

Hydrology Futures Climate Change Project

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Overview

The goals of this partnership between EPA and the USGS are to develop and disseminate estimates of future hydrologic parameters (e.g., streamflow, run off, snow water equivalence, and soil moisture) for the rivers and streams of the coterminous US. The timeframe of focus is 2020 – 2100, in monthly time steps.

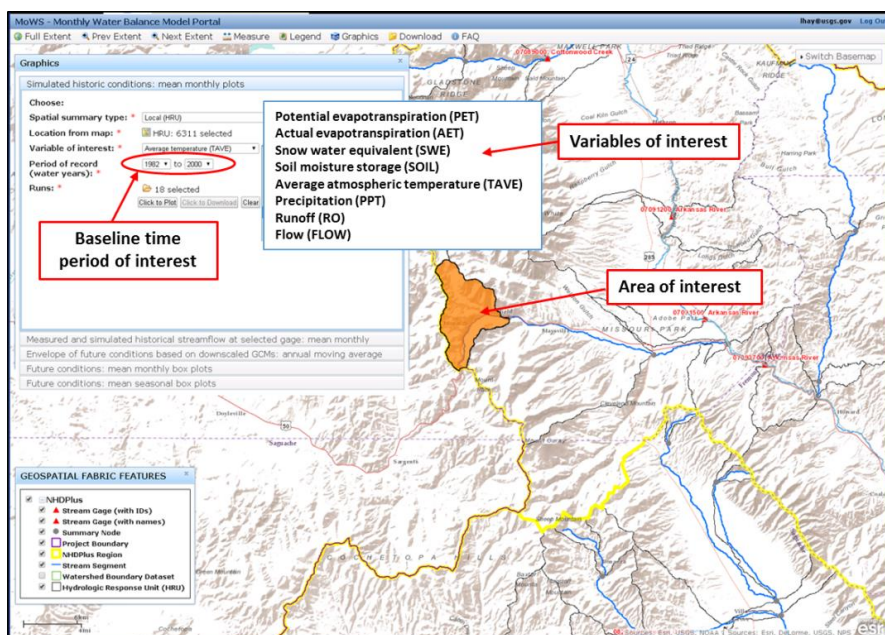
To date, the USGS national Monthly Water Balance Model (MWB), upon which the initial core modeling is done, has been converted from a gridded format to one based on over 110,000 NHD-derived Hydrologic Response Units (areas on the landscape that would be expected to have a similar hydrologic response to changes in factors such as precipitation and temperature), the model has been calibrated for the entire continental US domain based on USGS stream gage data, outputs from over 220 climate model-greenhouse gas emission scenario combinations have been run to provide a broad array of plausible future climate projections, and a web portal developed to facilitate dissemination of findings to the public. Multiple papers either have been published or are being prepared for publication in the peer-reviewed literature describing project components and an entire session at a recent American Water Resources Association conference was dedicated to the project.

Phase I of the project is scheduled for completion in 2016 with the launch of the web portal, which USGS will host. Next steps include expanding the climate modeling projections to additional USGS water models (enabling examination of parameters such as stream temperature) and forming partnerships with key Federal, State/Tribal, and private stakeholders to facilitate using Hydrology Futures' projections. Potential applications of project findings include vulnerability assessments to identify areas expected to experience the greatest climate change-related stress to drinking water supplies, wetlands, water quality via nutrient pollution from runoff, crop production, and forest health via increased wildfire risks.

Sample Products

Below are snapshots of a typical query process and sample products from a beta version of the web portal:

- 1) Select area of interest from map provided, choose a baseline time period, choose the hydrologic variable(s) of interest



2) Select climate modeling runs of interest, e.g. all model runs using the A2 emissions scenario

Select runs (by clicking on the cells in the right 3 columns). Note: Individual selection of SDS GCMs is temporarily disabled.

Station Based (SB)			GSD	Submit	Clear
Statistically Downscaled GCMs (SDS)	BCSD	CMP3	PRISM		
			BCCR_BCM2_0	Emission scenario a1b	
			CCMA CGCM3_1		
			CNRM_CM3		
			CSIRO_MK3_0		
			GFDL_CM2_1		
			GISS_MODEL_E_R		
			INMCM3_0		
			IPSL_CM4		
			MIROC3_2_MEDRES		
			MIUB_ECHO_G		
			MPL_ECHAM5		
			MRI CGCM2_3_2A		
			NCAR_CCSM3_0		
			NCAR_PCM1		
			UKMO_HADCM3		
			BCCR_BCM2_0	Emission scenario a2	
			CCMA CGCM3_1		
			CNRM_CM3		
			CSIRO_MK3_0		
			GFDL_CM2_1		
			GISS_MODEL_E_R		
			INMCM3_0		
			IPSL_CM4		
			MIROC3_2_MEDRES		
			MIUB_ECHO_G		
			MPL_ECHAM5		
			MRI CGCM2_3_2A		
			NCAR_CCSM3_0		
			NCAR_PCM1		
			UKMO_HADCM3		
			BCCR_BCM2_0	Emission scenario b1	
			CCMA CGCM3_1		
			CNRM_CM3		
			CSIRO_MK3_0		
			GFDL_CM2_1		
			GISS_MODEL_E_R		
			INMCM3_0		
			IPSL_CM4		
			MIROC3_2_MEDRES		
			MIUB_ECHO_G		
			MPL_ECHAM5		
			MRI CGCM2_3_2A		
			NCAR_CCSM3_0		
			NCAR_PCM1		
			UKMO_HADCM3		
			BCC_CSM1_1_M	Emission scenario rcp45	
			BCC_CSM1_1		
			BMU_ESM		
			CANESM2		
			CCSM4		
			CESM1_BGC		
			CESM1_CAMS		
			CMCC_CM		
			CNRM_CM5		
			CSIRO_MK3_6_0		
			EC_EARTH		
			FGOALS_G2		
			FGOALS_S2		
			FIQ_ESM		
			GISS_E2_H_CC		
			GISS_E2_R_CC		
			GISS_E2_R		
			HADGEM2_AO		
			HADGEM2_CC		
			HADGEM2_ES		
			INMCM4		
			IPSL_CMSA_LR		
			IPSL_CMSA_MR		
			IPSL_CMS5_LR		
			MIROC_ESM_CHEM		
			MIROC_ESM		
			MIROCS		
			BCC_CSM1_1	Emission scenario rcp60	
			CCSM4		
			CESM1_CAMS		
			CSIRO_MK3_6_0		
			FIQ_ESM		
			GISS_E2_R		
			HADGEM2_AO		
			HADGEM2_ES		
			IPSL_CMSA_LR		
			IPSL_CMSA_MR		
			MIROC_ESM_CHEM		
			MIROC_ESM		
			MIROCS		

3) Example products

