Historical and Future Projections of Snow Water Equivalent (SWE) for Glacier and Rocky Mountain National Park and vicinity study areas.

Summary

Data includes historical and future rasters of springtime snow water equivalent (SWE) for two study areas including Glacier and Rocky Mountain National Parks and vicinity (ArcGRID format). SWE was simulated by the Distributed Soils Vegetation and Hydrology Model (DHSVM). The archive contains SWE rasters for March 1st and 15th, April 1st and 15th, May 1st and 15th, and June 1st for each year. Digital Elevation Model (DEM) files and example model configuration files are also supplied along with the rasters. The historical simulations span the years 1998-2013. Five future projections based on CMIP5 GCM output were run using a "delta" or "change factor" method based on a nominal 2055 climate. These five scenarios largely span the temperature and precipitation changes seen in CMIP5 models for these regions. Data archive also includes ArcGIS shapefiles for the domain (extent) of the model projections, and Excel Spreadsheets that contain climate change deltas (change factors) used in the DHSVM simulations. For more details see Barsugli et al, 2020.

Citation

Barsugli, Joseph J., B. Livneh, A. Heldmeyer, I. Rangwala, A. J. Ray, C. F. Dewes, J. M. Guinotte, S. Torbit (2020), Projections of mountain snowpack loss for wolverine denning elevations in the Rocky Mountains. Earth's Future, accepted: 1 September 2020. DOI:10.1029/2020EF001537

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Files:

romo.zip "ROMO SWE Rasters", "DEM", "Example DHSVM configuration file (text)"	ArcGRID ASCII format	68.3 MB
glac.zip "GLAC SWE Rasters", "DEM", "Example DHSVM configuration file (text)"	ArcGRID ASCII format	125.4 MB
CMIP5_Monthly_Deltas_GLAC_data.xlsx "CMIP5_Monthly_Deltas_GLAC"	Excel Spreadsheet	35.4 KB
CMIP5_Monthly_Deltas_ROMO_data.xlsx "CMIP5_Monthly_Deltas_ROMO"	Excel Spreadsheet	35.2 KB

GLAC_ROMO_Study_Area_shapefiles.zip "GLAC and ROMO Study Area Shapefiles"	ESRI Shapefiles	8.7 KB

Additional Information:

Snow Water Equivalent rasters provided for the historical run ("hist") and the 5 future scenarios for each study area. The calibration run ("hist_bare") is also provided that used had no forest cover in order to simulate the typical site location of SNOTEL sites in clearings. Filename nomenclature is **studyarea_run(mmddyy)**, for example romo_giss(051503). Study area is either romo or glac (figure 1), run is hist or hist_bare for the historical runs, and run is the climate model name for the future scenarios. mmdd is the time of year of the output ranging from 0301 (01MAR) to 0601 (01JUN), and yy is the year ranging from 98 (1998) – 13 (2013).

Figure 1: Study areas in and near Glacier National Park (Montana), and Rocky Mountain National Park (Colorado)