Understanding spatial nonstationarity in the influence of topography and vegetation on patterns of snow depth and snow water equivalent (SWE) can improve distributed SWE models, improve river runoff forecasts, and guide investigations of physical processes that generate this variability. In this study, we seek to understand the nature of this nonstationarity and improve upon a basin-scale statistical snow depth model by allowing for spatial patterns within observed relationships. To accomplish these objectives, we apply a 2-stage regression framework, using a Mixed Regressive, Spatial Autoregressive (MR-SAR) error model to adjust for large-scale heterogeneous processes (e.g. weather) and a Geographically Weighted Regression (GWR) model to allow for spatial variation in model coefficients. The 2-stage model is applied to gridded, 3m-resolution, LiDAR-derived elevation, canopy height, land cover classification, and snow depth products from the Airborne Snow Observatory (ASO) mission in the Tuolomne River Basin in California. Analysis is performed using Google Earth Engine to take advantage of distributed computing resources necessary for the computationally expensive methodology. Preliminary results suggest that our localized approach leads to a 10