Introduction

High-cold region Observation and Research Network for land surface processes and environment (HORN)

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Main contents

1. Importance
2. Objectives
3. Basis & feasibility
4. Working packages
5. Supporting conditions
6. Scheme & Timetable
1. Importance

Why we emphasize observation in high-cold region?
High-cold region (high elevation and cold climate) in China includes the whole Tibetan Plateau, and some high mountains in Gansu, Inner Mongolia and Xinjiang, occupies the largest area of high-cold region in the world.
High-cold region is more sensitive to global changes, because it possesses special atmospheric process, active hydrological process involved by glacier, permafrost and snow, and ecological process involved by multi-ecosystem.
High-cold region is the source of main rivers of China, which is influenced by glaciers, permafrost, snow and wetland. It is the important eco-safety barriers of China and Asia.
High-cold region is characterized with odious climate, fragile environment, population pressure and lower level of economics.
Scientifically, **high-cold region** is being focused by several international programs, which are concerning water, soil, atmosphere, bios and their interactions, and the influence to regional sustainable development.
Observing is the first importance from the viewpoint of earth system science studies

Earth System Science is the study of the Earth System, with an emphasis on observing, understanding and predicting global environmental changes involving interactions between land, atmosphere, water, ice, biosphere, societies, technologies and economies.

Regional activities are important to ESSP’s mandate on several levels. ..., at the regional level, aspects of global environmental change manifest significantly different.

The ESSP is currently developing a small set of Integrated Regional Studies (IRS), ..... understanding in support of sustainable development at the local level. ..... also improve overall knowledge of regional-global linkages ......
Observing is also indispensable scientific support for macro environmental conservation engineering for the eco-safety barrier conservation and construction during 2010-2030 on the Tibetan plateau, observing is a basic work in supporting capacity construction, because it will provide whole and objective data.
Observing in high-cold region (through atmospheric, hydrological and ecological processes) will

— provide basic data for integrated earth system researches.

— benefit deep understanding to the response and influence of key regions in global changes.

— quantitatively recognize the effects of human activities in the global changes.
2. Objectives

What we want to do for the observation in high-cold regions?
(1) To construct a observation network in the national science & technology basic platform

(2) To provide data for solving key problems in scientific research of land surface and environmental changes

(3) To serve eco-society sustainable development in high-cold region
Scientific aims

（1）To fulfil data needs for the mechanism and model researches of the high-cold region’s influence to global changes:

— water, energy, CO2 exchanges between land and atmosphere, ecosystem pattern and changes

（2）To fulfil data needs for the environmental changes and their evolving tendency in high-cold region:

— glacier and permafrost changes, water isotopes, proxies for past climatic changes, lake water balance, carbon balance of main ecosystems

（3）To fulfil data needs for the resource rational utilization and eco-society sustainable development:

— water balance in watershed, permafrost and engineering, lake variations and land water cycles, terrestrial ecosystem changes (soil water and nutrient, biomass, net primary
Scientific — Social — International

HORN

Dataset

Land surface processes

Atmospheric processes

Hydrological processes

Ecological processes
3. Basis & feasibility

What resources we have for the observation in high-cold regions?
High-cold region Observation and Research Network for land surface processes and environment
(1) These stations are being supported by different level’s administrations (CAS, institutions);

(2) Most stations possess the integrated observation potentiality and networking observation ability;

(3) An observation team belong to these stations have been trained and their skills are kept to be improved;

(4) There are more and more international collaborations in these stations, which lead them to catch up with international frontiers.
Problems

(1) Less coordination among these stations, including site distribution and observation contents;

(2) Difference of observation standard and instrument types, influencing the quality of networking observation;

(3) Loose administration, limiting the data sharing and full use of basic conditions;

(4) Some blank areas are still existed due to harsh environment and limited funding;

(5) Supporting funds are still not stable from long time viewpoints.
3. Working packages

How we use these stations?
（1）Based on national level stations, increasing observation contents, make full use of the basic infrastructure;

（2）Depend on existed stations, gradually improving observation facilities and raising observation abilities;

（3）According to scientific requirement, develop new station construction to meet the needs of networking observations;

（4）From the viewpoints of data sharing, construct network data platform
HORN

Serve scientific research and regional sustainable development
**(1) Observation regulation & quality control system**

1) **Observation regulation**

   —— different level’s index: fixed, supplemental and self-decided. Fixed index are basic items among stations and unconditionally shared within network.

2) **Observation standard**

   —— publish the handbooks to provide operable technology scheme and detailed rules.

3) **Observation guarantee**

   —— establish a technology team, periodically calibrate the equipments, ensure data quality and continuity.
(2) Observation network and station abilities

1) The networks

—— Increase equipments and development items, realize the integrality for fixed observation index.
—— Construct key stations, exert the radiation actions based upon their excellent infrastructure and comprehensive observation abilities.
—— Build new stations, cover all physical geographic zones in the network.

2) Station abilities

—— Standard observation yard, unified equipments, personnel training, to ensure the basic observation and data handling.
(3) Data integration and data sharing policy

1) Database construction
   ——scientifically classified data management, construct a data center to connect stations in real-time and improve the temporal effectiveness for integrated data.

2) Data sharing policy
   ——clear the duty, right and obligation of the stations, built an operable data sharing policy among stations and among different scientific agencies.
5. Supporting conditions

What resource we will use to support observation of these stations?
Guiding principles

(1) Equipment allocation: priority in science and coordinated development among stations.

(2) Data sharing: from network to departments and then to the whole society share observation data.

(3) Cooperation: based upon self-development, keeping on collaborations with other departments and international agencies.
(1) HORN will develop based upon CAS’s stations, but also unite stations belong other departments.

(2) Bureau for Science Promotion & Development, CAS is the task manager of HORN, and the integrated center carry the coordination job.

(3) Stations will fulful their tasks based upon contracts, periodically accept assessment.
What we hope to get during a predictable period?
From 2013 to 2015, the stations of CAS in high-cold region of China will join HORN, and be supported with 200 to 600 thousands yuan per year.

Establish HORN integrated center and data center, to coordinate station development and realize data sharing.

Develop collaboration with non-CAS stations and at international level.
Expectations

(1) 2013, establish integrated center
——in charge of the organization of observation system, regulation and
——coordinate relationships among stations
——built a team to calibrate observation instruments and make data quality control
——construct datacenter to push data sharing
（2）2014，publish handbooks for observation standard
—— atmospheric, hydrological, ecological observation handbooks including detailed index and demands.

（3）2015，work out a long term development plan
—— according to the needs of scientific research and local eco-society development, make a long term development strategy.
Thanks