu.cn

Combining field observation, regional survey, modelling, and spatial information technology (e.g., remote sensing and geographic information system), this team focus on multiscale (from small watershed scale to global scale),and devotes to explore the coupling of landscape pattern and ecological process, scale effects and scaling, trade-off analyses and synthetic integration of multiple ecosystem services, the effects of global change on ecosystem services, earth surface processes and sustainability, and develops the integrated research methods and procedure for geographical science.

Recruitment of 'the Thousand Young Talents Plan for Young Professionals':
Integrated valuation of ecosystem services/ Vegetation and Ecological remote sensing

3) Earth Surface System Modeling and Simulation

a) Environment Evolution and Human Activities

Contacts：Prof. XIAO Cunde（效存德），Email：cdxiao@bnu.edu.cn

The team is committed to reconstruct paleo-climate and paleo-environment, revealing natural and anthropogenic forces on earth surface changes, with emphases on the time period of Holocene, especially since agricultural era (around 2000 years) and industrial era (around 200 years) . By investigating natural bearing capacity (Planetary boundary), present situation of bearing capacity as well as resilience of earth surface, the team tries to find out possible sustainable approach of renewable resources. Take the essential task of building sustainable development paradigm for human-earth dynamics, the team is trying to set up long-term human-earth dynamical method based on adaptation, resilience and vulnerability (ARV) system.

Recruitment of 'the Thousand Young Talents Plan for Young Professionals':
dynamical model of paleo-environment; resilience approach in complex social-ecological systems

b) Human-earth system dynamics

Contacts：Prof. GONG Daoyi（龚道溢），Email：gdy@bnu.edu.cn

The long-term target of the team covers a few of key issues including: (1) to establish a human-earth system model in which the earth surface processes, human-economical activities, and climate processes are dynamically coupled; (2) to explore the impacts of the multiple-scale human activities on the natural system; (3) to reveal the influence of different-scale climate change/variability on the natural and socioeconomic system; and (4) to pursue the approaching solutions to regulating human activities and socioeconomic processes for a sustainable human-earth system. The short-term goal focus on: (1) to build an operational system dynamic model or an earth system model, (2) to physically understand the human-earth interactions by the observation and numerical simulations, and (3) further to identify the human-related and/or naturally caused changes and consequences in the earth surface systems.

Recruitment of 'the Thousand Young Talents Plan for Young Professionals': Human-earth system dynamics/earth system modelling

4) Regional Sustainable Development Paradigm

a) Regional sustainability and land system design

Contacts: Prof. HE Chunyang （何春阳），Email: hcy@bnu.edu.cn，Tel：010-58804498

The goal of the team is to promote theoretical development and its place-based applications of regional sustainability science, with a focus on dry lands of northern China and elsewhere in the world. Key tasks include: (1) Understanding the dynamic relationship between land system change, ecosystem services and human well-being under uncertainties arising from internal feedbacks and external disturbances of climate change; (2) Developing the coupled model of land system change and regional sustainability; (3) Providing solutions for maintaining and improving regional sustainability.

Recruitment of 'the Thousand Young Talents Plan for Young Professionals': One who has rich experiences in land system modelling and good potential of carrying out regional sustainability research; One who has rich experiences in urban environment modelling and good potential of carrying out urban sustainability research.

b) Integrated risk research

Contacts: Prof. SHI Peijun（史培军），Email: spj@bnu.edu.cn； Prof. WANG Ming（汪明），Email: wangming@bnu.edu.cn

The team aims to respond to the national significant demand on comprehensive disaster prevention, mitigation and relief, public safety and integrated risk governance, through in-depth research on hazards mechanism, disaster processes, management mode and risk governance of large-scale disasters by adopting multi-disciplinary methodologies from geography, engineering and related disciplines. This research group investigates the complexity of the coupled disaster and socio-ecological systems and conducts integrative research on hazard-disaster-risk highly linked to climate change and earth surface processes, with emphasis on the impact analysis and risk assessment of socio-economy, industry, livelihood, ecology and environment, as well as their governance mode. From the perspective of theoretical innovation, the research group aims to establish theoretical foundation of integrated risk governance and safety system science. From the perspective of technological innovation, the research group aims to develop application-based technology for disaster risk modeling and simulation and practical techniques for safety protection. From the perspective of implementation innovation, the research group aims to integrate a knowledge and decision-making platform for large-scale disaster risk management. From the perspective of education innovation, the research group aims to establish an education center of high-level inter-disciplinary talents.

Recruitment of 'the Thousand Young Talents Plan for Young Professionals':
natural hazard/disaster, risk analysis and management and public safety, through (but not limited to) the Thousand Young Talent Plan.

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