



Institute of Tibetan Plateau Research,
Chinese Academy of Sciences

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Newsletter

Newsletter 15 December, 2011



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ITP seeks breakthroughs in three fields and four research directions

ITP has recently identified three fields for potential breakthroughs in scientific research on the Tibetan Plateau, and four key research directions to promote its development in China's twelfth and thirteenth five-year plans.

The three fields include:

- I. Formation and evolution of the northern Tibetan Plateau and related effects on natural resources and environment;
- II. Multi-phase transition of water on the Tibetan Plateau and its impact on, response to climate changes;
- III. Construction of the Tibetan Plateau observation and research platform.

The four key research directions are identified as follows:

- i. Indo-Eurasian geo-tectonics and dynamics and the Tibetan Plateau uplift;
- ii. Land surface multispheric mass flows, their interactions and environmental significance;
- iii. Alpine ecosystem changes and human activities;
- iv. Risk assessment of environmental crisis and adaptation.

ITP NSFC-funded programs reach new heights

Overview

Thirty-two out of the 53 applications from ITP scientific staff to the National Natural Science Foundation of China (NSFC) have been granted, according to the latest news release by the NSFC. Among the 32-funded projects, there is one key program (Prof. ZHU Liping serves as PI), 19 general programs and 12 Young Scientists Funds. Total funding for these projects amounts to 21.45 million RMB.

Fund for Distinguished Young Scholars

ITP Prof. XU Baiqing won the National Science Fund for Distinguished Young Scholars from NSFC, with a total of 2 million RMB for three research years.

Key Program

"Multi-phase transition of water in the Third Pole earth system and its impacts" has been named as a NSFC Key Program. Focused on glaciers, lakes and rivers in the Third Pole region, the project aims to establish mass-energy balance models for water multiphase transition and hydrological models at different scales through the integration of observation using remote sensing and modeling. The project includes four subjects: (a) glacial mass-energy balance and glacial melting, (b) lake-basin range water balance and water multiphase transition, (c) boundary mass balance during water multiphase transition, and (d) impacts of water multiphase transition on water resources and hazards.

MOST Vice Minister inspects SETORS

July 27, 2011, Mr. ZHANG Laiwu, Vice Minister of China's Ministry of Science and Technology (MOST) inspected the Southeast Tibet Observation and Research Sta-





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tion for the Alpine Environment (SETORS) in Nyingchi, Tibet Autonomous Region. He was briefed on the academic goals and operational status of the station, as well as on the various research projects conducted at the station. SETORS Director ZHU Liping introduced Mr. Zhang to the field station equipment and operations, including the atmospheric boundary layer tower, airborne pollen trap, and atmospheric permanent organic pollutants (PoPs) samplers. Mr. Zhang was impressed by the quality of in situ sampling and measurements, and stressed the importance of these remote field stations in the southeastern Tibetan Plateau. He further encouraged ITP staff to apply the first-hand data, field observations and research results to advance our understanding of environmental systems and processes.



Group photo of Minister Zhang (the middle one in the second row) with ITP staff at SETORS.

TEL hosts training course on stable isotope measurement and analysis



The CAS Key Laboratory of Tibetan Plateau Environment Changes and Land Surface Processes hosted a training course from November 18-19, 2011, on the theory and practice of stable isotope analysis. The training course combined theory with practice, and attracted over 60 scientific staff from CAS and other research institutes, as well as from China's top universities.

The course included an introduction to water stable isotope theory, organic molecular, surface heat ionization, and dating with inert gas isotopes. The training course also demonstrated the operation of analytical equipment such as

the Thermo MAT253, Picarro L1102i, SerCon Hydra2020, and GV HELIX.

The hosting of this training course was funded by a CAS supplementary fund for continuing education, and will contribute to new and enhanced applications and academic exchanges related to stable isotope analysis.

TPE research stations acknowledged in Science

A recent Science News Focus praised TPE's efforts in establishing a high-elevation environmental monitoring network. The article titled "Third Pole Glacier Research Gets a Boost from China" outlines some of the challenges and goals of the TPE flagship station monitoring network. In the article, Prof. YAO Tangdong, Director of the Institute of Tibetan Plateau Research summarized the urgent data needs with a single sentence: "To understand the past, we need to understand the present."

Although the article mistakenly reported the area of Third Pole glaciers as 1,000 km² (actual area is over 100,000 km²), it succeeded in highlighting the importance of the region's climate sensitivity, "The region is also among the world's most rapidly warming areas; monitoring it is crucial to understanding the impact of climate change..." The article by Christina Larson appears in Vol. 334 of Science (2 Dec 2011, p. 1199).

GLACIOLOGY

'Third Pole' Glacier Research Gets A Boost From China

NEW research stations in Tibet and central Asian countries will monitor environmental change around Himalayan glaciers.

BEIJING—An eye-piercing study of glaciers in central Asia came on 21 August 1999 when armed supporters of the Islamic movement of Taliban—a militant group aiming to establish an Islamic state observing Sharia law—set up a research station in Kargu's Pamir Mountains on the Pamir Knot. For 27 years, scientists had taken measurements of nearby Atangon Glacier, all their records and instruments were consumed in the blaze. Scientists and staff were heavily held hostage; men refused to negotiate nearly 65 kilometers to the nearest road.

That field station isn't the only casualty of the fragile politics of central Asia. Since the collapse of the Soviet Union, which funded glaciologists to gauge the region's water supply, other facilities have fallen into disrepair or disappeared. Tajikistan, for instance, lost many of its stations—along with water contents that stuffed flasks—during its bloody 1992-97 civil war.

But the network is re-emerging, thanks to a new commitment to regional glacier research by the Beijing-based Institute of Tibetan Plateau Research, Chinese Academy of Sciences (ITPCAS). In collaboration with counterparts in neighboring central Asian countries, it is helping to fund new state-of-the-art research stations in Tajikistan, Nepal and Pakistan and erecting its own high-elevation glacier stations in Tibet. The aim, Director Yao Tangdong says, is to "rebuild the full picture of environmental change around the glaciers."

Central Asia and the Tibetan Plateau contain over 1000 square kilometers of glaciers spanning parts of a dozen countries—some call it the third pole—the largest extent of ice outside the Arctic and Antarctic. The region is also among the world's most rapidly warming areas, monitoring it is crucial to understanding the impact of climate change, because no glacier melt feeds the upper reaches of the Indus, Brahmaputra, Yangtze, and other major Asian rivers. Geographer Vladimir Alexeev of the University of Idaho in Moscow, Idaho, calls it "the water tank for over 100 million people." Add-

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Downloaded from www.sciencemag.org on December 1, 2011

ity at high altitudes. One mystery involves temperature readings. After comparing satellite data for the Tibetan Plateau spanning 6 years against Chinese Meteorological Administration readings for the same period, meteorologist Qin Jun noticed that the rate of warming is amplified at high elevations. For stations located at 1000 to 2000 meters, the calculated rate of warming of about 1°C per decade. For stations at 3000 to 5000 meters, the rate of warming was double that. (Amplified rates of warming have also been observed in the Alps and the Andes.) Above 5000 meters, though, satellite temperature readings suggest that the rate of warming remains constant or even diminishes. Qin now hopes to pinpoint a cause for the discrepancy.

A network of 17 new high-altitude stations—located above 5000 meters—should help in that quest. Equipped with instruments to measure air and surface temperature, wind direction and speed, and humidity, the stations are intended to illuminate what Yao calls the glacier's "complete dynamic processes."

The new stations fill in a critical gap, says Raymond Bradley, a glaciologist at the University of Massachusetts, Amherst. Most of the world's high-altitude areas are poorly monitored, he says. ITPCAS's work, he adds, is the best example of activity which addresses questions of environmental change at high elevations.

One recent finding comes from a 2000-meter-modified station on Mount Xueshan, near Mount Everest. Data logs on under ground and open-air laser-based-expected summer wind speeds, a finding that contradicts both reports.

Even with the aid of new stations, obstacles remain. Retrieving data logs from the Mount Xueshan station entailed an arduous 3-day hike from base camp, says Bradley. Li Shengping, who participated in an August research trip. After subsiding, Li's team had to shovel the station out from under a meter-deep snow. They later intended to replace some broken instruments. But Yao cautions that the new efforts will help glaciologists working in central Asia and the Tibetan Plateau escape their tough past. "But we need now to ground-truth data," he says. "To understand the future, we need to understand the present."

CHRISTINA LARSON
Christina Larson is a writer in Beijing.



New Insights. Data from a 2000-meter-modified glacier-monitoring station on Mount Xueshan indicates rapid melt.

inance, freshly fallen snow may be indistinguishable as a satellite image from old melt ice, leading a scientist to perhaps infer that a retreating glacier is advancing. "Satellite data needs to be verified with actual measurements," he says.

"You can be surprised by Tibet since that visited the area in 1978 as a geography student. In 1989, after helping establish a glacier station near the city headquarters of the Yangtze River, he began dreaming of building a research network. Today, his dream is materializing. In 2003, a glacier station funded by CAS and the Tajikistan Institute of Geology was erected in Tajikistan. Next year, a similar station will be built in Pakistan. In Beijing, a CAS glaciologist sent to scout locations, says Pakistan will cover the construction costs, with CAS supplying instruments. CAS is looking at backing a site in Kyrgyzstan, he says.

China's glacier scientists hope to get better understanding of climate variability

2011 Annual Conference of the China Society on Tibetan Plateau held in Hainan

The 2011 Annual Conference of the China Society on Tibetan Plateau (CSTP) was held in Sanya, Hainan Province during November 29-30, 2011. Centered on the theme “Multi-spherical Interactions on the Tibetan Plateau and Their Effects on Natural Resources and Environment”, the annual conference gathered over 150 participants from various institutions, universities and organizations throughout China.

CAS members, Profs LI Jijun and ZHENG Du, delivered speeches at the opening ceremony; during which they highlighted the importance of timely reviews and academic exchanges given the rapid development of China's Tibetan Plateau research.

They also emphasized the importance of multi-disciplinary research and young talents cultivation. CAS member, Prof. SUN Honglie, announced the decision to award 10 researchers with “The Eighth Youth Scientific and Technological Award of CSTP”.

Prof. YAO Tandong, now chairman of the CSTP, presided over the opening ceremony. During the ceremony, Prof. QIN Dahe also gave a talk on the latest IPCC reports.

Presentations from various aspects in the Tibetan plateau research were made during the plenary session, reviewing the achievement by the international programs JICA/Tibet, sharing latest understanding of the Plateau tectonics and its implication to natural resources, and updating on recent study of climate changes and ecological responses.

The plenary session was followed by group-discussions evolving around such aspects as tectonic structures of the Plateau, geological

hazards, land-air interactions, atmospheric environment, glacier-lake modern processes, paleoclimate reconstructions, ecological responses to climate changes and related control experiments, adaptations to climate changes and anthropogenic impacts.

The conference witnessed deepened understanding of the Tibetan Plateau tectonics and its uplift, and updated the spatial and temporal features of land surface processes and environmental changes. It also touched upon ecosystem changes and their impacts on environment and anthropogenic activities. Multi-disciplinary approaches were widely approved and to be promoted in future Tibetan Plateau research in China.



Academic advisory committee guides ITP development

The annual academic advisory committee of ITP kicked off at Beijing in late November, 2011, offering guidance on future ITP development. Summarized as one orientation, three fields for potential breakthroughs and five key research directions, the goal of ITP in the twelfth five year plan was introduced by ITP Director Prof. YAO Tandong.

This goal is in accordance with the general requirement of the Chinese Academy of Sciences. Members of the academic advisory committee were invited to suggest research goals, academic ideas, major scientific contents, general approaches, and future demands for China's Tibetan Plateau research.





Valuable suggestions were made for future ITP development, and focused on theory innovation, and deepening research related to key ITP science questions.

Coupled ground observation - aerial remote sensing experiment accomplished on the Tibetan Plateau



The first coordinated experiment of field observation with aerial remote sensing observation on the Tibetan Plateau was accomplished in August, 2011. It is an important aspect of the national 973 program entitled “Tibetan Plateau climate system variations, their influences on East Asia and their mechanisms.” It aims to provide a high-resolution dataset of land-air interaction to study climate system change on the Tibetan Plateau in relation to global climate change

The aircraft utilized in the aerial remote sensing observation was equipped with three sensors, including airborne light detection

and ranging, airborne hyper-spectral imaging camera, and infrared thermal imaging system. Seven flights at a height of ~3000 m a.s.l. were completed during the remote sensing experiment, acquiring about 20 million gigabytes of data synchronized or quasi-synchronized with Landsat-5 and SPOT-5 satellite images.

Field observations were conducted at 37 long-term fixed-site observation stations, includ-

ing Nagqu Station of Alpine Cold Climate and Environment, NAMORS, Damxung Station of Climate Change Observation, Southeast Tibet Observation and Research Station for the Alpine Environment (SETORS), and Qomolangma Atmospheric and Environmental Observation and Re-

search Station (QOMORS). To coordinate with the aerial remote sensing observation, synchronized or quasi-synchronized monitoring were conducted with a wind profiler, GPS radiosonde atmospheric observation of troposphere, in addition to a mobile ground station to observe heterogeneity in soil humidity, sample field and targeted intensive observation, etc.

This coupled experiment is particularly useful in providing synchronized satellite-aerial-ground remote sensing and in situ observation data in order to quantify the main factors affecting land-surface processes on the Tibetan Plateau.

INTERNATIONAL COOPERATION

MOST approves ITP’s international cooperation

A delegation from the Ministry of Science and Technology (MOST) led by Vice Minister CAO Jianlin visited ITP on November 30, 2011. Dur-

ing the visit, ITP director Prof. YAO Tandong delivered an overview of the Third Pole Environment program and Deputy Director of CAS Bureau of International Cooperation Mr. QIU Huasheng briefed attendees on the academic

cooperation of CAS with other developing countries.

Vice minister Cao praised the strength and endurance of China's scientists engaged in Tibetan Plateau research. Cao also stated that CAS



international cooperation shows great potential for involvement in MOST international cooperation on the national level. He also approved the promotion of the Third Pole Environment (TPE) program, encouraging China's scientists to foster long-term collaborations with their foreign partners, and thus to jointly advance human understanding of the environment.

3rd TPE Workshop: A step forward in polar research integration

Upon invitation from President of Iceland Olafur Grimsson and the University of Iceland, participants representing 15 countries from around the world attended the 3rd Third Pole Environment (TPE) Workshop in Reykjavik, Iceland. The workshop continued to build on the progress and success of the first two TPE workshops by achieving four main goals, including:

- Review and present scientific progress related to TPE research
- Small-group theme discussions
- Review and discuss the TPE Science Plan draft
- Discuss the planning and configuring of TPE flagship research stations

The general workshop



agenda consisted of registration on August 29, with the opening ceremony during the following morning of August 30. On each of the first two workshop days, academic presentations were followed by group discussions within the following five themes:

- Climate
- Glaciers
- Lakes and rivers
- Ecosystems
- Natural dynamics of the Third Pole environment-Lessons from the Past

The TPE Science Plan draft was discussed at the end of the second day, and the discussions were continued in the morning of the third day. A technical meeting on TPE flagship stations was held on the third and final workshop day, and included presentations followed by a round-table discussion. The flagship station discussions centered on the five main topics of:

- Standardized equipment for stations
- Suggestions for additional flagship stations
- Coordinated management and financing
- Data availability and data sharing policy
- Conclusions and action points

Workshop presentations will be available for download on the TPE website as they are received from the authors. The complete workshop report will also be available soon on the TPE website. The next TPE workshop (2012) will be held in India, with dates and location to be announced early next year.





TPE trains young scientists in Nepal

From October 31-November 14, 2011, the first TPE training course was held in Nepal in conjunction with the 2nd TiP summer school. 35 young scientists were selected to take part; of which, 10 were from Nepal, India and Pakistan, 13 from Germany and 12 from China. The training was an opportunity for students to advance their current research on the Third Pole region by increasing their scientific writing and statistical analysis skills, and advancing their knowledge of glaciology, isotope hydrology, slope stability and landslides, and atmospheric circulation. During a field excursion to Kali

Gandaki Valley, lectures on geology, geomorphology, biology and glaciology were given and participants presented on their individual research during evening seminars.

The TPE training course & TiP summer school was a huge success and an indicator of TPE's ability to provide quality, effective trainings for young scientists. Participants were able to share knowledge and experience amongst themselves and learn from top scientists in the field. The opportunity also opened the door for new friendships and future cooperation amongst Third Pole scientists. More information is available on the TPE website (www.tpe.ac.cn/training), including links to presentations and photos.



ITP establishes cooperation with University of Arizona

A cooperation agreement was signed on October 27, 2011, between ITP director Prof. YAO Tandong and Prof. Karl W. Flessa, head of the Department of Geosciences, University of Arizona. A brief introduction of the University of Arizona faculty and their research interests was presented by Prof. Flessa, which was followed by the signing of the agreement for collaborative academic research.

Associate Prof. Paul Kapp was invited to report his study, "Wind erosion in the Qaidam

basin: implications for tectonics, paleoclimate and the source of the loess plateau", which shed light on the formation of wind erosion landforms such as yardangs in the Qaidam Basin, illustrating the relationship between wind erosion



and the transformation of Qaidam Basin tectonics.

Following the presentation, ITP staff conducted active exchanges with Dr. Kapp in area interested to both sides.

CAS Einstein Prof. Paul Tapponnier guests at Tibetan Plateau Science Forum

As an internationally recognized geologist,



Prof. Paul Tapponnier currently working at Earth Observatory of Singapore was invited to ITP by Prof DING Lin and presented an academic report entitled, “Discovering the surface rupture of the Mw=8.1, 1934, Bihar Nepal earthquake”, at the 2nd session of the Tibetan Plateau Science Forum. As a member of the French Académie des sciences, foreign member of the United States National Academy of Sciences, and winner of the 2010 Chinese Academy of Sciences Einstein Professor, he has extensive experience and insight to share with ITP.

ITP staff attend 1st Pamir-Tianshan Geology and Eco-environment conference

On occasion of the Third Shanghai Cooperation Organization, the 1st Pamir-Tianshan Geology



and Eco-environment Conference was held in Dushanbe, Tajikistan, during November 17-18, 2011. ITP Profs. DING Lin and HE Jiankun attended the conference, presenting the formation of the Tajikistan basin from the geo-tectonics perspective, and preliminary results from a new GPS network surrounding the Pamir Plateau, respectively.

ITP staff reinforced academic ties and established new cooperation by communicating with participants from Russia and from central Asian countries such as Kyrgyzstan, Kazakhstan and Tajikistan.

Visits and Academic Exchanges

Jeffrey Freymueller, University of Alaska

Prof. Jeffrey T. Freymueller of the University of Alaska-Fairbanks visited ITP on November 22, 2011.

As an accomplished solid earth scientist, Prof. Freymueller shared his



latest research with ITP staff, including a presentation titled “Separating hydrologic, cryospheric and tectonic deformation: Examples from Alaska and the Tibetan Plateau”. Taking examples from Alaskan ice field and the Tibetan Plateau, he presented the latest progress in GPS measurement of crustal



movement and discussed the diverse impacts of water, cryosphere and tectonic activities on crustal movement.

Alan Gillespie, Quaternary Research

Dr. Alan Gillespie, editor of Quaternary Research,



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visited ITP on September 11, 2011, and presented a talk entitled “Glaciation at the three corners of the Tibetan Plateau (Xizang, Qinghai and Gansu)”. Revolving around the growth of the quaternary glaciation in the Tibetan Plateau and its surroundings, Dr. Gillespie’s report emphasized on the influence of precipitation variability on paleo-glacier growth.

Robert Spicer, British Open University

Prof. Robert Spicer of British Open University was invited to ITP to conduct academic exchanges in mid-October, 2011. He presented a talk entitled “When did the Tibetan Plateau attain its present elevation”, and updated the status of international studies related to the history of Tibetan Plateau uplift using different proxies. During his talk, he elaborated on how Plateau elevations through time can be obtained from phytoliths. He also discussed the emergence of the Indian monsoon based on the latest studies from Assam, India.

An Yin, University of California, Los Angeles

On September 30, 2011, Prof. An Yin of University of California, Los Angeles, presented an academic report titled “Lithospheric Structures and formation mechanisms of the Tibetan Plateau”. His report focused on the formation mechanism of the lithospheric belt extending from the southern Tibetan Plateau to the Long Men Shan tectonic zone overpassing the Himalayan orogenic belt at its eastern edge. Further cooperation related to



Tibetan Plateau geology and tectonics will be forthcoming.

Andre Berger, Universite Catholique de Louvain

Invited by Prof. FANG Xiaomin, Prof. Andre Berger of Universite Catholique de Louvain visited ITP on August 28, 2011. During his visit, Prof. Berger shared his latest understanding of paleo-astronomy and paleo-climate with a talk entitled “Does MIS-13 challenge the astronomical theory?” He is well known for his research on the astronomical theory of paleoclimate (Milankovitch theory). His insights will aid in further exploration of the role and mechanisms of Tibetan Plateau uplift and its relation to global climate change.



Yun Qian, Pacific Northwest National Laboratory

Dr. Yun Qian of the Pacific Northwest National Laboratory visited ITP in mid-November, 2011, and presented an academic report on “Sensitivity studies on the impacts of Tibetan Plateau snowpack pollution on the Asian hydrologic cycle and monsoon climate”.

He introduced his topic by first presenting basic features of the atmospheric pollutants (esp. black carbon). Model calculations were integrated in the comparative study with in situ observations to lay the foundation for further modeling of greenhouse gases, black carbon and dust variations and their impacts on seasonal distribution of snowmelt on the Tibetan Plateau and on the Asian monsoon.

LABORATORIES AND TIBETAN OBSERVATION AND RESEARCH PLATFORM (TORP) Activities

Deliang Chen, former Executive Director of ICSU, visits QOMORS



To explore future collaborations, Dr. Deliang Chen, professor at Goeteborgs Universitet, Sweden, and then Executive Director of the International Council of Scientific Unions (ICSU), visited QOMORS on August 5, 2011.

He was welcomed by Drs. ZHOU Xiaoping and WANG Zhongyan, who introduced him to the operation of the field station and in situ monitoring capabilities. The QOMORS station was established in 2005.

Impressed by the endurance of ITP staff despite the hardships associated with remote field conditions, Prof. Chen offered some suggestions

for improved maintenance and operation of the field station. He also hoped to further cooperate with ITP staff in the future.

NAMORS actively involved in the Sixth Namco International Walking Campaign

The Sixth Namco International Walking was held on September 8, 2011 in Namco. The event was jointly organized by NAMORS, Tibet Tourism Bureau and Damxung County People's Government. NAMORS is mainly responsible for the science popularization of this event.

As the education base of science popularization, software and hardware facilities, NAMORS has already held a number of successful science popularization activities and made a huge contribution to broadening local students' field of vision, improving scientific literacy and practical ability. In the future, NAMORS will explore more ways to serve for science popularization in remote regions using current, relevant scientific research.





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