CEOP Web Site: http://monsoon.t.u-tokyo.ac.jp/ceop/

Coordinated Enhanced Observing Period

Newsletter No. 1

January 2002

CEOP Starts - A Step for Predictability Improvement of the Water Cycle and Water Resources -

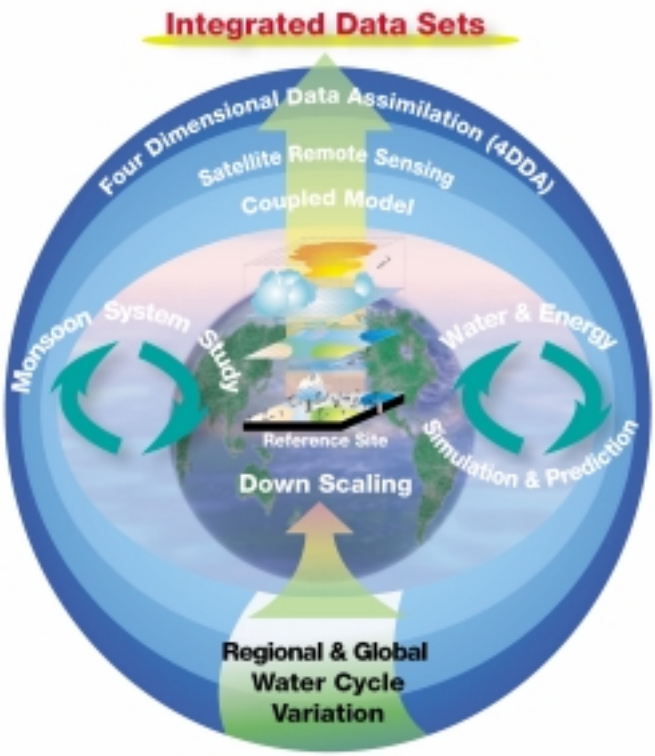
Toshio Koike, CEOP Leading Scientist, Professor, University of Tokyo

To achieve a more accurate determination of the water cycle in association with climate variability and change, as well as baseline data on the impacts of this variability on water resources, the Coordinated Enhanced Observing Period (CEOP) was launched on July 1, 2001. CEOP is now in the buildup phase after the preliminary data period from July to September, 2001 and will have the two annual cycle periods from October, 2002 to September, 2004.

CEOP is seeking to achieve a database of common measurements from both in situ and satellite remote sensing measurements, as well as matching model output that includes Model Output Location Time Series (MOLTS) data along with four-dimensional data analyses (4DDA; including global and regional reanalysis) for each specified period. In this context, a number of carefully selected reference stations are linked closely with the existing network of observing sites involved in the GEWEX Continental Scale Experiments, which are distributed around the world. The initial step of CEOP is to develop a pilot global hydroclimatological dataset with global consistency under the climate variability that can be used to help validate satellite hydrology products and evaluate, develop and eventually predict water and energy cycle processes through global and regional models. Based on the collective dataset, we will address studies on the regional water and energy budget and both inter-comparison and inter-connectivity studies of the monsoon systems around the world. CEOP will also address defining a path to down-scale from global climate to local water resource application as a next step.

The CEOP was originally proposed by the Global Energy and Water Cycle Experiment (GEWEX) Hydrometeorology Panel (GHP) and managed through GEWEX of the World Climate Research Programme (WCRP). It is being developed and implemented within the WCRP; in particular, the Climate Variability and Predictability (CLIVAR) study, the emerging Climate and Cryosphere (CliC) project, and the Working Group on Numerical Experimentation (WGNE), which is the joint activity between the World Meteorology Organization (WMO) Commission for Atmospheric Sciences and the WCRP Joint Scientific Committee (JSC). The Committee on Earth Observation Satellite (CEOS) agencies will use their best efforts to contribute to CEOP and in particular, to cooperate with the integration of satellite data and the field campaigns data from reference sites. It has also been endorsed by the Integrated Global Observing Strategy Partnership (IGOS-P) as the first element of the IGOS Water Cycle Theme.

CEOP will enable us to address the local to global water cycle issues through a 'hands-on', focused examination of the water cycle over the particular time period.



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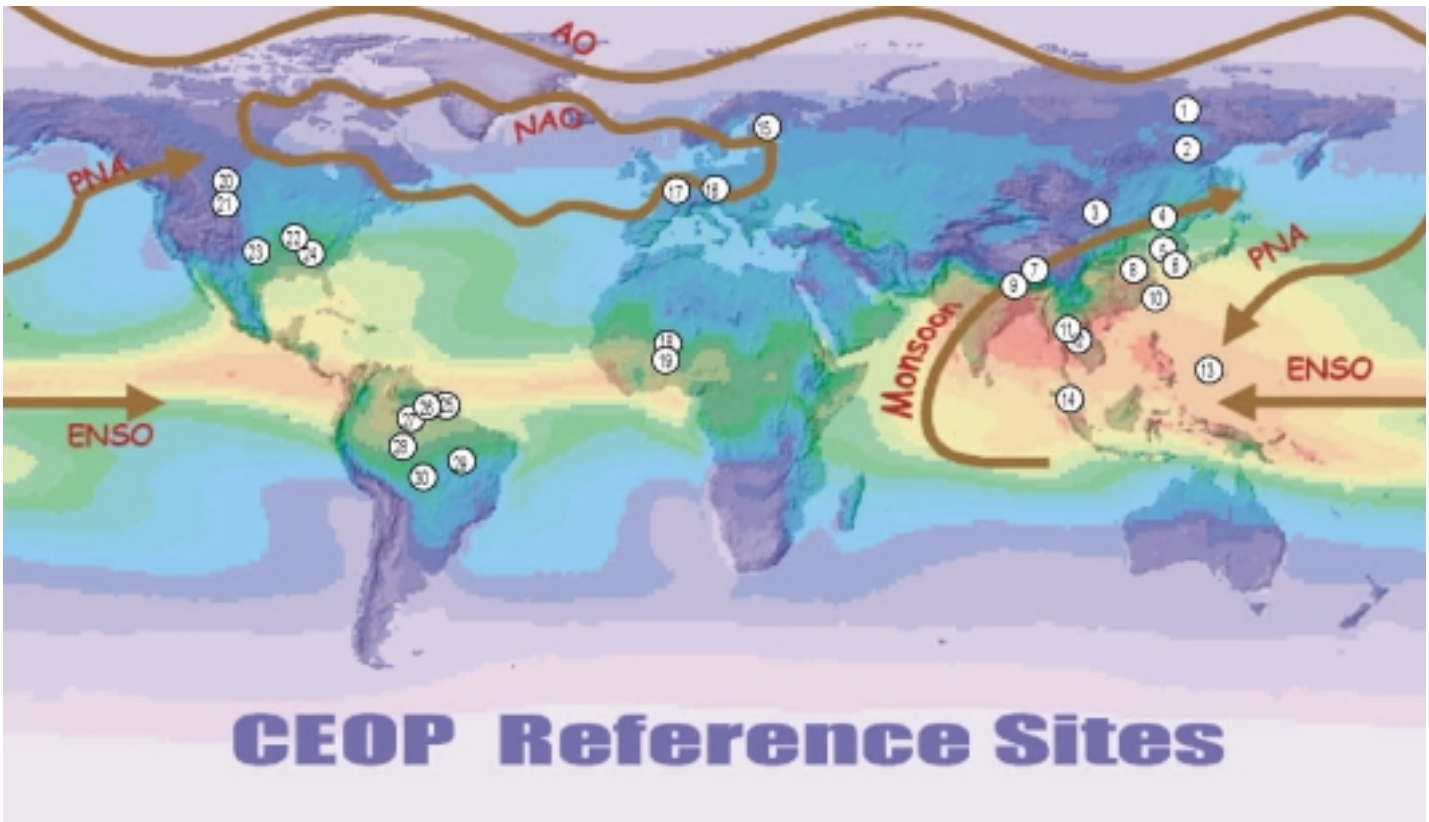
GEWEX Continental Scale Experiment (CSE) Contributions to CEOP / CEOP Reference Sites

Steve Williams, UCAR/Joint Office for Science Support (JOSS)
Sam Benedict, CEOP International Coordinator

A key aspect of CEOP is to coordinate the regional observations by the different GEWEX Continental Scale Experiments (CSEs) that have been established within the framework of the GEWEX Hydrometeorological Panel (GHP) to facilitate global and transferability studies. The science that motivates GEWEX, CLIVAR, and other WCRP Programs is driving the coordinated data set, which can satisfy the numerical modeling and observational analysis needs of these projects and the climate research community at large. Therefore, a critical facet of CEOP is its data collection and organization to support advanced climate research. Of the three types of data (in situ, satellite and model output) that are the basis of CEOP, the In situ data gathered from the reference sites and reference hydrological basins from the CSE regions around the world is the most fundamental component of the CEOP strategy. The CEOP reference sites located in the the six most comprehensive GEWEX CSEs namely, GAPP (Mississippi River Basin), BALTEX (Baltic Sea region), MAGS (Canadian Mackenzie River Basin), LBA (Amazon region), CAMP (Asian monsoon region) and CATCH (Western African Monsoon Region), are being provided, through Multi-National commitments, to improve the collective contribution of the CSEs to the global requirements of CEOP. The enhanced observations of sub-surface (soil), surface (radiation and precipitation), near surface (flux tower), atmospheric soundings (raob and profiler), and 3D (radar and aircraft) made at these sites will provide CEOP with the basic resources necessary to achieve its main scientific objectives. The CSEs, in turn, stand to benefit, along with other stakeholders, from the outcomes of CEOP that will be associated with better prediction of water and energy fluxes and reservoirs over land on temporal scales up to seasonal for water resource applications and with a better assessment of the driving mechanisms, physical connections and march of the monsoon systems. Detailed information about the CSE reference sites and their characteristics can be found at http://www.joss.ucar.edu/ghp/ceopdm/rsite.html.



CAMP
1. Eastern Siberian Tundra
2. Eastern Siberian Taiga
3. Mongolian
4. Inner Mongolia
5. Korean Peninsula
6. Korean Jeju
7. Tibet
8. Yangtze River
9. Himalayas
10. Northern South China Sea-Southern Japan
11. Chao-Phraya River
12. North-East Thailand
13. Western Pacific Ocean
14. Equatorial Island

BALTEX
15. Sodankyla
16. Lindenberg
17. Cabauw

CATCH
18. Niamey
19. Oueme

MAGS
20. BERMS

GAPP/GCIP
21. Fort Peck
22. Bondville
23. SGP
24. Oak Ridge

LBA
25. Flona
26. Santarem
27. Manaus
28. Rondonia
29. Brasilia
30. Pantanal

Introduction to CLIVAR

C. Roberto Mechoso, Professor, University of California, Los Angeles

The World Climate Research Programme (WCRP) Climate Variability and Predictability (CLIVAR) project was established in 1995 to build on the successes of the Tropical Ocean Global Atmosphere (TOGA) project and the World Ocean Circulation Experiment (WOCE). Its overarching goal is to further understanding of climate variability and predictability on time-scales from months to centuries with particular emphasis on the role of the oceans.

CLIVAR has, through a period of international consultation, developed and published science and implementation plans that highlight the science issues and challenges that fall within CLIVAR's scope and documented a consensus of what research activities need to be undertaken and which can benefit most from international coordination. CLIVAR aims to understand natural climate variability, detect and attribute human influences, determine the extent to which climate is predictable, and develop predictive capabilities. To provide clear foci for implementation, a number of Principal Research Areas (PRAs) have been identified, including, for example, improved ENSO predictions, understanding monsoons in Asia and the Americas, assessing the role of the thermohaline circulation in climate and detection of anthropogenic climate change. coordinated programme of observations, paleo investigations, modelling and process studies has been developed for each of these thrusts. These efforts, in turn, are embedded in a global modelling and observational strategy. Further information about CLIVAR, its plans, its organisation, its publications and its research can be found on the CLIVAR web site (http://www.clivar.org).

The different research projects under CLIVAR will contribute to CEOP in two fundamental ways. The first is by making available the datasets generated by field programmes under CLIVAR. The second is by providing a unified research framework for analysis of the datasets collected by various regional programmes. For example, the variability of the Asian-Australian monsoon and American monsoon systems are two of CLIVAR's PRAs. CEOP products will be used for intercomparison studies of the monsoon systems around the world to better understand their basic similarities and discern the importance of their differences. Observational data will be compared with output from global and regional models run at major operational centres. This approach will encourage investigations towards improving the success with which individual monsoon systems and their interactions are captured by numerical models.

NASDA's Satellite Missions in Support of CEOP

Yoji Furuhama, Executive Director, NASDA

NASDA's long-awaited H-IIA first test vehicle (No.1) was successfully launched from the Tanegashima Space Center in August 2001, opening the way for the launch of ADEOS-II in 2002. In the same year, NASDA plans to fly the Advanced Microwave Radiometer-E instrument (AMSR-E) on NASA's Aqua platform. NASDA plans to acquire data on planetary water and energy fluxes using AMSR (on ADEOS-II) in the 'morning' orbit and AMSR-E (on Aqua) in the 'afternoon' orbit. 2002 will also be marked with the launches of several new generation satellite missions; in addition to ADEOS-II of NASDA, and Aqua of NASA, ESA will launch the ENVISAT-1 mission. In addition, since the orbital altitude of the highly successful NASA-NASDA joint satellite mission, TRMM, was increased in August 2001, the TRMM mission life will be extended through 2002 - in fact it now has a projected life beyond 2005. These satellite missions will provide Earth observation data of unprecedented volume and quality, providing opportunities (and challenges) for synergistic and integrated uses and applications of their results. The Coordinated Enhanced Observing Period (CEOP) project is one such important application. CEOP will collect satellite data on atmospheric, surface, hydrological and oceanographic data from these missions, integrate them with in-situ data from more than 20 world-wide ground reference sites, and will produce valuable composite datasets for data assimilation and reanalysis, model development and analysis.

As for the ground system, the CEOS Working Group on Information Systems and Services (WGISS) has developed the WGISS Test Facility (WTF) - a prototype information system to support data retrieval, exchange and analysis among users. The WTF was successfully demonstrated at the CEOS Plenary meeting in Kyoto, November 2001, where CEOS Plenary endorsed the development of WTF in support of CEOP. NASDA, in cooperation with other interested space agencies, intends to support CEOP through access to key data acquired by its Earth observing satellite missions, and through support to development of the WTF. The second CEOP Satellite Working Group meeting will be held at NASDA's Earth Observation Research Center (EORC) in March 2002.

Contributions of NWP Center to CEOP

NCEP

Kenneth Mitchell, NCEP/EMC (NOAA/NWS)

NCEP will participate in CEOP and thereby continue the NCEP legacy of GEWEX participation, spanning GEWEX programs of GCIP, GAPP, ISLSCP, PILPS, GLASS, and GCSS and funded substantially by NOAA's Office of Global Programs. This GEWEX participation has accelerated improvement of NCEP prediction models and we anticipate similar benefits from CEOP. NCEP will contribute to CEOP with 1) output from NCEP operational global and regional prediction models and their 4-D data assimilation systems (4DDA), 2) global and regional 4DDA reanalysis products, 3) global and/or regional analyses and reanalyses of precipitation and SST, and 4) snow cover and sea-ice analyses.

For CEOP, NCEP will continue archiving for GCIP/GAPP (since April 1995) with NCAR both gridded output fields and point-wise time series output (known as MOLTS) from its mesoscale Eta forecast model, and its data assimilation system (EDAS). MOLTS output sites will be added for CEOP reference sites. The NCEP global Medium-Range Forecast model (MRF) and its Global Data Assimilation System (GDAS), which provided MOLTS output at 16 sites for the GEWEX GCSS program during 2001, will add and archive around 30 additional MOLTS sites at CEOP reference sites during the primary CEOP period (Oct 2002 to September 2004). NCEP is presently seeking a partner to archive and distribute the extensive MRF/GDAS gridded output for the primary CEOP period.

The 50-year NCEP/NCAR Global Reanalysis I (1948-1997), and its update known as the NCEP/DOE Reanalysis II (1979-1999), are routinely extended to present time by realtime execution and will continue to archive 6-hourly gridded output through the primary CEOP period. Additionally, using the Eta/EDAS suite, NCEP has launched a 25-year (1979-2004), high-resolution (32-km) Regional Reanalysis project, which will span the primary CEOP period.

Also during CEOP, NCEP will contribute analyses of precipitation, SST, snow cover and sea-ice, as follows: A) global, 2.5-degree, 5-day, gage/satellite precipitation analysis in realtime, and reanalysis to January 1979; B) U.S., 0.25-degree, daily, gage-only precipitation analysis in realtime, and reanalysis to January 1948; C) U.S., 4-km, hourly, radar/gage precipitation analysis in realtime, with archive to July 1996; D) Mexico, 1.0-degree, daily, gage-only precipitation analysis in realtime, and reanalysis to January 1948; E) global, 1.0-degree, weekly, SST analysis in realtime, and reanalysis to November 1981; and F) N. Hemisphere, 25-km, daily, snow cover and sea ice analysis in realtime, with archive to January 1997 (via NESDIS partner).

Finally, from the multi-institution, experimental National Land Data Assimilation System (N-LDAS) project spearheaded by NCEP, during the primary CEOP period we will archive land states and surface energy/water fluxes from four land models (NOAH, MOSAIC, VIC, SAC-SWA) running in realtime, parallel, PILPS-like mode on a 0.125-degree CONUS grid. The N-LDAS project and partner institutions are described in the November 1999 GEWEX News.

UK Met Office

Stuart Bell, Head of Numerical Modelling, Met Office, UK

The Met Office recognises the importance of detailed validation of NWP and climate models. We hope the CEOP initiative will provide the information required to further understand and improve the performance of the physical parameterisation schemes contained within our model.

At present we are testing a new formulation of our global Unified Model with the intention of implementing the new model by 2nd Quarter 2002. The new model contains a completely new dynamical core (non-hydrostatic, semi-Lagrangian, semi-implicit, height based vertical coordinates on a Charney-Phillips vertical grid and Arakawa C-grid). We have also taken the opportunity to review and upgrade many of the physical parameterisations in our global NWP model configuration to encompass developments already active in mesoscale and climate configurations.

The Met Office Unified Model is extremely flexible. Details of our current model configurations can be found at the following link http://www.metoffice.com/research/nwp/index.html#nwp. Our new model will run at the same horizontal resolution but increased vertical resolution (to 38 levels). In research mode we are already running both global models and limited area mesoscale models at higher horizontal (to 2km) and vertical (to 90 levels) resolutions for both climate and NWP studies. Our supercomputer procurement plans are well advanced and these research configurations will move into the production environment during late 2003.

Once the new model is operational we welcome the opportunity which CEOP provides to undertake extensive validation of our new Unified Model. Our provisional plan is to:

* Review and upgrade our gridded output archive - late Spring 2002
* Prepare Model Output Location Time Series (MOLTS) output - Summer 2002
* Archive operational data in MOLTS format from Oct 2002
* Diagnostic activities using MOLTS starting from Sept 2003

In the first stage of the work we will determine the content and format of the archived data and would welcome an exchange of views with other centres doing similar work. Our effort will be managed by Sean Milton (sean.milton@metoffice.com).

IGOS-P Water Cycle Theme is Approved

David Carson, Director, World Climate Research Programme

I am delighted to be able to report that the IGOS Partners, at their eighth session held in Kyoto, 8 November 2001, gave their approval to the proposal for an Integrated Global Water Cycle Observations (IGWCO) theme. In particular, the Partnership re-affirmed CEOP as 'the first element of the IGWCO'. So what is the IGOS-Partnership (IGOS-P); what are its aims and themes; and, most importantly, what is its relevance and importance to CEOP? I will try to answer each of these questions briefly, in turn.

IGOS stands for the Integrated Global Observing Strategy whose overriding goal is to produce comprehensive global, regional and national data and information to satisfy the environmental information needs of policy-makers, and to support scientific and operational environmental programmes. The IGOS-P was established in 1998 and comprises representation from recognised Global Observing Systems, the international agencies which sponsor these systems, the Committee on Earth Observation Satellites (CEOS), the International Group of Funding Agencies for Global Change Research (IGFA), and the international global change research programmes (including the World Climate Research Programme (WCRP)). IGOS-P recognises that it is simply not practical to attempt to define a single and comprehensive global system, which can satisfy all needs for environmental information in one step. So it has adopted a process of identifying, selecting and developing 'themes'. The first and most advanced such theme is on the Ocean, for which a report was published in January 2001. Other approved and relatively advanced themes are the Integrated Global Carbon Observation theme and the Integrated Global Atmospheric Chemistry Observations theme.

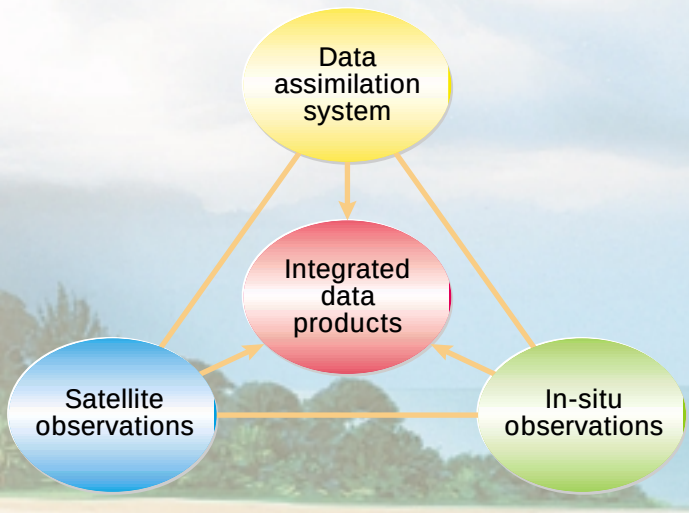
On behalf of the IGOS-P, and the wider scientific and user communities, WCRP accepted the responsibility of leading the development of the IGWCO theme. The first formal step in the process is to develop a so-called 'proposal' for the consideration and approval of the IGOS-P, and this is what was achieved successfully at the most recent IGOS-P session in Kyoto. The credit and thanks for this must go largely to Dr Rick Lawford (NOAA Office of Global Programs) who organised the seminal IGOS Water Cycle Planning Workshop, held in Irvine, California, USA, in January 2001, and then led the 'writing team' that produced the required 'proposal' for timely approval by the IGOS-P. Several colleagues worked hard with Rick on the proposal but I wish to pay particular tribute to Prof Pierre Morel, who co-ordinated and crafted a most valuable appendix ('white paper') to the proposal entitled, 'Global precipitation and prediction'. This gives a sound scientific rationale for establishing a major part of the need for an IGWCO.

In brief, the IGWCO objectives are:

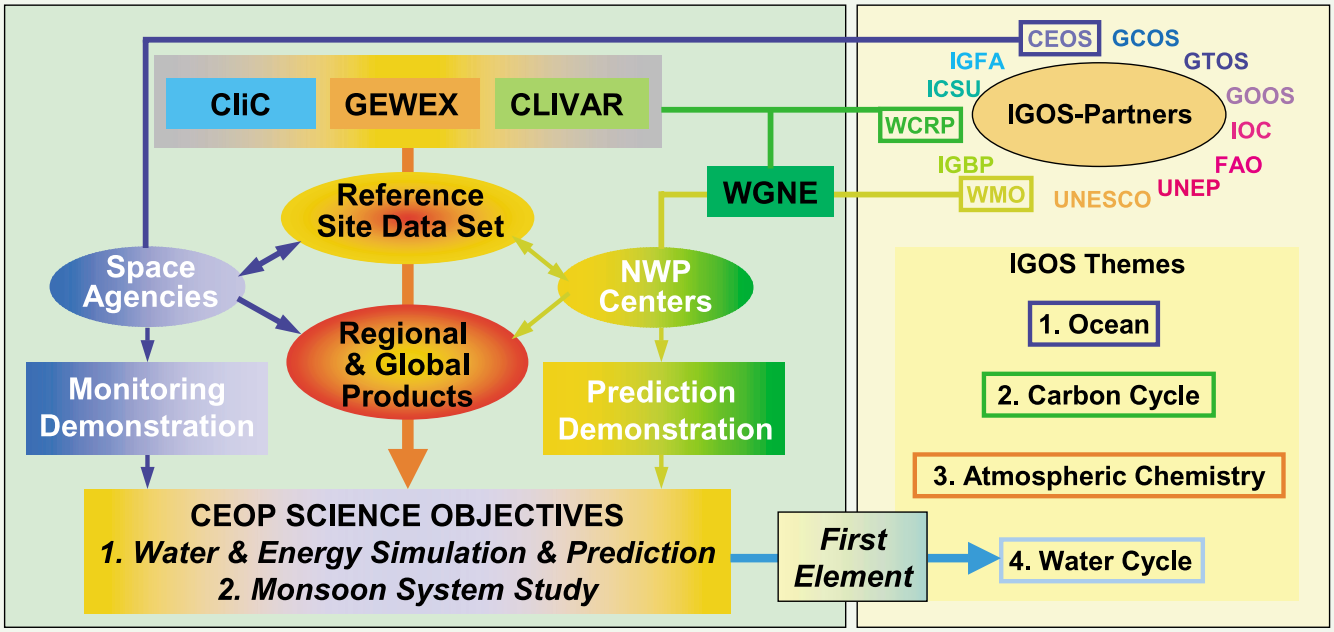
- to provide a framework for guiding decisions on priorities and strategies regarding water cycle observations for
  - monitoring climate variability and change
  - effective water management through the provision of better information
  - sustainable development of the world's water resources
  - specification of initial conditions for weather and climate forecasts
- to promote strategies that facilitate the processing, archiving and distribution of water cycle data products.

The next and more daunting stage of the process is to develop the approved proposal into an IGOS theme 'Report' (corresponding to that for the Ocean theme). How this should and can be done is under active consideration with, I am pleased to say, Rick's continuing significant and informed input. In this respect, we shall soon be reaching out again for help into the communities most interested in the further development of this crucially important theme.

The evolving IGWCO has provided, and will continue to provide, a wider framework under which the IGOS-P, and in particular CEOS and its membership, can be informed about and understand the rationale, aims and outputs from CEOP, and thereby be persuaded to give CEOP their support. It is most important therefore that this important relationship (between CEOP and IGWCO) is fully understood and recognised as we continue to develop and sharpen the focus of and the deliverables from CEOP in this crucial initial year of its implementation. I wish Prof Toshio Koike and all others actively engaged good luck and every success for the further development and implementation of CEOP. The successful implementation of this major, ambitious project is of great importance to the WCRP.



Structure of CEOP



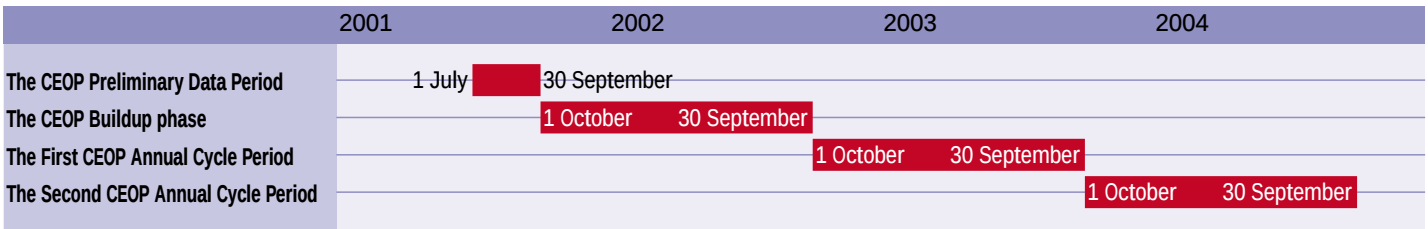
CEOP Kick-off Meeting

The CEOP kick-off meeting will be held at the Earth Observation Research Center (EORC) of the National Space Development Agency of Japan (NASDA), in Tokyo, Japan, from 6-8 March 2002. The schedule of the kick-off meeting is as follows.
For details, please refer to the web site: http://monsoon.t.u-tokyo.ac.jp/ceop/meeting/kickoff/

Schedule

March 6 (Wednesday)	Reference Sites Session
March 7 (Thursday)	
Morning	Reference Sites Session
Afternoon	Working Group Parallel Sessions
March 8 (Friday)	Science Steering Committee and Advisory Committee Sessions
March 9 (Saturday)	CAMP International Science Panel Meeting

Schedule of CEOP



Newsletter Editorial Board

Robert Schiffer

Carlos R. Mechoso

Paul D. Try

Contact Address of International Coordination Body (ICB)

International Coordinator

Sam Benedict

742 "H" Avenue
Coronado, CA, 92118, USA
Phone: +1-619-437-7904
Fax: +1-619-437-6814
E-mail: seb@www.wmo.ch

International Coordination Office

Secretary general: Dawen Yang
Secretary: Akiko Goda
Technical support: Katsunori Tamagawa

Department of Civil Engineering, University of Tokyo
7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan
Phone: +81-3-5841-6132
Fax: +81-3-5841-6130
E-mail: ceop@monsoon.t.u-tokyo.ac.jp