

## Introduction

**H**igh-cold region **O**bservation and **R**esearch **N**etwork  
for land surface processes and environment (**HORN**)



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December 5, 2013

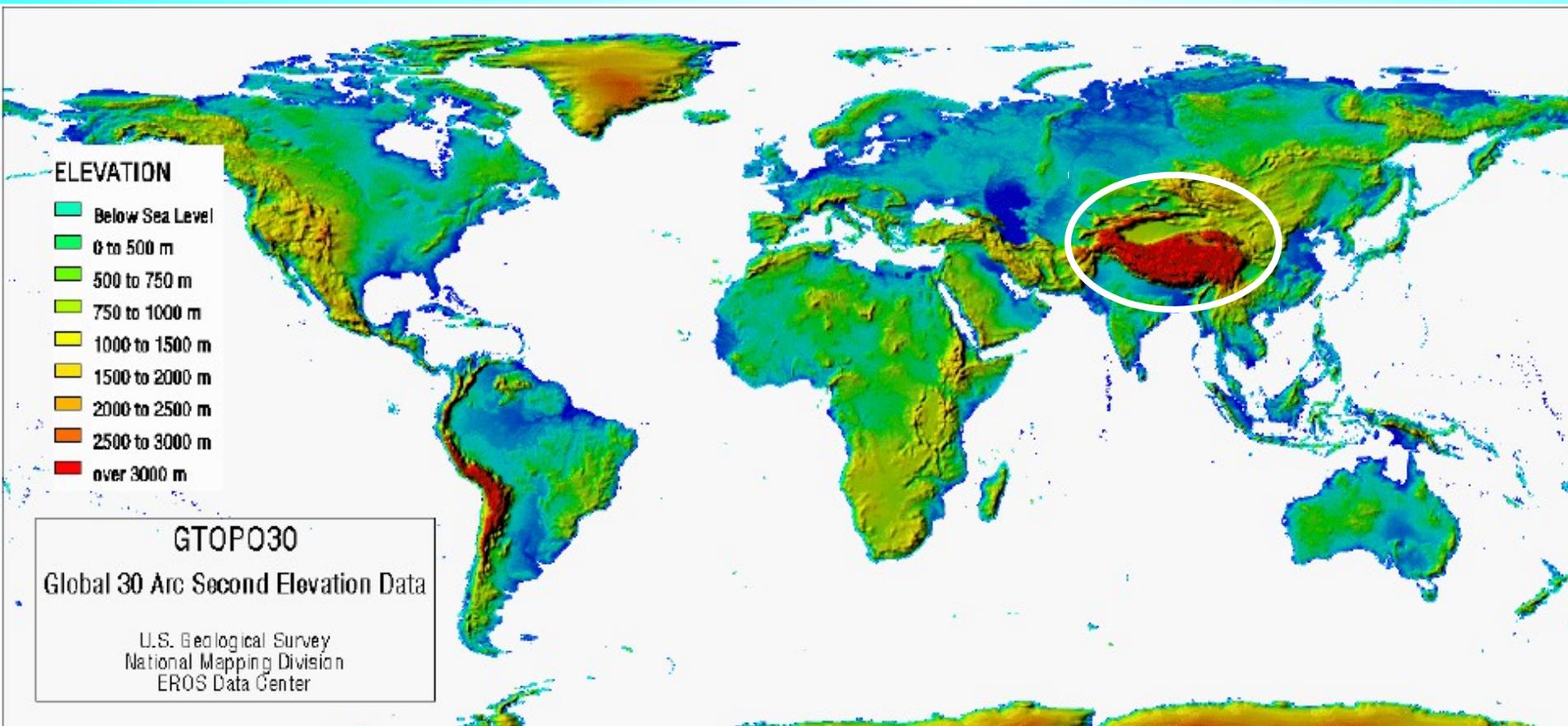
# **Main contents**

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

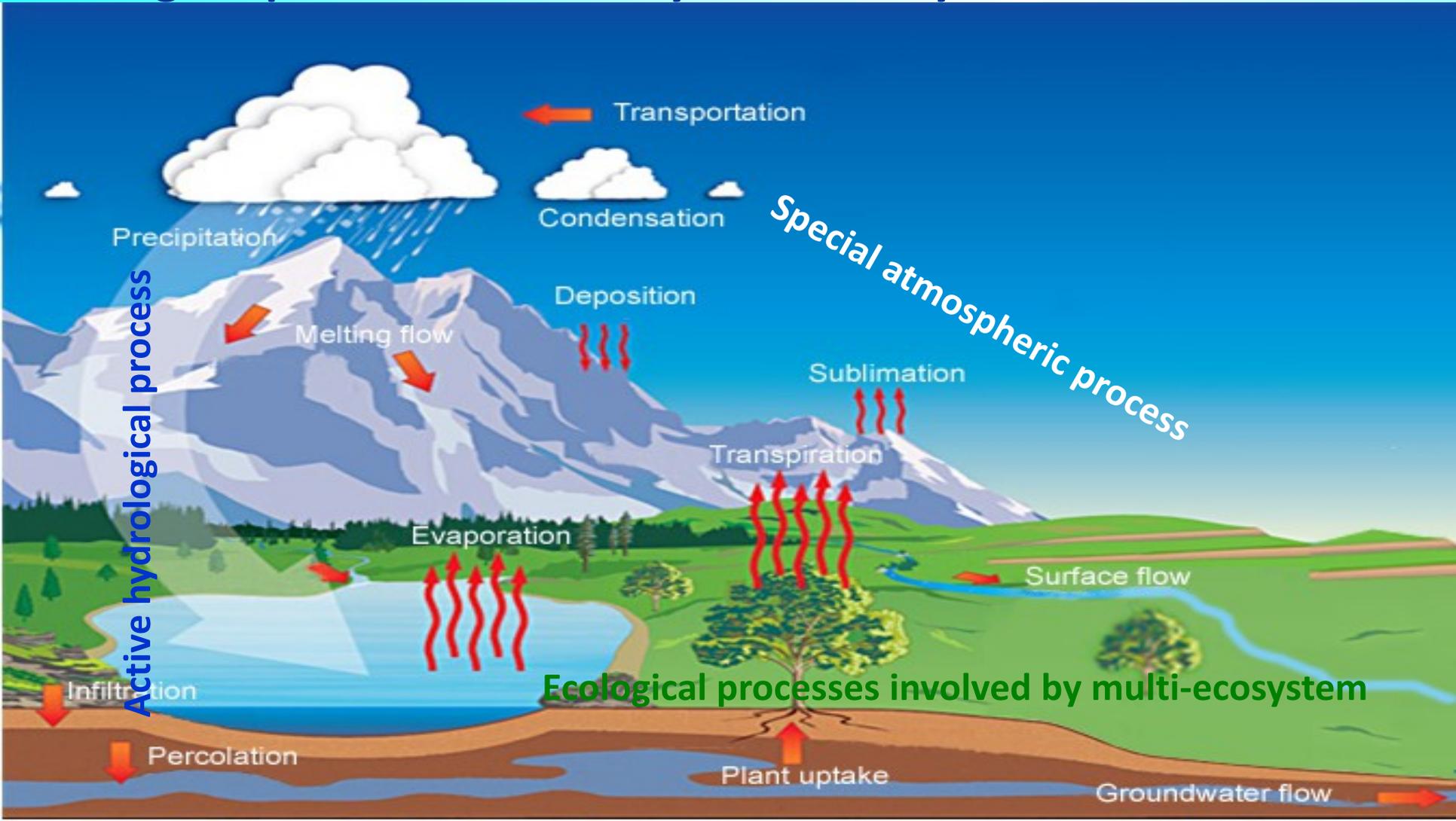
## 1. Importance

**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.

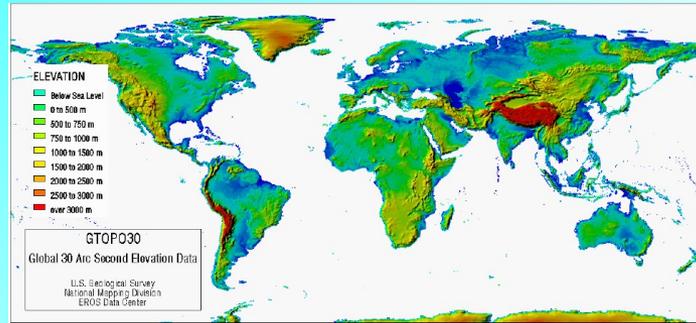




**High-cold region** is characterized with odious climate, fragile environment, population pressure and lower level of economics.



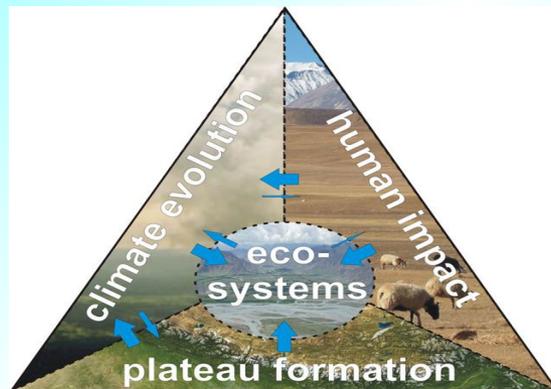
Scientifically, **high-cold region** is being focused by several international programs, which are concerning water, soil, atmosphere, bios and their interactions, and the influence to regional sustainable development.



**CEOP-HE**



**Pyramid**



**TiP**



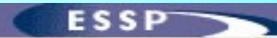
**TPE**

# **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

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## 西藏生态安全屏障保护与建设规划 (2008~2030年)

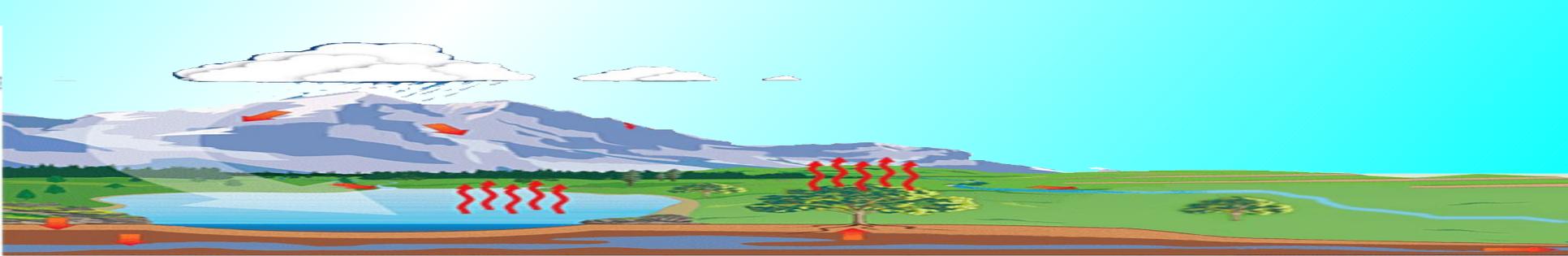
### 第三节 支撑保障工程

支撑保障工程包括生态综合监测站和观测点建设。整合规划区内现有的监测资源，在充分发挥环保、水利、农牧、林业、气象等行业现有监测能力的基础上，建立密度适宜、布局合理和自动化程度较高的生态监测站网，逐步形成以地面站与“3S”技术相结合的生态动态变化及工程实施效果监测与评价系统，为生态安全屏障功能评价和构建成效评估提供数据支撑。

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**

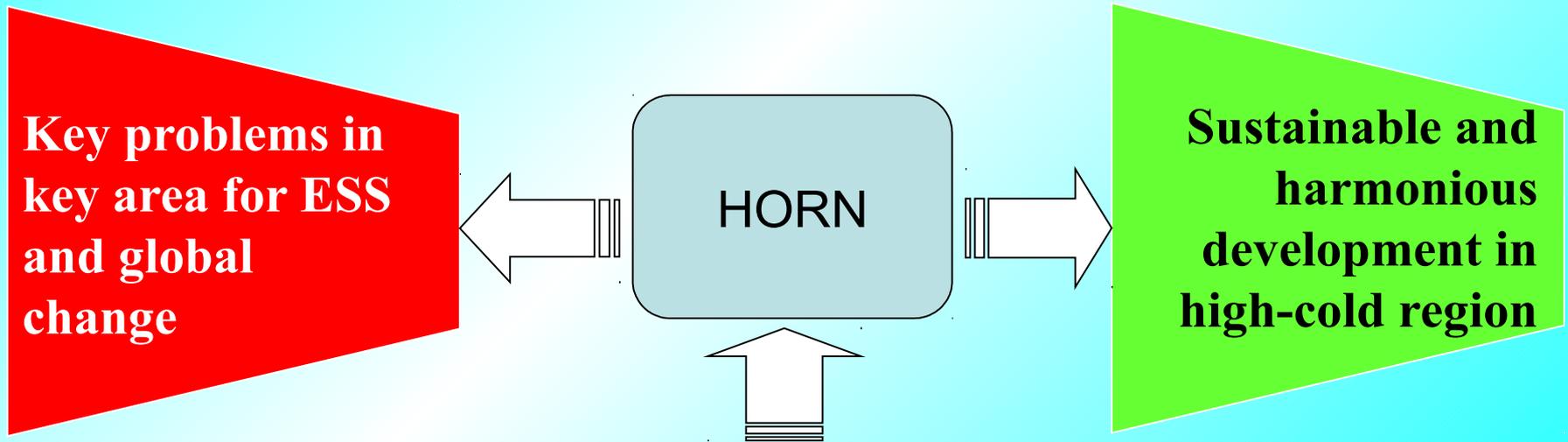
- provide basic data for integrated earth system researches.
- benefit deep understanding to the response and influence of key regions in global changes.
- quantitatively recognize the effects of human activities in the global changes.



## 2. Objectives

**What we want to do for the observation in high-cold regions?**

- (1) To construct an 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**



**National S & T basic platform**

## 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, CO<sub>2</sub> 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:**

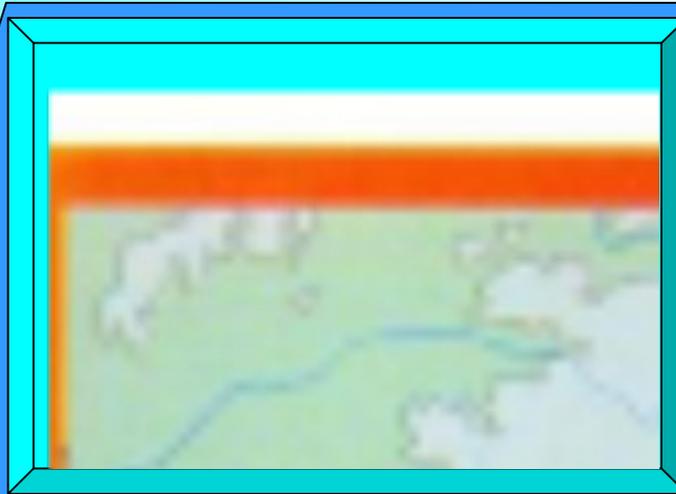
———glacier and permafrost changes, water isotopes, proxies for past climatic changes, lake water balance, carbon balance of main ecosystems

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

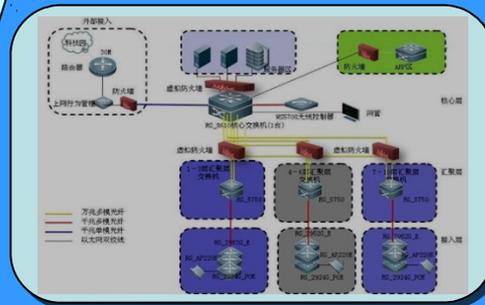
———water balance in watershed, permafrost and engineering, lake variations and land water cycles, terrestrial ecosystem changes (soil water and nutrient, biomass, net primary

# Scientific — Social — International

HORN



Dataset



Land surface processes

Atmospheric processes

Hydrological processes

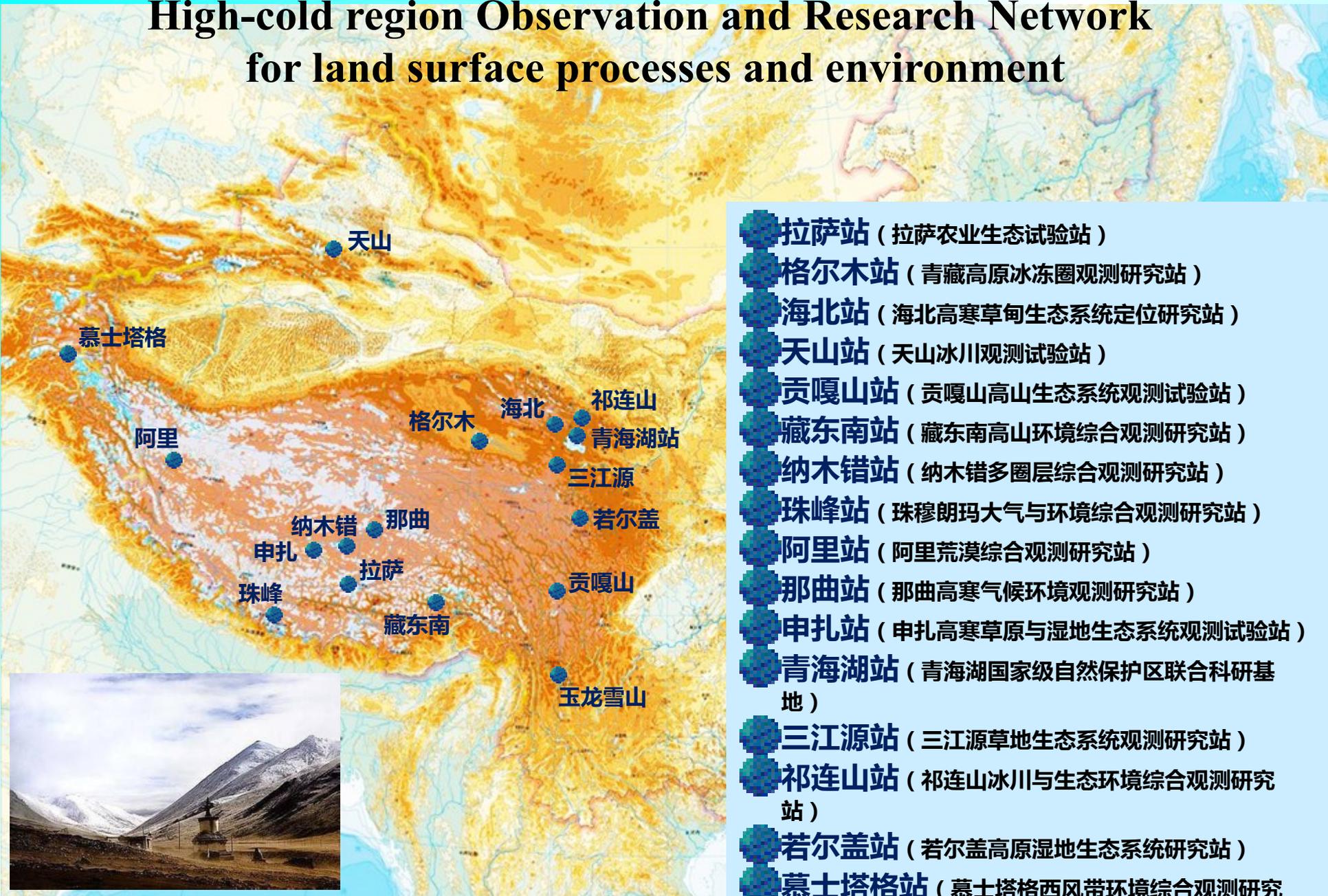
Ecological processes

### **3. Basis & feasibility**

**What resources we have for the observation in high-cold regions?**

# 高寒区地表过程与环境观测研究网络 ( HORN )

## High-cold region Observation and Research Network for land surface processes and environment



- 拉萨站 ( 拉萨农业生态试验站 )
- 格尔木站 ( 青藏高原冰冻圈观测研究站 )
- 海北站 ( 海北高寒草甸生态系统定位研究站 )
- 天山站 ( 天山冰川观测试验站 )
- 贡嘎山站 ( 贡嘎山高山生态系统观测试验站 )
- 藏东南站 ( 藏东南高山环境综合观测研究站 )
- 纳木错站 ( 纳木错多圈层综合观测研究站 )
- 珠峰站 ( 珠穆朗玛大气与环境综合观测研究站 )
- 阿里站 ( 阿里荒漠综合观测研究站 )
- 那曲站 ( 那曲高寒气候环境观测研究站 )
- 申扎站 ( 申扎高寒草原与湿地生态系统观测试验站 )
- 青海湖站 ( 青海湖国家级自然保护区联合科研基地 )
- 三江源站 ( 三江源草地生态系统观测研究站 )
- 祁连山站 ( 祁连山冰川与生态环境综合观测研究站 )
- 若尔盖站 ( 若尔盖高原湿地生态系统研究站 )
- 慕斯塔格站 ( 慕斯塔格西风带环境综合观测研究站 )



## **Advantages**

- ( 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 collabrations 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?**

## **Thought of the construction**

- ( 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**

**Top design**

Resource

**Observation team**

CAS

CMA

NFA

CSB

Qinghai Province

TAR

**Resource conformity**

Aims

**HORN**

**System integration**

Technology route and task

↓  
**Regulations and standard**

↓  
**Resource conformity and sharing**

↓  
**Facilities and abilities improving**

↓  
**Necessary new stations**

↓  
**Database construction and data sharing**

**Network observation**

Service

**Serve scientific research and regional sustainable development**

# Work packages

## (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.

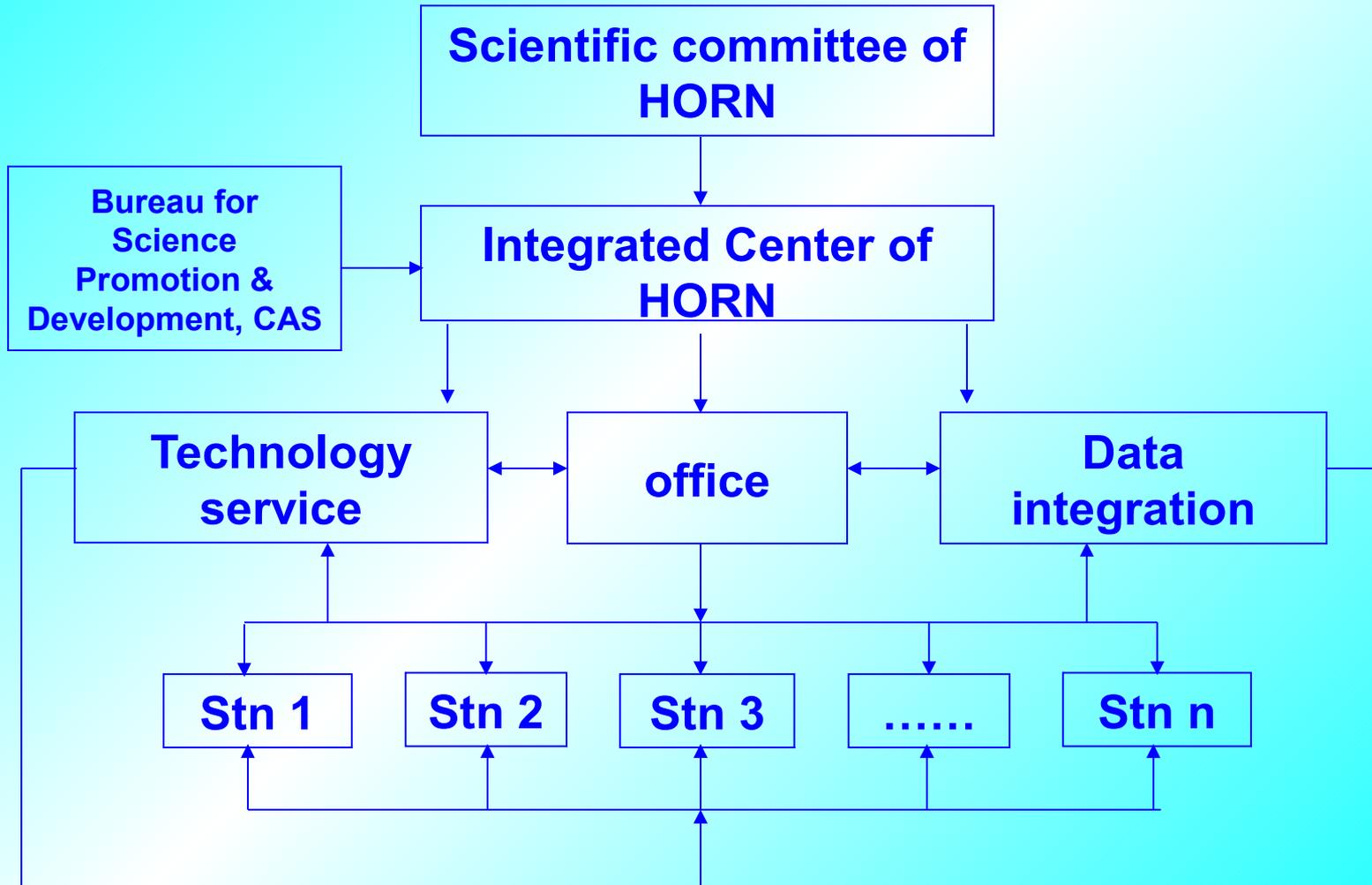
#### **2) Data sharing policy**

——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?**

# Organizations



## 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.

## **Administration**

- ( 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 fulfil their tasks based upon contracts, periodically accept assessment .**

## 6. Scheme & Timetable

**What we hope to get during a predictable period?**

## **Recent scheme**

- ( 1 ) 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.**
- ( 2 ) Establish HORN integrated center and data center, to coordinate station development and realize data sharing.**
- ( 3 ) 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**