Global Energy and Water Exchanges

GEWEX Organization, Science Questions & Imperatives

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Outline

- **Introduction**
- **WCRP and GEWEX, history and overview**
- **GEWEX Science**

  WCRP Grand Challenges

  GEWEX Science Questions

  GEWEX Organization

  GEWEX Regional Activity Relevant to African Water Cycle Symposium

- **Conclusion**

World Climate Research Programme

Sponsored by the World Meteorological Organization, the International Council for Science and the Intergovernmental Oceanographic Commission of UNESCO.

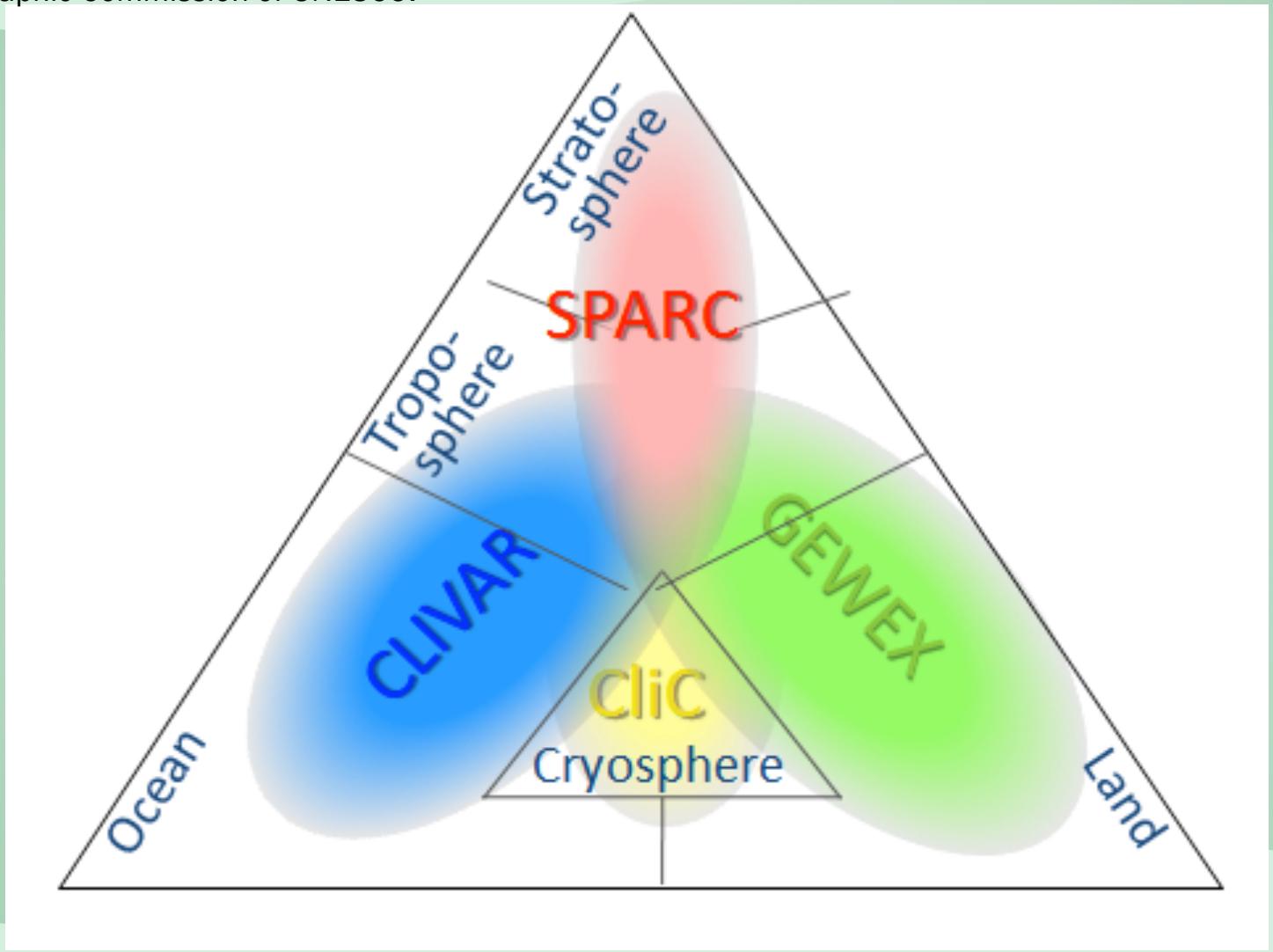
- **The WCRP Mission:** to facilitate analysis and prediction of Earth system variability and change for use in an increasing range of practical applications of direct relevance, benefit and value to society.

WCRP
World Climate Research Programme

GEWEX GHP

World Climate Research Programme

Sponsored by the World Meteorological Organization, the International Council for Science and the Intergovernmental Oceanographic Commission of UNESCO.



GEWEX

A brief history

- Born out of the realization that the Earth observational systems at that time (the early 1980's) needed to be improved on if more progress was to be made on the meteorology and global climate research.
- Two feasibility workshops were held in 1987 and 1988 and in the first part of 1990 a science plan was finalized
- In December of 1990 the Global Energy and Water cycle Experiment (GEWEX) was approved by WMO and ICSU as a core project of the World Climate Research Programme (WCRP)

Phase III: 2013 ~ 2022

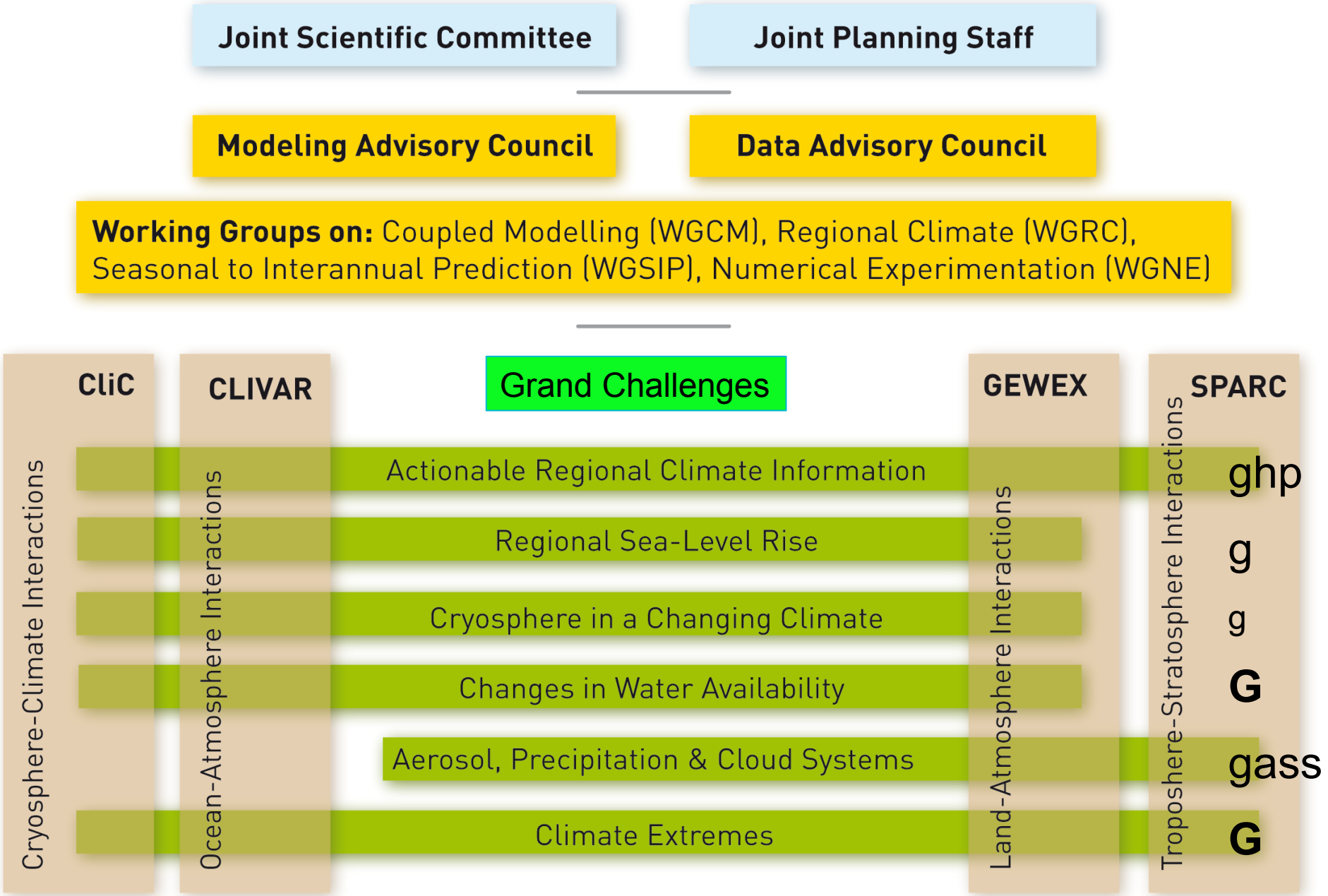
Science Objectives & Imperatives

- **Building upon the results and experience from Phase I and II the GEWEX community for Phase III has developed through an open and interactive process:**
  - A new Name, Vision and Mission Statement
  - Driven now by the WCRP Grand Challenges and the development of
  - The GEWEX Science Questions that map into the Grand Challenges and which will be addressed in the next 5 to 10 years partly facilitated through the GEWEX Imperatives.

GEWEX Mission

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.

WCRP Organization



Four GEWEX Science Questions

For the next 5 to 10 years

1	Observations and Predictions of Precipitation
2	Global Water Resource Systems
3	Changes in Extremes
4	Water and Energy Cycles and Processes

1. Observations and Predictions of Precipitation

How can we better understand and predict precipitation variability and changes?

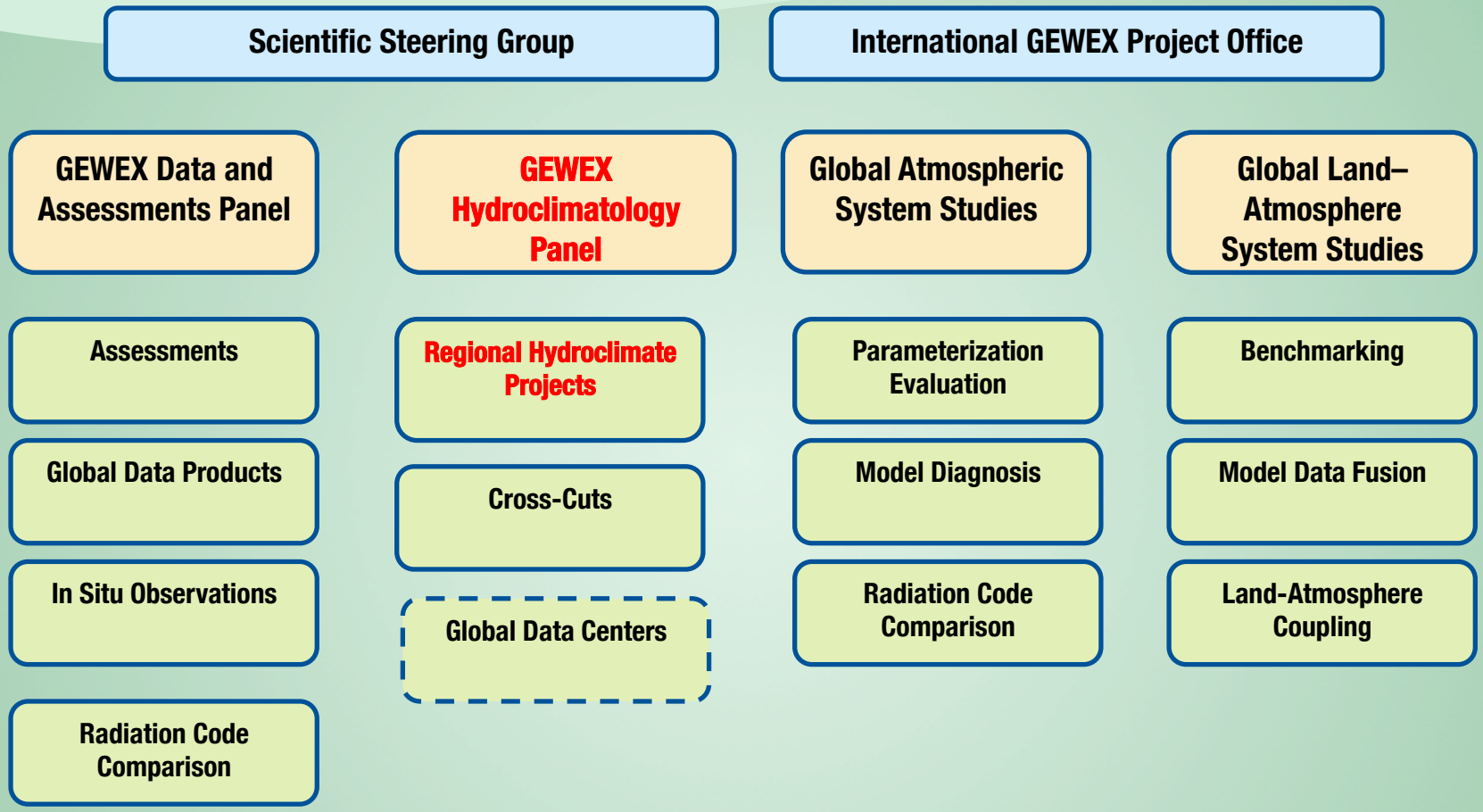
- How well can precipitation be described by various observing systems and what basic measurement deficiencies and model assumptions determine the uncertainty estimates at various space and time scales
- How do changes in climate affect the characteristics (e.g., distribution, amount, intensity, frequency, duration, type) of precipitation, with particular emphasis on extremes of droughts and floods?
- How much confidence do we have in global and regional climate predictions of precipitation?

2. Global Water Resource Systems

How do changes in land surface and hydrology influence past and future changes in water availability and security?

- How do changes in land surface and hydrology influence past and future changes in water availability and security
- How do changes in climate affect terrestrial ecosystems, hydrological processes, water resources and water quality, especially water temperature?
- How can new observations lead to improvements in water management?

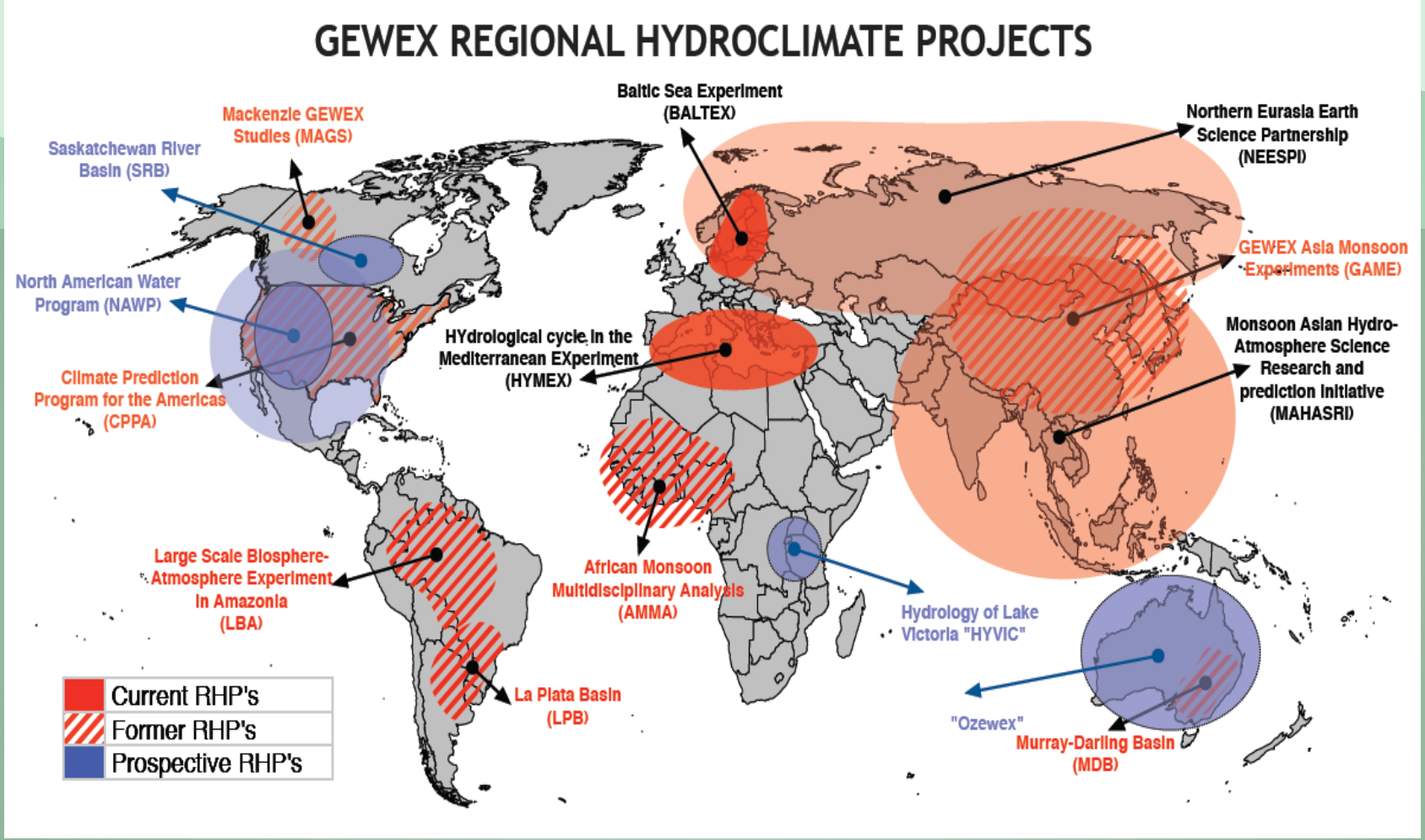
GEWEX Organization



GHP

GEWEX Hydroclimatology Panel

Regional Hydroclimate Projects	Cross-Cuts	Global Data Centers
BALTEX	Extremes	GRDC
HYMEX	High Elevations	GPCC
MAHASRI	Regional Seasonal Forecasting	Hydrolare
NEESPI	HEPEX	
SaskRB		



Completed

LBA LPB

MDB AMMA

Active

BALTEX, HYMEX

MAHASRI NEESPI

SaskRB

Proposed

HYVIC, BALTIC-EARTH

NAWP, OzEWEX

HyVic Overarching Science Questions

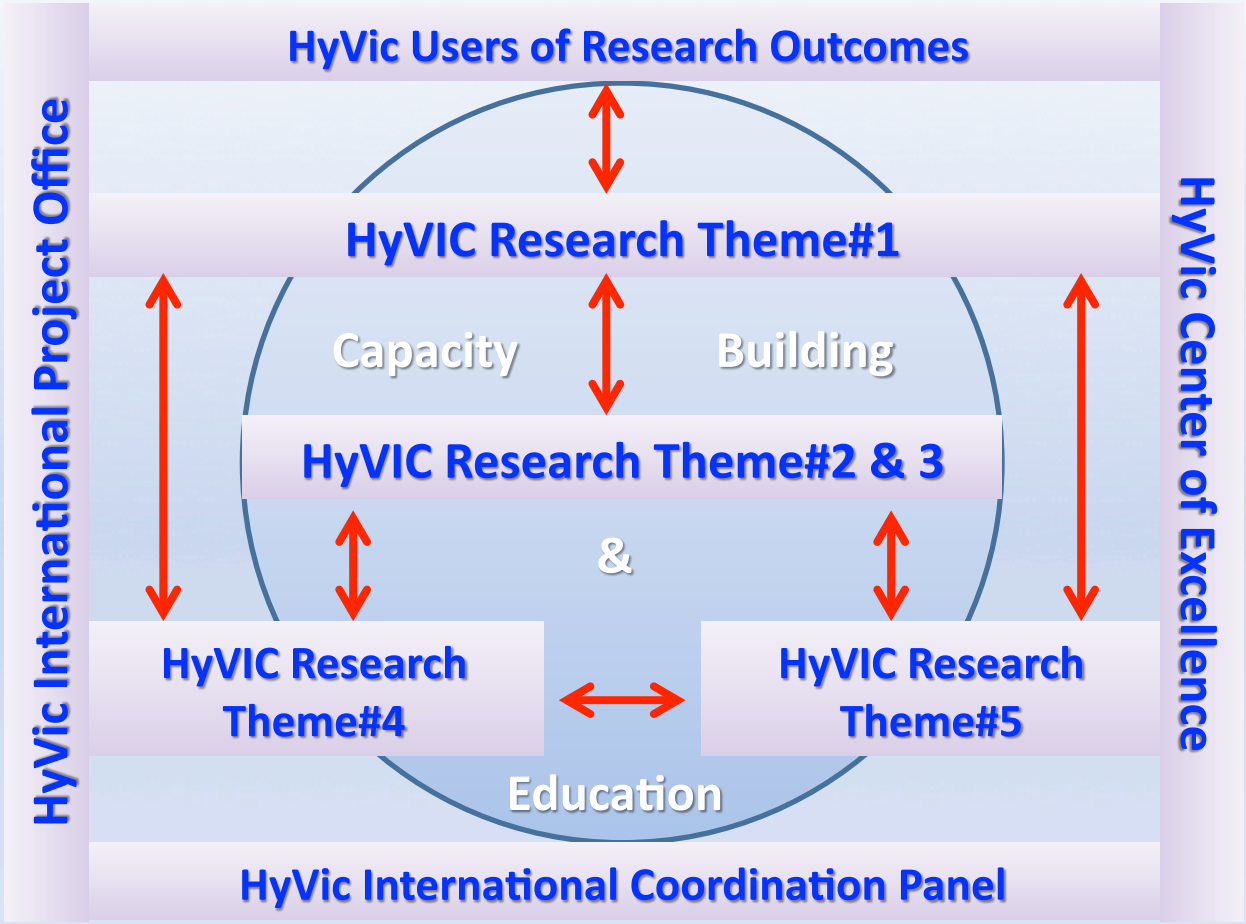
Considering important factors that have not been considered before, in order to reduce the present high levels of climate model uncertainty in the projections of the changes in the hydrological cycle over Lake Victoria basin to determine,

(i) whether a hypothesized reversal in the availability of water resources will occur during the next few decades,

(ii) the timing of when it will occur, and

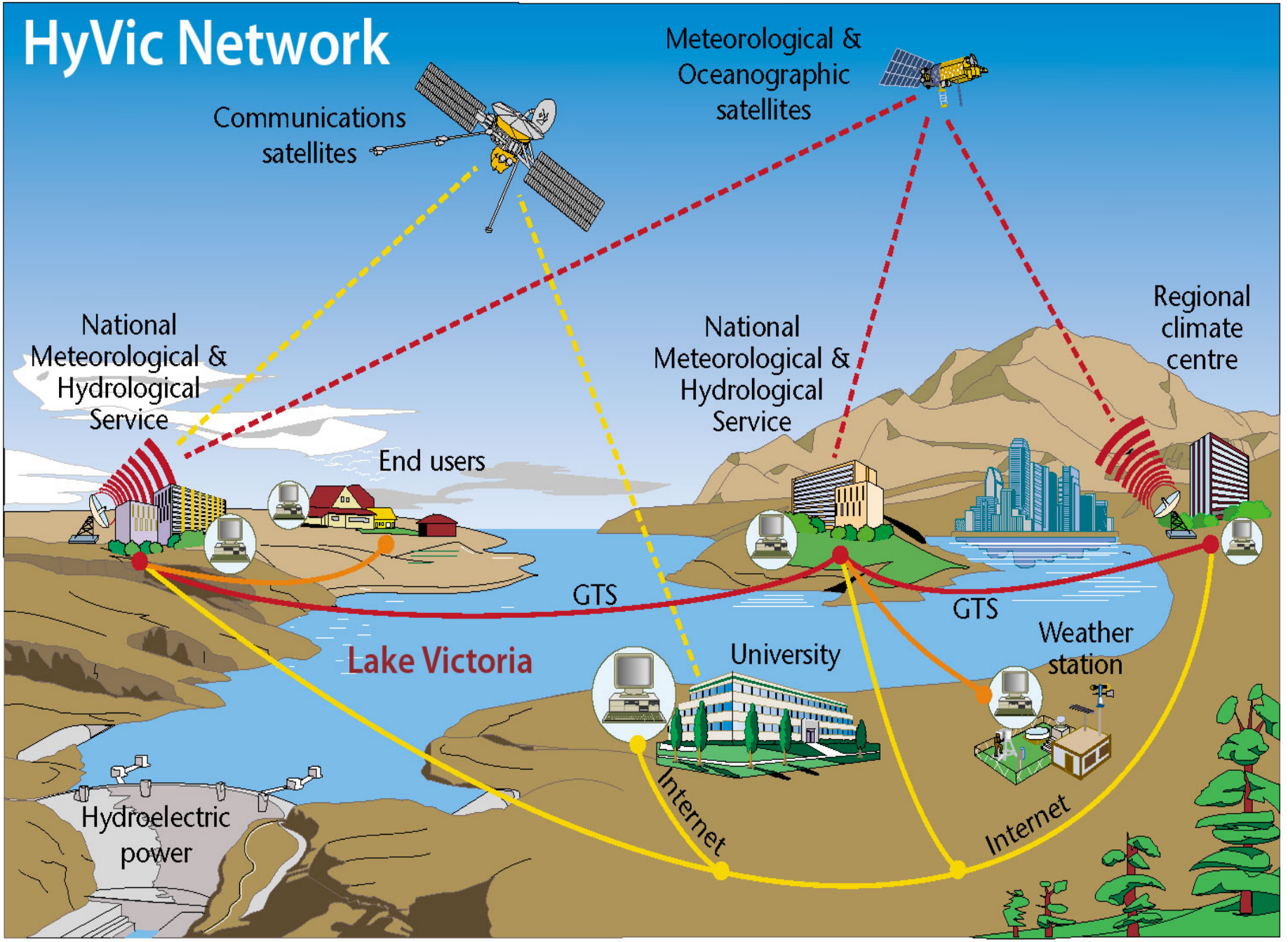
(iii) these two factors can be estimated at sufficient levels of confidence to address applications sector-specific policy and management questions

HyVIC Components



HyVIC Research Theme-1: Translational Research Interface with Applications
HyVIC Research Theme-2: Severe Weather and Water Currents (collaboration with WWRP-LVP)
HyVIC Research Theme-3: Lake Victoria Basin Water Budget
HyVIC Research Theme-4: HyVic Earth System Model (EaSM)
HyVIC Research Theme-5: Observation of the Hydroclimatological System

(Customized from GFCS)


HyVic Network
Communications satellites
Meteorological & Oceanographic satellites
National Meteorological & Hydrological Service
National Meteorological & Hydrological Service
Regional climate centre
End users
GTS
GTS
Lake Victoria
University
Weather station
Internet
Internet
Hydroelectric power

Hydroclimate Project for Lake Victoria Basin (HYVIC)

Fredrick Semazzi – HyVic International Planning Committee (Chair)
Rosalind Cornforth, University of Reading, Helen Houghton-Carr, CEH/NERC, Caroline Bain, UKMO, Ricard Anyah, U. of Connecticut, Rita Roberts, NCAR/UCAR, Lian Xie, North Carolina State University, Laban Ogallo, Climate Prediction and Applications Centre (ICPAC), Pascal Waniha, Tanzania Meteorology Agency (TMA)Andrew Githeko, Kenya Medical Research Institute, Felix Mutua (Jomo Kenyatta University of Agriculture and Technology) – HyVic International Planning Committee (Members)

GEWEX GHP

Conclusion

The successful implementation of the WCRP Grand Challenges and associated science questions described here depend significantly 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 research programs.

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

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

Contact Us

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