



Global Energy and Water cycle EXchanges (GEWEX)

41st Session of the WCRP Joint
Scientific Committee

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May 2020 - Online



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Progress and achievements

Main New Activities: ISCCP-NG // EEI // LS4P // SoilWat // ET Crosscut // ANDEX, AsiaPEX and TPE-Water Sustainability RHP //new projects addressing recognized model biases/challenges

Modevaluation.org // L-A MIPS // RHPs (GWF, BALTEX, HYMEX and PANNEX) // INTENSE //TeamX // INARCH//Process studies PROES: convection/aerosol-precipitation/warm rain// Convection-Permitting Modeling

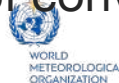
Sustained support for IGPO (renewed for additional 5 years per 2020)

Continued strong collaboration with operational & research Space Agencies, exemplified by ISCCP-NG initiative, the (postponed) EO4Water 2020 conference, continued support by NASA for stewardship & promotion of global data records (e.g. assessment: EEI (with CLIVAR), precipitation (linked to EGC), clouds)

New US GEWEX office created under auspices of USGCRP

All panels have completed restructuring & rejuvenation

- GASS reports to WGNE and WWRP (co-chair from WWRP)
- Initiated a number of important projects linked to advances of model, like ESM-SCM intercomparison of convective diurnal cycle



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Future plans

New RHPs: Africa (Eastern), Central Asia, USA (CONUS)

Collaboration with START*, Regional Partners (IHE, ITC, AUCA etc.)

GEWEX/GASS Land-Atmosphere Feedback Observatories

- linked to ongoing funded community studies that are defining the next generation PBL spaceborne observing system.

New climate data records, ISCCP-NG; an EEI product,

New process-oriented activities and assessments such as ET, SoilWat, others.

Modelling Activities – fall into 4 broad efforts & align well to identified model systematic errors (e.g. Zadra et al., 2018; *Systematic errors in weather & climate models*, BAMS)

- **Model assessment** – observational records (e.g. GDAP), process centric evaluation (e.g. PROES, modeval.org & other GASS projects,...)
- **Formulation** (e.g. human dimension in regional & global climate models such as irrigation, wrm; actively being developed under the GC; LUMIP)
- **Resolution & parameterization** (convectively resolved, diurnal cycle, ..)
- **Coordination** (e.g. Land Surface Modelling Summit –GLASS/ iLEAPS, Sept, 2021 Oxford; Convection Permitting Modeling Workshop #3 (postponed); Second phase of ‘Grey-zone’ linked to EUREC4A)

Links to the WCRP Strategic and Implementation Plans

GEWEX Science and Applications Traceability Matrix (SATM) will be finalized at next SSG – provides explicit traceability to WCRP strategic goals and LH activities

Activities of GEWEX's panels are in close collaboration with other structures within WMO : WWRP, WGNE, ...

GEWEX activities that contribute to the WCRP implementation

All Panels (GASS, GLASS, GDAP, GHP) contribute to process level understanding and prediction of the climate. Panels also engage ECR.

The regional hydroclimate projects of GHP are focused on regional understanding, impacts and prediction of the water cycle.

GHP through its regional activities and our collaboration with START and regional partners contribute to capacity building.

GASS and GLASS develop models & model modules which synthesize our process understanding. GDAP assess the quality of global products used for assimilation and model validation & fosters development of new global products.

Emerging issues

Sunseting of Grand Challenges:

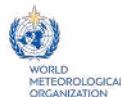
- Water for the Food Baskets GC - has the potential to become a GEWEX theme /focal point (capacity building, links to agriculture, advancing digital earth capability).
- Extremes will continue to be a dimension across WCRP - the growing lengths of the global climate data records will be critical (e.g. GC study of precip extremes, INTENSE)
- Clouds-climate GC – many elements of this grand challenge, centered on process understanding/ interaction directly map into ongoing GEWEX activities (GASS,GDAP)

Organizational:

- Balance the tendency to over coordinate being fixated on structure and not people. Avoid ‘coordinating coordination’ Clarity on a new streamlined structure is essential.
- Monsoon Panel coordination is improving but clarity will be within the emerging new structure. Monsoons are very much a WCRP cross-cut, regional phenomenon with huge societal implications.
- Role of the WMO Science Advisory Panel in relation to JSC & WCRP?

Integration of critical core activities toward broader WCRP goals:

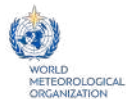
- Defining specific LH activities ‘sub-themes’ needs careful thought (this will feedback on GEWEX strategies)



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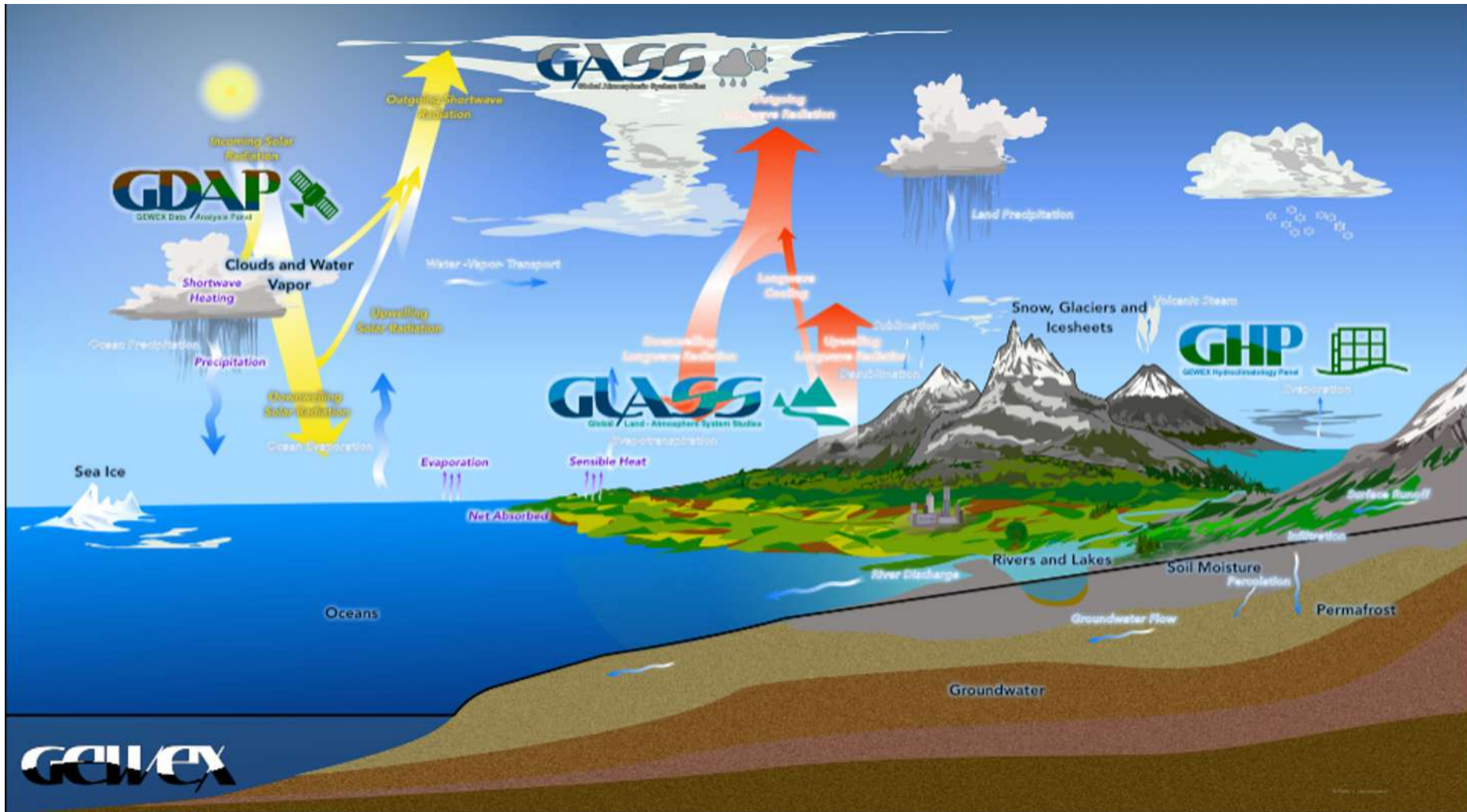
Additional Slides



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The 4 GEWEX Panels



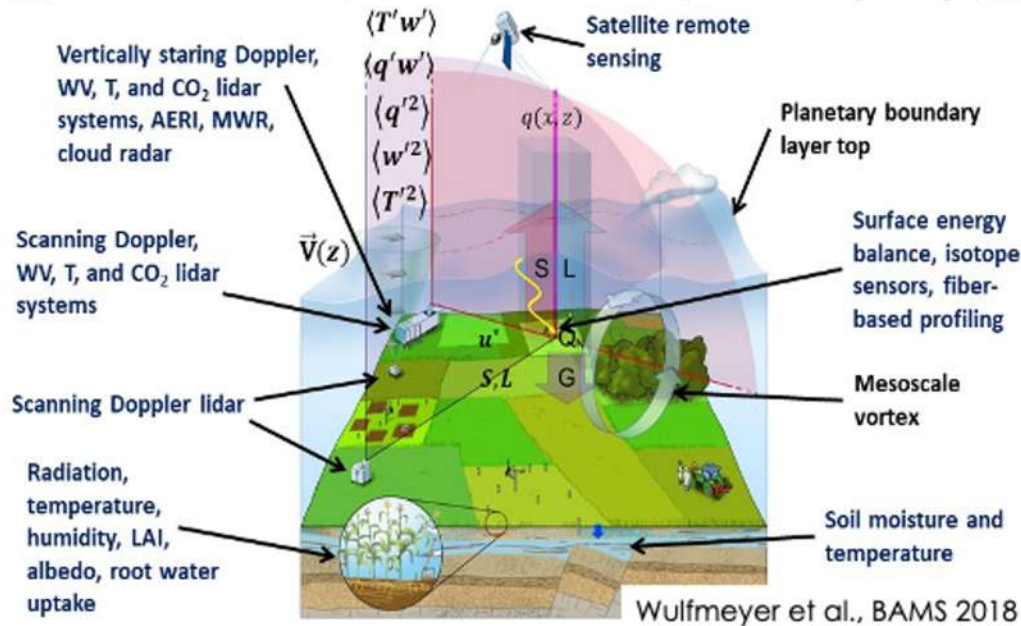
GLASS

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GLASS Proposal: GLAFOs

- **LoCo**: Continuing to promote the importance and development of improved observations of the land-atmosphere system, particularly in the planetary boundary layer.

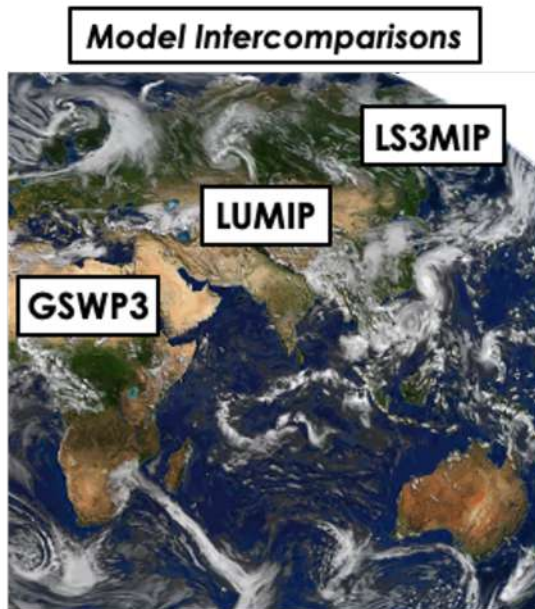
The Land-Atmosphere Feedback Experiment (LAFE)



- We propose the development and operation of multiple **GEWEX/GLASS Land-Atmosphere Feedback Observatories**
- These observatories should record long-term, high-frequency observations of soils, vegetation, surface fluxes and the planetary boundary layer.

GLASS

Model Intercomparison Projects



- ▶ **GSWP3:** Global Soil Wetness Project, phase 3
 - ▶ terrestrial modeling activity, produces a long-term land reanalysis and investigates changes of the energy-water-carbon cycles
- ▶ **LS3MIP:** Land Surface, Snow and Soil Moisture MIP
 - ▶ assess the performance of current land surface modules of earth system models and quantify land surface feedbacks in a changing climate
- ▶ **LUMIP:** Land Use MIP
 - ▶ understanding the impact of land use and land use change on climate

GEWEX SSG-32, Pasadena, CA, January 2020

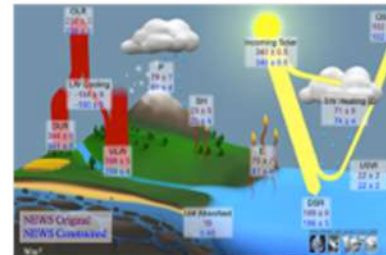
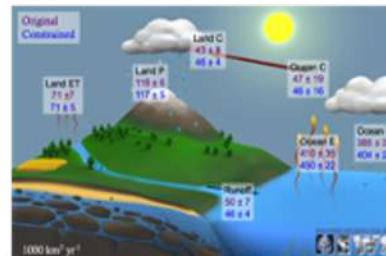
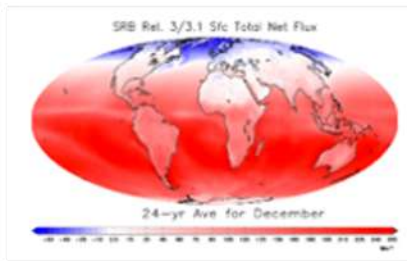
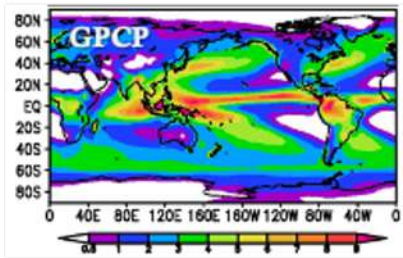
GDAP

Realizing a New Vision

Products



Processes



GDAP: Assessment → Analysis

GDAP

GDAP Science Drivers

Science Focus	Activity
☞ Energy imbalance and climate sensitivity	☞ EEI Assessment
☞ Cloud dynamics and feedbacks	☞ ISCCP-NG
☞ Global land-atmosphere interactions	☞ GEWEX Integrated Product and Ground Networks
☞ Global energy and water cycle variability	☞ Land closure assessment
☞ Precipitation extremes	☞ Precipitation Assessment

GHP

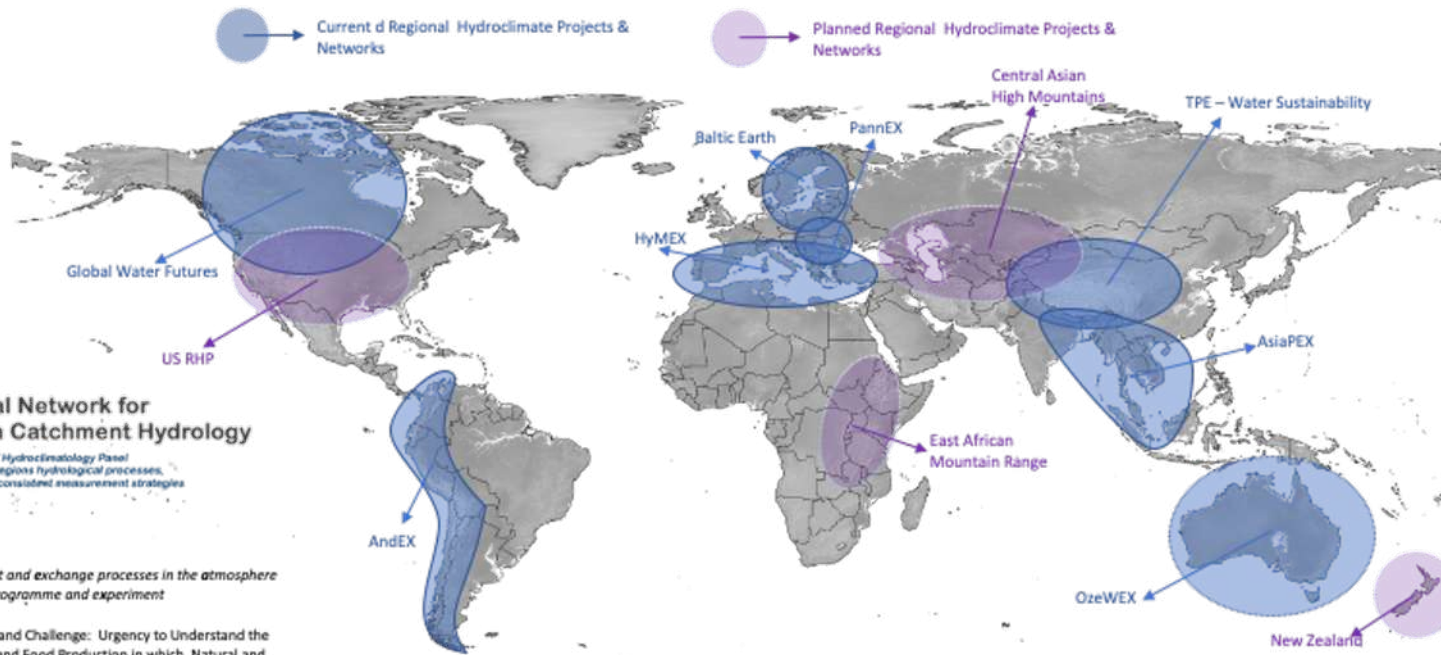
GEWEX Activities in High Mountain Regions



HTTP://WWW.GEWEX.ORG

- Regional Hydroclimate Projects (RHPs) & Networks
 - Modeling, Observations, Predictions and Projections, Impacts studies etc.
- Crosscutting Activities
 - TeamX (new), Mounterrains (new), INTENSE, Near 0°C Precipitation, INARCH

- Global Observational Data Sets Assessments and Analyses <-> e.g. with International Precipitation Working Group
- Process Studies -> "PROES" – Process Evaluation Studies
- Regional Observational Campaigns (short and long term) -> e.g. LIAISE



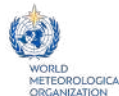
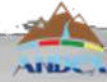
The International Network for Alpine Research Catchment Hydrology

A cross-cut project of the GEWEX Hydroclimatology Panel to better understand alpine catchment hydrological processes, improve their prediction and find consistent measurement strategies



Multi-scale transport and exchange processes in the atmosphere over mountains – programme and experiment

Water for the Food Baskets Grand Challenge: Urgency to Understand the New State of the Water Cycle and Food Production in which Natural and Anthropogenic Processes Interact



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GHP

Science Objectives and Activities

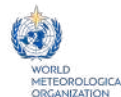
There are four types of projects within GHP:

**Regional
Hydroclimate
Projects**

**Cross-cut
Projects**

**Global Data
Centers**

**GHP
Networks**



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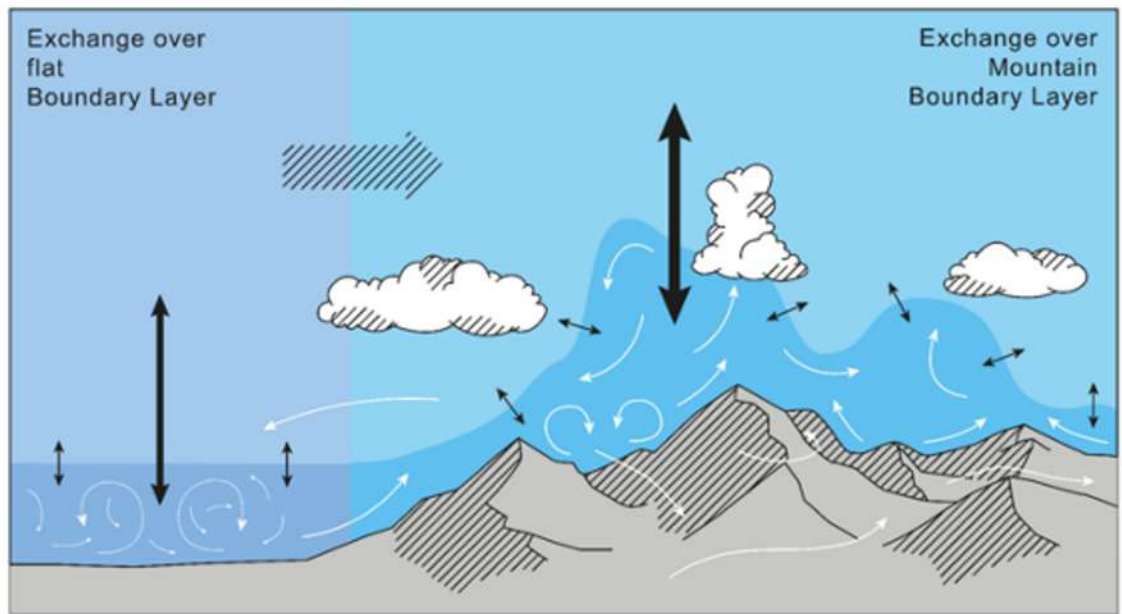
GHP

TEAMx CC has just been approved CC status.

TEAMx

Mathias Rotach, Stefano Serafin, Helen Ward

- *Exchange processes induced by mountains:* Transfer of heat, momentum and mass (water, CO₂, aerosols) between the ground, the PBL and the free atmosphere.
- High-resolution observation and modelling possible, but non-trivial. Model spatial resolutions outpacing observations.
- Special challenges over mountains: Spatial heterogeneity, wide range of relevant scales of motion.



Instructions

In order to assist our discussions at the JSC Session this year, we have put together a template for your presentations. If you prefer your own template, please feel free to use it and copy over the slide outlines. You are encouraged to add your own image at the top in place of the default.

- As a guideline, the main presentation content needs to contain:
 - Progress and achievements
 - Future plans
 - Relationship to the WCRP Strategic and Implementation Plans and process
 - A slide on emerging issues requiring the immediate attention of the JSC
- Please note that only a maximum of 2 slides will be allowed to be shown during the online meeting, which should be the links to the WCRP Strategic and Implementation Plans and Emerging Issues. Participants will be expected to have read the full presentation beforehand.
- At the end of your presentation please leave the slide on emerging issues visible to facilitate discussion. Introduction and thank you slides are not necessary.
- Additional slides in support any of the main slides can be added at the end of the presentation for reference.
- Unless otherwise requested, all presentations will be made available on the WCRP website prior to the meeting
- Please email your presentation to msparrow@wmo.int in advance of the meeting (Deadline: May 1, 2020)