Accurate knowledge of local surface emissivity is required for lower tropospheric microwave remote sensing over land. Ideally, for a stand alone microwave system, accuracies of 0.01 or less are needed for minimizing the impact of cloud liquid water on temperature and water vapor retrievals and for improving surface temperature retrievals. Because surface properties may change rapidly, the emissivity database must be frequently updated. Surface emissivity may be well characterized in the clear-sky using co-located microwave and infrared observations although, in certain areas, terrain and surface type inhomogeneities may be a limiting factor. In cloudy (non-precipitating) skies one must rely on temporal persistence. The use of such an approach is necessarily limited to areas for which frequency of occurrence of “clear” measurements is higher than the rate at which surface properties change. Surface emissivity in the AMSR-E channels is being retrieved from combined observations from the AMSR-E, AIRS and MODIS instruments on the EOS/Aqua platform in relatively clear conditions. In this paper, we examine the temporal variability of retrieved local surface emissivity over selected regions of the globe and provide a preliminary assessment of the usefulness of the product for cloudy microwave retrievals.