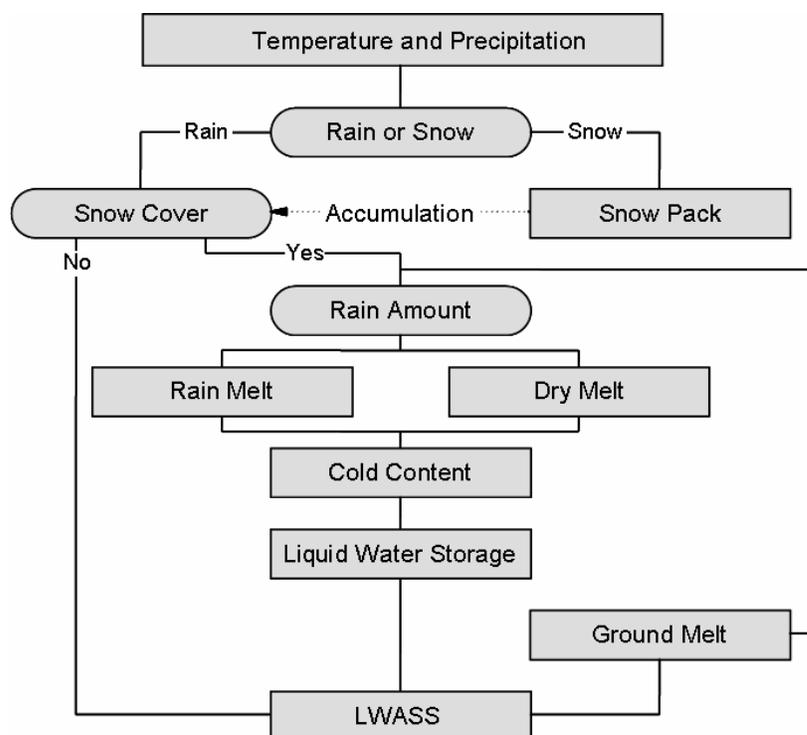




Snowmelt Modeling in HEC-HMS

Description

The snowmelt component of Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS) estimates snow accumulation and melting based on a temperature index method. The method was taken from the “Snow-Band” snowmelt computation of the Streamflow Synthesis and Reservoir Regulation (SSARR) model, originally developed by the U.S. Army Corps of Engineers. The snow model requires precipitation and air temperature as inputs and can be applied in gridded form, elevation bands, or over the entire watershed. The gridded temperature index model is designed to work with the gridded ModClark transform method. The temperature index method predicts snow melting with either of two options to describe the melting rate: a function of an antecedent temperature index or a predetermined function of month of the year. Heavy rain events trigger a separate melt rate coefficient. At any point in time, an antecedent temperature index describes the cold content of the snowpack, which accumulates during cold events. The model must ‘satisfy’ the cold content before melt runoff can occur. A simple ‘bucket’ concept provides the mechanism to retain liquid water in the snow against drainage processes until the water content reaches a user-set threshold. The output of the method is the liquid water available at the soil surface (LWASS), which becomes the hyetograph of the subbasin.



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| Benefits | HMS snow models will allow Corps engineers to easily estimate the impacts of snowmelt on stream flow or reservoir operation and estimate the total volume of snow water equivalent (SWE) in each subbasin. The temperature index method also has a calibration program, calSSARR, which can be used to determine the snowmelt parameters included in the temperature index method. The temperature index method requires only air temperature and precipitation, but has been shown to provide accurate results in most areas. |
| Status | The temperature index snowmelt model is available in the latest release of HEC-HMS, Version 3.1.0. A complete energy budget snowmelt model is currently under development. |
| Distribution Source(s) | HEC-HMS with snowmelt capability can be obtained from the HEC Web site at the following location: http://www.hec.usace.army.mil |
| Available Documentation | Documentation for snowmelt models currently is available in the HEC-HMS User's Manual, Version 3.1.0, Nov 2006, which can be downloaded from the HEC Web site. |
| Available Training | There is currently no separate training course on snowmelt modeling in HEC-HMS. However, a one day class on snow modeling was included in the "Advanced Applications of HEC-HMS" class offered at HEC. To find out more about these classes, and when they are offered, visit the HEC Web site under the training area. |
| Available Support | Support for snow model with HEC-HMS is available to all Corps employees. Corps users can either e-mail or call HEC with questions and/or comments. |
| Application | The snow modeling available in HEC-HMS and its predecessor program DSPM have been used by several of Corps Districts to estimate snowmelt runoff in several studies. Recent applications have been used at Kings River, California, Rogue River, Oregon, Dworshak Dam, Idaho, and Pine Flat Watershed, California. |
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| Partners | N/A. |