History and Perspective of the International Soil Moisture Working Group and GEWEX

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International Soil Moisture Working Group

- 2005: Started under the IGOS-P IGWCO (Integrated Global Observing Strategy – Partnership /Integrated Global Water Cycle Observations theme)

- March 2006: First Workshop/Meeting, The Netherlands
- November 2007: Second Workshop/Meeting, China
- March 2009: Third Meeting, Lisbon, Portugal

Summary


GEWEX
WCRP
imperatives
surface
Processes
Water
energy
Energy
SSG
name
given
However
water
system
regional
within
strong
projects
statement
climate
radiation
new
Observations
Global
land
future
set
cycle
atmospheric
particular
mission
core
interactions
research
list
components
hydrological
challenges
suggested
modeling
understanding
global
approved
panels
also
science
human
much
land-atmosphere
Panel
Modeling
services
influences
retain
move
observations
Cycle
timeline
plans
view
Project
Experiment
scientific
themes
together
via
atmosphere
January
activities
indeed
old
clouds
Scientific
complete
related
project
fast
Coordination
Land-atmosphere
experiments
dynamics
encompasses
Councils
facilitate
arguments
number
began
featuring
hydrology
imperative
evolution
CliC
including
complex
along
site
actions
ocean
organizations
time
runoff
bit
points
Delhi
partial
e.g
current
located
leading
Silver
EX
featured
role
place
web
post-2013
Capacity
ones
convincing
part
Spring
Regional
terms
Model
compared
detail
noted
original
sunset
basis
World
common
falls
et
parts
endorsed
feature
extensive
International
slow
sentiments
change
Cryosphere
background
search
visioning
physical
deliverables
driving

GEWEX Project Organization

RADIATION

GRP GEWEX Radiation Panel (C. Kummerow; J. Schultz)

- **BSRN** **Baseline Surface Radiation Network** (E. Dutton)
- **CIRC** **Continuous Intercomparison of Radiation Codes** (L. Oreopoulos)
- **GACP** **Global Aerosol Climatology Project** (M. Mishchenko)
- **GPCP** **Global Precipitation Climatology Project** (R. Adler)
- **ISCCP** **International Satellite Cloud Climatology Project** (W. Rossow)
- **I3RC** **Intercomparison of 3-D Radiation Codes** (R. Cahalan)
- **LandFlux** **Land Surface Fluxes** (W. Rossow)
- **RAMI** **Radiation transfer Model Intercomparison** (J-L Widlowski)
- **SeaFlux** **Sea-Surface Fluxes** (C. Clayson)
- **SRB** **Surface Radiation Budget Project** (P. Stackhouse)
- **WGDMA** **Working Group on Data Management and Analysis** (W. Rossow)

Assessment Working Groups:

- **Aerosols** (S. Christopher; J. Reid)
- **Clouds** (C. Stubenrauch)
- **Radiation** (P. Stackhouse)

MODELING AND PREDICTION

GCSS/ GABLS **GEWEX Cloud System Study** (J. Petch; C. Bretherton)
GEWEX Atmospheric Boundary Layer Study (B. Holtslag; G. Svensson)

- **ACPC** **Joint GCSS/iLEAPS Project on Aerosols, Clouds, Precipitation and Climate** (B. Stevens/GCSS; A. Meinrat/iLEAPS)
- **DIME** **Data Integration for Model Evaluation** (R. Rossow)

GCSS Working Groups

- **Boundary Layer Clouds** (A. Lock)
- **Cirrus Cloud Systems** (S. Dobbie)
- **Cloud Climate Feedback**
  - **CFMIP-GCSS Intercomparison of LES and SCMs** (M. Zhang; C. Bretherton)
- **Cloud Microphysics** (U. Lohmann)
- **GCSS Pacific Cross-section Intercomparison** (J. Teixeira)
- **Polar Clouds** (J. Pinto; H. Morrison)
- **Precipitating Convective Cloud Systems** (J. Petch)

GLASS **Global Land/Atmosphere System Study** (B. van den Hurk; M. Best)

- **ALMA** **Assistance for Land-surface Modeling Activities**
- **GLACE-2** **Global Land/Atmospheric Coupling Experiment** (R. Koster)
- **GSWP-3** **Global Soil Wetness Project** (T. Oki)
- **LoCo** **Local land-atmospheric Coupling** (B. van den Hurk)
- **LUCID** **Land-Use and Climate, Identification of robust impact** (A. Pitman)
- **PILPS** **Project for the Intercomparison of Land-surface Parameterization Schemes** (A. Pitman)

HYDROCLIMATOLOGY

GHP GEWEX Hydroclimatology Panel (D. Lettenmaier; TBD) J. Polcher

Regional Hydroclimate Projects (RHPs)

- **AMMA** **African Monsoon Multidisciplinary Analysis Project** (T. Lebel)
- **BALTEX** **Baltic Sea Experiment** (H.J. Isemer)
- **CPPA** **Climate Prediction Program for the Americas** (J. Huang)
- **HyMeX** **HYdrological cycle in the Mediterranean Experiment** (P. Drobinski)
- **LBA** **Large-Scale Biosphere-Atmosphere Experiment in Amazonia** (J. Maia)
- **LPB** **La Plata Basin Project** (H. Berbery)
- **MAHASRI** **Monsoon Asian Hydro-Atmosphere Scientific Research and Prediction Initiative** (J. Matsumoto)
- **MDB** **Murray-Darling Basin Water Budget Project** (J. Evans)
- **NEESPI** **Northern Eurasia Earth Science Partnership Initiative** (P. Groisman)

Regional Studies

- **Cold Region** (T. Ohata)
- **High Elevation** (G. Tartari)
- **Monsoon** (J. Matsumoto; H. Berbery; W. Lau)
- **Semi-arid** (C. Fu)

Data Management

- **Reference Sites, River Basins** (S. Williams)
- **Model Output** (M. Lautenschlager)
- **Satellite Data** (T. Koike)
- **Data Integration and Dissemination** (T. Koike)
- **Central Data Integration** (T. Koike)

Cross-Cutting Studies

- **Water and Energy Budget Studies** (K. Yang)
- **Extremes** (R. Stewart)
- **Isotopes** (D. Noone; K. Yoshimura)
- **Aerosols** (W. Lau)

Modeling Studies

- **Global Models** (M. Bosilovich)
- **Regional Models**
  - **Inter-Continental Transferability Study** (B. Rockel)
  - **Scale Interaction Evaluation Experiment** (R. Arritt)
- **Land Surface Models** (M. Rodell)
- **Hydrologic Applications Project** (E. Wood)

Affiliated Global Organizations

- **GPCC** **Global Precipitation Climatology Centre** (U. Schneider)
- **GRDC** **Global Runoff Data Centre** (U. Looser)

Imperatives: Headlines

Datasets: Foster development of climate data records of atmosphere, water, land, and energy-related quantities, including metadata and uncertainty estimates.

Analysis: Describe and analyze observed variations, trends and extremes (such as heat waves, floods and droughts) in water and energy-related quantities.

Processes: Develop approaches to improve process-level understanding of energy and water cycles in support of improved land and atmosphere models.

Modeling: Improve global and regional simulations and predictions of precipitation, clouds, and land hydrology, and thus the entire climate system, through accelerated development of models of the land and atmosphere.

Applications: Attribute causes of variability, trends and extremes, and determine the predictability of energy and water cycles on global and regional bases in collaboration with the wider WCRP community.

Technology transfer: Develop diagnostic tools and methods, new observations, models, data management, and other research products for multiple uses and transition to operational applications in partnership with climate and hydro-meteorological service providers.

Capacity building: Promote and foster capacity building through training of scientists and outreach to the user community.

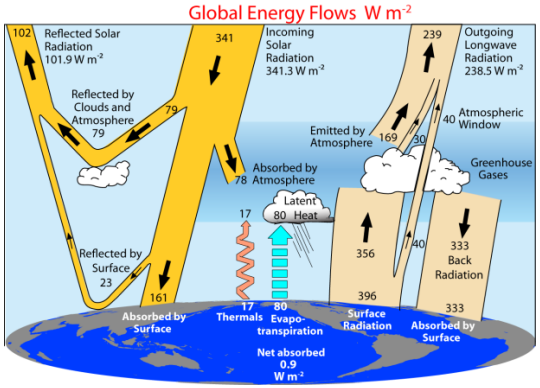
Example: Imperatives: 1

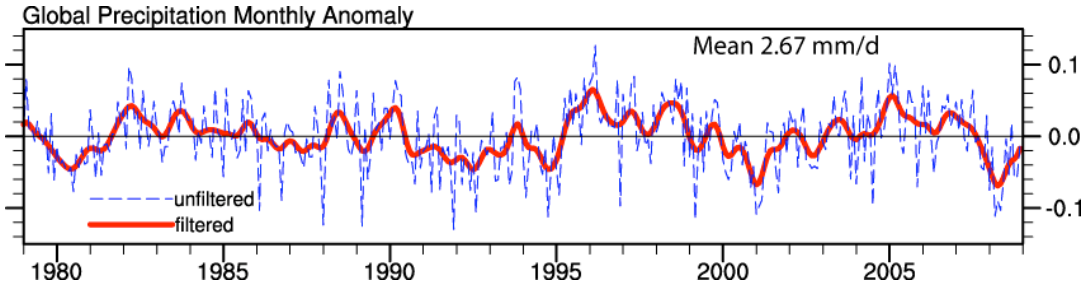
DATASETS: **Foster development of climate data records of atmosphere, water, land, and energy-related quantities, including metadata and uncertainty estimates.**

Lead: GRP, GHP; **Partners:** SCOPE-CM, CEOS, WOAP

Actions:

- Reprocess GEWEX datasets, provide advice on other efforts and lead evaluations.
- Continue evaluation and refinement of sensor algorithms, influencing next generation space-born platforms and reprocessing.
- Development of appropriate calibration/validation/evaluation datasets to confront models.
- Devise robust ways of dealing with the more diverse, complex, higher spatial and temporal resolution, and much greater volumes of data.
- Build on CEOP experience in data management, archival and access.





GRP develops **climate data records** of water and energy variables, complete with metadata and error bars.

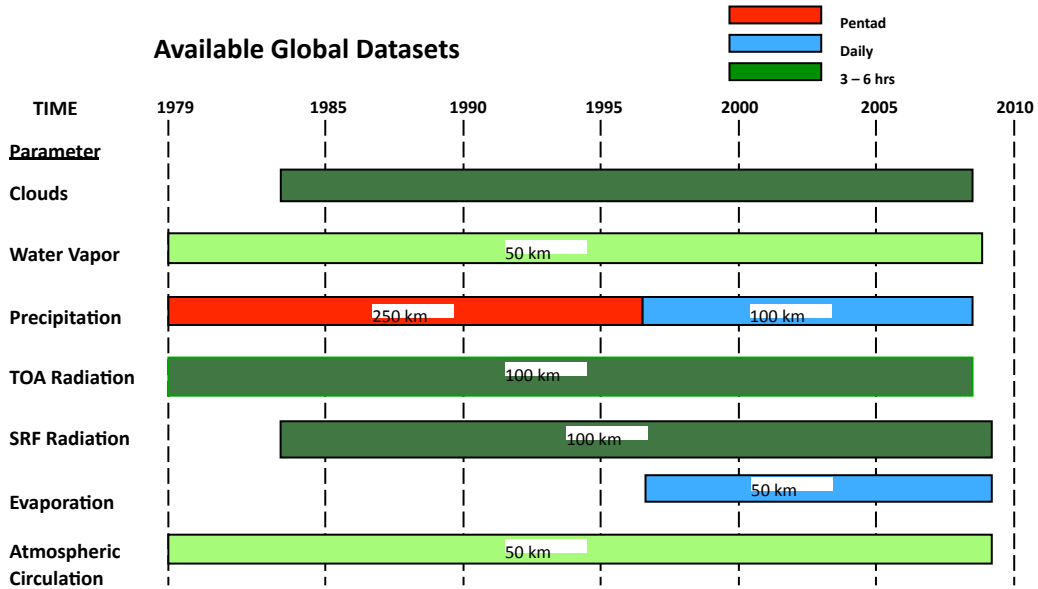
Clouds - ISCCP
- Cloud Assessment

Radiation - SRB
- Surface reference observations - BSRN
- Radiation Assessment

Aerosols - GACP
- Aerosol Assessment

Precipitation - GPCP
- Sfc gauge obs (GPCC)

Turbulent Fluxes
- SeaFlux
- LandFLux
- Soil Moisture



A GRP product is endorsed by GEWEX/GRP to conform to a high standard of production and documentation. It consists of a blend of available satellite and in-situ observations and is periodically compared and assessed against other products in an open and transparent fashion. It is openly available to everyone without restrictions.

Key Data Objective

When GRP began there were few datasets. Now there is a proliferation: a multitude of datasets that are all different, and with different strengths and weaknesses. The need to assess these, and evaluate and reprocess the data is enormous! So the objective is:

Reprocess all GRP products with common ancillary data and assumptions.
Panel has learned much about reprocessing; distribution; documentation and user support. Plan to reprocess periodically (e.g. approx. every 5 years)

Publish state of the "Observed" Water and Energy budgets

Expand accessibility to multi-variable products

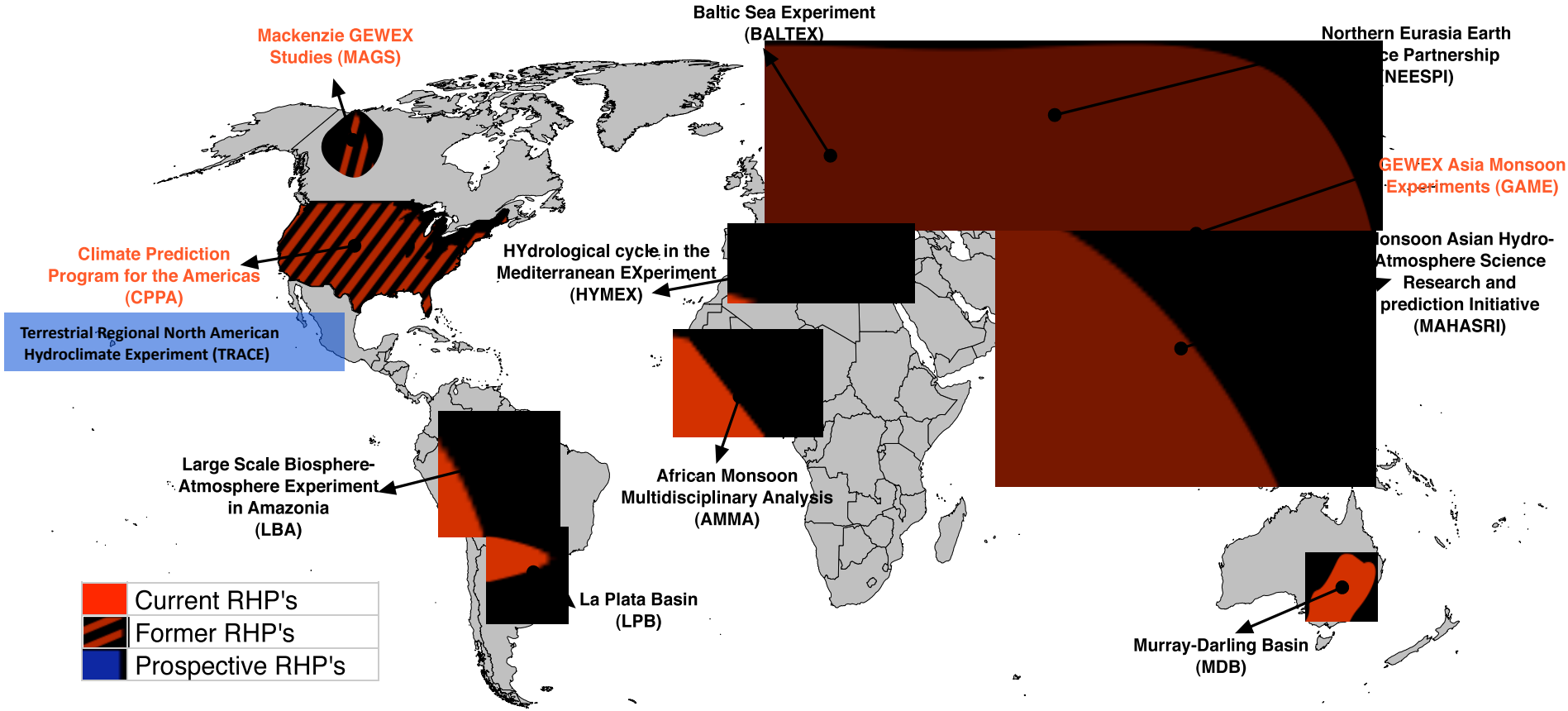
Facilitate research to interpret global and regional covariance among Water & Energy variables.

Assess all products of the same variable for strengths and weaknesses.
Each agency wants to only reprocess their product.

Help move products to operations; share experience

CEOP → GHP

GEWEX REGIONAL HYDROCLIMATE PROJECTS



Regional water cycles

ISMWG Future Outlook from 2009!

- **Proposed New Structure and Embedding within GEWEX**

- The embedding of the ISMWG in the GEWEX Radiation Panel (GRP) requires a few changes in the so far loose structure. Proposed is a three tier system which is guided by a board consisting of the (co-)chairs of each of the tiers plus ex-officio members.
  - Tier 1: Validation
  - Tier 2: Assimilation
  - Tier 3: Product Fusion and Merging
- Consistent with other GRP activities

Tier 1: Validation:

- Development of Global In-Situ Soil Moisture network and data sets to support validation of satellite soil moisture retrieval and assimilation
  - Data Hosting, Measurement Protocols
- Validation of Satellite Soil Moisture Products and Soil Moisture Intercomparison Projects
  - Links all three tiers

Tier 2: Assimilation

- The assimilation of soil moisture and satellite data (both active and passive) into numerical weather prediction and hydrological modeling for both forecasting as well as process studies.
  - Important to show usefulness
  - Expand to yield forecasting

Tier 3: Product fusion and merging

- Development of long term consistent global soil moisture products (and their derivatives)
  - Combining various sources of data (PM, AM, In-Situ)
  - Climate/Trend research robust

So far..

- ISMN is established and working well
- Many of the anticipated and envisioned activities are started and/or underway

- Need for continued growth (ISMN) and support
- International collaborative effort needs to be stimulated