Cryospheric Databases in China

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Outline

• Data centers and databases of cryospheric data in China
• Representative datasets at WestDC.westgis
• Data sharing and services
• Toward World Data System for Cold and Arid Regions
1. Data Centers and Databases of Cryospheric Data in China

- Cold and Arid Regions Science Data Center (Lanzhou)
- Chinese National Arctic and Antarctic Data Center (Shanghai)
- Third Pole Environment Database (Beijing)
- Information System of Chinese Glacier Resources and Change
- Data Information System of Permafrost Environment Investigation over the Qinghai-Tibet Plateau
Cold and Arid Regions Science Data Center at Lanzhou

- Subcenter of CAS environ. db
- Subcenter of Earth system data sharing system of MOST
- Digital Heihe
- WestDC of NSFC
- Sub-system of CAS featured db
- CARD-WDS Regular member of WDS
- WDCDGG

DC for Cold and Arid Region Sciences
Cold and Arid Regions Science Data Center at Lanzhou
Zhuotong Nan
320 Donggang West Road
Lanzhou
Gansu 730000
China

Monday, 03 June 2013

Subject: CARD as Regular Member of ICSU World Data System

Dear Zhuotong Nan,

Cold and Arid Regions Science Data Center at Lanzhou applied for membership in the new International Council for Science (ICSU) World Data System (WDS). On behalf of ICSU and the WDS Scientific Committee (WDS-SC), it is my distinct honour and pleasure to formally accept your organization as a Regular Member of ICSU-WDS, pending the finalization of a signed agreement with ICSU (as noted in the application). A template agreement is provided on the ICSU-WDS website (http://icsu-wds.org/membership/join-icsu-wds/template-agreement).

As described on the WDS website, Regular Members are nodes within a ‘system of data systems’ that deal directly with data curation and data analysis services. Your application was reviewed favourably by two referees. The summary of their comments at the end of this letter is intended to help your organization become a more effective

Regular membership in the new World Data System
## Chinese National Arctic and Antarctic Data Center

### Latest Dataset

<table>
<thead>
<tr>
<th>Publish Date</th>
<th>Title</th>
<th>Location</th>
<th>Author</th>
<th>Data size</th>
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<td>2013-11-05</td>
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<td>2013-11-04</td>
<td>Satellite Image of Chinese Antarctic Research Stations-Zhongshan Station</td>
<td>Zhongshan Station</td>
<td>Jian Liu</td>
<td>5.6 KB</td>
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<td>2013-10-17</td>
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<td>Zhengbing H...</td>
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<td>2013-10-16</td>
<td>Antarctic Land Cover Map 1:9000000</td>
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<td>Prydz Bay, Southern Ocean</td>
<td>Hongxia Chen</td>
<td>1.3 MB</td>
</tr>
</tbody>
</table>

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Third Pole Environment Database

# Information System of Chinese Glacier Resources and Change

## Project Overview

2. DEM data of Qilian Mountains (2005)

## Technical Specifications

- **Data Source:** WestDC WestGIS Academic Network (in Chinese)
- **PI:** Prof. Shiyong Liu
- **Website:** [http://westdc.westgis.ac.cn/glacier](http://westdc.westgis.ac.cn/glacier)
Data Information System of Permafrost Environment Investigation over the Qinghai-Tibet Plateau

http://pf.crs.ac.cn/ (in Chinese), PI: Prof. Lin Zhao
2. Representative Datasets

• Chinese Glacier Inventory
• Snow dataset: in situ observations and snow depth/snow water equivalent datasets derived from remote sensing
• Frozen soil data: permafrost distribution map of China, soil surface freeze/thaw data derived from remote sensing, and borehole data
• Cryospheric data of other regions
• Experimental datasets from the Watershed Allied Telemetry Experimental Research (WATER), HiWATER, HEIFE, and other experiments.
2.1 Chinese glacier inventory
Glacier distribution map and statistics of number, area, and ice volume of glaciers in China
2.2 Snow data

• In situ observations
  • The daily snow depth observations of west China from 1960s to present.
• The snow depth derived from passive microwave remote sensing (SMMR and SSM/I)
  • Modified algorithm
  • Long time series, 1978~2012
Snow depth data set (1978 — 2005) derived from PM remote sensing

Daily snow depth of 2001

Mean snow depth (1978-2005)

Snow depth variation from 1978 to 2005

Monthly maximum snow depth

Che et al., 2008
Distribution of averaged snow depth and steady snow cover extents in China

Li et al., 2008
Mean snow depth and snow cover days of 32 years

Interannual change trend and its statistical significance of snow depth

Che et al., 2013
Snow depth variation in different snow season
• In north China, snow cover mainly distributed in the mountainous areas, maximum snow in in January and February.

• Annual SCD significantly decreased in the deep snow areas and insignificantly increase in the Northeast plain and Junggar basin.

Dai et al., 2012; Che et al., 2013
2.3 Frozen soil data

• Borehole ground temperature observations
  • More than one hundred borehole data along the Qinghai-Tibet highway and railway are archived.

• Frozen soil map
  • Historic frozen soil maps were digitized
  • GIS based frozen soil mapping

• Surface soil freeze/thaw derived from Remote sensing
• GIS and digital roadbed of the Qinghai-Tibet railway
Historic frozen soil maps
Overview of existing permafrost maps

- CAREERI1988: Isolated
- QTP1996: Permafrost
- C-IPA: Isolated patches, Sporadic, Discontinuous
- CAREERI2000: Sparsely island, Predominantly continuous and island, Predominantly continuous
- CAREERI2006: Patchy, Discontinuous
A new frozen soil map of China

Ran et al., 2013, PPP
Overview of Existing Permafrost Maps

Table 4 The area of frozen ground in China based on the updated frozen-ground map.

<table>
<thead>
<tr>
<th>Class</th>
<th>Frozen ground area ($\times 10^6$ km$^2$)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Including glaciers and lakes</td>
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<tr>
<td>Total Permafrost</td>
<td>1.65</td>
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<tr>
<td>(a) High-altitude permafrost</td>
<td>1.41</td>
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<tr>
<td>(a1) Mountain permafrost</td>
<td>0.31</td>
</tr>
<tr>
<td>(a2) Plateau permafrost</td>
<td>1.10</td>
</tr>
<tr>
<td>(b) High-latitude permafrost</td>
<td>0.24</td>
</tr>
<tr>
<td>Seasonally frozen ground</td>
<td>5.41</td>
</tr>
<tr>
<td>Instantaneous frozen ground</td>
<td>1.73</td>
</tr>
</tbody>
</table>
Trend Analysis
F-test, 90% Confidence

- Onset date of soil freeze is postponed 19.6±14.6 days
- Onset date of soil thaw is advanced -19.0±9.4 days
- Duration of soil thaw is shortened for 34.3±16.5 days

Li et al., 2012, JAE; Jin et al., 2013
2.4 High Asia cryosphere data
2.5 Representative datasets—field experiment datasets

GAME Tibet

WATER experiment datasets

HEIFE

Hydro-meteor stations

Hydro testings in cold area
Data System for WATER (Watershed Allied Telemetry Experimental Research)

- Built from August 2008
- To acquire, interpret and publish data from the WATER experiment.
An observation matrix to capture the land surface heterogeneity

Li et al., BAMS, 2013, doi: 10.1175/BAMS-D-12-00154.1
Linking Wireless Sensor Network deployed in Heihe basin to the data system, automating data collection, quality control, visualization as well as device management.
3. Data Service
Technical infrastructure: Data Sharing Platform

- Based on ISO 19115 metadata
- First use of DOI for data copyright in China
- Designated person for data service
- Data Sharing Policy: Full & Open

Suggested data citation


本数据引用方式


数据使用声明

为尊重知识产权，确保数据使用的权益，扩展数据共享的服务，评估数据的应用潜力，未经授权不得使用该数据所生产的数据集。未经授权的使用包括数据的复制、分发、修改、销售和发布。使用数据（包括数据的复制品）的个人或单位，应在发表与该数据有关的成果时，注明数据的来源。
Data citations

WATER: Dataset of LAI measurements in the Yingke oasis and Huazhai desert steppe foci experimental areas

How to cite dataset

How to acknowledge in paper

Projects/program information

Data usage statement

Acknowledgments

References
International Journal of Remote Sensing

Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/iores20

Estimation of effects of a freezing environment on vegetation using model simulation and a truck-mounted microwave radiometer

Z. J. Zhang\textsuperscript{a,b}, L. X. Zhang\textsuperscript{b,c}, G. Q. Sun\textsuperscript{d} & S. J. Zhao\textsuperscript{b,c}


Offline Service

- Real user required (information)
- Simple goal with required dataset
- Citation required
- Assignment for these agreements

- Protect author's Intellectual Property
- Protect research data sharing lifecycle with data citation
Services Statistics
References

Thank you!

中国寒区旱区数据中心： http://westdc.westgis.ac.cn/
WDS Cold and Arid Regions Science Data Center at Lanzhou: http://card.westgis.ac.cn/