SENSITIVITY ANALYSIS OF THE SWAT AND KINEROS-OPUS SNOW MODULES IN A SMALL HEADWATER CATCHMENT IN THE SEMI-ARID WESTERN UNITED STATES.

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Abstract Snow is a major component of the annual water balance in many locations across the mountainous regions of the interior western United States. Across the landscape, the amount, timing, and distribution of snow and melt-water infiltration into the soil influences vegetation patterns and sustainability, recharge to aquifers, and ultimately water supply. Moreover, our ability to quantify environmental effects of conservation practices in this region is tightly linked to our ability to simulate the redistribution, accumulation, and ablation of the seasonal snowcover. AGWA (Automated Geospatial Watershed Assessment) allows one to parameterize, execute and visualize results from both SWAT (Soil Water and Assessment Tool) and Kineros-Opus (K2-O2) and is often used for CEAP (Conservation Effects Assessment Projects). AGWA was used for this research to test the existing snow modules within SWAT and K2-O2. In order to test how these models respond with a more detailed treatment of snow accumulation and ablation, SWAT and K2-O2 were loosely-coupled with output from an energy balance model (Isnobal). Essentially, the spatially-distributed liquid water from either melting snow or rain on the soil surface was used as water input to the existing SWAT and K2-O2 models. A carefully collected, processed, and validated meteorological dataset for the 1984-2008 water years was assembled for a headwater catchment within the Reynolds Creek Experimental Watershed in southwestern Idaho, United States. The data were used to force the physically-based, distributed Isnobal energy balance snow model and the AGWA models. Comparisons between measured and simulated parameters of stream discharge and spatially-distributed snow–accumulation and soil moisture were used to quantify model efficiency.