In this study, we estimate the spatial variability of surface heat fluxes using multi-scale remote sensing based retrievals from the Surface Energy Balance System (SEBS) model across the Murrumbidgee basin in south-eastern Australia. The SEBS model is forced with meteorological data from a regional climate model and available in-situ observations, while satellite data is derived from Landsat, MODIS and AIRS imagery to examine the degree of spatial variability in using multi-resolution satellite data. Multiple Landsat scenes are used to develop a temporal sequence of remotely sensed retrievals, enabling a thorough assessment of scaling between surface flux retrievals to be undertaken. Results are compared with in-situ observations of latent and sensible heat fluxes collected across varying parts of the catchment during the analysis period.