

gewex



Global Energy and Water Exchanges

World Climate Research Programme

New name!

International GEWEX Project Office

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Director



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Support



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Graciously
sponsored:



GEWEX Scientific Steering Group



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Dr. Chia
Chou



Prof. Rene
Garreaud



Dr. Xin Li



Dr. Paolo M.
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Prof. Ronald
Stewart

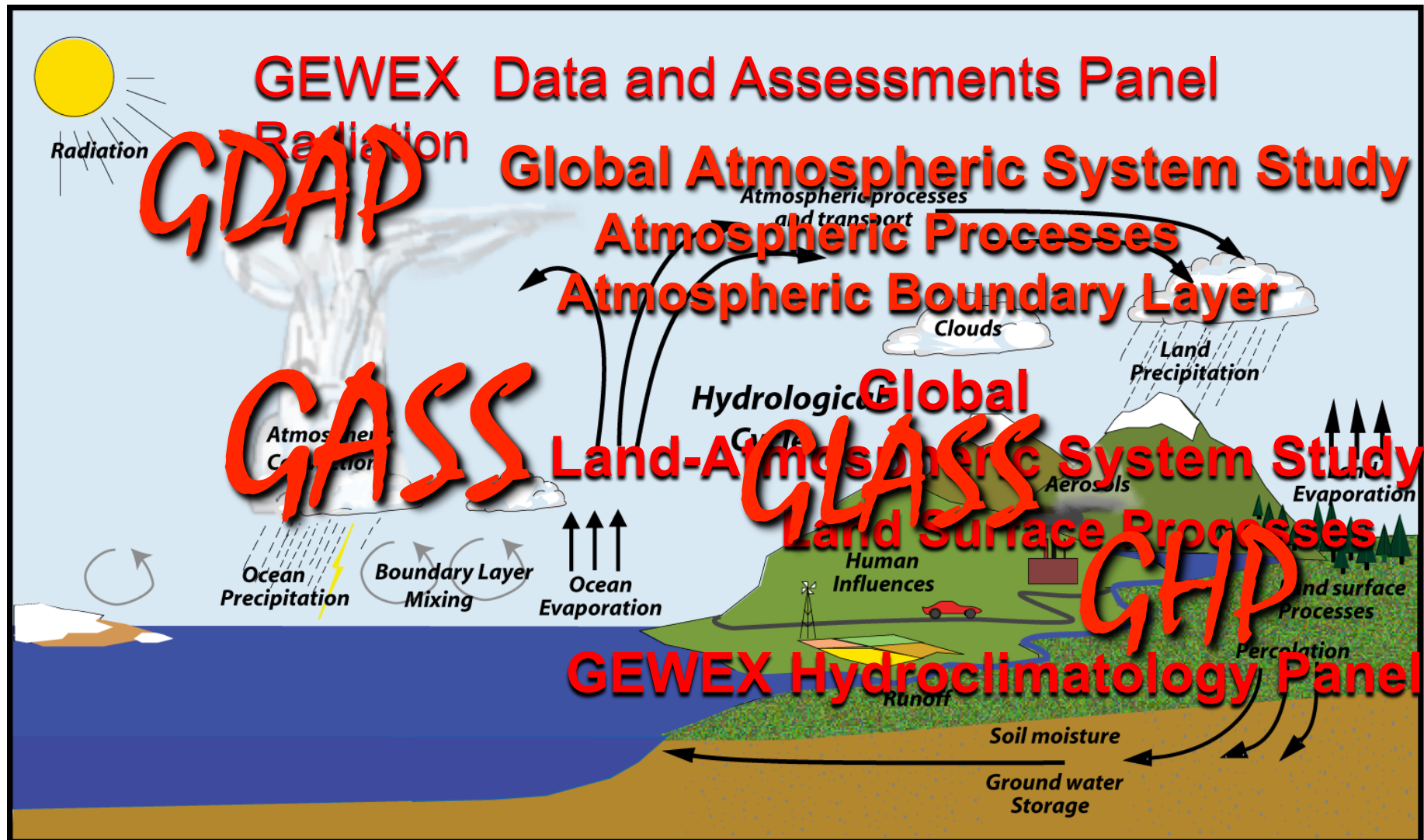


Prof. Minghua
Zhang



Dr. Olga
Zolina

GEWEX: Major components





Kevin Trenberth: Chair SSG
Peter van Oevelen: Director IGPO
J. Evans, J. Polcher (GHP)
C. Kummerow (GDAP)
J. Santanello, A. Boone (GLASS)
J. Petch, S Klein (GASS)

SSG, Univ. NSW, Sydney, Australia, 15-18 October 2012





See the **GEWEX** Newsletters

New name,
new beginning

<http://www.gewex.org/>

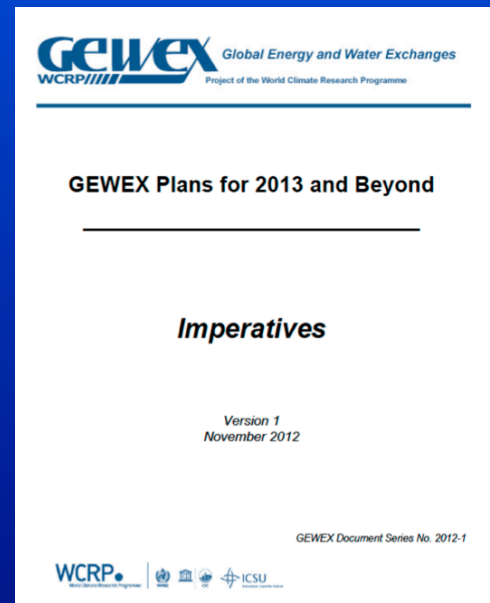
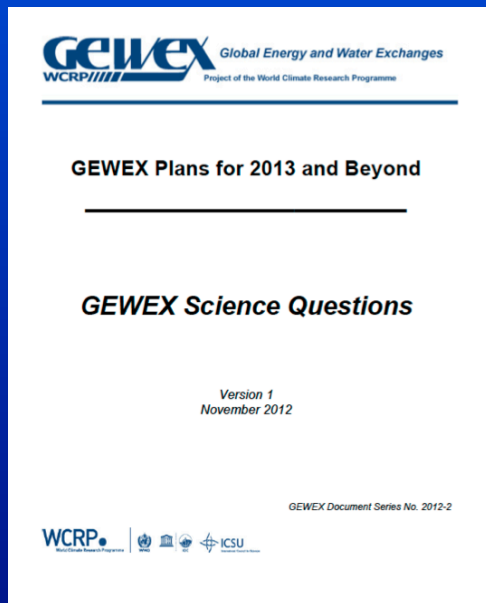
<http://www.gewex.org/gewexnews/Feb2013.pdf>



GEWEX Plans for 2013 and Beyond

- "GEWEX Science Questions"
- "Imperatives"

Are published:
on line and hard copy
GEWEX DS 2012-1, DS 2012-2



GEWEX: post 2013



Vision statement

Water and energy are fundamental for life on Earth. Fresh water is a major pressure point for society owing to increasing demand and vagaries of climate.

Extremes of **droughts**, **heat waves** and **wild fires** as well as **floods**, heavy rains and **intense storms** increasingly threaten to cause havoc as the climate changes. Other challenges exist on how **clouds and aerosols** affect energy and climate. Better **observations** and **analysis** of these phenomena, and improving our ability to **model** and predict them, will contribute to increasing **information** needed by society and decision makers for future planning.

GEWEX: post 2013

Mission statement

To measure and predict global and regional energy and water variations, trends, and **extremes** (such as heat waves, floods and droughts), through improved observations and modeling of land, atmosphere and their interactions; thereby providing the scientific underpinnings of climate services.



Imperatives: Headlines

The imperatives include aspects related to:

- observations and dataset development and assessment,
- data analysis and generation of products,
- understanding processes and improving their depiction in models,
- improving models more generally including for data assimilation and predictions,
- applications of all sorts,
- technology transfer into operations or to users, and
- capacity building of the community and users.

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.

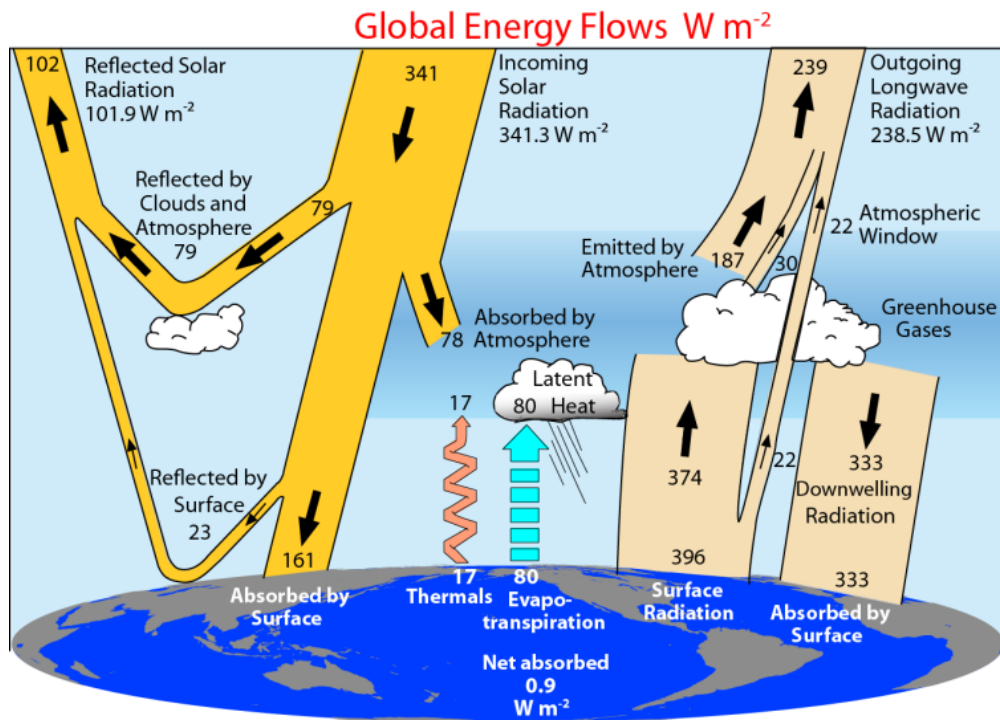
Applications: Attribute causes of variability, trends and extremes, and determine the predictability of energy and water cycles on global and regional bases in collaboration with the wider WCRP community.

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.

GEWEX Data and Assessments Panel

- Radiative processes and understanding
 - Develop and improve of radiative transfer codes, comparisons
- Global Data sets
- Global In-situ observational networks, development and standardization (radiation, soil moisture)
- Reprocessing of datasets
- Assessment and intercomparison studies
- <http://www.gewex.org/GDAP.html>



Global datasets

Aerosols

Clouds

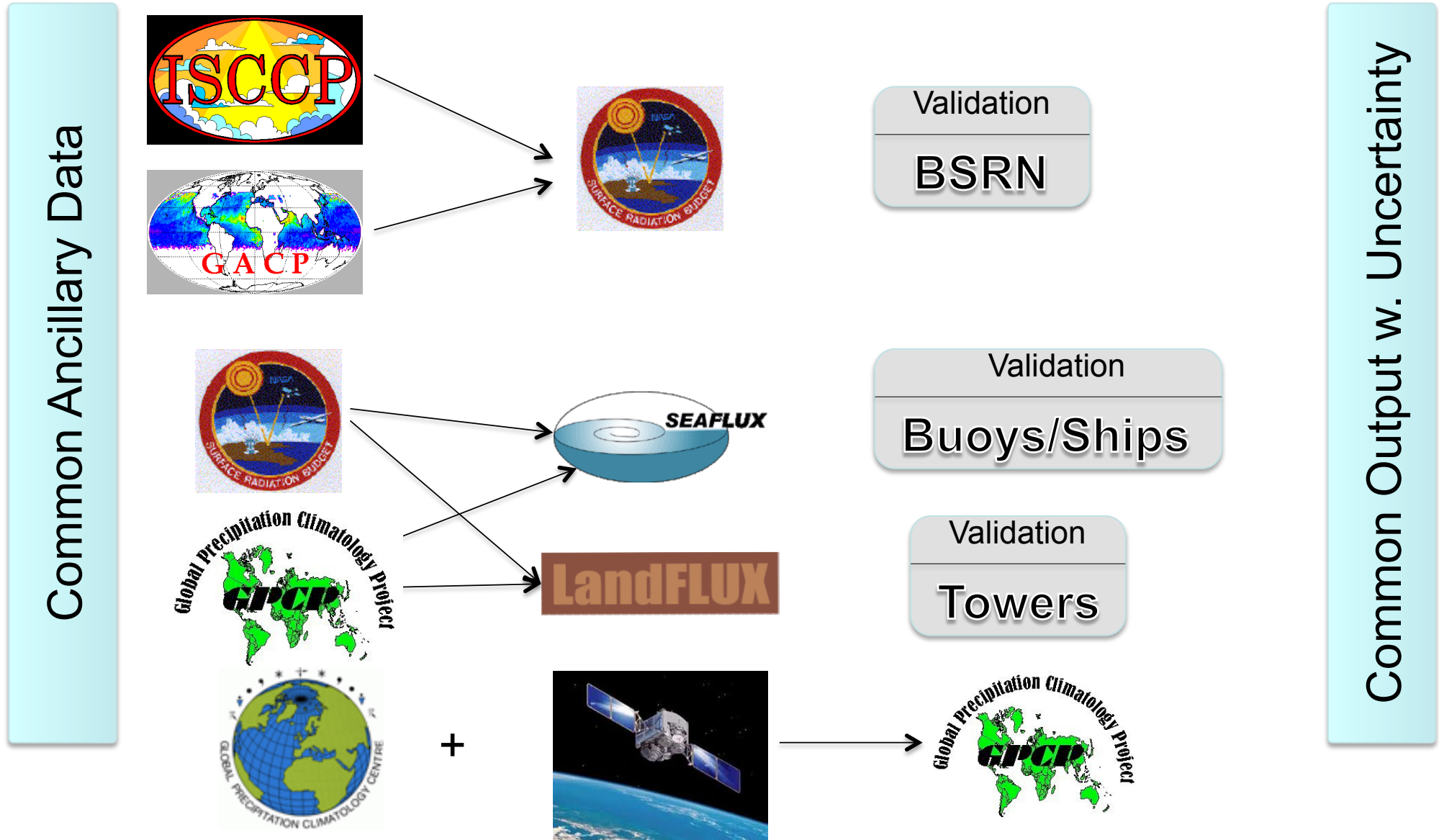
Radiation

Water Vapor

Precipitation

Surface fluxes

GEWEX Integrated Products



Assessments Completed in 2012



GEWEX Radiative Flux Assessment (RFA)

A project of the World Climate Research Programme
Global Energy and Water Cycle Experiment
(GEWEX) Radiation Panel

Lead Authors:

Ehrhard Raschke
Max-Planck-Institute for Meteorology, Hamburg, and Institute for Meteorology of University of Hamburg, Germany,

Stefan Kinne
Max-Planck-Institute for Meteorology, Hamburg, Germany

Paul W. Stackhouse
NASA, Langley Research Center, Hampton, Virginia, USA

January 2012
WCRP-???
WMO/TD-No. ????



Assessment of Global Cloud Datasets from Satellites

A Project of the World Climate Research Programme
Global Energy and Water Cycle Experiment
(GEWEX) Radiation Panel

Lead Authors:

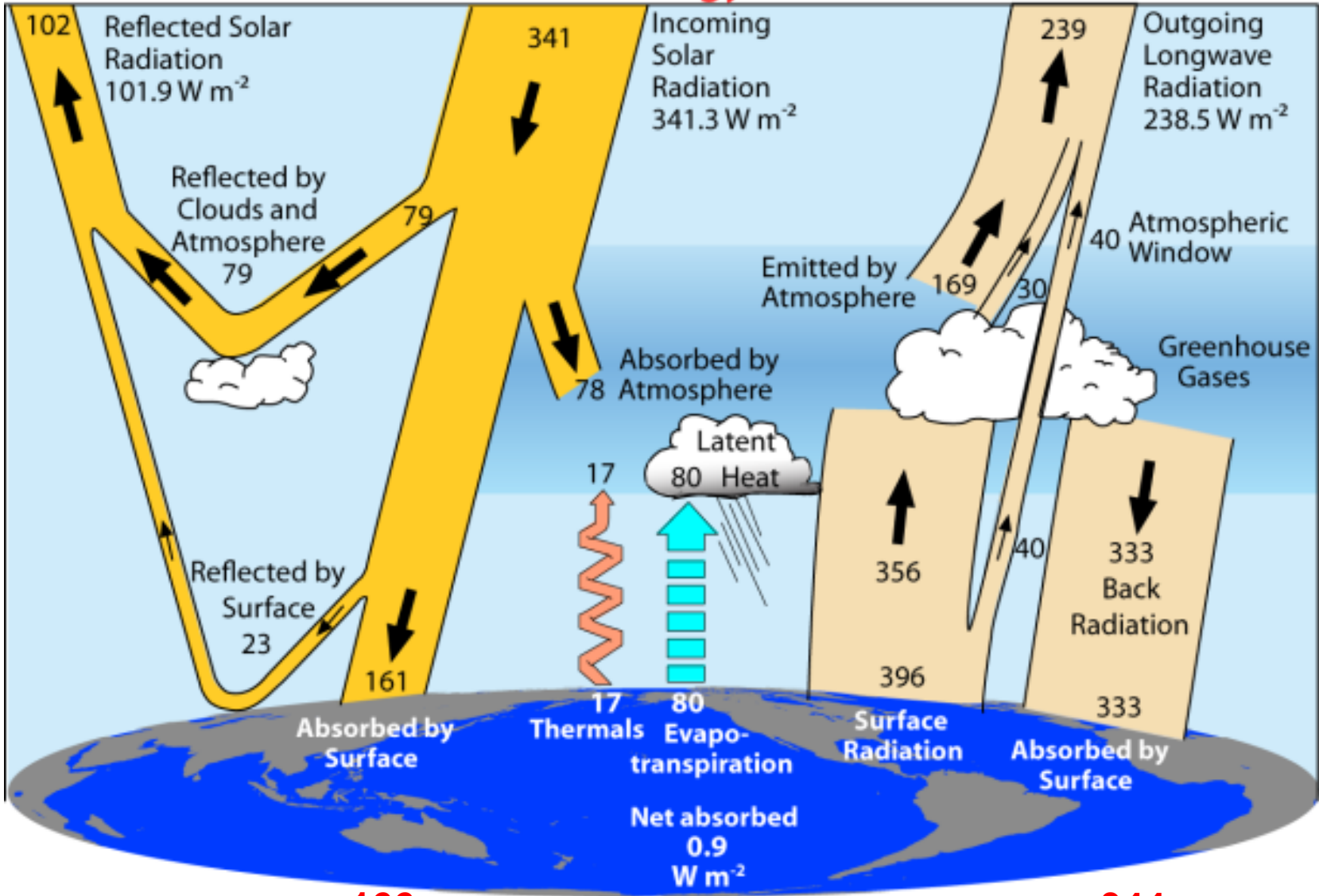
Claudia Stubenrauch
Laboratoire de Météorologie Dynamique IPSL / CNRS, France

William Rossow
CREST Institute at City College of New York, USA

Stefan Kinne
Max Planck Institute for Meteorology, Hamburg, Germany

April 2012
WCRP Report 19/2012

Science



166

344

ISCCP at 30:

What Do We Know and What Do We Still Need to Know?

22-25 APRIL 2013



<http://isccp.giss.nasa.gov>

Grove School of Engineering, Steinman Hall, City College of New York, NY, NY
Sponsors: GEWEX, NASA, NOAA, EUMETSAT, JMA, INPE

Agenda

- Clouds-Radiation - I [Chair: J. Schmetz]
- Clouds-Radiation - II [Chair: B.J. Sohn]
- Clouds-Precipitation [Chair: G. Stephens]
- Cloud and Related Observations [Chair: M. Maiden]
- Cloud Microphysics - Liquid [Chair: S. Klein]
- Cloud Microphysics - Ice [Chair: C. Kummerow]
- Clouds-Aerosols [Chair: J. Jiang]
- Cloud Dynamics - I [Chair: J. Petch]
- Cloud Dynamics - II [Chair: T. Kurino]
- Cloud Feedbacks - I [Chair: J. Schulz]
- Cloud feedbacks - II [Chair: J. Bates]
- Future Activities [Chair: R.A. Schiffer]



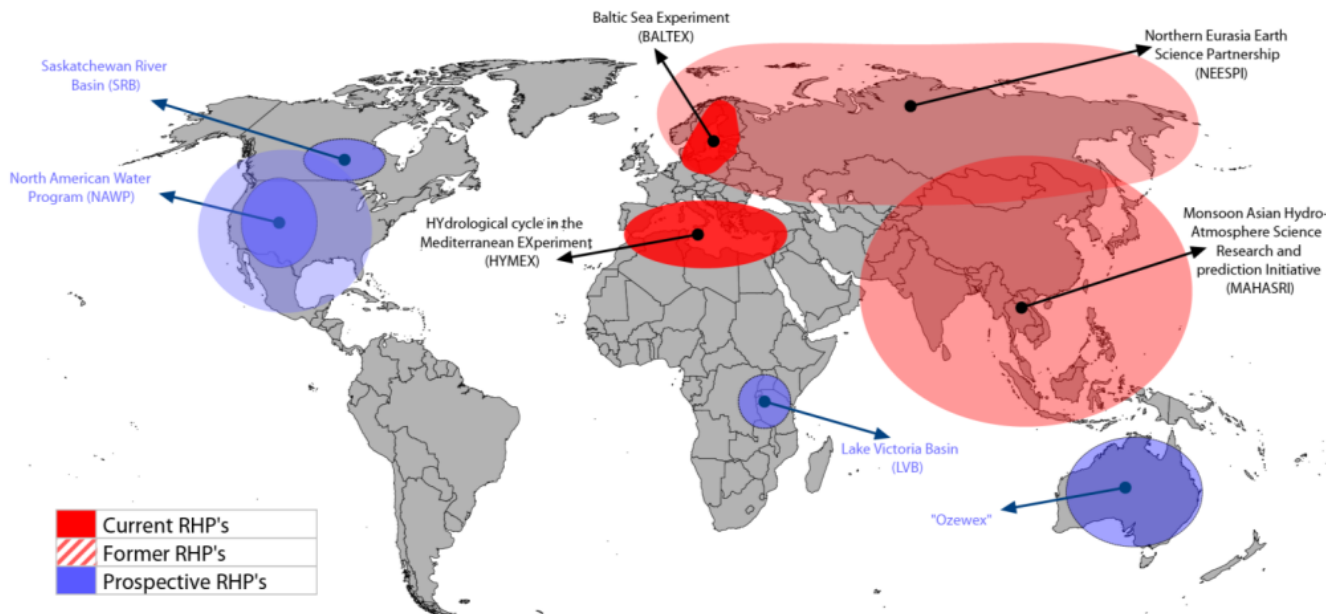
The 2013 GDAP Schedule

- | | |
|----------------|---|
| Jan 01, 2013 | 1 year of ISCCP, AeroCom & Ancillary data (2009) delivered to all. |
| March 01, 2013 | SRB and GPCP processed for same year |
| May 30, 2013 | SeaFlux and LandFlux processed for same year |
| June 30, 2013 | Data are integrated |
| July 2013 | Data distribution (NCDC). Advertise to various portals. |
| 2013 | Submit paper with results and preliminary analysis including global and regional balances as well as covariance and sample process studies. |

GEWEX Hydroclimatology Panel

- Regional hydroclimate projects
- Globally distributed extensive regional data sets : water and energy cycle observations (in situ and space borne and modeling data)
- **Global Data Centers**; data management system / GEO Prototype for Water Cycle Observations
- Regional climate and hydrological modeling and process Descriptions
- Hydrological Applications and Forecasting (Drought monitoring, Hydrological Ensemble Predictions...)
- <http://www.gewex.org/projects-ghp.html>

GEWEX REGIONAL HYDROCLIMATE PROJECTS



RHPs

BALTEX
HYMEX
LBA
LPB
MAHASRI
MDB
AMMA
NEESPI

proposed

NAWP
HYVIC
TPE
BALTEX-3
OZEWEX

New

SasRB

The Regional Hydroclimate Projects:

Changes at the global scale have **consequences at the regional** scale, and vice versa.

The RHP's better discern the various processes over the entire range of spatial and temporal scales, and links the regional observations and process understanding to the global scale.

New emphasis is on **stronger collaboration** between the various RHP's as well as the intercomparison and evaluation of the GEWEX **global datasets** with the **regional data sets**.

Crucial to success in this endeavor is the **linkage between in-situ observations, modeling data and earth observational data**.

GEWEX RHPs North America

Past:

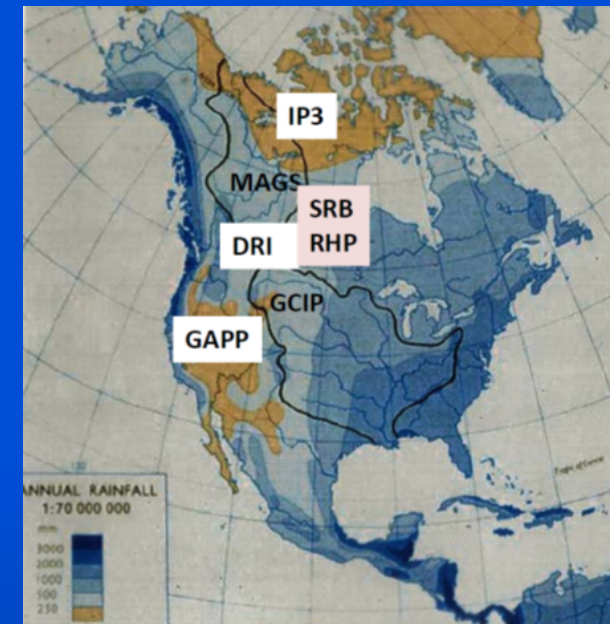
- * GCIP (Mississippi 1994-2000)
- * GAPP (US and part Mexico 2000-2004)
- * MAGS (McKenzie basin)
- * CPPA (Americas 2005-2009)

New:

- * **Saskatchewan River Basin.**
 - * workshop March 2011

Future:

- * **NAWP: North American Water Project**
- * Was **TRACE: Terrestrial Regional North American hydroClimate Experiment**
 - * workshop April 2011: <http://www.trace-rhp.org>



NAWWP Just the Facts...

Vision: Establish the scientific basis, observation, modeling and decision approaches needed to manage water security and sustainability through climate, population and environmental change uncertainties.

Objective: An interdisciplinary integration of North American hydroclimate observation and prediction resources that transcends scales and enables procedures and analytic tools to adapt to change.

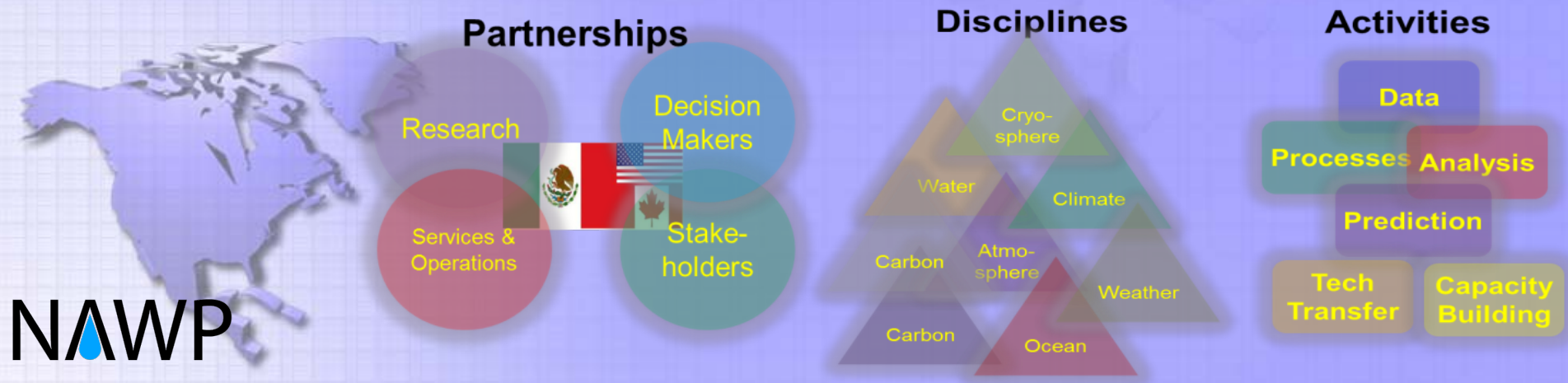
Science Question: How does climate, environmental and population change affect the water cycle across scales, to what extent is it predictable, and can we adapt to achieve freshwater sustainability?

Challenges: *to organize NAWP efforts*

- **Adaptation:** Develop scientific basis and tools to adapt to climate, population and environmental change.
- **Benchmarking:** Assess water dynamics, water cycle sensitivity, and evaluate/improve model skill.
- **Science informing decisions:** Develop capacity for sustainable water management practices.

Implementation:

- Quantify: Systematically quantify North American water storages and fluxes.
- Understand: Analyze water cycle variations, trends and extremes; adaptation measure impacts.
- Predict: Improve continental precipitation, cloud and hydrology prediction.
- Solutions: Develop and transition new observations, models, and tools to operations.



U.S. activities

- NAWP white paper
- Briefing of program managers about GSQs and plans
- Follow-up letter (no response)
- As part of our outreach wrt recruiting names for the SSG, we had 29 nominations and 15 of these were from U.S.
 - I recommended formation of a US GEWEX Panel to capitalize on this interest and the NAWP.
 - I sent list of names to the Program managers
- Request for support and for a
 - US Coordinator for GEWEX
 - to work with IGPO, and
 - to brief program managers and inter-agency aspects
 - (quite a lot of interest in this, regarded as doable, but no action)

Saskatchewan River Basin

Aiming to deliver world-class research sites and data

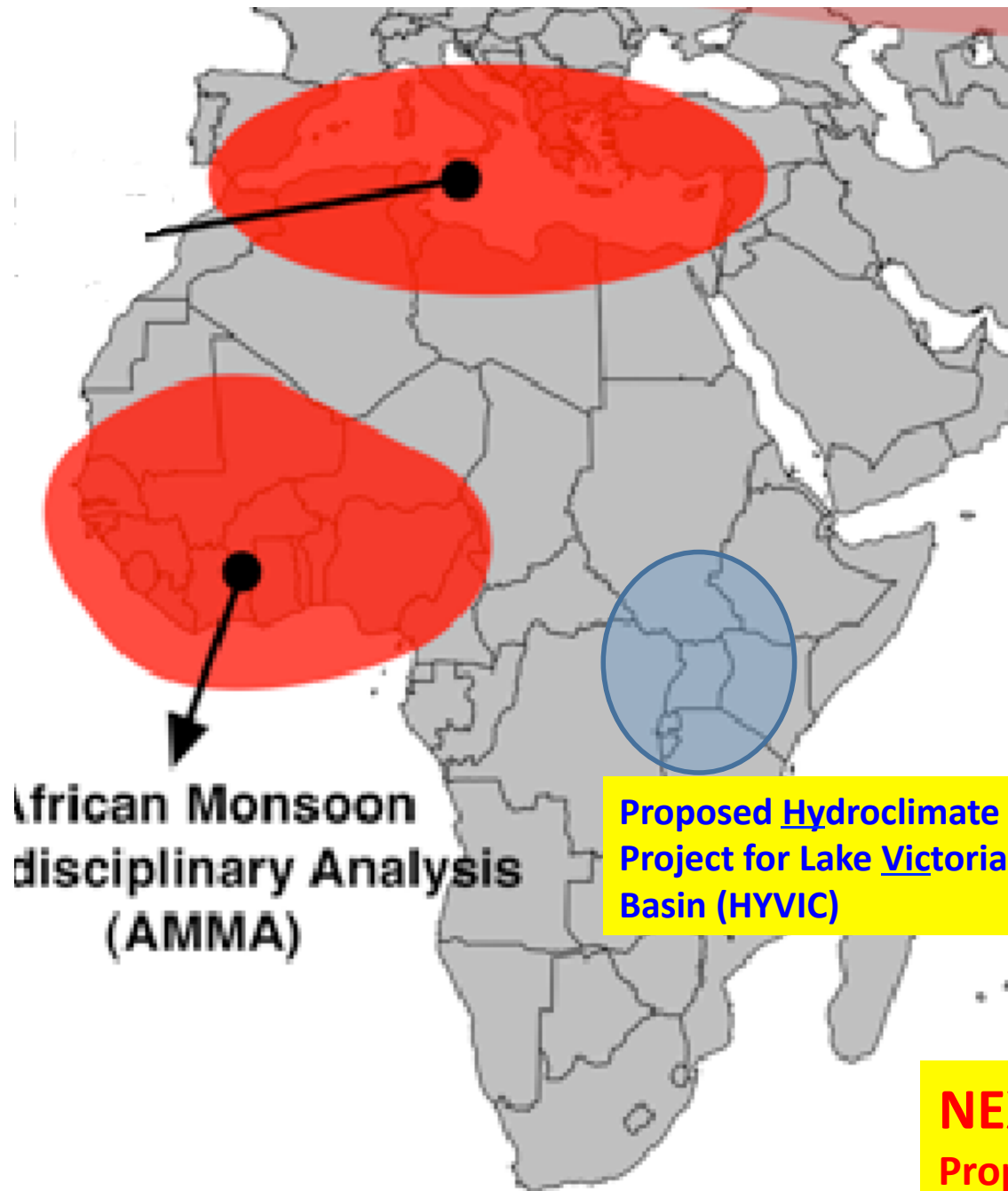


Area 400,000 km²

- Drains from continental divide in Alberta, through Saskatchewan to Manitoba
- Transboundary basin; poses generic science and management challenges

Howard Wheeler

Proposed Regional Hydroclimate Project (RHP)



- What is the water balance?
- What are the trends?
- Why are the changes occurring?
- What does it mean for water resources in the future?
- What are the implications and risks for management of hydroelectric power generation, water, agriculture, and other leading sectors?

Fred Semazzi

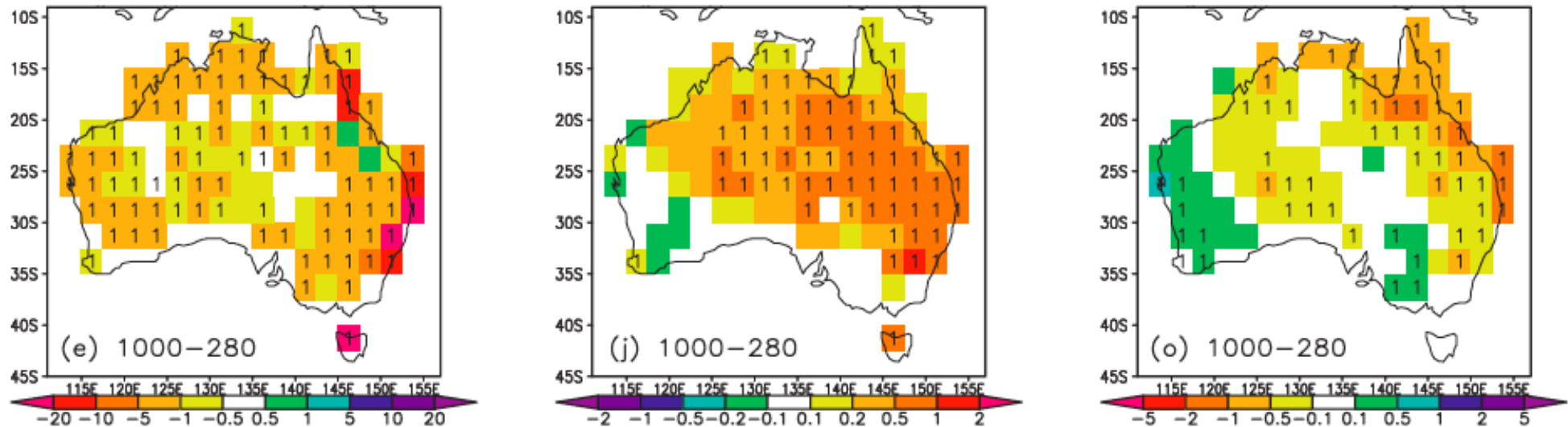
NEXT STEPS – Draft Science Plan & Proposed HYVIC Workshop (early 2013)

Murray Darling Basin Regional Climate Modelling

<http://www.ccrcc.unsw.edu.au>

Contact: Jason Evans (jason.evans@unsw.edu.au)

Andy Pitman (a.pitman@unsw.edu.au)



Monthly average changes in (e) transpiration (W m^{-2}), (j) canopy temperature ($^{\circ}\text{C}$) and (o) rainfall rate (mm d^{-1}) for changes in leaf-level CO_2 : 1000-280 ppmv. Averages are taken over 51 realizations for each of the three Januarys in the wet case. Changes that are statistically significant at a 95% confidence level are marked with “1”.

From Cruz, F.T., A.J. Pitman, J.L. McGregor & J.P. Evans (2010), Contrasting regional responses to increasing leaf-level atmospheric carbon dioxide over Australia., *J. Hydrometeorol.*, 11(2), 296-314 25



BALTEX Phase III: new name

Study Conf: Borgholm, Sweden, 10-14 June 2013

Building Regional Earth System Knowledge - A future programme for the Baltic Sea region

BALTEX Phase II was an **environmental research network** dealing with the **Earth system of the entire Baltic Sea catchment** including terrestrial and marine ecosystems

Scientific disciplines (in Phase II):

- Meteorology
- Hydrology
- Climatology
- Oceanography
- Biogeochemistry

Important elements:

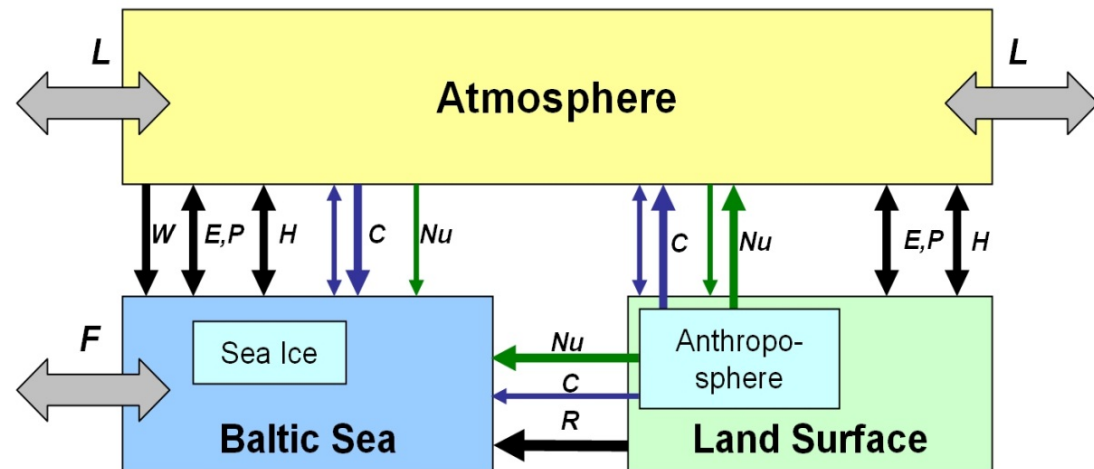
climate variability and change

and related impacts on ecosystems (and the human sphere)

“Regional Earth System Modelling”

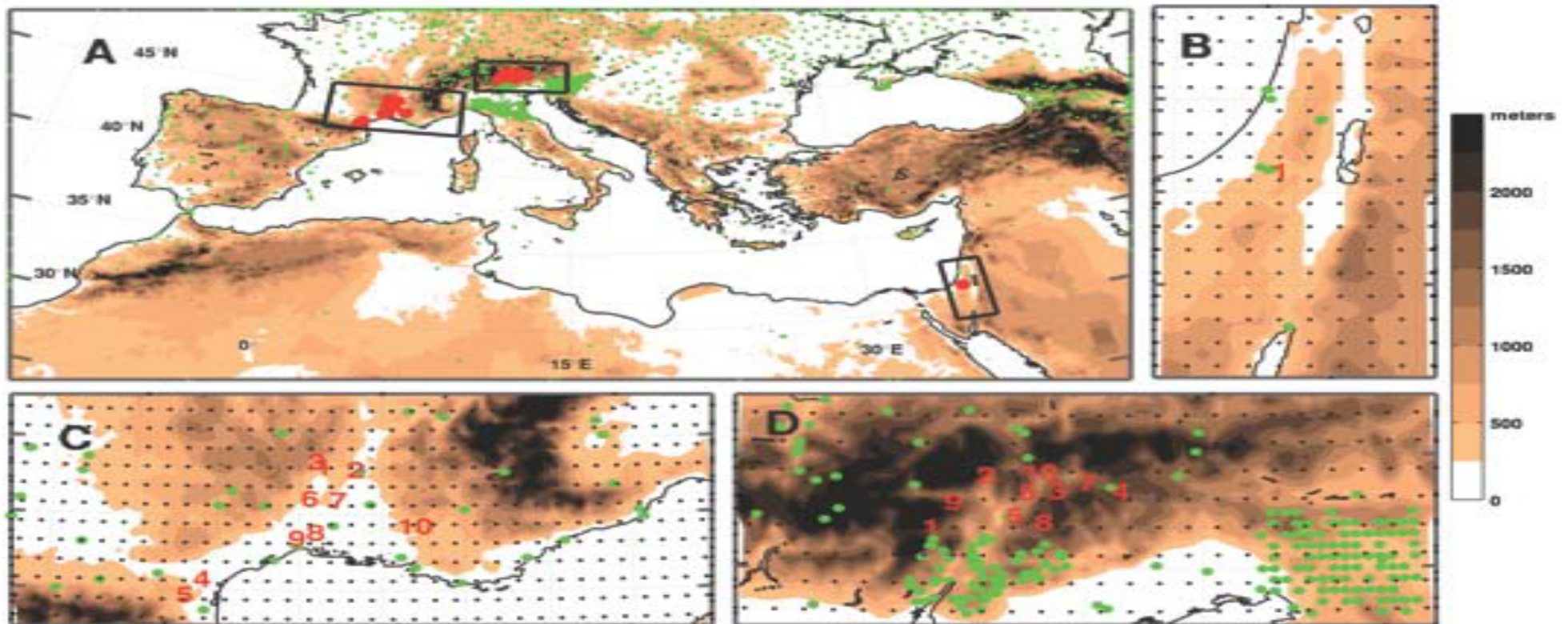
The human dimension of regional climate change (perception, adaptation)

Outreach to stakeholders



HyMeX

Philippe Drobinski¹, Véronique Ducrocq², Piero Lionello³ and Víctor Homar



HyMeX stations (red numbers) used for the uncertainties assessment of the European Climate Assessment (ECA) data set (grid in black dots), and stations used for the ECA data set construction (green dots). (A) Mediterranean domain used for the Coordinated Regional Climate Downscaling Experiment (CORDEX) climate simulations. Enlarged areas show stations in Israel (B), France (C), and Italy (D).

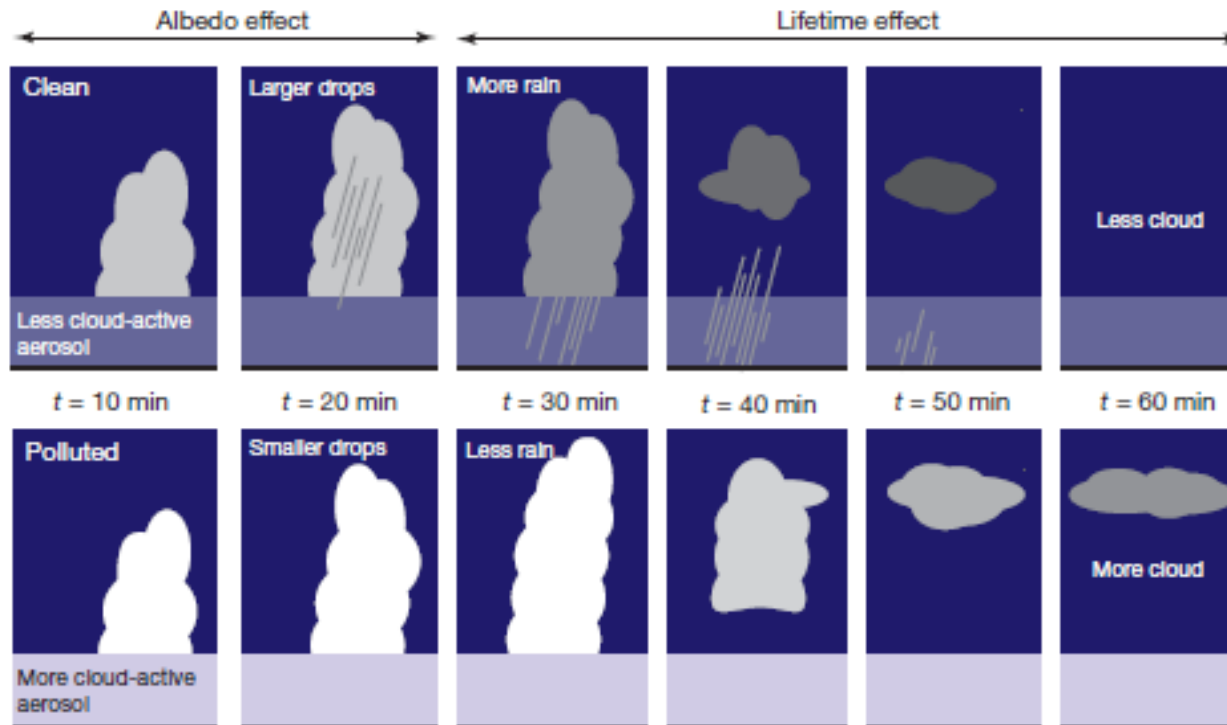
GHP: Promoting cross-cut projects

- Generate interactions among RHPs
- Push GEWEX science questions
- Address issues of common concern
- Keep completed RHPs involved
- A tool for collaboration with other GEWEX panels and WCRP projects.
- **A way for the broader Community to get involved in GEWEX/GHP.**

GEWEX Modeling: GASS

Global Atmosphere System Study

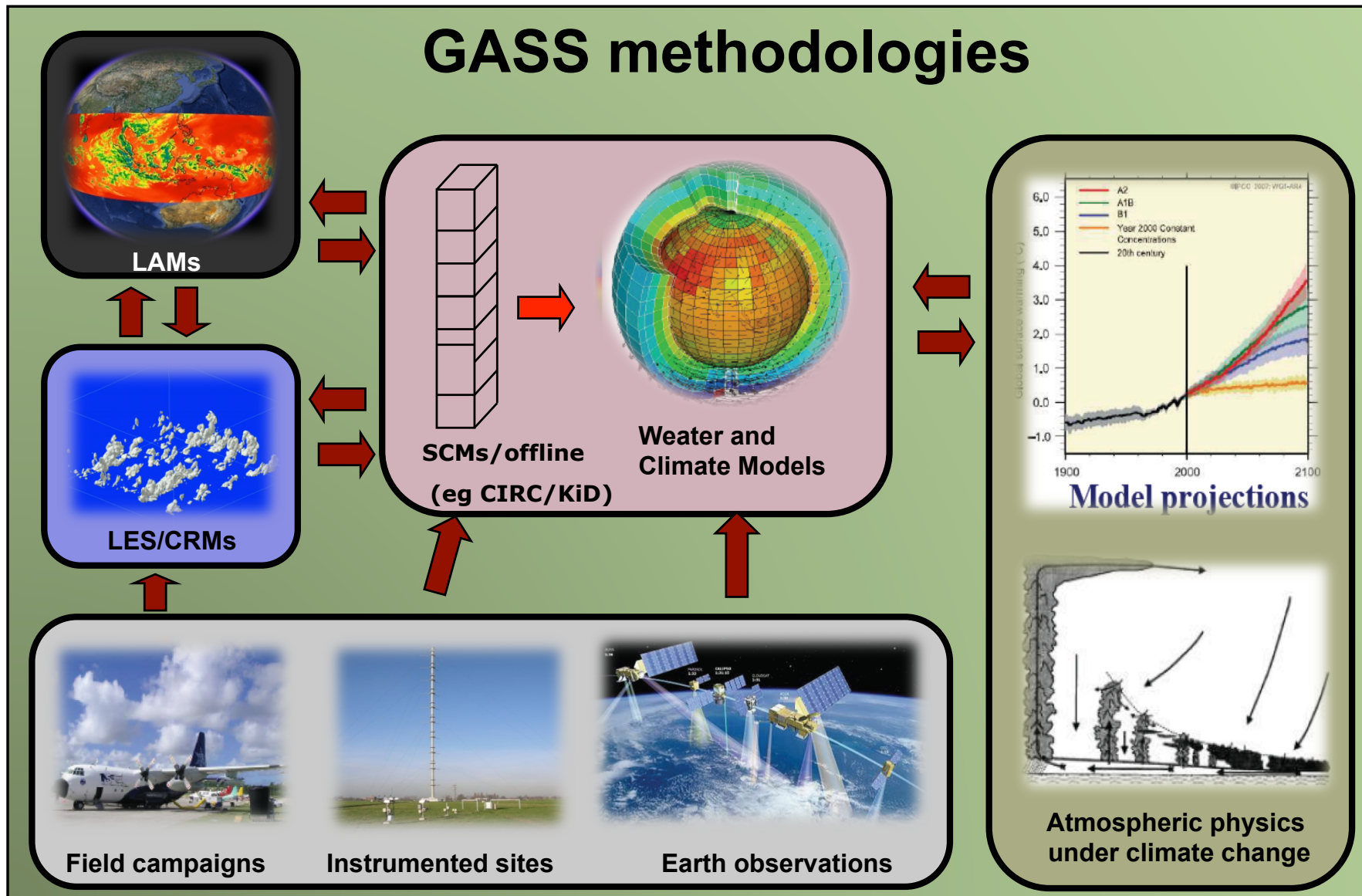
- Atmospheric processes, esp. clouds, convection, microphysics
- Model Parameterization evaluation and development
- Data sets and tools, intercomparisons
- Atmospheric Boundary Layer
- Strong cooperation with NWP via WGNE
- http://www.gewex.org/gass_panel.html



Projects

Boundary Layer clouds
Polar clouds
Convection, clouds
GABLS3
MJO
Single Column Models
Cloud Resolving Models
GASS-GHP links

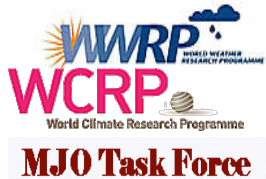
Working with many model types bringing together observations, modelling and understanding in intercomparison projects



Accomplishments in last 20 years

Often in collaboration with other groups, there have been over **40 projects** in the last 20 years.

Area	no	Project
Boundary layer clouds	13	Fire stratocumulus, smoke cloud case, Astex Lagrangians (2), Astex stratocumulus, Bomex, ATEX, ARM Shallow Cu, Eurocs FIRE diurnal cycle, DYCOMS (2), RICO stratocu->trade cu transition, climate change (CGILS)
Deep convection	9	ARM summer 1997, ARM summer 1999, TOGA-COARE (3), TWP-ICE; EUROCS
Polar clouds	4	MPACE (2), Sheba May 8 , ISDAC
Cirrus	4	ICMCP, Parcel Model, 9 March 2000 ARM, sparticus
Frontal clouds	4	Australian cold front, FASTEX, ARM March 2000 IOP (2)
Global clouds	2	GPCI, MJO Diabatic heating
Stable boundary layer	3	GABLS cases
Radiation	1	CIRC – now GASS/GDAP joint
Microphysics	1	KiD



The 1st Pan-GASS meeting: Observing, modelling and representing atmospheric processes in weather and climate models 10-14 September 2012 (Boulder)

- 60K of support in total from: **WCRP; NASA; NOAA**
- GEWEX IPO hosted a web site and the talks
- Most critical support was from NCAR for the Center Green facilities and organisational support

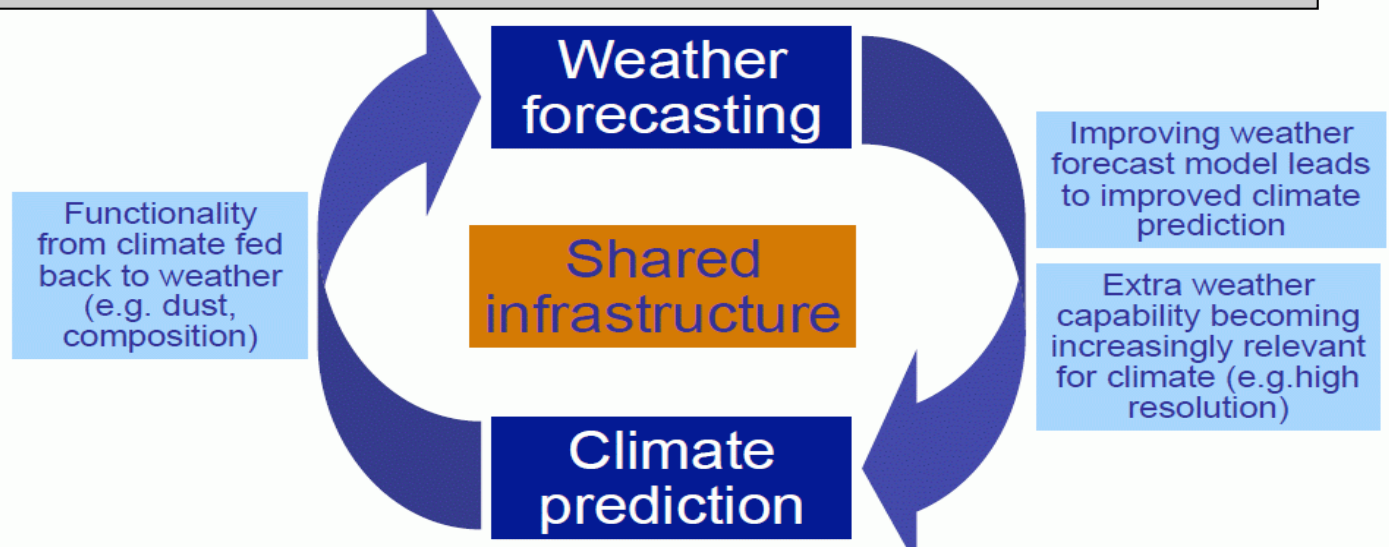


230 participants with a focus on:

- Land-atmosphere interactions was a focus (**with GLASS**)
- Tropical processes and dynamics (**with MJO task force**)
- Radiation processes included for first time (**CIRC presentation; radiation in climate models; discussions of radiation projects**)
- Panel discussion on observations to support model development
- Seamless prediction – weather and climate

Past (pan-GCSS meetings)

Year	Location
1998	Reading
2002	Kananaskis
2005	Athens
2008	Toulouse

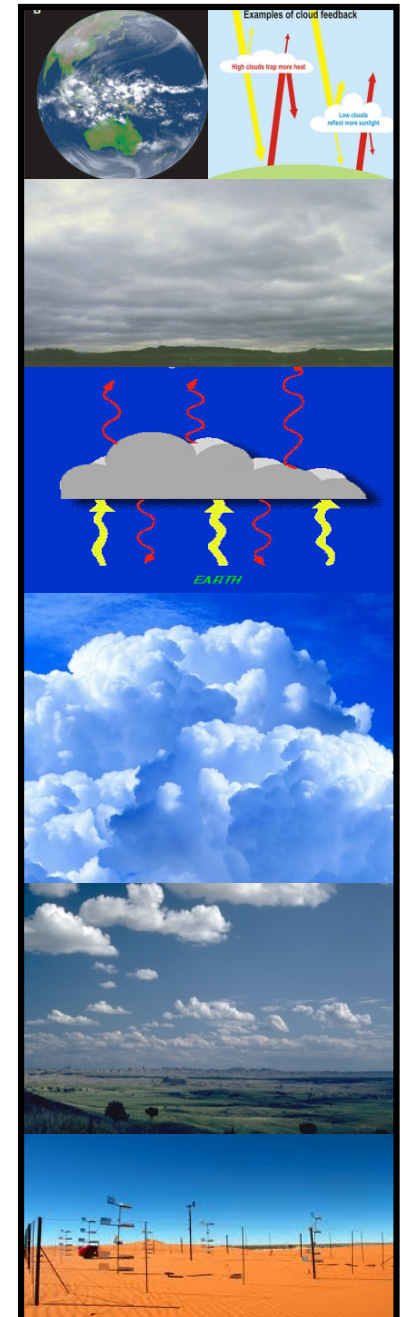


Current and future projects

Stable boundary layers: Antarctic case
The role of cloud and radiation processes in models US warm bias
Weak temperature gradient
Grey-zone project
Microphysics modelling (KiD)
DICE: LoCo/SGP Testbed (GLASS project) ←
Marine Boundary Layer Cloud Feedbacks (CGILS)
Land-Atmosphere Interactions (GLASS/GABLS joint project)
CIRC – the continuous intercomparison of radiation codes
Cirrus
Tropical Convection observed during CINDY/DYNAMO
Polar Clouds (ISDAC)
Stratocumulus-to-trade cumulus transition
Vertical structure and diabatic heating of the MJO ←

Mature/completing projects

GABLS3	Boundary layer processes
ISDAC	Polar clouds
SHEBA	Polar clouds
TWP-ICE	Deep convection





Diurnal land-atmosphere Coupling Experiment: **DICE**

Joint GASS-GLASS activity

New project as of April 2013

- Led by Adrian Lock and Martin Best at UK Met Office
- Joint activity between GASS (atmospheric boundary layer modellers) and GLASS (land surface modellers)
- Results due by August
- Workshop 14-16th Oct at UK Met Office, Exeter
- **Assessment of the land and single-column atmosphere models separately, constrained by observational data,**
- **Identify changes due to coupling.**

Website: <http://appconv.metoffice.com/dice/dice.html>

Vertical Structure and Diabatic Processes of the MJO: *Global Model Evaluation Project*

MJO Task Force/YOTC and GASS



www.ucar.edu/yotc/mjodiab.html

Model Experiment	Science Focus	Exp. POC
<p>I. 20 Yr Climatological Simulations (1991-2010 if AGCM) 6-hr, Global Output Vertical Structure, Physical Tendencies</p>	<p>Model MJO Fidelity Vertical structure Multi-scale Interactions: (e.g., TCs, Monsoon, ENSO)</p>	<p>UCLA/JPL X. Jiang D. Waliser</p>
<p>II. 2-Day MJO Hindcasts YOTC MJO Cases E & F (winter 2009)* Time Step, Indo-Pacific Domain Output Very Detailed Physical/Model Processes</p>	<p>Heat and moisture budgets Model Physics Evaluation (e.g. Convection/Cloud/BL) <i>Short range Degradation</i></p>	<p>Met Office P. Xavier J. Petch</p>
<p>III. 20-Day MJO Hindcasts YOTC MJO Cases E & F (winter 2009)* 3-hr, Global Output Elements of I & II</p>	<p>MJO Forecast Skill State Evolution/Degradation Elements of I & II</p>	<p>NCAS/Walker in. N. Klingaman S. Woolnough</p>

*DYNAMO Case TBD

Commitments: About 20 Modeling Groups with AGCM and/or CGCM





Met Office

Looking forward - MJO

- 3-5 June 2013: A GASS/MJO TF MEETING ON THE HEATING AND MOISTENING PROCESSES OF MJO
Centre for Climate Research Singapore (CCRS)



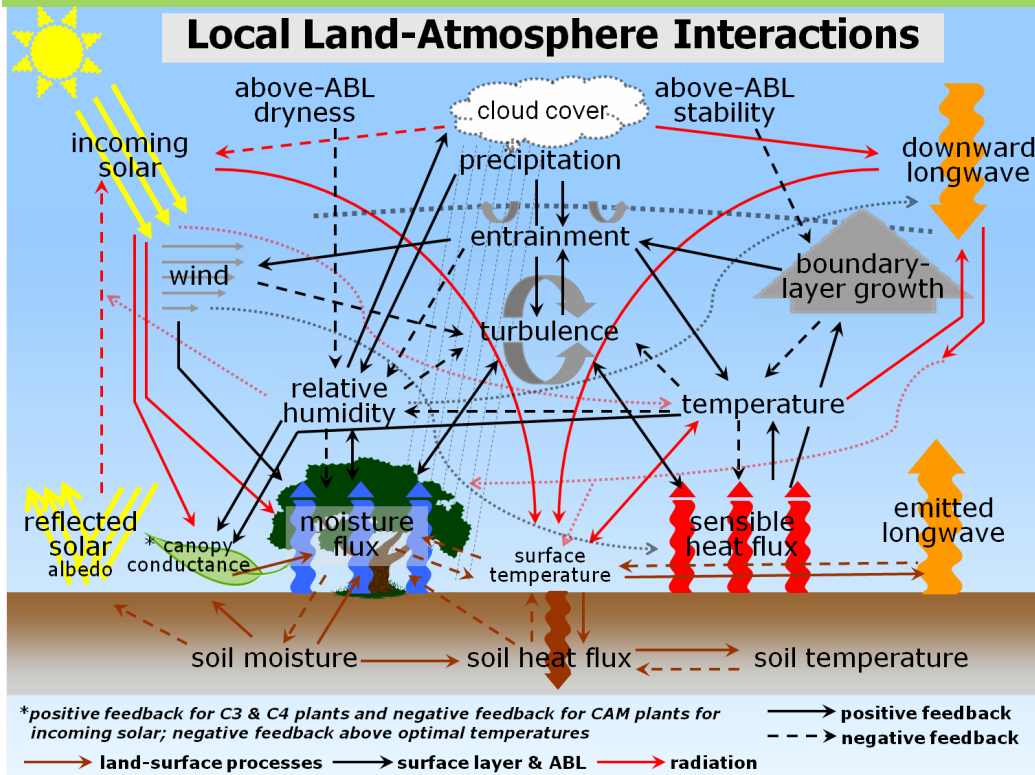
- June 2013: Release of CINDY/DYNAMO case including process models
- Summer 2013 : Draft of papers on each component & **release of data for all to work with**
- Fall 2013 : Summary paper and recommendation for high priority process studies

Contact: prince.xavier@metoffice.gov.uk

GEWEX Modeling: GLASS

Global Land Atmosphere System Study

- Land surface modeling
- Model Parameterization and development from land surface process
- Data sets and tools, intercomparisons
- Land-atmosphere coupling
- Model Data Fusion
- Strong cooperation with NWP via WGNE
- http://www.gewex.org/glass_panel.html



Projects

GLACE

LoCo

PILDAS

GSWP-3

PALS

PILPS

ALMIP2

LUCID2

GLASS-GHP links

Global Land Atmosphere System Study (GLASS)

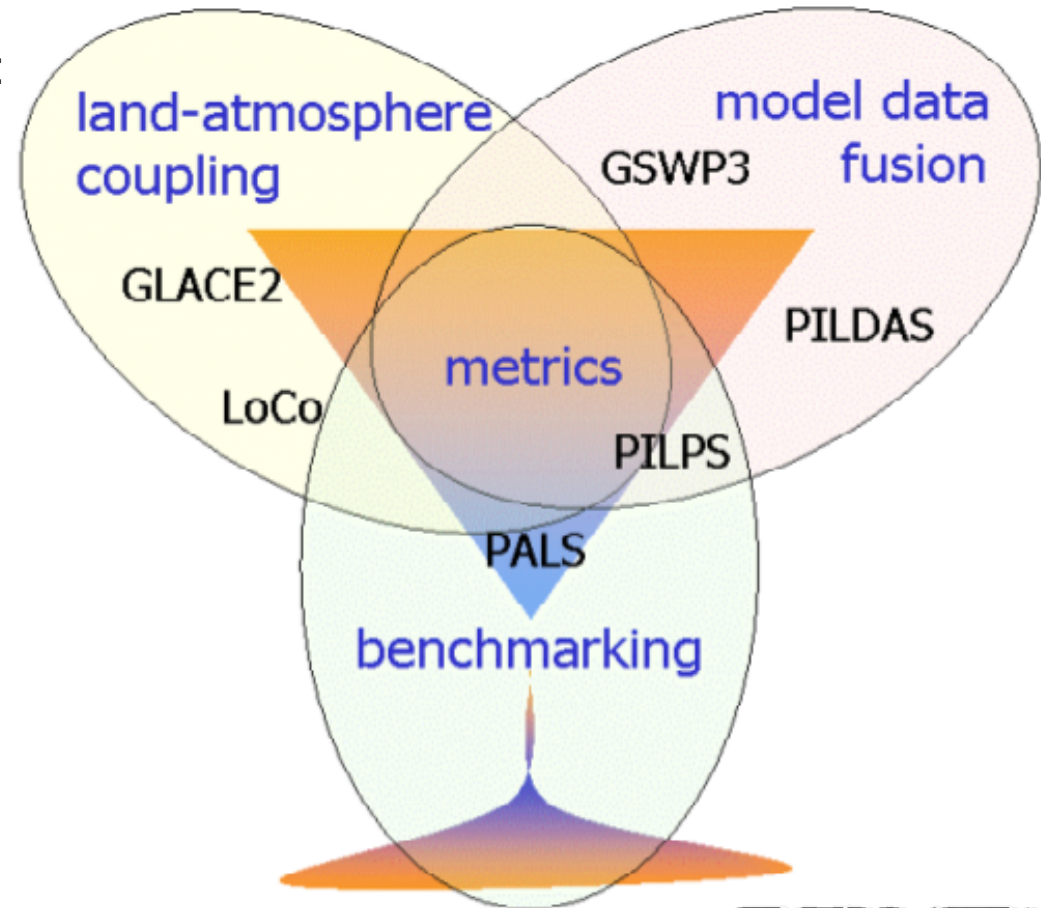


The aim of GLASS is to promote community activities that improve:

1. best estimates and the model representation of land surface state variables
2. understanding of land/atmosphere feedbacks
3. understanding of the role of land surface in predictability.

To best achieve these aims, GLASS has been re-structured into three elements:

- **Model Data Fusion**
- **Land-Atmosphere Coupling**
- **Benchmarking**



GLASS Projects :



- **LOCO: Local Land-Atmosphere Coupling**
- **PALS: Protocol for the Analysis of Land Surface models**
- **GLACE-2: Global Land-Atmosphere Coupling Experiment -2**
- **ALMIP-2: AMMA Land Surface Intercomparison Project Phase 2: Meso to Local Scale**
- **GSWP-3: Global Soil Wetness Project -3**
- **PILDAS: Project for the Intercomparison of Land Data Assimilation Systems**
- **PILPS: Project for Intercomparison of Land-surface Parameterization Schemes**

LoCo (Joe Santanello)

PALS (Gab Abramowitz)

GLACE2 (Bart vd Hurk)

ALMIP2 (Aaron Boone)

GSWP-3 (Hyungjun Kim)

PILDAS (Rolf Reichle)

GLASS-GHP Links (Mike Ek)



GLASS Projects :



- Ongoing
 - ALMIP2 – [Links to GHP](#)
 - GLACE2-CMIP
 - LoCo Working Group
 - LUCID2 – [Links to iLEAPS](#)

- Launching in next 12 months:
 - GSWP3 – [Links to carbon community](#)
 - PILDAS – [Links to WGNE](#)
 - DICE – GLASS/GABLS diurnal cycles
 - PALS/Benchmarking (PLUMBER) – [Links to GHP](#)
 - LoCo/SGP testbed

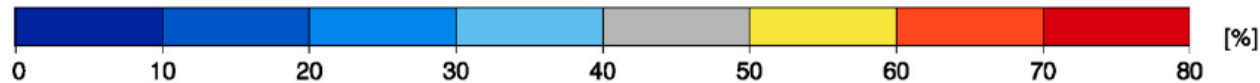
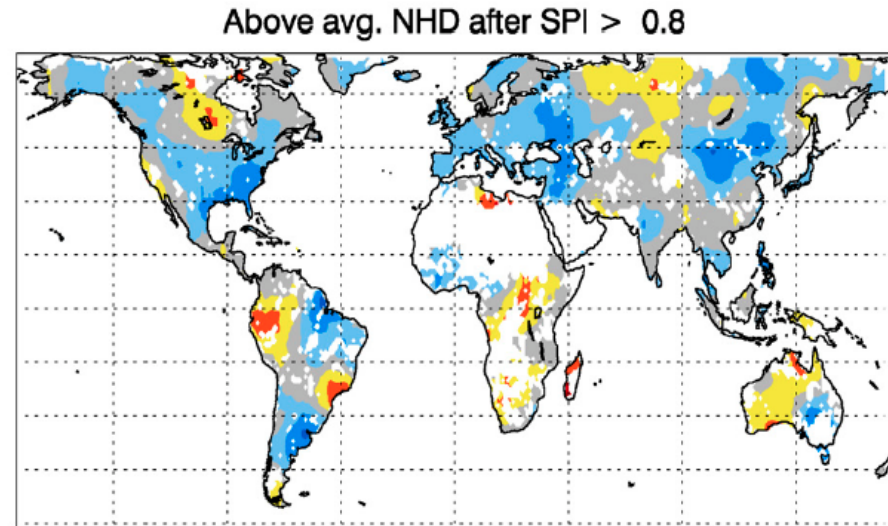
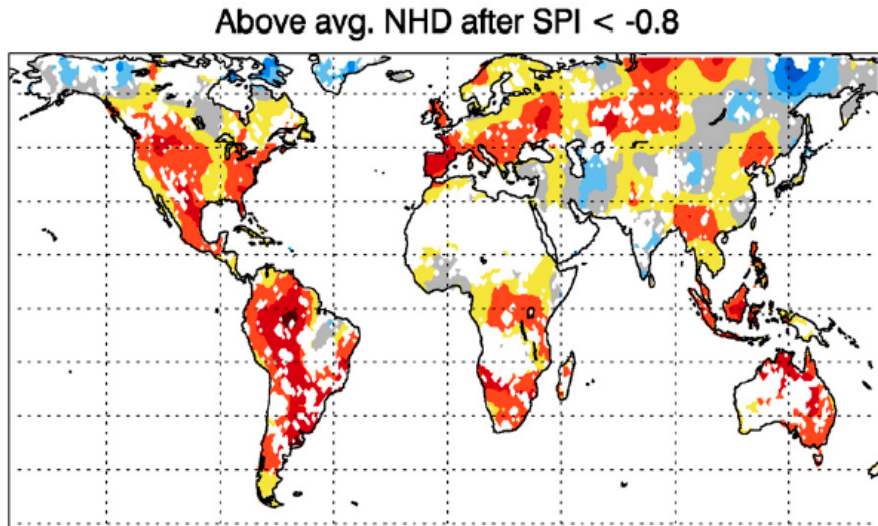
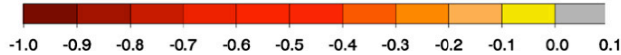
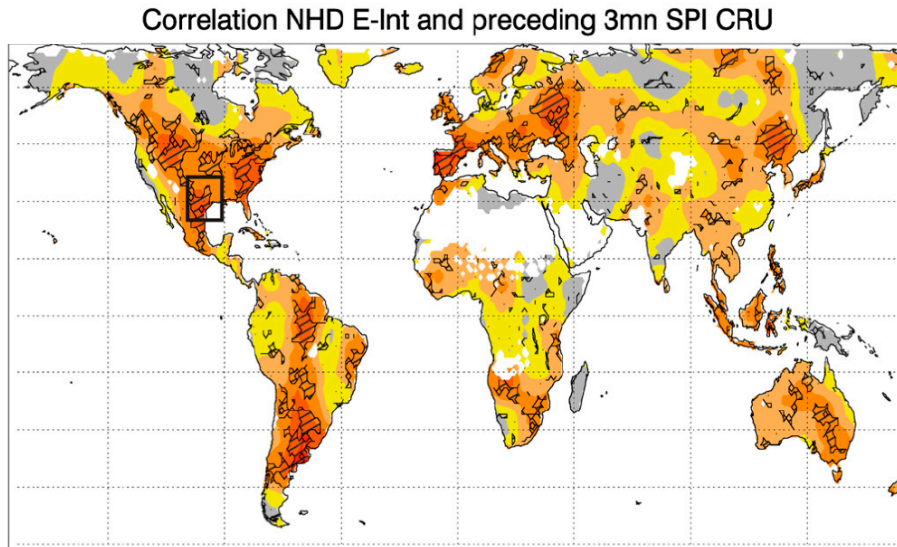


Hot spots of soil moisture-temperature coupling

Analysis for local **hottest month**
(i.e. valid in all regions \neq JJA)

NHD: Number of hot days (ERA-interim)
SPI: Standardized precipitation index (in 3-month preceding hottest month)

Surface moisture deficits are a necessary condition for the occurrence of hot days in a large fraction of the globe



(Mueller and Seneviratne 2012, PNAS)

Revising Forcing data for EXP1 (long-term retrospective)

Dynamical Global Downscaling

- * Spectral Nudging using GSM (Yoshimura and Kanamitsu, 2008)
- * Single Ensemble Correction (Yoshimura And Kanamitsu, 2013)
- * Vertically Weighted Damping (Hong and Chang, 2012)

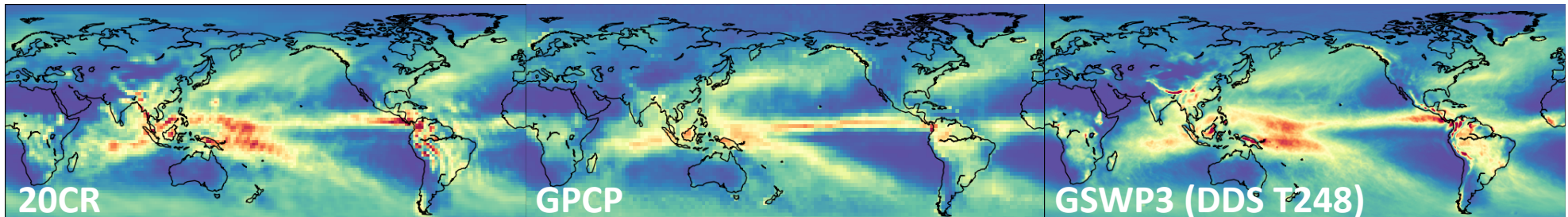
Two-pass Ensemble Bias Correction

- * Non-parametric Daily Correction (Kim et al., in prep.)
- * Parametric Monthly Correction (Watanabe et al., 2012)

GSWP3
EXP1
Forcing

20CR (Compo et al., 2011)
1901-2010 6hr / 2°x2°(91x180)

Observations (Prpc: GPCC, GPCP, CPC-Unified; Tair: CRU; Rad.: SRB)
0.5°x0.5°
1901-2010 3hr



Upcoming Schedules (tentative)

May : distribute EXP1 forcing
Aug. : EXP1 result submission

Sep. 9-11th : First Workshop@Tokyo
Nov. : distribution EXP3 forcing

GEWEX Science Questions:

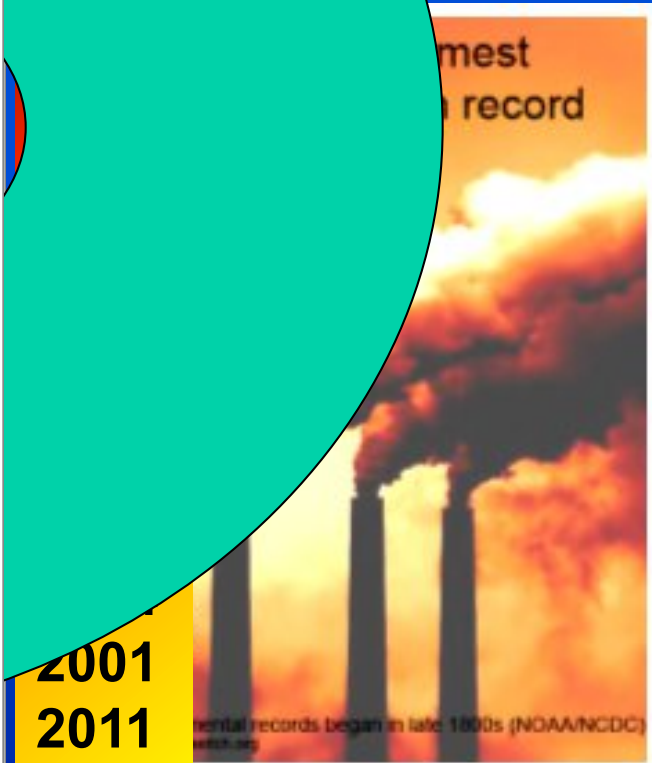
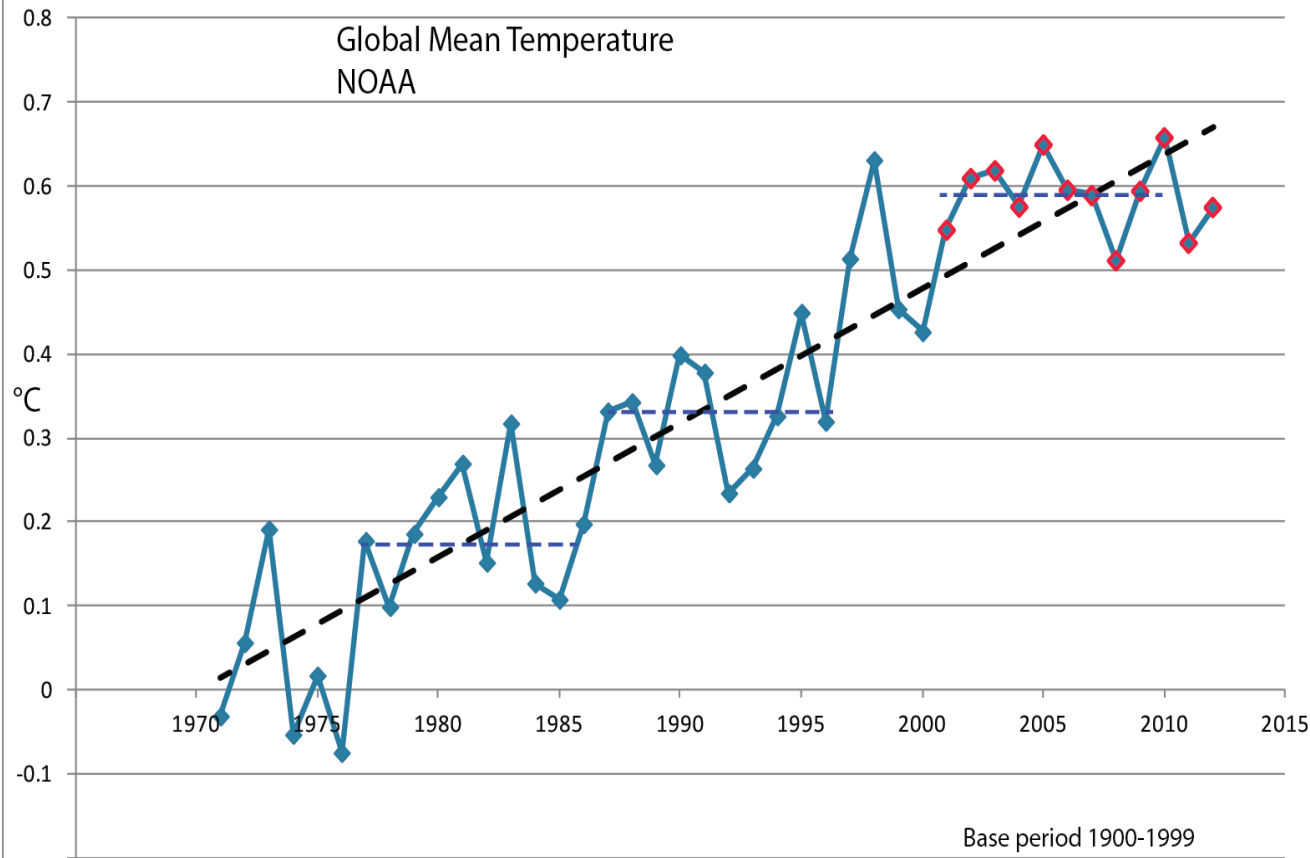
- **Observations and Predictions of Precipitation**
How can we better **understand** and **predict** **precipitation variability and changes**?
- **Global Water Resource Systems**
How do changes in the **land surface** and **hydrology** influence past and future changes in **water availability** and **security**?
- **Changes in Extremes**
How does a warming world affect **climate extremes**, and especially **droughts**, **floods** and **heat waves**, and how do **land processes**, in particular, contribute?
- **Water and energy cycles and processes**
How can understanding of the effects and uncertainties of **water** and **energy exchanges** in the current and changing climate be improved and conveyed?

Water and Energy Cycles

-GSQ 4

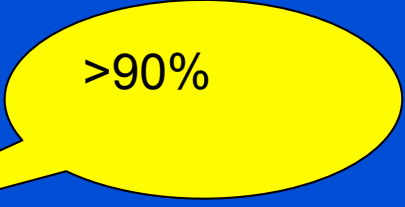
- Can we balance the **energy** budget at the top-of-atmosphere?
- Can we balance the **energy** budget at the surface of the Earth?
- Can we further track the **changes** over time?
- Can we relate the changes in surface energy budget with atmospheric-oceanic processes and long term variability?
- Can we improve confidence in **feedbacks** associated with cloud-aerosol-precipitation interactions in the climate system?

A few of glob

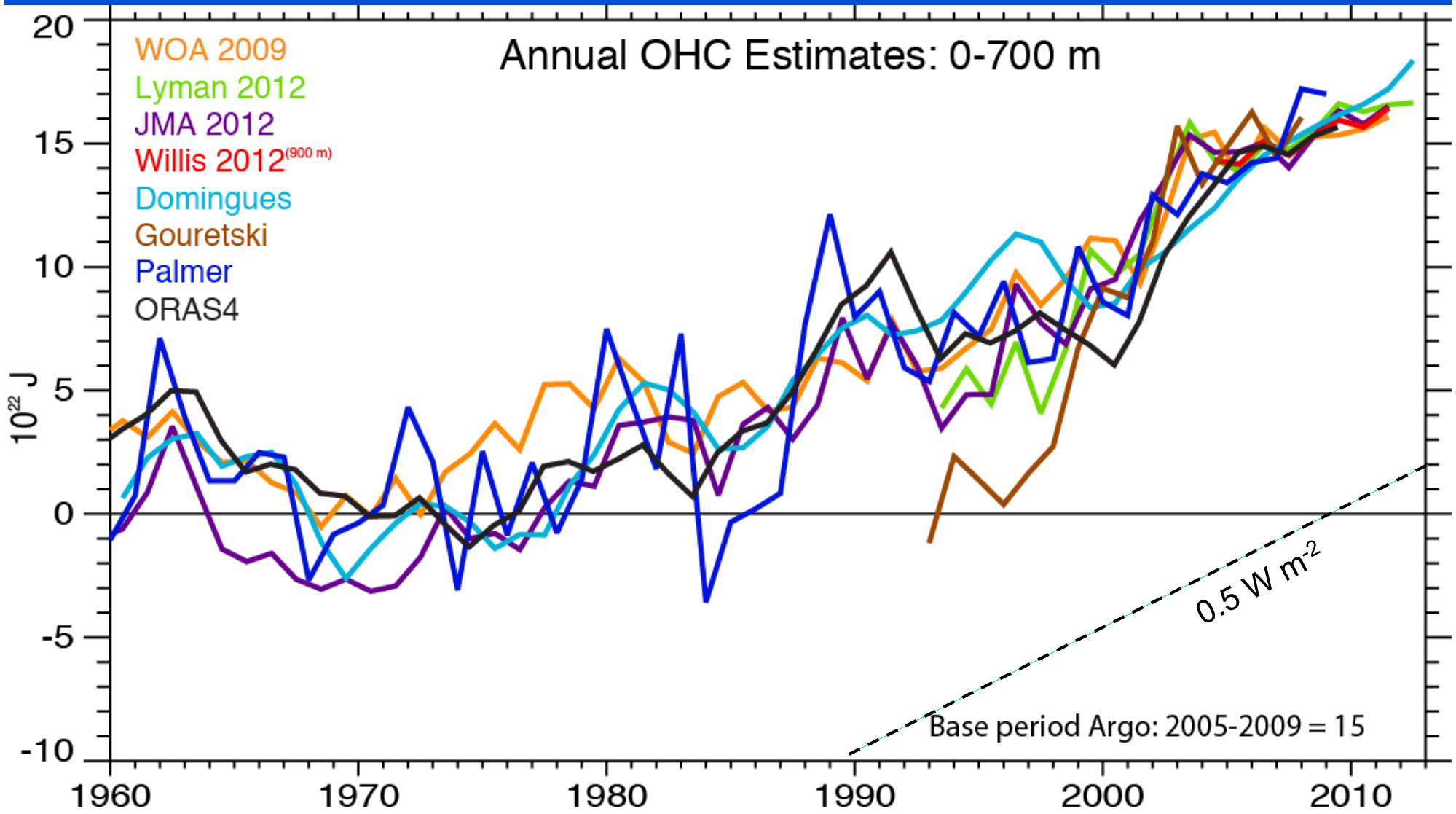


1998 was especially warm from the major El Nino, but by cherry picking points one can infer the wrong trend (red) vs the correct one (black dashed).
NOAA/NCDC data Thru 2012

Global warming means more heat: Where does the heat go?

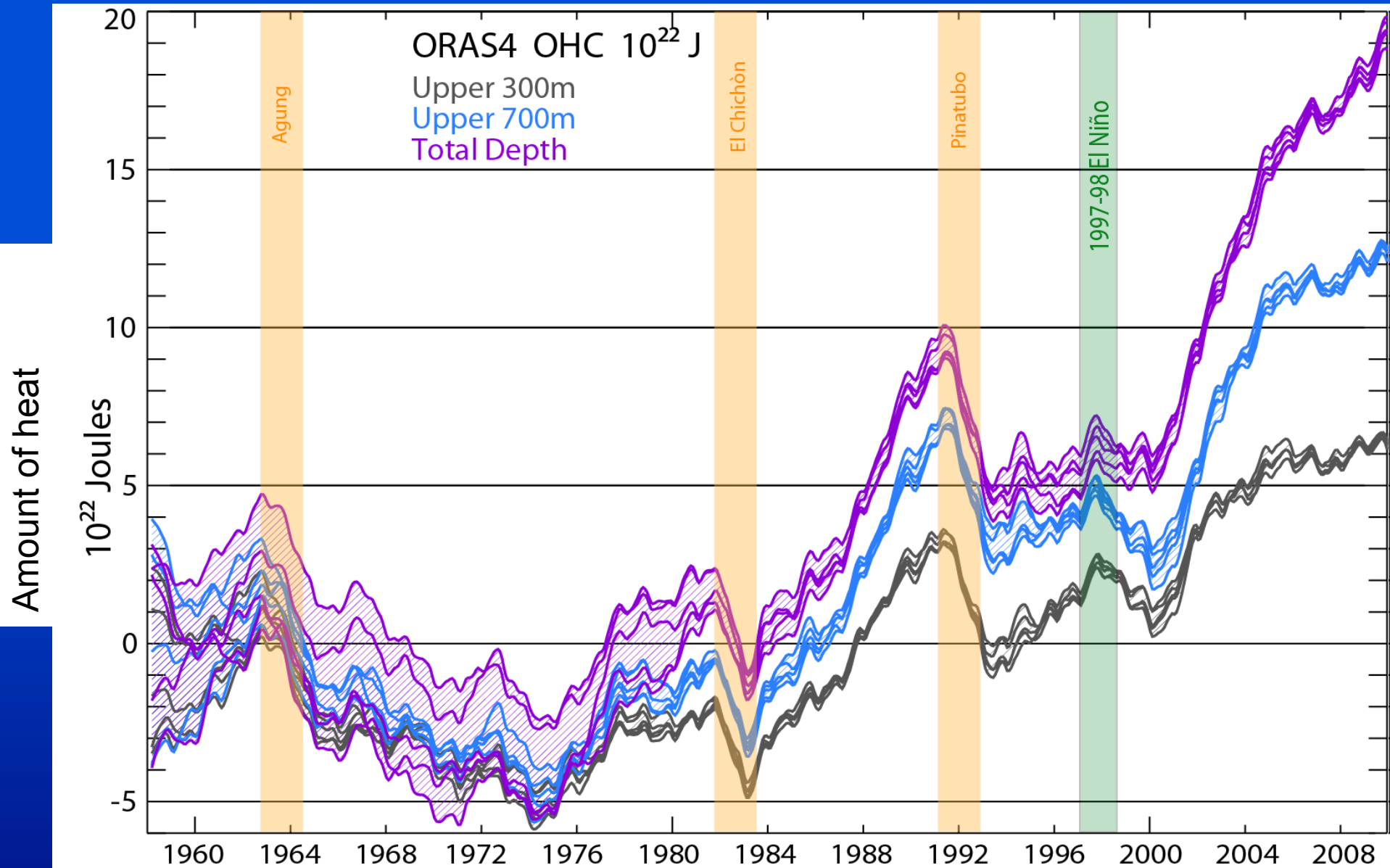
1. Warms land and atmosphere 
2. Heat storage in the ocean (raises sea level)
3. Melts land ice (raises sea level)
4. Melts sea ice and warms melted water
5. Evaporates moisture \Rightarrow rain storms, cloud
 \Rightarrow possibly reflection to space

Ocean Heat Content



Base period 2005-09 set to 15

Global Ocean Heat Content



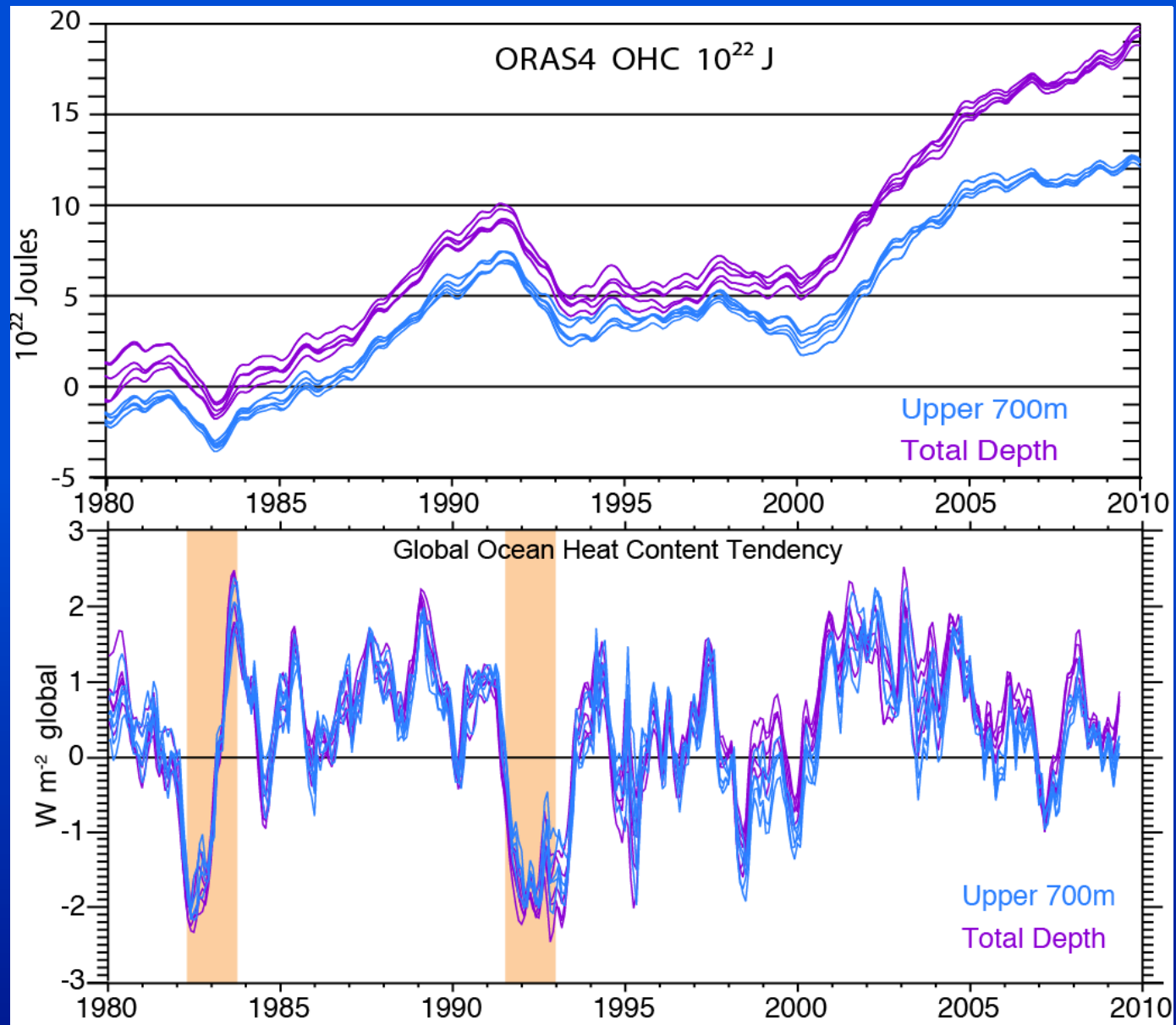
Deep Doo Doo

Lynne Page

marduckbud@yahoo.com

There's a clearer analysis forming
Of the increase in powerful storming;
But it's not just hot air
About which we should care,
For the cold ocean depths have been warming.

OHC from ORA4 and rates of change



Linear Ocean $W m^{-2}$

0.91 $W m^{-2}$ all included (melting ice etc)

	1975-2009	1980s	1990s	2000s	NoArgo 2000s
Total (ocean)	0.47 ± 0.03	0.58 ± 0.15	-0.26 ± 0.13	1.19 ± 0.11	0.82 ± 0.10
Global	0.33	0.41	-0.18	0.84	0.58
Upper 300m	0.26 ± 0.02	0.46 ± 0.11	-0.04 ± 0.12	0.45 ± 0.08	0.35 ± 0.08
Upper 700m	0.38 ± 0.03	0.59 ± 0.13	-0.22 ± 0.10	0.90 ± 0.13	0.67 ± 0.09
Below 700m	0.10 ± 0.01	-0.01 ± 0.02	-0.04 ± 0.05	0.30 ± 0.02	0.15 ± 0.01

Planned Events 2013

The GEWEX SSG has responded to the JSC requests by developing strategies in Latin America, and Africa, and for some Grand Challenges.

2-6 Sept 2013: GDAP/GHP parallel/joint meetings (3 days) and GHP/GDAP/ **South America** open conference (2 days) prelude to Latin America/Caribbean Conference (local host Ana Nunes, University of Rio de Janeiro)

15-18 Oct 2013 **African** climate conference, Arusha, Tanzania; with GEWEX involvement on several fronts (HAP, AMMA, HyVic, WAMME2)

Grand Challenge on Water Resources

5-7 June 2013 GSQ 2 mtg Saskatoon (Wheater)

24-26 June 2013: GSQ 1 meeting Fort Collins (Kummerow)

Grand Challenge on extremes

2014 : summer school on attribution and prediction of extreme events in ICTP (Italy)

28-31 Oct 2013 GEWEX SSG mtg; Boulder (Trenberth)


Planned Events 2014

6-12 July 2014: GEWEX Summer Session for Early Career Scientist at the Delft University of Technology; Delft

Topic: *GSQs*; Eric Wood and Massimo Menenti

13-19 July 2014 GEWEX Sci Conf, The Hague, Netherlands

(incl pan-GEWEX and pan-CLIVAR mtg)

A photograph of the World Forum building in The Hague, The Netherlands, at night. The building is a large, modern structure with a curved facade and many lit windows. The name 'world forum' is visible on a sign. The building is reflected in a body of water in the foreground. The sky is dark, and there are some lights visible in the distance. A blue diagonal shape is overlaid on the left side of the image.

7th International Scientific Conference on the Global Energy and Water Cycles

World Forum
The Hague, The Netherlands
14-17 July 2014

7th International Scientific Conference on the Global Energy and Water Cycles

The World Forum At The Hague



The World Forum is a full-service international congress venue located in the heart of World Forum zone, an area known for organizations headquartered there such the International Criminal Tribunal for the former Yugoslavia

- Multifunction rooms with varying capacities
- Expo areas for poster displays
- Largest theater in The Netherlands

7th International Scientific Conference on the Global Energy and Water Cycles



Conference format will be similar to the 2011 WCRP Open Science Conference

- Plenary with speakers
- Poster sessions

Main themes:

- The GEWEX Science Questions
- The WCRP Grand Challenges
- Topics from the GEWEX Panels

The Conference will be followed by Pan-GEWEX and Pan-CLIVAR Meetings

GEWEX Science Conference and pan-GEWEX meeting

14-18 July 2014
at the World Forum
in The Hague; Netherlands.

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
730 -		Registration				
830 - 1230		Plenary (250-400)	Plenary (250-400)	Plenary (250-400)	Plenary (250-400)	4 Panel Meetings (20-30) (20-30) (20-30)
1230 - 1400		Lunch	Lunch	Lunch	Lunch	Lunch
1400 - 1530		Poster (~150 Posters)	Poster (~150 Posters)	Poster (~150 Posters)	Plenary Pan-GEWEX (80-100)	4 Panel Meetings (20-30) (20-30) (20-30)
1530-1730	Registration	3 Parallel Sessions (80-100) (80-100)	3 Parallel Sessions (80-100) (80-100)	3 Parallel Sessions (80-100) (80-100)	4 Panel Meetings (20-30) (20-30) (20-30)	Plenary Pan-GEWEX (80-100)
		Reception/ Icebreaker		Dinner		

GEWEX Science Conference and pan-GEWEX meeting

14-18 July 2014

GEWEX	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
730 -		Registration				
830 - 1230		Plenary (250-400)	Plenary (250-400)	Plenary (250-400)	Plenary (250-400)	4 Panel Meetings (20-30)(20-30)(20-30)
1230 - 1400		Lunch	Lunch	Lunch	Lunch	Lunch
1400 - 1530		Poster (~150 Posters)	Poster (~150 Posters)	Poster (~150 Posters)	Plenary Pan-GEWEX (80-100)	4 Panel Meetings (20-30)(20-30)(20-30)
1530-1730	Registration	3 Parallel Sessions (80-100)	3 Parallel Sessions (80-100)	3 Parallel Sessions (80-100)	4 Panel Meetings (20-30)	Plenary Pan-GEWEX (80-100)
		Reception/ Icebreaker		Dinner		
CLIVAR	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
730 -						
830 - 1230				Registration	5 Parallel Sessions (20-30)	6 Panel Meetings (20-30)(20-30)(20-30)
1230 - 1400				Lunch	Lunch	Lunch
1400 - 1530				Plenary Pan-CLIVAR (80-100)	Plenary Pan-GEWEX/CLIVAR (250)	6 Panel Meetings (20-30)(20-30)(20-30)
1530-1730				5 Parallel Sessions (20-30)	6 Panel Meetings (20-30)	Plenary Pan-CLIVAR (80-100)
				Dinner		

Pan-CLIVAR meeting

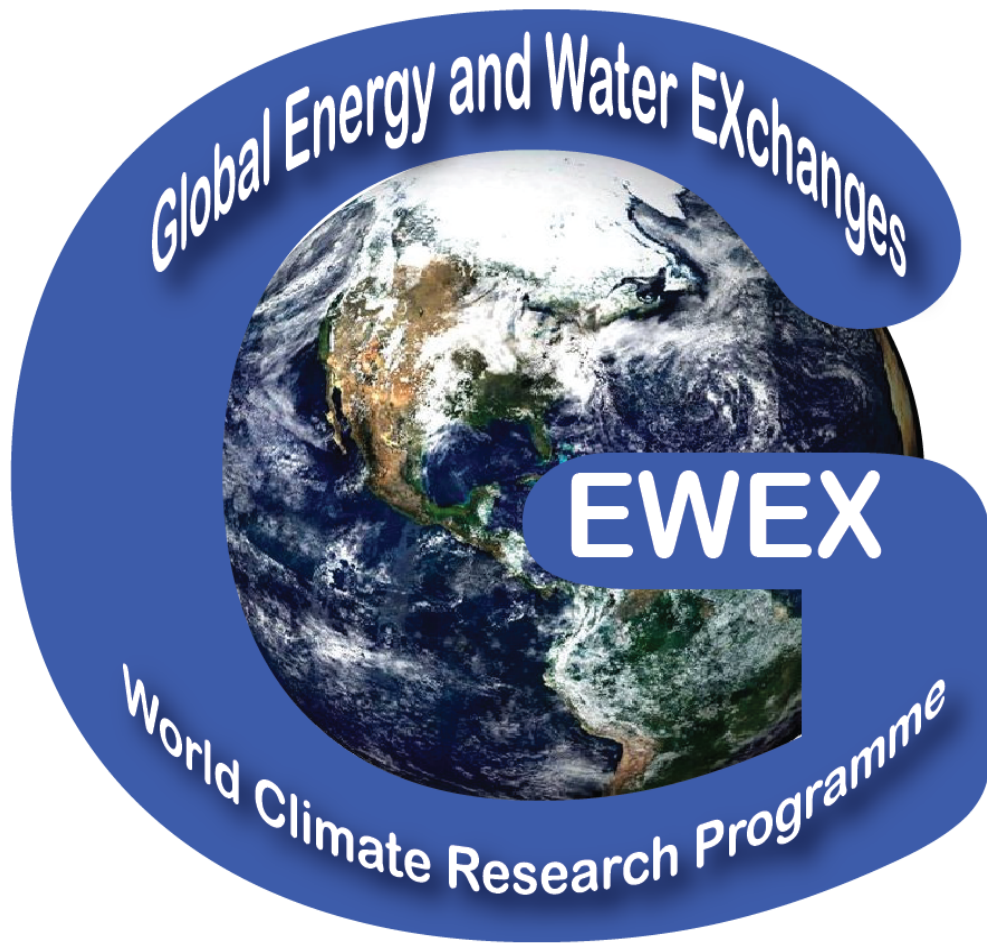
1. We expect many CLIVAR scientists will attend.
2. Many topics will be of mutual interest
3. A pan-CLIVAR mtg at same time as pan-GEWEX mtg
4. Potential to enhance the science conference with some jointly convened sessions:
 - Surface fluxes
 - Energy balance
 - Monsoons
 - Extremes
 - ...

Implementation of the **WCRP Grand Challenges** and **science questions**

Depend upon the **GEWEX Imperatives**:

observations and data sets, their analyses, process studies, model development and exploitation, applications, technology transfer to operational results, and research capacity development and training of the next generation of scientists.

They involve all of the **GEWEX Panels** and will benefit greatly from strong interactions with other WCRP projects such as **CLIVAR, SPARC, and CliC** and other sister global environmental change (GEC) research programs: IGBP, International Human Dimensions Programme (IHDP), and DIVERSITAS; or the new Initiative called **Future Earth**.



See you there!