



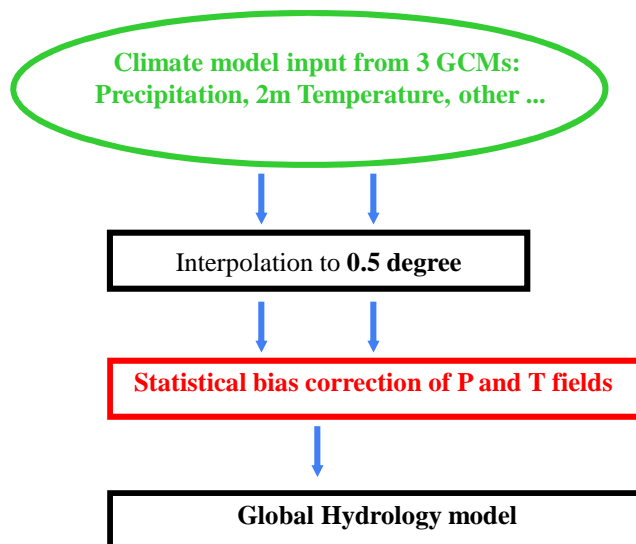
WATCH

Assessment of the Global Water Cycle in the 21st Century using global climate and hydrology models

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Global modelling chain in WATCH



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3 GCMs

Centre	GCMs	Horizontal resolution	Vert.
MPI-M	ECHAM5/MPIOM	T63 (ca. 200 km)	L31
CNRM	CNRM-CM3	T42 (ca. 300 km)	L45
IPSL	LMDZ-4	T42 (ca. 300 km)	L19

Time periods

- ❖ C20: 1960-2000
- ❖ C21: Scenarios B1 and A2: 2001-2100



Statistical Bias Correction

- ❖ Method:
Piani, C., G.P. Weedon, M. Best, S.M. Gomes, P. Viterbo, S. Hagemann, and J. O. Haerter, 2010: Statistical bias correction of global simulated daily precipitation and temperature for the application of hydrological models J. Hydrol., 395, doi:10.1016/j.jhydrol.2010.10.024, 199–215

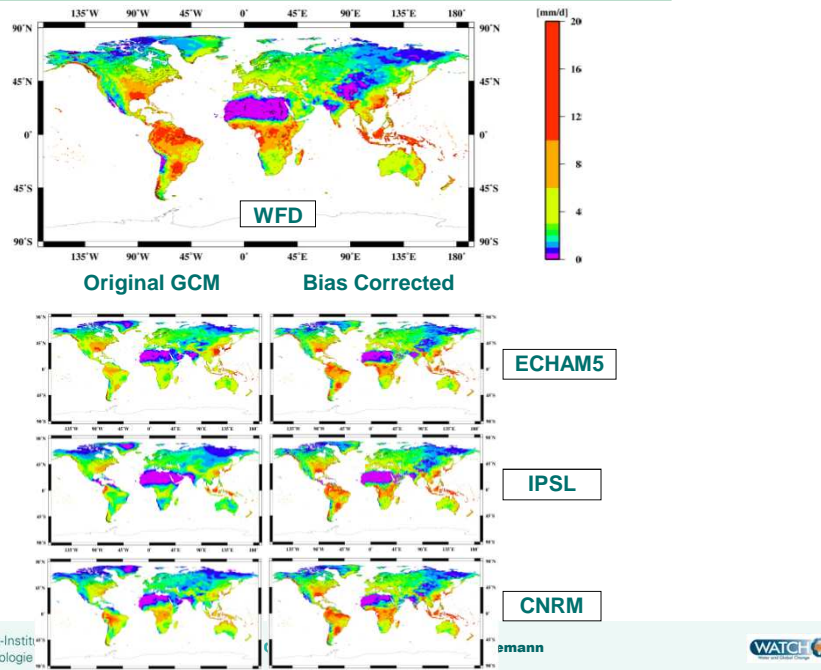
- ❖ Observations used for bias correction:
Daily WATCH forcing data (Weedon et al. 2010)

Bias correction factors are derived for period 1960-99 and applied to 1960-2100

- ❖ Precipitation, (Snowfall fraction taken from GCM)
- ❖ Temperature: $T_{\text{mean}}, T_{\text{min}}, T_{\text{max}}$
 - Diurnal Range: $\Delta T = T_{\text{max}} - T_{\text{min}}$
 - Skewness: $\sigma = (T_{\text{mean}} - T_{\text{min}}) / \Delta T$



Standard deviation of precipitation (1960-99)



Global Hydrology Models: GHMs and LSHMs

GHMs	Model group
MPI-HM	Max-Planck Institute for Meteorology, Hamburg (MPI-M)
LPJmL	Potsdam Institute for Climate Impact Research (PIK)
WaterGAP	University of Kassel (CESR)
VIC	Norwegian Water Resources and Energy Directorate (NVE)
MacPDM	University of Reading (NERC)
GWAVA	Centre for Ecology and Hydrology (CEH)
H08	National Institute for Environmental Studies (NIES)
HTESSEL	University of Lisboa
JULES	UK Met Office (UKMO)

Data Submission:

	ECHAM A2	ECHAM B1	ECHAM Ctrl	IPSL A2	IPSL B1	IPSL Ctrl	CNRM A2	CNRM B1	CNRM Ctrl
MPI-HM									
LPJmL									
VIC									
MacPDM									
WaterGAP									
JULES									
HTESSEL									
H08									
Gwava									

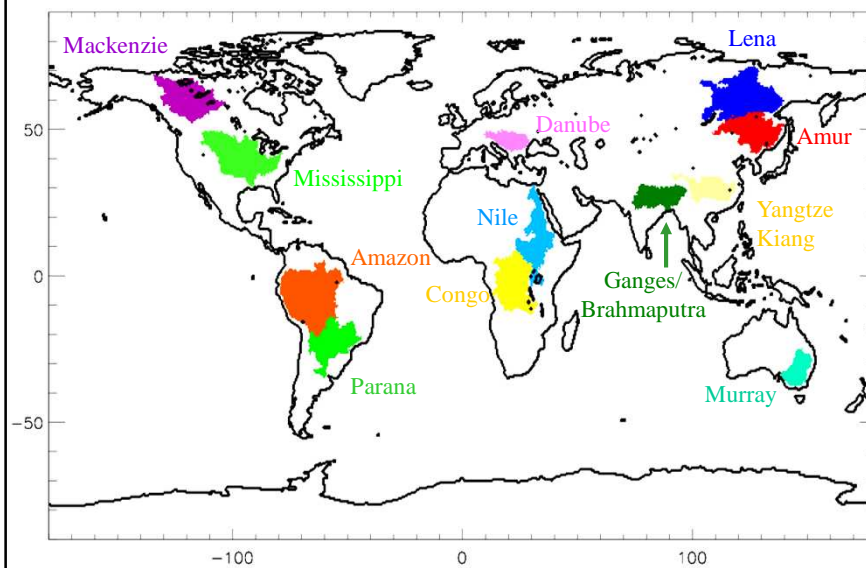


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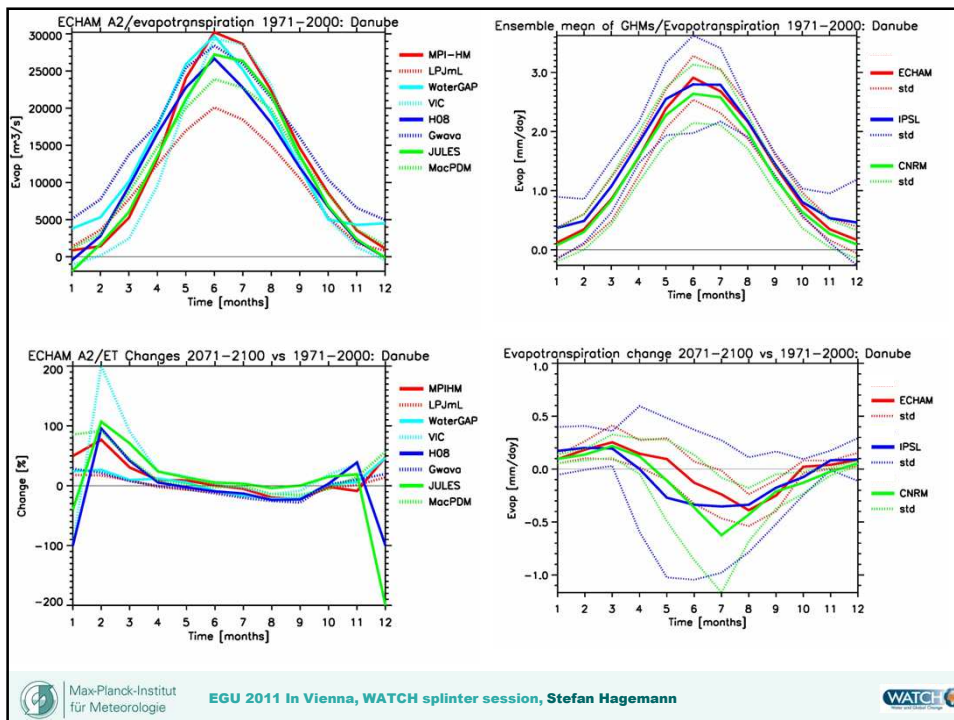
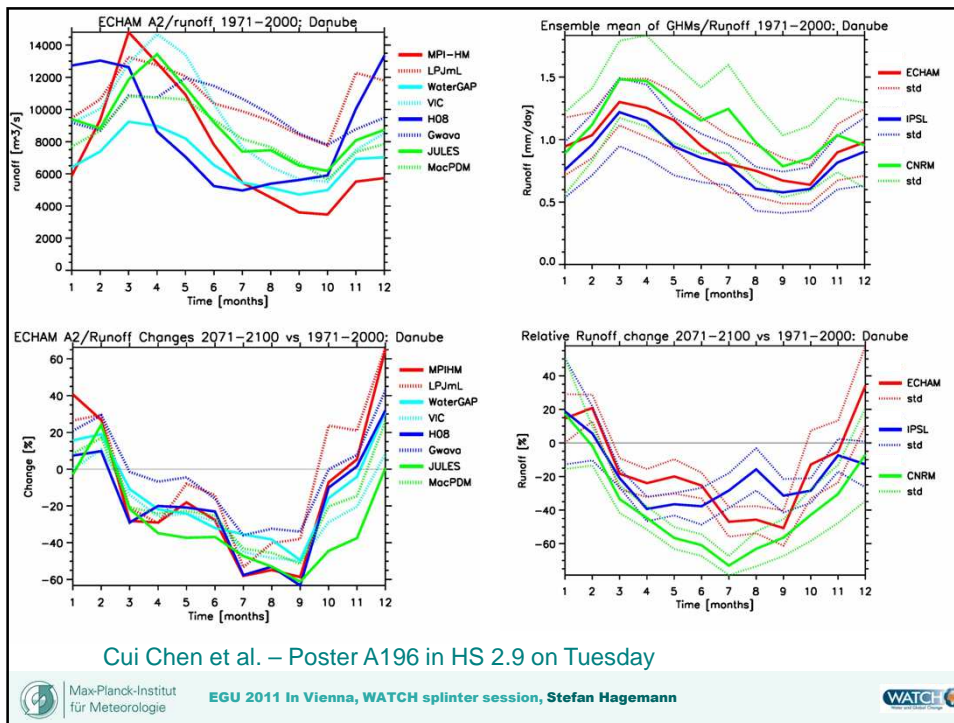
Large catchments are considered



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Objectives

- Evaluate the projected changes for the terrestrial components of the hydrological cycle in the 21st century based on multi-climate and hydrological model simulation.
- Construct global maps identifying regions where the global water cycle is significantly impacted by climate change, and which regions are vulnerable to these changes in terms of e.g. water availability
- Assessment of the uncertainties

Naturalized runs = Direct anthropogenic influences on the hydrological cycle are not considered.

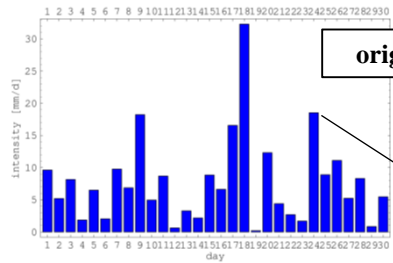


**Thank you for
your attention!**

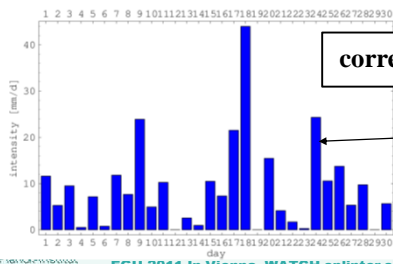


Observed and modeled time series

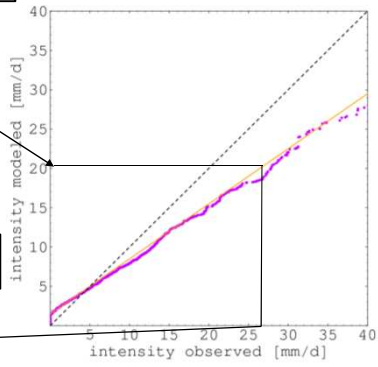
modeled



original



corrected



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