The 2nd CEOP Annual Meeting, Geneva, Switzerland, 15 – 17 September 2008

Presentation Abstracts (12 September 2008)

Oral presentations

Regional Hydroclimate Projects Session: LBA (Monday 15 September; 1100 – 1120)
The Large Scale Biosphere-Atmosphere Experiment in Amazonia (LBA)
Luiz Horta, Alessandro Araujo

The Large Scale Biosphere-Atmosphere Experiment in Amazonia (LBA): background, objectives, data contributions, recent scientific achievements, contributions to GEWEX and WCRP goals, issues and future plans.

Regional Hydroclimate Projects Session: MAHASRI (Monday 15 September; 1140 – 1200)
MAHASRI
Jun Matsumoto

Current status of Monsoon Asian Hydro-Atmosphere Scientific Research and Prediction Initiative (MAHASRI) will be reported. As for the observation system, Radar-profiler network, high density rain-gauge networks have been developed in Southeast Asia. Surface and upper air observations over Tibet and Mongolia have been also developed. The improvement of flood forecasting using these data has been tested. A new coordinating project AMY (Asian Monsoon Years 2007-2012) has been started. The coordinated intensive observations in the tears 2008-2009 are just now in progress. Research activities related with the WCRP Pan-Monsoon activity will be promoted by utilizing AMY IOP data and coordinated modelling activities. Collaboration with IGBP/iLEAPS, ESSP/MAIRS will also be promoted. Social applications under the JICA and other international aiding projects will also be enhanced.

Regional Hydroclimate Projects Session: BALTEX (Monday 15 September; 1200 – 1220)
BALTEX – The Baltic Sea Experiment: Background and Status 2007-2008
Marcus Reckermann, Hans-Jörg Isemer

Background. BALTEX Phase I (1993-2002) emphasised on describing the water and energy cycle involving the atmosphere, the land surface, rivers and lakes, the Baltic Sea and sea ice. Among the major accomplishments of Phase I have been the improvement of measuring and data infrastructure and the establishment of coupled atmosphere-land-sea-ice numerical models able to simulate past and future climate in the Baltic Sea basin.

BALTEX Phase II (2003-2012) exceeds the scope of BALTEX to more applied and environmental research areas. 4 scientific and 2 overarching society-relevant objectives form the backbone of BALTEX Phase II:

- Water and energy cycles
- Climate change and extreme events
- Improving tools for water management
- Air and water quality
- Involvement of stakeholders and decision makers
- Education and outreach

The vision is to create a common platform for scientists from all environmental disciplines, striving towards an integrative description of the Baltic Sea basin, including a retrospective modelling of the past and the simulation of the Baltic Sea basin environment in the future.

Status 2007-2008. An overview is given over activities and achievements within the BALTEX programme during the past year, as well as an outlook to coming activities. A major achievement is the publication of the BACC book (see poster). BACC is a comprehensive literature review on past and future climate change and its impacts in the Baltic Sea drainage basin. Furthermore, BALTEX was successful in getting research funds from the EU funding scheme BONUS, and new BALTEX Working Groups (BWG on the Utility of Regional

Climate Models; BWG on BACC II) have commenced their work. Some of the BALTEX Phase II objectives (see above) are currently under review and will be modified for a more effective research in the remaining years of BALTEX. In the coming year, BALTEX will coordinate four major international events: 2 international scientific conferences, an international workshop, and a summer school.

For more information see www.baltex-research.eu.

Regional Hydroclimate Projects Session: NEESPI (Monday 15 September; 1400 – 1420)

Northern Eurasia Earth Science Partnership Initiative (NEESPI): **An overview of the current status**

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Four years ago NEESPI was launched with the release of its Science Plan (http://neespi.org). Gradually, the Initiative was joined by numerous international projects launched in EU, Russia, the United States, Canada, Japan, and China. Currently, serving as an umbrella for more than 125 individual research projects (always with an international participation) with a budget close to $15M annually, the Initiative is in full swing. In September 2006, NEESPI was granted the status of the IGBP External Project and in January 2007, NEESPI received a status of the GEWEX Regional Hydroclimate Project.

Several NEESPI Workshops and Sessions at the International Meetings were held during 2008 that strengthen the NEESPI grasp on biogeochemical cycle studies, climatic and hydrological modeling, and regional NEESPI components in the Arctic and Eastern Europe. Following the Aspen Global Change Institute Workshop (August, 2007), the NEESPI research focus has begun to shift from organizing improved environmental monitoring of the region and studying of individual environmental processes towards modeling and its ability to project the future state of climate, environment, and societies in the NEESPI domain. In April 2008, this focus, received an intergovernmental level of support being included in a Memorandum of Understanding for Collaboration in the Fields of Meteorology, Hydrology, and Oceanography between the U.S. National Oceanic and Atmospheric Administration and the Russian Federal Service for Hydrometeorology and Environmental Monitoring.

Special session on CEOP-High Elevations (Monday 15 September; 1515 – 1520)

Current status and perspective of HE initiative

Tartari G.[1,2], E. Vuillermoz[1], B. Schommer[1], E. Manfredi[1].
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The CEOP-HE initiative is an element of regional focus established in the GEWEX/CEOP framework which intents to contribute to global climate and water cycles studies by furthering knowledge on physical and dynamic processes at high elevations. In particular, the goal of HE is to study multi-scale variability in energy and water cycles in high elevation areas, while improving observation, modeling and data management. In particular, HE aims to improve overall long-term monitoring of meteo-climate parameters in high elevation areas to further knowledge on climate change impacts, understand the impacts of aerosols on the water cycle at high elevations, and improve the hydro-climate forecasting capabilities at high elevations.

To reach these objectives, HE intends to promote coordinated mechanisms to favor the sharing of high-quality hydrological and meteo-climatic datasets through development of a global network of high altitude monitoring stations. The CEOP Reference Sites located in Tibet, Himalaya and Karakorum will constitute the foundations of the network, followed by inclusion of existing non-CEOP stations. Installation of new observatories in significant but unrepresented areas will also subsequently be encouraged. HE will develop QA/QC protocols for installation and maintenance of HE sites to guarantee harmonization of data in accordance with CEOP data policy.

At present, the HE working group has concentrated on elaboration of the HE Science Plan which is being developed with contributions from the HE Steering Committee. The Science Plan will describe the scientific rationale and methods for the achievement of HE's objectives in line with the goals of CEOP.

Special session on CEOP-High Elevations (Monday 15 September; 1525 – 1540)

The CEOP-HE Scientific Rationale and Regional Water and Energy Cycle Research

Kenichi Ueno, CEOP-HE Scientific Coordinator
University of Tsukuba, Japan

Large scale mountain ranges and high-elevation (HE) areas have function to pump up water vapor from the lower troposphere, accumulate the surface water as seasonal snow cover or glaciers, and drain them by major river channels. Re-distribution processes with time-lag in the borderless water and energy cycle (WEC) around mountains strongly characterize regional climate variability and impact on human society. To deal effectively with recent concerning of environment changes in high-elevations, an international framework is strongly required for establishing observation network and conducting comprehensive data analysis under GEWEX/CEOP. Through making the CEOP-HE implementation plans, following aspects have been recognized as common processes to reveal in the HE, such as assessment of the impacts by global change, land-atmosphere interactions over the mountain system, transportation processes of water vapor and trace gases/aerosol monitoring, impacts to extreme weather and regional climate, and assessments of glacier mass-balance changes affecting the water resources of lower elevations. At the same time, regional issues are proposed from six representative areas, such as Tibet/Himalayas, Central Asia, North American Mountains, South American Andes Cordillera, European Alps, and African Mountains. CEOP-HE has been initiated by aggregating such various issues for the brain storming among steering member. In the presentation, prospects of the scientific rationale for mountains and high-elevation areas are introduced based on my experiences of the Tibet/Himalaya studies. Especially, recognition of two different view points, such as up-scaling and down-scaling, are very important to overcome the gap of understanding between continental scale WEC and basin scale WEC over the complex terrains.

Special session on CEOP-High Elevations (Monday 15 September; 1540 – 1550)

Reference stations for the High Elevations (HE) network

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Better comprehension of physical and dynamic processes in high altitude areas is one of the main aims of the CEOP-HE initiative. In this framework, collection of representative data becomes a key element and establishing mechanisms for coordination amongst high altitude stations is essential to the definition of an HE network.

In selecting stations which can be considered HE reference stations, we must consider: elevation and topographic setting; available instrumentation; duration, calibration and maintenance protocols, homogeneity and completeness of data, and regional coverage. Another important characteristic would be the ability of the station to sample the free troposphere. Out of the possible classifications: HE Weather Stations (AWS or synoptic stations); HE Observatories (full-scale scientific observatories), and HE Research Stations (AWSs operational for a limited period of time), HE reference stations should generally belong to “HE Observatories” category. In this way high quality data and long term continuous measurements would be guaranteed. Finally, these stations should be equipped with high precision sensors and real-time data transmission systems.

The current CEOP network is made up of 51 sites where various measurements are performed, including: surface meteorology and radiation, heat and CO_2 fluxes, soil temperature and soil moisture and data from meteorological towers. Three of these sites are high elevation sites, located on the Tibetan plateau and in the Himalaya and Karakorum mountain ranges. The CAMP Himalayas (Pyramid, Pheriche, Namche and Lukla) and Pakistan Karakorum Network (Askole and Urdukas) are managed by the Ev-K2-CNR Committee, the organization at the head of the CEOP-HE working group and creators of the SHARE (Stations at High Altitude for Research on the Environment) Project.

SHARE operates in the mountain regions of Europe, Asia, Africa with perspectives of expansion to other areas (e.g., South America). Within this network environmental monitoring is carried out in high altitude areas in the fields of Environmental and Earth Sciences (atmosphere and climate changes, glaciology, hydrology and limnology in high altitude areas, geophysics and natural hazards). The important but otherwise unobtainable data collected at high altitudes within the SHARE framework contributes information to several

international climate-environmental monitoring programs besides GEWEX-CEOP, such as: UNEP-ABC, WMO-GAW, WCRP- NASA-AERONET, ILTER , EUSAAR, ACCENT.

Special session on CEOP-High Elevations (Monday 15 September; 1550 – 1555)

The Proposed CEOP-HE Implementation Strategy

Tartari G.[1,2], E. Vuillermoz [1], B. Schommer [1], E. Manfredi [1]
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In order to ensure successful achievement of its objective of studying water end energy cycles in high elevation areas, the HE Working Group has identified the key elements of an implementation strategy. Although the main focus of HE to date has been development of an integrated Science Plan, the Steering Committee has also been assessing the research actions, coordination mechanisms, the links to other CEOP subgroups, and the need for effective internal and external coordination which make up the foundation of such a strategy.

Most importantly, the work of the HE group will need to correspond to the overall strategic objectives and implementation plan of GEWEX and CEOP. HE research will also foresee collaboration with CEOP elements, including Regional Hydroclimate Projects (MAHASRI, CPPA), other Regional Studies (Cold Region Studies, Monsoons, SARS) and Cross-Cutting working groups (WEBS, Extremes, Aerosol). Such collaboration will especially regard elements that directly influence (monsoon circulation, aerosols) or characterize HE areas (arid conditions, cold temperatures, etc.). CEOP case studies which are representative of HE areas, such as Western American Mountains, will also be taken into account. Joint activities will be undertaken with the Model Studies group as well.

As HE intends to develop a global high altitude network, selection of sites will take into account CEOP standards and data parameters (CEOP data policy). The production of integrated meteo-climate and hydrology datasets will follow precise QA/QC protocols drawn up within the HE initiative. All of this will aim ultimately towards the development of a coordinated global approach to data collection at high elevations and will promote the execution of consolidated and coordinated studies. The creation of a critical mass within the international scientific community of researchers interested in the study of water and energy cycles at high elevation will be key to ensuring that the goals of CEOP-HE are met.

The HE initiative will be managed by the CEOP members, the Ev-K2-CNR Committee and a CEOP-HE Secretariat has been opened at their headquarters. CEOP-HE will benefit in particular from affiliation with Ev-K2-CNR's SHARE project, the only existing high altitude integrated environmental monitoring network within which two CEOP high elevation reference stations are already included.

The CEOP-HE Secretariat will also support the actions of the working group by coordinating efforts to investigate funding sources to maintain and expand the HE network and promote research activities. The Secretariat will also promote internal and external communication and dissemination, via the website www.ceop-he.org, through organization of meetings, scientific workshops and conferences, and through development of an HE newsletter.

Special Monsoon Session – Pan-WCRP (Monday 15 September; 1710 – 1725)

Pan-WCRP Monsoon Activities

Guoxiong Wu
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The climate system is a dissipative open system which experiences various forcing. In response to different types of external forcing, the climate system behaves differently, and the feedback between external forcing and circulation and the intricate interdependence of heat source, rain and winds make the monsoon system over the globe very complicated. However, subject to the thermal adaptation to these external forcing, in general the climate system presents as some certain patterns with deserts and monsoons occurring in specific areas over the world. It is demonstrated that due to land-sea distribution the continental-scale forcing is well organized: from west to east across each subtropical continent and its adjacent oceans in summer, the dominant forcing appears as a "LOSECOD" quadruplet- heating pattern: long-wave radiation cooling (LO)

over eastern coastal oceans, sensible heating (SE) over western continents, condensation heating (CO) over eastern continents, and double (D) dominant heating over western coastal oceans. Corresponding to this quadruplet heating the general feature of the subtropical climate is formed. Dry climate and desert appear over the western continents while wet climate and monsoon appear over the eastern continents.

It is also demonstrated that the uplifted heating of orography in summer generates a pronounced Rossby-wave type circulation with pole-ward flow and atmospheric ascent to the east and equator-ward flow and descent to the west. As a result, the observed regional climate pattern is formed under continental-scale forcing as well as local-scale forcing. The Tibetan Plateau (TP) is located over the eastern Eurasian continent. Atmospheric circulation forced due to the TP is in phase with that due to continental forcing. The strongest monsoon and the vastest deserts are therefore formed over the African- Eurasian Continent. Whereas the Rockies and Andes are located over the western continents, while the descending motion over the oceanic regions to the west of the North American and South American Continents are intensified remarkably, the ascending regions over the continents due to the orography forcing are separated from those due to continental forcing. The desert and monsoon climate over these continents are not as strong as over the Eurasian Continent.

Most of monsoon activities under the World Climate Research Programme (WCRP) were organized by the two key projects, the Climate Variability and Predictability (CLIVAR) and the Global Energy and Water Cycle Experiment (GEWEX). “In 2004 the Joint Scientific Committee (JSC) that provides scientific guidance to the WCRP requested an assessment of (1) WCRP monsoon related activities and (2) the range of available observations and analyses in monsoon regions. The purpose of the assessment is to (a) define the essential elements of a pan-WCRP monsoon modeling strategy, (b) the procedures for producing this strategy, and (c) the procedure for making any necessary improvements in monsoon observations and analyses with a view toward their adequacy, and addressing any undue redundancy or duplication. As such, the WCRP sponsored the ‘1st Pan-WCRP Workshop on Monsoon Climate Systems: Toward Better Prediction of the Monsoons’ at the University of California, Irvine, CA, USA from 15-17 June 2005. Experts gathered to assess the current understanding of the fundamental physical processes governing monsoon variability and to highlight outstanding problems in simulating the monsoon that can be tackled through enhanced cooperation between CLIVAR and GEWEX”. (Sperber and Yasunari: The 1st Pan-WCRP Workshop on Monsoon Climate Systems: Toward Better Prediction of the Monsoons)

After the First Pan WCRP Monsoon workshop, a large number of national and multi- national monsoon program and activity have been organized. In 2005 WCRP commenced her future ten- year strategy “Coordinated Observation and Prediction of the Earth System (COPES)”. To coordinate and integrate the numerous individual efforts in monsoon study, the 28th JSC/WCRP held in Zanzibar, Tanzania from 26-30 March 2007 endorsed the WCRP crosscutting Monsoon Initiative. The JSC commented that the monsoon crosscut should include all the monsoon groups with a broader perspective, led by CLIVAR and GEWEX with participation of SPARC, CliC and WGNE and several activities outside WCRP (particularly THORPEX). The JSC requested CLIVAR and GEWEX to agree on how it will be supervised and the development of an implementation plan. The proposals for and concepts of an Asian Monsoon Year and an International Year of Tropical Convection should be considered as components of an International Monsoon Study (IMS) 2007-2011, a 5-year strategy of WCRP monsoon research, which would include issues related to the East African Monsoon, capacity building and application of observations and predictions in monsoon regions for societal benefit. The JSC also asked GEWEX and CLIVAR to rationalize the number of monsoon committees.

Following from the JSC-28 decision to establish a WCRP crosscut, a one-day meeting on international monsoon research in conjunction with the AMY Workshop was organised in Bali in September 2007. The meeting came up with several goals for the IMS. The workshop also identified the need for an IMS scoping group under the JSC with potential membership from the JSC Monsoon Oversight Group, from CLIVAR/GEWEX Monsoon Panels and WGs, CEOP, THORPEX (YOTC), MAIRS and other regional monsoon projects, WMO monsoon study committee, and including IPO directors of CLIVAR and GEWEX.

The Monsoon cross cut issue was further discussed in the JSC-29, which was held in Arcachon, France from 31 March to 4 April 2008. It was stressed that with the many diverse activities in several regions, some of them ongoing like VAMOS, AMMA and some planned, with the need to interact with projects outside WCRP such as YOTC/WWRP, it is important for JSC to agree on the main coordinating mechanism for WCRP monsoon research. To move forward the plans, a 2nd Pan-WCRP Monsoon Workshop was proposed in conjunction with the 4th WMO Monsoon Conference to be held in October 2008 in Beijing, China, including joint sessions, a meeting of the IMS Scoping Group, and the 4th AMY Workshop.

Special Monsoon Session - AMY (Monday 15 September; 1710 – 1725)

Asian Monsoon Year – AMY

Jun Matsumoto

A new coordinating project AMY (Asian Monsoon Years 2007-2012) has been planned and implemented jointly with MAHASRI, CLIVAR/AMMP, CLIVAR/IOP, and a number of projects in Japan, China, India, Malaysia. The coordinated intensive observations in the years 2008-2009 are just now in progress.

Special Monsoon Session - WAMME (Monday 15 September; 1740 – 1755)

The West African Monsoon Modeling and Evaluation project (WAMME) and its First Model Intercomparison Experiment

Yongkang Xue*, K-M Lau, Kerry H. Cook, David P. Rowell, Aaron Boone, Jinming Feng, Abdourahamane Konare, Tim Bruecher, Fernando De Sales, Paul Dirmeyer, Leonard M. Druyan, Andreas Fink, Matthew Fulakeza, Zhichang Guo, Samson M. Hagos, Kyu-Myong Kim, Akio Kitoh, Vadlamani Kumar, Patrick Lonergan, Massimiliano Pasqui, Isabelle Poccard-Leclercq, Natalie Mahowald, Wilfran Moufouma-Okia, Phillip Pegion, Ibrah Seidou Sanda, Jae K. Schemm, Siegfried D. Schubert, Andrea Sealy, Wassila M. Thiaw, Augustin Vintzileos, Edward K. Vizy, S. Williams, Man-Li C. Wu

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The West African Monsoon Modeling and Evaluation project (WAMME) project, a CEOP initiative in collaboration with the African Multidisciplinary Monsoon Analysis (AMMA), uses general circulation models (GCMs) and regional climate models (RCMs) to address issues regarding the West African monsoon (WAM) prediction at different scales and role of ocean-land-aerosol-atmosphere interactions on the WAM development. This paper presents the scientific challenge in WAM simulation and discusses WAMME initiative and its approaches to improve WAM simulations. Major scientific highlights from the first WAMME model comparison are the focus of the paper. Unlike most model comparisons, which consist of either GCMs or RCMs, WAMME consists of 11 GCMs and 7 RCMs. Based on the first WAMME experiment, the WAMME models' performance is evaluated with precipitation being the major focus. The analyses indicate that the models with specified SST generally have reasonable simulations of the mean spatial distribution of WAM precipitation, but more deficiencies in simulating seasonal WAM evolution and largely fail to produce proper daily precipitation frequency distributions. WAMME multi-model ensembles, however, produce excellent WAM precipitation spatial distribution, intensity, and temporal evolution, better than Reanalysis in many aspects. The GCMs produce smooth development of a monsoon season. The WAM onset jump feature, however, is only produced in RCMs and a high resolution GCM. In addition, the WAMME is the first project consisting of the most state-of-the-art GCMs and RCMs to collectively investigate the WAM/external forcing feedbacks. Cases based on the first WAMME experiment are presented to demonstrate scientific challenges for further investigation of interactions between WAM, SST, land, and aerosol. Case studies with SST, land, and aerosol forcing, all produce a dipole anomaly pattern, indicating that they affect WAM development. The study reveals that ensemble means produce weak correlation between SST and WAM precipitation. Furthermore, the study shows large discrepancies in producing the precipitation and surface evaporation relationship and the model results in the aerosol case also show discrepancies in responses to aerosol forcing, warranting more investigation on these issues. The analyses in this article provide a quantitative assessment on model uncertainty, identify main issues in WAM modeling, and provide a good starting point as benchmarks for future studies.

Special Extremes Session (Tuesday 16 September; 0920 – 0935)

The Extremes Focal Point within CEOP

Ronald Stewart

An important cross-cutting effort within CEOP is the focus on hydrometeorological extremes such as drought and heavy precipitation events. The overall aim of this activity is to better document, understand and model the occurrence and evolution of such extremes and to contribute to their better prediction at various temporal scales. Because of their importance, extremes are being considered within each of the RHPs and also within many of the other CEOP elements. Such activities are being brought together to gain the needed global perspective. This presentation will summarize our recent progress and identify future actions that will be followed in order to realize our collective objectives.

Isotopes (Tuesday 16 September; 1110 – 1130)

Activity report and planning of Isotope Cross Cut Studies (ICCS)

Kei Yoshimura (SIO/UCSD) and David Noone (CIRES/CU)

The purpose of the isotope cross cut studies (ICCS) includes modeling (both validation and assessment), process studies from in situ and remote sensed data, and moreover, integration with other CEOP Elements (CEs) by facilitating the utility of the stable water isotopes (HDO and $H_2{}^{18}O$) for further understanding of the processes.

A modeling research group called Stable Water Isotope Intercomparison Group (SWING) has been active, and the second phase of the intercomparison project (SWING2) is going to hold a meeting in November at IAEA head quarter in Vienna. By welcoming the new isotope implementations in climate models, the November meeting will focus on following objectives:

- Evaluate the capability of climate models to represent the spatial and temporal variability of water isotope composition in precipitation
- Spatially and temporally interpolate the GNIP (Global Network of Isotope in Precipitation, IEAE/WMO since 1960's) dataset by applying the nudging technique (Yoshimura et al., 2008) or something else.
- Deliver an optimal reconstruction of monthly gridded maps of water isotopes in precipitation, by merging simulations and observations
- Assess the uncertainties and confidence intervals of the above gridded data-set (for all approved methods)

The observation community had significant progress, too. Recent successes of remote sensed observation from satellites for vapor isotopes, particularly HDO, dramatically increased the number of observed data for isotopes. Zakharov et al. (2004) retrieved latitudinal climatology for column vapor HDO by using IMG on ADEOS, Worden et al., (2006) retrieved low level atmospheric vapor HDO over tropical region in fine temporal and spatial resolution by using TES on Aura, and Payne et al. (2007) retrieved upper troposphere and stratosphere vapor HDO global distribution in monthly basis by MIPAS on Envisat. Furthermore, for in-situ equipment, TDL (tunable diode laser) has taken huge development to observe isotopic ratio of vapor flux. These data have brought great insight for understanding the basic distribution for isotopes and the physical process that drives the isotopes.

Delivering such remotely sensed observation as well as the interpolated data by using appropriate methods such as a data assimilation technique would enlighten new aspect for other CEs. The impact would be larger in the cases that they autonomously have isotopic observation (and such case is not too rare, as far as the author knows). Monsoon study is one of such synergetic examples, as seen in previous studies on the relationship between Monsoon activities and isotopic records in precipitation in Hoffmann and Heimann (1997), Yoshimura et al. (2003), and Sturm et al. (2007).

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Regional Models (Tuesday 16 September; 1150 – 1210)

The Inter-Continental Transferability Study (ICTS)

Burkhardt Rockel

The results from simulations of five regional climate models for the seven domains around the globe defined in the ICTS are now available through the CEOP model data archive (http://cera-www.dkrz.de/CERA/index.html). The data consist of MOLTS in 3 hourly temporal resolution and daily values for gridded data.

Z. Kodhavala (University of Quebec) compared MOLTS data of ICTS regional model results with CEOP reference sites observations. He started to write a publication on the results. He also prepares an ICTS diagnostics web page. It includes high-quality figures of all the ICTS MOLTS output compared to different types of observations. In a later stage it is planned to make it available through the ICTS homepage.

D. Paquin (Ouranos) has looked at a mini-ensemble of ICTS runs for the large Asia/Himalaya domain. In addition to the requested simulations over 7 domains, supplementary simulations with the CRCM over the GAME domain (Asia) were generated with the aim of estimating the internal variability of the model. This estimation is needed to assess how much of the inter-model variance observed in this domain can be explained simply by model internal variability (sensitivity to initial conditions), rather than model configuration differences.

Two different configurations were used: a) the standard configuration of the model that includes spectral nudging of the horizontal wind in the higher levels of the atmosphere, and b) a configuration without spectral nudging. Each configuration was run twice with different initial dates (twin simulations).

The internal variability responses of the two configurations are evaluated for temperature and precipitation over observation points. Time series and diurnal cycle are studied. Results show that at some locations internal variability for simulations without spectral nudging can be as large as are the differences between different model configurations or other models.

I. Meinke, J. Roads, and M. Kanamitsu (ECPC) compared gridded observations of the Global Precipitation Climatology Project (GPCP) and the Global Precipitation Climatology Center (GPCC), as well as CEOP reference site precipitation observations with the RSM simulated precipitation for the first half of the CEOP Enhanced Observation Period (EOP) III (October 2002 to March 2003). Although the RSM is able to accurately simulate the seasonal evolution and spatial distribution of precipitation, the RSM has an almost uniform positive bias (i.e., RSM values are greater than observed values) over almost all the domains. Most of the positive bias is associated with convection in the Intertropical Convergence Zone (ITCZ) or monsoonal convection in Southeast Asia. Predicted stratiform precipitation is also excessive over areas of elevated topography. The precipitation simulation was significantly improved for almost all domains when using either the KF scheme or the SAS scheme.

B. Rockel and B. Geyer (GKSS) performed similar comparison as I. Meinke et al. but with the regional climate model CLM. As expected, the quality of the simulations for temperate and continental climates is similar to those over Europe. Tropical climates, however, display systematic differences with a land-sea contrast. Here, precipitation is overestimated over warm oceans and underestimated over land. Another similarity in all regions is the positive bias in precipitation occurring over high and narrow mountain ranges that stand perpendicular to the main wind direction. In these cases, the CLM produces higher precipitation values than those given in the Global Precipitation Climatology Project (GPCP) data set. A comparison to three other regional climate models indicates that the findings are not CLM-specific. It also stresses the major role of the convection scheme in tropical regions. The study confirms the assumption that in order to gain optimal results, one standard model setup is not appropriate for all climate zones.

Regarding the next phase of ICTS advantage should be taken in form of cooperation from other projects where also regional climate models are transferred to different regions on the globe.

Satellite Data – JAXA contribution (Tuesday 16 September; 1415 – 1430)

Production of CEOP satellite dataset by JAXA

Kazuo Umezawa

Japan Aerospace Exploration Agency

The Coordinated Energy and Water Cycle Observation Project (CEOP) has been developing water-cycle datasets integrating various satellite data, in-situ observation data, and multi-dimensional model simulation results. It should be noted that the goals of producing the CEOP data set consisting of in situ, satellite, and model output data require a significant effort to compile the data in such a manner that they are both easily accessible and can be used by the scientific community with a minimum amount of extra data formatting and

handling by individual research scientists. Therefore, the coordination effort itself will lead to a data set that is greater than the sum of its parts.

For this goal, the Japanese Aerospace Exploration Agency (JAXA) has been producing and providing satellite datasets as a contribution to the CEOP activities since 2003. Satellite data will include Level 1B (radiances), Level 2 (geophysical parameters), and Level 3 (gridded/averaged) data associated with reference sites, Levels 2 and 3 for continental-scale experiments (CSE) regions, and Level 3 for global coverage from the new Earth-observing satellites, along with subsets of the Global Energy and Water Cycle Experiment (GEWEX) global cloud, surface radiation, precipitation, water vapor, and aerosol data sets.

The JAXA's satellite datasets dedicated to CEOP are geo-coded data resampled to a regular latitude-longitude grid on three scales: small scale (35 to 52 reference sites), large scale (five monsoon regions), and global scale (the entire area of the Earth). It is easy to compare satellite data with in-situ measurement and/or model output. Also, the satellite datasets include radiance data and geo-physical parameters such as soil moisture, vegetation index, water vapor, precipitation, and sea-surface temperature acquired by JAXA's spaceborne sensors including the Advanced Microwave Radiometer (AMSR), Global Imager (GLI) aboard the Advanced Earth-Observing Satellite–II (ADEOS-II), Precipitation Radar (PR), TRMM Microwave Imager (TMI) aboard the Tropical Rainfall Measuring Mission (TRMM) spacecraft, and the Advanced Microwave Radiometer for EOS (AMSR-E) aboard Aqua, as well as the US Special Sensor Microwave/Imager (SSM/I) aboard Defense Meteorological Satellite Program (DMSP) spacecraft.

Daichi (also called Advanced Land-Observing Satellite (ALOS)) sensor data was added in 2007. ALOS has three sensors: the Panchromatic Remote-sensing Instrument for Stereo Mapping (PRISM), which is comprised of three optical systems to measure precise land elevation; the Advanced Visible and Near Infrared Radiometer 2 (AVNIR-2), which observes land-surface cover; and the Phased-Array L-band Synthetic Aperture Radar (PALSAR), which enables day-and-night, all-weather land observation. The ALOS datasets associated with the reference sites have been path-mosaics instead of subsets because of the original small scene size and the large data volumes.

These datasets consist of raster image data and meta-data that describe observation conditions and processing conditions based on ISO standards. Metadata of satellite imagery is being standardized by several organizations such as ISO/TC211. Those metadata, however, do not meet all the requirements for integrating satellite imagery, in-situ observation data and 4D model simulation results collected in CEOP. For CEOP reference site data, no further data for geometric and radiometric correction need be included in the metadata because all satellite data are already geo-coded and radiometrically corrected, i.e. satellite image data are already converted to raster data. This means that the same metadata can be used for "data-finding" and "data integration" as far as CEOP reference site data are concerned.

At the conference, we will present the specifications of CEOP satellite datasets and some processing results. The status and schedule of processing will also be discussed.

Satellite Data – NASA contribution (Tuesday 16 September; 1430 – 1445)

The Status of Terra MODIS Data Products for the CEOP

Michael Teague

The MODAPS project at NASA/GSFC is ready to generate MODIS Terra data products for CEOP. The code for conversion from the hdfEOS format used for MODIS to the CEOP format is being generated by JAXA and has not been tested using MODIS products generated by MODAPS. The data products requested by CEOP for EOP-3 and -4 for the reference sites, the monsoon regions, and the global region constitute 13TB and there are concerns that this volume may be too large. MODAPS is suggesting that parameter sub-setting should be considered for the four largest data products. MODAPS will archive the geographically sub-setted products and the global products in the MODAPS LAADS system. MODAPS is suggesting modifications to the filenames and mosaicing the daily files for CEOP consideration. CEOP can access the products in LAADS by direct access at whatever rate can be sustained by the network and the University of Tokyo.

Data Session – Global Data Centers (Tuesday 16 September; 1600 – 1610)

The Global Precipitation Climatology Centre (GPCC)
- A contribution to climate monitoring and research in context of GCOS and WCRP

Tobias Fuchs and U. Schneider
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Summary
The Global Precipitation Climatology Centre (GPCC) provides global monthly precipitation analyses for monitoring and research of the earth's climate. The centre is a German contribution to the World Climate Research Programme (WCRP), to the Global Climate Observing System (GCOS), and to the Global Earth Observation System of Systems (GEOSS). Its products are gridded data sets of monthly precipitation on the earth's land surface derived from raingauge based observation data. Intensive quality control of observation data and station metadata ensures a high analysis quality.

The 4 different GPCC products are adjusted to different user needs. GPCC routinely produces 2 near real-time precipitation monitoring products. 2 non real-time GPCC products are updated at irregular time intervals after significant updates of its full database, which is the largest monthly precipitation station database of the world. GPCC recently published a new global precipitation climatology as well as a reanalysis of its full data base for all months of the period 1901-2007. It contributes to water resources assessments, flood and drought monitoring, climate variability and trend analyses. All GPCC products can be visualised and accessed free of charge via Internet from **http://gpcc.dwd.de**.

The **GPCC First Guess Product** of the monthly precipitation anomaly is based on synoptic weather reports (SYNOP) from about 6,000 stations worldwide received near real-time via the WMO Global Telecommunication System (GTS). The product is available within 5 days after end of an observation month. Main application purpose is near real-time drought monitoring. The product uses since mid 2008 the new GPCC monthly precipitation climatology as analysis background. Spatial product resolution: 1.0° and 2.5°.

The **GPCC Monitoring Product** of monthly precipitation is based on SYNOP and monthly CLIMAT reports received near real-time via GTS from about 7,500 stations. It is available within about 2 months after end of an observation month. The analyses are based on automatic and manual quality-control (QC) of input data and related station metadata. The GPCC Monitoring Product is the *in situ* component to the satellite-raingauge combined precipitation analyses of GPCP and CMAP. It also supports regional climate monitoring in context of WMO RA VI and EUMETNET. The product uses since mid 2008 the new GPCC monthly precipitation climatology as analysis background. Spatial product resolution: 1.0° and 2.5°.

The **GPCC Full Data Reanalysis Product** is of higher accuracy compared to the GPCC near-realtime products mentioned above. Thus its application is recommended for hydrometeorological model verification and water cycle studies. This analysis product is based on all stations, near real-time and non real-time, in GPCC's data base with precipitation data for the individual month. Until end of September 2008 Version 4 of this product will be ready based on a significantly enlarged database, which enables GPCC to extend the analysis period to 1901-2007. The product uses since mid 2008 the new GPCC monthly precipitation climatology as analysis background. Spatial product resolution: 0.5°, 1.0° and 2.5°.

The **GPCC 50-Year Dataset VASClimO** is based on data being selected with respect to a (mostly) complete temporal data coverage and homogeneity of the time-series. These long-term climatological analyses of homogenised area-averaged precipitation time-series are of special interest for GCOS and contributed to the IPCC Fourth Assessment Report. VASClimO Version 2 will be ready at the begin of year 2009 based on a significantly enlarged database, which enables GPCC to extend the product analysis period to 1951-2005. Spatial product resolution: 0.5°, 1.0° and 2.5°.

Since May 2008 a new **GPCC global monthly precipitation climatology** is available, based on data from more than 50,000 different stations worldwide with at least 10 years of data. Data sources are the normals collected by WMO, normals delivered by the countries to the GPCC, and normals calculated from data time-series available in the GPCC database. The new climatology enabled GPCC to change its analysis method now using the climatology as background for its near real-time and non real-time precipitation analyses. This further improves the representation of orography in areas with poor station density. Spatial product resolution: 0.25°, 0.5°, 1.0° and 2.5°.

GPCC activities for the next 1-3 years will comprise continuous updating of its monthly *in situ* database based on data acquisition activities related to the quality needs of the different GPCC products. Processing and quality control activities are continuously done after reception of additional national data. Based on the enlarged GPCC data base a new version of the VASClimO Climatology (Version 2) is in preparation, planned to be available until end of year 2008. The GPCC products are operationally visualised and provided on the GPCC website. This activity will comprise a significant update of the GPCC Visualiser (http://orias.dwd.de/GPCC/GPCC_Visualizer). A GPCC reference publication to be published in a peer reviewed journal is in preparation. This is expected to further enlarge the user community of GPCC products.

Plans for future research activities include testing of the applicability of the GPCC products for operational monitoring of precipitation extremes leading to flooding and drought. This will be done under umbrella of UNESCO FRIEND in joint research activities with the German hosted Global Runoff Data Center (GRDC). Additionally a new global daily precipitation product covering the whole surface of the earth is planned to be developed based on a combination of GPCC *in situ* based precipitation analyses for the land surface with high quality satellite based microwave precipitation analysis products for the ocean surface from the Hamburg Ocean Atmosphere Parameter System (HOAPS, http://www.hoaps.org), which are operationally processed by the EUMETSAT Climate Monitoring Satellite Application Facility (CM-SAF) hosted at DWD. Further down the road is the climatological exploitation of hourly regional and national precipitation products (like the RADOLAN products of DWD) using weather radar based quantitative precipitation estimates online adjusted with measurements from automatic weather stations.

All CEOP Elements are invited to consider using GPCC products and to contribute to further improvements of the GPCC database and analysis products. Specifically the RHPs might consider a closer cooperation with GPCC (concerning data provision to GPCC as well as concerning use of GPCC analyses). Synergies might also be possible with activities in context of HAP and EXTREMES. The model initiatives might consider using GPCC precipitation products for validation purposes. The links to CEOP data management and the interaction with GPCC might be enhanced, esp. in relation to the CEOP DM *in situ* activities.

Data Session – Global Data Centers (Tuesday 16 September; 1610 – 1620)

The Global Runoff Data Centre (GRDC) - in support of Global Change Research and Integrated Water Resources Management

Ulrich Looser
GRDC, Federal Institute of Hydrology,

Introduction

The Global Runoff Data Centre (GRDC) was established in 1988 at the Federal Institute of Hydrology (BfG) under the auspices of the World Meteorological Organization (WMO). It is a contribution of the Federal Republic of Germany to the World Climate Programme Water (WCP-Water) of the WMO.

Objectives:

The main objective of the GRDC is the world-wide acquisition, storage and dissemination of historical and near real-time river discharge data in support of the predominantly water and climate related programmes and projects of the United Nations (UN), their specialised agencies and the scientific research community.
Cooperation with and consulting of international organisations, other world data centres as well as foreign institutions in the fields of hydrology, water resources as well as data management and data acquisition. This includes active participation in a number of national and international working groups, steering committees and panels.

Data acquisition strategies:

GRDC data acquisition is supported by WMO resolutions on the free and unrestricted exchange of Hydrometeorological data. Data acquisition is not institutionalised and is mainly opportunity driven, as the cooperation with the GRDC is based on voluntary participation.

GRDC Main Database:

In mid-2008 the GRDC database holds world-wide discharge data of 7,332 stations in 156 countries featuring around 276,000 station-years of monthly and daily values with an average time-series length of 37,7 years.

GRDC databases in support of special projects and programmes:

The GRDC maintains the following specialized databases:

- Arctic Runoff Database (ARDB) containing data from over 2400 stations specifically for the arctic research community associated with the WCRP ACSYS and CLiC Programmes
- European Terrestrial Network for River Discharge (ETN-R) database for near-real time data, a GRDC contribution towards the European Flood Alert System (EFAS) under development by the EU Joint Research Centre
- European Water Archive (EWA) in support of the European Flow Regimes from International Experimental and Network Data (European-FRIEND) research community
- Global Terrestrial Network for River Discharge (GTN-R) database for near-real time data, a contribution towards the Implementation Plan for the Global Observing System for Climate and to GTN-H

The Global Terrestrial Network for River Discharge (GTN-R)
The Global Runoff Data Centre (GRDC) has been tasked with the implementation of the GTN-R to address the growing need for a global runoff network monitoring freshwater surface water fluxes in near real-time. This network directly supports the Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC (GCOS-IP), the GTN-H and further initiatives in the field of climate and hydrological research and monitoring.
Unfortunately only limited progress was achieved with this GCOS Baseline River Discharge Network. Currently near real-time hydrological data are received from 12 stations in 3 countries. 10 countries provided historical discharge data for 103 stations. The original objective was to include 380 stations from 81 countries, but only a quarter of the approached countries responded to the request to participate.

New initiatives to strengthen the GTN-R
Countries hosting identified GTN-R stations will be approached again with assistance of the WMO to obtain and strengthen support for the GTN-R. The station selection will be finalised with the participating countries.
Cooperation with the HARON initiative is planned in a submission for project funding by the European Union.

GRDC growing concerns
Discharge data on the GRDC database is outdated for many parts of the world. Reluctance of many National Hydrological Services is experienced in submitting discharge data to the GRDC for various reasons.
The decline of hydrological networks and capacity to operate the networks might contribute to the decline in hydrological data provided to the GRDC.

Invitation to CEOP Elements
All CEOP Elements are invited to utilize the discharge data maintained in the GRDC database.
At the same time the GRDC is requesting CEOP Elements to actively support the delivery of discharge data to the GRDC.
The GRDC can best serve the research community, including GEWEX CEOP, with a comprehensive global up-to-date river discharge database for climate and hydrological studies.

Data Session – Data Integration (Tuesday 16 September; 1620 – 1640)
Development of Data Integration and Analysis System (DIAS)
Eiji Ikoma*, Masaki Yasukawa*, Hiroko Kinutani*, Toshihiro Nemoto** and Masaru Kitsuregawa**
**Earth Observation Data Integration and Fusion Research Initiative, the University of Tokyo, Japan*
***Institute of Industrial Science, the University of Tokyo, Japan*

1. Outline of DIAS System
We have been developing DIAS system since 2006 as part of the Earth Observation and Ocean Exploration System, which is one of five National Key Technologies defined by the 3rd Basic Program for Science and Technology of Japan. In this talk, we introduce the outline of DIAS and the system structure of DIAS core system.

2. Introduction of Data Upload, Meta-Data Registration, and Quality Control System
On DIAS core system, we are preparing lots of tools to manage huge, various kind of data. Data Upload system enables users to upload observation data on reference site with Web-Based Graphical User Interface.
Meta-Data Registration system can reduce the labor to input metadata by using our smart and helpful interface. Quality Control System also reduces the time for observers to check the quality of each data. We introduce these 3 Systems with User Interface.

3. Introduction of CEOP Satellite Data Gateway system
CEOP Satellite Data Gateway system provides CEOP satellite data to the public. We will report the outline of this system and introduce how to register, how to access and download these data.

4. Applications on DIAS System
On our system, lots of user applications are running using DIAS data. We will report following examples of Data Integration and Analysis:
1) Analysis of Bai-u front in the Japanese Islands
- Moisture flow analysis using a powered visualizer for three-dimensional data set
- Data integration between reanalysis data (NCEP) and satellite data (AIRS)
2) Climate model analysis
- Using extra-large volume IPCC climate model output and reanalysis data, an integrated analysis for the effect of global warming on Bai-u front in Japan has been carried out.

Poster presentations

The Use of Telematics for Data Monitoring at the LBA Scientific Sites
Luiz Horta, Alessandro Araujo

The telematics project developed by the LBA DIS (Data and Information Systems) uses computer and telemetry technologies to collect, store and disseminate data generated by Data Collection Platforms (DCPs), improving performance of the operational work carried out by researches of the micrometeorology laboratory. This practice contributes to reducing logistic costs, increasing data quality and also reduces interruptions of DCP activities.

Ten years of operational boundary-layer measurements at the Richard – Aßmann Observatory Lindenberg (DWD)
Frank Beyrich, Claudia Heret, Sieghard H. Richter, Udo Rummel, Gerd Vogel, and Ulrich Weisensee
Deutscher Wetterdienst
Meteorologisches Observatorium Lindenberg / Richard – Aßmann Observatorium

The German Meteorological Service (DWD) performs a comprehensive operational measurement program at the Meteorological Observatory Lindenberg / Richard – Aßmann Observatory in order to characterise the physical status of the atmosphere and to provide a reference data set on the physical structure and processes in the atmosphere – the so-called “Lindenberg Column”. Boundary layer measurements form an essential part of the observatory’s activities, and a special boundary layer field site has been established in the 1990ies 5 km to the south of the observatory site (the so-called “Grenzschichtmessfeld” (GM) Falkenberg”). Measurements at this field site became operational in May, 1998. They comprise the full spectrum of standard meteorological measurements, in-situ profile measurements of wind, temperature and humidity at towers of 10m and 99m height, micrometeorological measurements (soil parameters, radiation, turbulent energy fluxes) close to the ground and the operation of a sodar-RASS system for temperature and wind profiling of the lower atmospheric boundary layer. Moreover, scintillometer measurements are performed to provide estimates of the sensible heat flux at different spatial scales. Additional boundary-layer measurement are performed at the MOL-RAO observatory site (wind profiler / RASS, lidar, microwave radiometer profiler, radiosoundings) and in a 20*20 km^2 area around Lindenberg - Falkenberg (network of rain gauges and radiation sensors, forest micrometeorological station).

The presentation will give an overview on the data available from the MOL-RAO boundary-layer measurement programme and on the QA/QC efforts. Some results will be presented from the analysis of ten years of measurements including the use of the data for the validation of boundary-layer parameterisations in meteorological models. Finally, selected topics of actual research and data analysis activities will be discussed.

BACC – BALTEX Assessment of Climate Change for the Baltic Sea basin
Marcus Reckermann, Hans-Jörg Isemer

The Baltic Sea drainage basin covers almost 20% of the European continent and spans different climate and population zones, from a temperate, highly populated and industrialized south with intensive agriculture to a boreal and rural north. The Baltic Sea itself is a major intracontinental shelf sea in northern Europe, and is among the most studied sea areas in the world.

The purpose of BACC (BALTEX Assessment of Climate Change for the Baltic Sea basin) is to provide the scientific community and the public with an assessment of ongoing and future climate change in the Baltic Sea region. This is done by reviewing published scientific knowledge about climate change in the Baltic Sea region. BACC offers an up-to-date overview over the most recent scientific findings in regional climate research in the Baltic Sea basin, including climate changes in the recent past, climate projections until 2100 using the most sophisticated regional climate models available, and an assessment of climate change impacts on terrestrial, freshwater and marine ecosystems. This overview is authored by a consortium of more than 80 scientists from 12 countries and will be published as a comprehensive text book.

The unique feature of BACC is the combination of evidence on climate change and related impacts on marine, freshwater and terrestrial ecosystems in the Baltic Sea basin (catchment and water body). It is the first systematic scientific effort for assessing climate change in the Baltic Sea region.

It is demonstrated that a warming is going on in the Baltic Sea region and it is considered plausible that this warming is at least partly related to anthropogenic factors. So far, and in the next few decades, the signal is limited to temperature and directly related variables, such as ice conditions. Later, changes in the water cycle are expected to become obvious. This regional warming will have a variety of effects on terrestrial and marine ecosystems – some predictable such as the changes in the phenology, others so far hardly predictable.

For more information see www.baltex-research.eu/BACC.

CEOP Reference sites/Basins
Steve Williams[1] and Katsunori Tamagawa[2]
[1]*Earth Observing Laboratory, The National Center for Atmospheric Research, Colorado, USA*
[2]*Earth Observation Data Integration and Fusion Research Initiative, The University of Tokyo, Tokyo, Japan*

The Coordinated Enhanced Observing Period (CEOP) was proposed in 1997 as an initial step for establishing an integrated observation system for the global water cycle. The CEOP has represented a unique opportunity to improve the scientific foundation needed to archive over all water-cycle documentation and preparation goals, based on coordination among the WCRP/GEWEX Continental Scale Experiments (CSEs). At first stage, CEOP has started with **35** reference sites and they were organized by the CSEs to cover the range of global climate variation.

The CEOP regenerated as a new CEOP (Coordinated Energy and Water Cycle Observations Project), and the new CEOP Reference sites has been enlarged up to **52** more diverse sites during the reorganizing phase of 2007. They also involve in the various CEOP Regional Hydroclimate Projects(RHPs), which are composed of AMMA, BALTEX, CPPA/GAPP, LBA, LPB, MAHASRI/CAMP, MDB, NEESPI and others. These Reference Sites provide enhanced observation datasets of sub-surface (soil profiles), surface (standard meteorological and radiation), near surface (flux tower), atmospheric profiles (rawinsonde and profiler), and ancillary data sets (radar, special observations) in a common format.

All the data from the CEOP Reference sites, the satellite and the NWP models are now archived and disseminated by the NCAR/EOL, in Boulder Colorado, in the USA.

Further details are available at: http://www.eol.ucar.edu/projects/ceop/dm/.

High Elevations (HE) working group: a new element of Regional Studies within the GEWEX/CEOP Projects

Gianni Tartari G.[1,2], Elisa Vuillermoz [1], Beth Schommer [1], Emanuela Manfredi [1]
[1] *Ev-K2-CNR Committee, Bergamo Italy,*
[2] *CNR–Water Research Institute (CNR-IRSA), Brugherio, Italy*

This poster provides an overview of the scope and objectives of the High Elevations working group recently implemented as an element of Regional Studies within the GEWEX/CEOP Projects. HE's goal is to study multi-scale variability in energy and water cycles in high elevation areas, while improving observation, modelling and data management. More specifically, coordinated mechanisms will be developed to facilitate the harmonization and exchange of data and expertise among researchers concerned with high elevations. Research will focus on the analysis of meteo-climate and hydrological conditions over time in high elevation areas to better comprehend the processes and mechanisms regulating the water and energy budget there. Local environmental responses to global climate change will also be evaluated, as will the impacts of natural and anthropogenic aerosols on the climate and hydrological cycle. Use of the resulting data to improve modeling and forecasting capacities will be promoted.

Since continuous measurements at high elevation sites are crucial for the proposed studies, data from existing high elevation CEOP Reference Sites (CRSs): *CAMP/Himalayas*, *CAMP/Tibet* and *Pakistan Karakorum Network,* will receive primary attention. Subsequently, a global HE network and database of observation stations, including but not limited to CRSs, will be created. The HE working group will make provisions for more homogeneous data and station management procedures and will encourage the establishment of CEOP-HE sites in poorly represented area.

The HE initiative will surely benefit from collaboration with the only existing international high altitude environmental monitoring network: SHARE, run by the Ev-K2-CNR Committee. The CRSs *CAMP/Himalayas* and *Pakistan Karakorum Network* are already an integral part of the SHARE network, which includes different operational sites in Asia (Himalayan-Karakorum region), Europe (Italian Alps and Apennines) and Africa (Uganda). The purpose of the SHARE project is to contribute to the study of climate change impacts and adaptation strategies, with special attention to water resources, biodiversity and ecosystem conservation and food security. The project also aims to make new and more complete information on climate changes and their local, regional and global consequences available to governments and international agencies.

CEOP-AEGIS: Coordinated Asia-European long-term Observing system of Qinghai – Tibet Plateau hydro-meteorological processes and the Asian-monsoon systEm with Ground satellite Image data and numerical Simulations

Jerome Colin

Human life and the entire ecosystem of South East Asia depend upon the monsoon climate, its linkage to major rivers and its predictability. The headwater areas of the Yellow River, Yangtze, Mekong, Salween, Irrawaddy, Brahmaputra and Ganges, are located in the Tibetan Plateau. However, estimates of the Plateau water balance rely on sparse and scarce observations that cannot provide the required accuracy, spatial density and temporal frequency. Integrated use of satellite and ground observations is necessary to support water resources management in SE Asia and to clarify the interactions between the land surface and the atmosphere over the Tibetan Plateau in the Asian monsoon system.

The goal of the CEOP-AEGIS project is two-fold: a) to construct out of existing ground measurements and current / future satellites an observing system to determine and monitor the water yield of the Plateau, i.e. how much water is finally going into the seven major rivers of SE Asia; this requires estimating snowfall, rainfall, evapotranspiration and changes in soil moisture; b) to monitor the evolution of snow, vegetation cover, surface wetness and surface fluxes and analyze the linkage with convective activity, (extreme) precipitation events and the Asian Monsoon; this aims at using monitoring of snow, vegetation and surface fluxes as a precursor of intense precipitation towards improving forecasts of extreme precipitations in SE Asia.

This project builds upon 10 years of experimental and modeling research and the project team includes many key-players and pioneers of this long term research initiative.
Three main elements are foreseen. A) Observations of the terms of the water balance: precipitation, meltwater from snow and glaciers, changes in soil water content and evaporation for a period of three years

will be generated by integrating ground and satellite measurements on weekly and monthly basis. Radiative transfer models and algorithms will be developed for different regions of the electro-magnetic spectrum. B) The water balance of the Plateau will be calculated with a distributed hydrological model. Interactions of land surface hydrology with convective activity and the Asian Monsoon will be investigated by using a meso-scale atmospheric model. C) The time-series of image data will be used to demonstrate a Drought and a Flood Early Warning Systems.

The project will deliver a prototype Water Balance Monitoring System and a three year data set including observations of the water balance terms on weekly and monthly basis. The system will rely on an existing and expanding network of observatories and on spaceborne observing systems for which data continuity is guaranteed. A Database Management System will be put in place in Lhasa and will remain in operation beyond project completion as an EC contribution to the GEOSS. These observations will contribute to clarify the role of Plateau hydrology in the onset and intensity of the Asian Monsoon and in intense precipitation. The time-series of hydrological satellite data products will be used to demonstrate an Early Warning system on droughts and one on floods.

CEOP-AEGIS is financed by the European Commission under the FP7 Cooperation ENV program and coordinated by the University Louis Pasteur, Strasbourg, France. The consortium involves 17 partners from 8 European and Asian countries.

Lean more at: www.ceop-aegis.or

HARIMAU
Manabu D. Yamanaka and his collaborators

The Hydrometeorological ARray for Isv-Monsoon AUtomonitoring (HARIMAU) is a 5-year project under the Japan EOS Promotion Program (JEPP) contributing to the Global Earth Observation System of Systems (GEOSS) starting from FY2005. A radar-profiler network for observing the world's most active convective activities over the Indonesian Maritime Continent (IMC) has been constructed. Rainfall and wind distributions are displayed in near real time on the internet (http://www.jamstec.go.jp/iorgc/harimau/ HARIMAU.html). Both scientific understanding and practical concepts on intraseasonal variations (ISVs) interacting with larger (seasonal and interannual) and smaller (diurnal or local) scale phenomena will be established. These are expected to contribute greatly and directly to climatic disaster prevention over the IMC and to global climate change assessment through studies on the global effects of the IMC-induced variations such as El Niño, and through construction of the first climatic database over the IMC. The HARIMAU data will also be valuable for MAHASRI, AMY and CEOP Monsoon Study to understand the multi-scale interacting system in Asian and Australian monsoons.

An overview of observation studies of semi-arid climate change over Northwest China
Jianping Huang[1], Mingxia Ji[1], Guoyin Wang[1], Xin Wang[1], Janrong Bi[1], Jing Xie[1], Xiaodan Guag[1], Yue Li[1], and Congbin Fu[2, 1]
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Arid and semi-arid areas comprise about 30% of earth surface. Changes in climate and climate variability will likely have a significant impact on these regions. Loess Plateau over Northwest China is a special semi-arid land surface and part of dust aerosol source. To improve understanding and capture the direct evident of the impact of human activity on semi-arid climate over Loess Plateau, the Semi-Arid Climate & Environment Observatory of Lanzhou University (SACOL) (http://climate.lzu.edu.cn) has been established since 2005. SACOL consists of a large set of instruments and focuses on: 1) monitoring of long term tendencies in semi-arid climate changes; 2) monitoring of the aerosol effect on water cycle; 3) studies of interaction between land surface and atmosphere; 4) improving the land surface and climate model; and 5) validation of space-borne observations. This study presents a description of SACOL objectives, measurements, and sampling strategies. 2-years observation results and some new finding are reviewed in this study.

New Information on Radiative Fluxes in Support of CEOP

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In support of the Coordinated Energy and Water Cycle Observations Project **(**CEOP) Concept of Transferability, methodologies for inferring Radiative Fluxes and related parameters were developed over regions of the GEWEX Continental Scale Experiments with a focus on the Asian and African Monsoons. Utilized were observations from several geostationary satellites such as Meteosat-5 and 7 and polar orbiting satellites such as (MODIS). The models used were modified to include detail treatment of aerosol effects and as such are well suited to address research issues related to aerosol-induced anomalous tropospheric warming above the Tibetan Plateau as well as the effects of African dust. Moreover, the derived radiative fluxes allow testing the transferability of hydrological models between different continental-scale regions, to predict water-related parameters. The impact of clouds on the energy and water cycles is quite powerful. Cloud observations are valuable for the various science and model development groups within CEOP and the community of potential future users. Under this project gridded satellite based cloud parameters are provided for the MOLTS reference sites.

Described will be what was done, information that is now available and given will be examples how the new information can be applied to address outstanding issues of interest to CEOP.

Validation of NASA's Modern Era Retrospective-analysis for Research and Applications (MERRA)

Michael Bosilovich
MERRA Validation Team, NASA GMAO

In late-2007, the Global Modeling and Assimilation Office (GMAO) conducted a validation of the GEOS5 data assimilation system, specifically considering the water and energy cycles in reanalyses. Here, we will present a summary of those findings including global and regional precipitation, TOA radiation fluxes, surface fluxes and temperature, and the general circulation. At monthly time scales, the global precipitation and TOA radiation fluxes show much better comparisons to observations than previous reanalyses. There are also many promising results apparent from regional hydrometeorological validation. The MERRA reanalysis should provide a significant source of data for future CEOP research. Production of MERRA began in early 2008, and the latest status and results will be presented.

Road map toward “Isotope Reanalysis”, data assimilation of vapor isotope with IsoGSM and LETKF

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Vapor isotopes have recently become observable in a spatially and temporally high resolution by a remote sensing technique with some limitation in temporal and spatial coverage (e.g., Worden et al., 2007). On the other hand, recent isotopic general circulation models have shown nice reproducibility of precipitation isotopes even though there are problems associating with the chaotic behavior (e.g. Yoshimura et al., 2008). Therefore, it is natural to expect having the isotopic observations assimilated in the isotopic model for better analyses of global vapor/precipitation fields in high spatial and temporal resolution. To realize such a big research target, we checked feasibility of the isotopic data assimilation by a numerical experiment. In the experiment, atmospheric circulation fields were constrained and isotopic fields were leaved by the model, and the results were compared with the satellite observation data for vapor isotopes. There found a significant correlation between the two (R=0.55), which implies large possibility of improvement of vapor/precipitation isotopes by having isotopic information assimilated. The local transformed ensemble Kalman filter (LETKF) scheme (Hunt et al., 2007) was thus adopted to be utilized for the isotopic data assimilation, i.e., “Isotope Reanalysis”.

Hunt, B., E. Kostelich, and I. Syzunogh, 2007: Efficient data assimilation for spatiotemporal chaos: A local ensemble transform Kalman filter. *Physica D,* **230,** 112–126.

Worden, J., et al. 2006: Tropospheric Emission Spectrometer observations of the tropospheric HDO/H2O ratio: Estimation approach and characterization, *J. Geophys. Res.*, **111**, D16309, doi:10.1029/2005JD006606.

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Application study: Land Data Assimilation System developed at University of Tokyo (LDAS-UT)

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The Land Data Assimilation System developed at University of Tokyo (LDAS-UT) was applied to the Gaize Station at Tibetan Plateau for period of June to August 2007.

This system consists of a land surface model (LSM) to calculate surface fluxes and soil moisture, a radiative transfer model (RTM) to estimate microwave brightness temperature, and an optimization scheme to search for optimal values of soil moisture through minimizing the difference between modeled and observed brightness temperature.

The LSM is a revised Simple Biosphere model (SiB2) for the application in bare soil and sparse vegetation region. The RTM used in LDAS-UT has two components: a volume scattering part and a surface scattering part. The volume scattering part simulates the radiative transfer process inside soil layer by a 4-stream based RTM in which the multiply scattering effects of dry soil medium is calculated by the dense media radiative transfer model (DMRT). And the surface scattering part simulates the surface scattering effects at the land-atmosphere interface by Advanced Integral Equation Method (AIEM). The minimization scheme is Shuffled Complex Evolution method.

LDAS-UT adopts a two-pass assimilation technique to solve parameterization problems. Pass 1 inversely estimates the optimal values of model parameters with long-term (~months) forcing data and brightness temperature data, and Pass 2 only estimates the near-surface soil moisture in a daily assimilation cycle. The initial parameters of this system are obtained from global data set, for example, the leaf area index (LAI) from MODIS, and the soil and vegetation parameters from ISLSCIP. In-situ observation and JMA MOLTS data are used as meteorological forcing data. The satellite observation data is AMSR-E brightness temperature. The LDAS-UT was applied to the Gaize station on the Tibetan Plateau. Comparing our system output with in situ data measured by a PBL tower, reasonable estimation of surface energy budget and soil moisture is achieved by LDAS-UT.