# SSHCZO Metadata Worksheet

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| Data File Name | **Upscaling of Hydrological Models (Complex versus Simple Case in Flux-PIHM) - Shale Hills (2009)** |
| Date Prepared | 01/01/2019 to 12/21/2020 |
| Descriptive Title | Input and output files from a complex and simple case used in Flux-PIHM |
| Update Frequency | Daily |
| Abstract | Upscaling of hydrology models remains a major challenge. Large-scale models often use single cells to represent an entire catchment, assuming homogeneity; yet the impacts of such assumptions on simulating stream flow remains poorly understood. To investigate the impact of ignoring spatial heterogeneity on hydrology, Wen et al. (2021) compared hydrological dynamics at Shale Hills (PA, USA) using models with and without spatial details. Wen et al. (2021) compared a complex model (spatially distributed) with 535 cells expressing heterogeneity, with a simple model (homogeneous) with two cells for the two sides of the catchment using “effective”, averaged parameters. This file provides the input and output data from the complex and simple model in Wen et al. (2021). More details are referred to the paper of Wen et al. (2021) in Water Resources Research. |
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| Data Value Descriptions | The input and output files provide the data to reproduce the results in Wen et al. (2021). The full descriptions about the format of these files are included in the manual of Flux-PIHM (https://github.com/PSUmodeling/MM-PIHM). Here we provide the brief introduction about key simulation data:Output/Complex:* File rivflx1: the discharge in river segments; Column 1 = Time; Column 21 = Discharge (m^3/s) at the stream outlet
* File ett, ec, edir, and esnow: Column 1 = Time; Other columns = the evapotranspiration rate (=ett + ec + edir + esnow / 2.836e06/1000) for each grid cell (m^3/s)
* File unsat: Column 1 = Time; Other columns = the unsaturated water storage for each grid cell (m)
* File sat: Column 1 = Time; Other columns = the saturated water storage for each grid cell (m); Water table depth = (soil depth – the saturated water storage);
* File smc: Column 1 = Time; Other columns = soil moisture for each grid cell (m)

Output/Simple:* File rivflx1: Column 1 = Time; Column 2 = Discharge (m^3/s) at the stream outlet
* File ett, ec, edir, and esnow: Column 1 = Time; Other columns = the evapotranspiration rate for each grid cell (m^3/s)
* File unsat: Column 1 = Time; Other columns = the unsaturated water storage for each grid cell (m)
* File sat: Column 1 = Time; Other columns = the saturated water storage for each grid cell (m); Water table depth = (soil depth – the saturated water storage);
* File smc: Column 1 = Time; Other columns = soil moisture for each grid cell (m)
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| Keywords | Discharge, Evapotranspiration, Soil water saturation, Water table depth, Upscaling, Flux-PIHM. |
| Methods | * Model: Flux-PIHM;
* Soil, and Bedrock Data: Field campaign in 2003(Lin et al. 2006; Lin 2006); Soil Survey Geographic;
* Vegetation type: National Land Cover Database;
* Surface Elevation: USGS NED;
* Forcing data: NLDAS, SURFRAD, MODIS (Corrected by local flux tower data):

DATA SOURCE Precip NLDAS TMP SURFRAD (Corrected by Local Flux Tower data; For missing Data, use NLDAS)RH SURFRAD (Corrected by Local Flux Tower data; For missing Data, use NLDAS)SOLAR SURFRAD (For missing Data, use NLDAS)LONGWV SURFRAD (For missing Data, use NLDAS)PRES SURFRAD (Corrected by Local Flux Tower data; For missing Data, use NLDAS)LAI MODIS* Discharge, soil moisture and water table depth data: Field measurement in 2009 (Shi et al., 2013).
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| Sites | Shale Hills: WGS84, Lat 40.664328 Lon -77.907653 |
| Publications | Wen et al. (2021) in Water Resources Research: The limits of homogenization: how much can a simple model capture hydrological dynamics? |
| Citation | The following acknowledgment should accompany any publication or citation of these data: Logistical support and/or data were provided by the NSF-supported Shale Hills Susquehanna Critical Zone Observatory. |
| Data Use Notes | The user of Shale Hills Susquehanna CZO data agrees to provide proper acknowledgment with each usage of the data. Citation of the name(s) of the investigator(s) responsible for the data set, in addition to the generic statement above, constitutes proper acknowledgment. Author(s) (including Shale Hills Susquehanna CZO investigators) of published material that makes use of previously unpublished Shale Hills Susquehanna CZO data agree to provide the Shale Hills Susquehanna CZO data manager with four (4) copies (preferably reprints) of that material for binding as soon as it becomes available. The user of Shale Hills Susquehanna CZO data agrees not to resell or redistribute shared data. The user of these data should be aware that, while efforts have been taken to ensure that these data are of the highest quality, there is no guarantee of perfection for the data contained herein and the possibility of errors exists. These data are defined as either public or private, such that a password may be required for access. |