

1) WMO review of WCRP

Graeme Stephens, NASA JPL

GEWEX UTCC PROES workshop,
Paris, France, 22-23 October 2018

World Climate Research Programme

**Strategic Plan
2019-2029**



WMO/IOC

GLOBAL CLIMATE OBSERVATIONS, ANALYSES & MONITORING

ECVs;
Climatologies;
(Coupled) Global & Regional Reanalyses;
Climate Change Detection

WCRP CAPABILITY THEMES		
<p>EARTH SYSTEM PROCESSES ACROSS SCALES <i>Jointly with WWRP</i></p> <p>Energy, Water and Carbon Cycles; Fundamental Atmospheric Physics (e.g. Convection); Land-Atmosphere Coupling; Ocean-Atmosphere Coupling; Cryosphere Processes</p>	<p>CLIMATE VARIABILITY, PREDICTABILITY & PREDICTION</p> <p>Ocean, Land, Cryosphere, Atmosphere & Solar Drivers; Climate Dynamics, Modes of Variability & Teleconnections; Monthly to Decadal Predictability & Prediction</p>	<p>CLIMATE CHANGE AND EARTH SYSTEM FEEDBACKS <i>Jointly with AIMES</i></p> <p>Climate Change Forcing & Sensitivity; Climate Change Attribution; Climate Change Projections (Global & Regional) for Mitigation & Adaptation; Abrupt Climate Change; Geoengineering Assessment</p>
<p>WCRP CROSS-CUTTING RESEARCH PROJECTS <i>(on occasions with WWRP, Future Earth.....)</i></p> <p><i>Examples:</i> Regional Sea Level Rise, Coastal Impacts and Cities, Weather and Climate Extremes, now and in the future Water Cycle and the Food Baskets of the World Fate of the Antarctic and Greenland Icesheets Is the Jet Stream changing its Behaviour? Climate Change and Human Health</p>		
<p>WCRP WORKING GROUP ON CLIMATE MODEL DEVELOPMENT <i>jointly with WGNE</i></p> <p>Identifying Systematic Errors; Improving Climate Models & Building Next Generation Earth System Models; Planning for Exascale Computing</p>		
<p>WCRP WORKING GROUP ON CLIMATE INFORMATION FOR REGIONS</p> <p>Regional downscaling methods; Application-inspired Climate Science; Transdisciplinary Engagement</p>		

WMO/ICSU

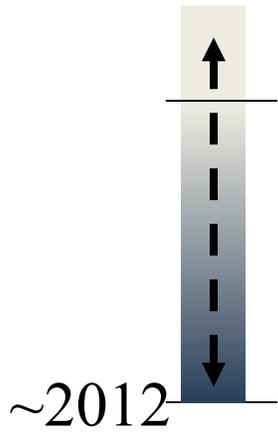
GLOBAL ATMOSPHERIC COMPOSITION

GHG Monitoring;
Air Quality Prediction;
Atmospheric Chemistry Processes & Modelling

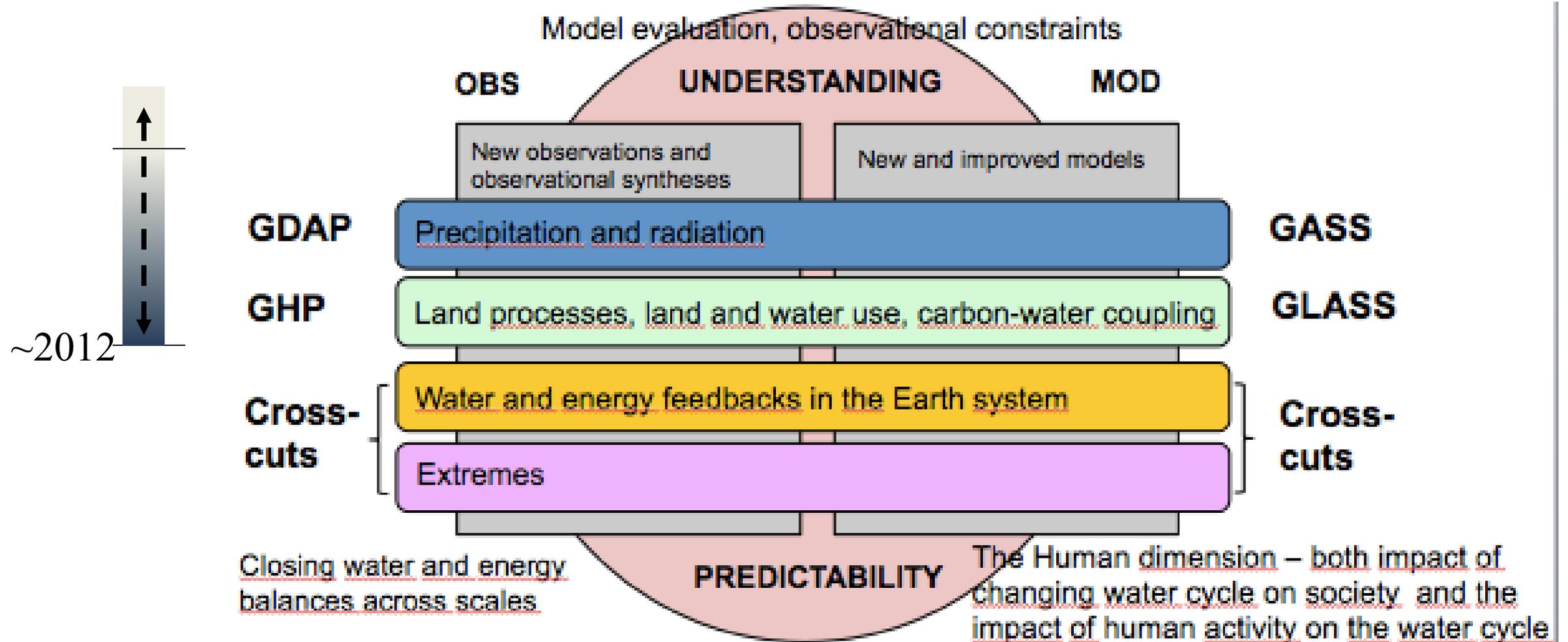
CLIMATE CHANGE ASSESSMENTS AND CLIMATE SERVICES (UNFCCC, IPCC, GFCS, Copernicus, VIACS,)

Phase III: Quantitative understanding and prediction of the Global water and energy system

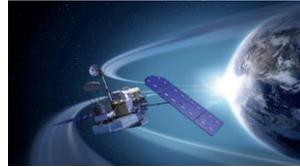
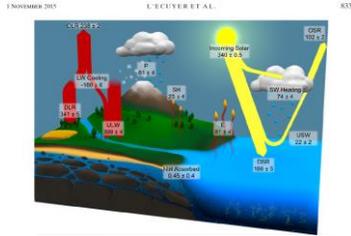
Really began with definition of science questions and imperatives



Phase III: Quantitative understanding and prediction of the Global water and energy system



Phase III: Quantitative understanding and prediction of the Global water and energy system



- Integrated observing strategies of the Earth system
 - address gaps (eg mountain & cold phase hydrology)
- Promote/exploit new measurement approaches to fill gaps (eg ISCCP-next)

Advances in Earth system modeling

Need to study process interactions across time scales

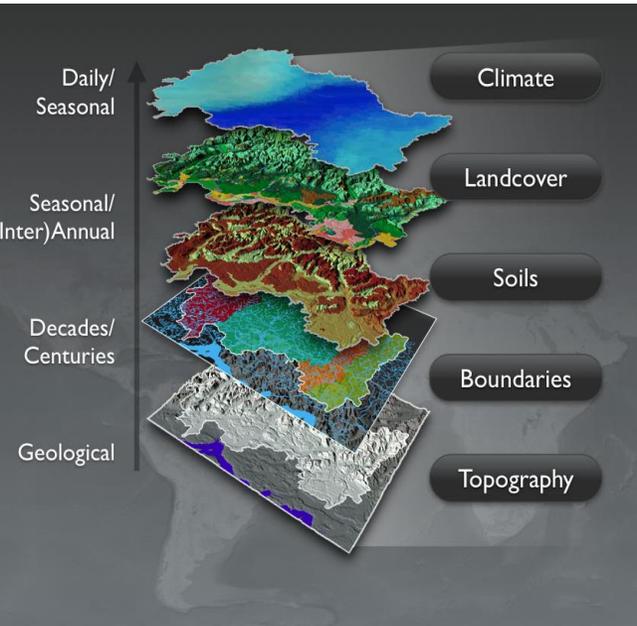
Instead of the traditional paradigm of properties define processes, study how processes define properties, Martyn Clark

Challenge is that humanity is embedded in a deeply interconnected living Earth system, Betts

~2014



Phase III: Quantitative understanding and prediction of the Global water and energy system



Challenge – representing the influence of humanity in the physical Earth system (Betts)

Challenge – balance between complexity and reality; as models increase in complexity, how do we know they are approaching reality (Dave Lawrence)

Challenge – a more process based understanding of the water/energy ‘system’

Challenge – can we evolve our analysis systems to provide the energy and hydrological information on increasingly finer scales.

A-CCP Study Plan has begun in response to Decadal Survey of US NRC

GEWEX will aid in helping the study plan particularly wrt PoR (GEWEX NexGen)



Aerosols and Cloud-Convection Precipitation (A-CCP) Study

Draft Study Plan in response to Designated Observables Guidance for
Multi-Center Study Plans

An awe-inspiring, truly joint Center plan



Submitted by:
Goddard Space Flight Center
Langley Research Center
Jet Propulsion Laboratory
Marshall Space Flight Center
Ames Research Center
Glenn Research Center