

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.

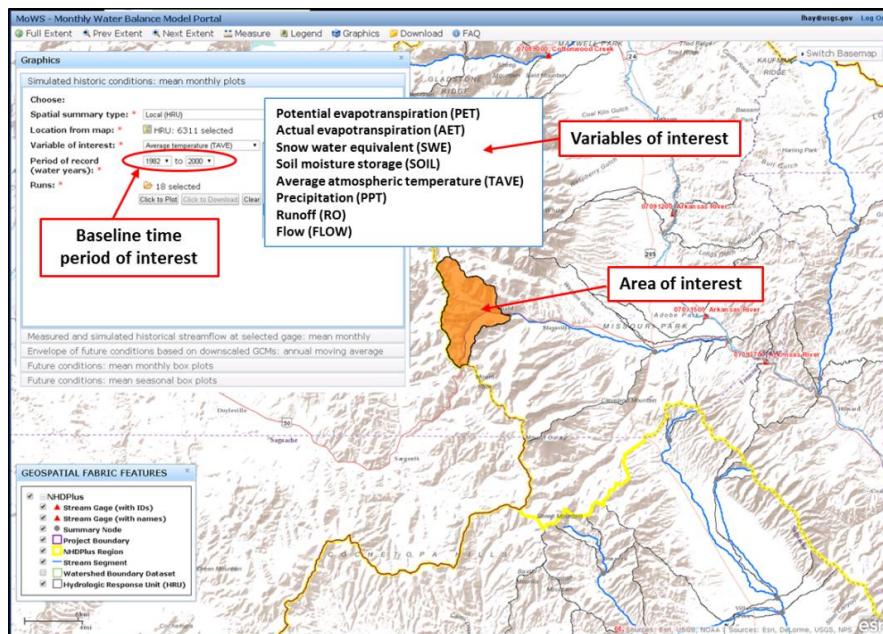
To date, the USGS national Monthly Water Balance Model (MWBM), upon which the initial core modeling is done, has been converted from a gridded format to one based on over 110,000 NHD-derived Hydrologic Response Units (areas on the landscape that would be expected to have a similar hydrologic response 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	CMIP3	Emission scenario a1B
			BCCR_BCM2_0 CCCMa_GGCM3_1 CNRM_CM3 CSIRO_MK3_0 GFDL_CM2_1 GISS_MODEL_E_R INMCM3_0 IPSL_CM4 MIROC3_2_MEDRES MIUB_ECHO_G MPI_ECHAM5 MRI_GCM2_3_2A NCAR CCSM3_0 NCAR PCM1 UKMO_HADCM3 BCCR_BCM2_0 CCCMa_GGCM3_1 CNRM_CM3 CSIRO_MK3_0 INMCM3_0 IPSL_CM4 MIROC3_2_MEDRES MIUB_ECHO_G MPI_ECHAM5 MRI_GCM2_3_2A NCAR CCSM3_0 NCAR PCM1 UKMO_HADCM3
			CMIP5 Emission scenario rcp45 BCC_CSM1_1_M BCC_CSM1_1 BNU_ESM CANESM2 CCSM4 CESM1_BGC CESM1_CAMS CMCC_CMS CGCM3_AH5 CSIRO_MK3_0 EC_EARTH FGOALS_G2 FGOALS_S2 FIO_ESM GISS_E2_H_CC GISS_E2_H_C GISS_E2_R HADGEM2_AO HADGEM2_CC HADGEM2_ES INMCM4 IPSL_CM2A_LR IPSL_CM2A_MR IPSL_CM2B_LR MIROC_ESM_CHEM MIROC_ESM MIROC BCC_CSM1_1 CCSM4 CESM1_CAMS CSIRO_MK3_0 FIO_ESM GISS_E2_R HADGEM2_AO HADGEM2_ES IPSL_CM2A_LR IPSL_CM2A_MR MIROC_ESM MIROC_ESM MIROC5
			Emission scenario rcp80 BCC_CSM1_1 CCSM4 CESM1_CAMS CSIRO_MK3_0 FIO_ESM GISS_E2_R HADGEM2_AO HADGEM2_ES IPSL_CM2A_LR IPSL_CM2A_MR MIROC_ESM MIROC_ESM MIROC5
Emission scenario a2			
Emission scenario b1			

3) Example products

