Validation of NASA, NOAA AND ESA mid and thermal infrared data and products using the Lake Tahoe and Salton Sea automated validation sites

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The stated goal of NASA's Earth Science Research Program is to utilize global measurements to understand the Earth system and its interactions as steps toward the prediction of Earth system behavior. NASA has identified the provision of well-calibrated, multiyear and multi-satellite data and product series as a key requirement for meeting this goal. In order to help address this goal we have established two automated validation sites where the necessary measurements for validating mid and thermal infrared data from spaceborne and airborne sensors are made every few minutes on a continuous basis.

The two automated validation sites are located at Lake Tahoe CA/NV and Salton Sea CA. The Lake Tahoe site was established in 1999 and the Salton Sea site was established in 2008. Lake Tahoe is ideally suited for validation of mid and thermal infrared data for several reasons including its size, homogeneity, elevation, accessibility and composition. In order to use Lake Tahoe for validation, 4 buoys have been deployed. Each buoy includes a custom-built highly accurate (50mK) radiometer measuring the surface skin temperature and several bulk temperature probes that trail behind the buoy. Each buoy includes a logging system with dial-up cellular access and two full meteorological station measuring wind speed, wind direction, relative humidity and net radiation. All the measurements are made every few minutes and downloaded hourly via a cellular modem. The buoy measurements are supplemented with a variety of atmospheric measurements made onshore. The Salton Sea site was established in 2008 to validate high water temperatures, up to 35 C and evaluate the performance of surface temperature retrieval algorithms under wet and dry atmospheres depending on time of year.

Data from the sites have been used to validate numerous satellite instruments including the Advanced Very High Resolution Radiometer (AVHRR) series, the Along Track Scanning Radiometer (ATSR) series, the Advanced Spaceborne Thermal Emission and Reflectance Radiometer (ASTER), the Landsat series, the Moderate Resolution Imaging Spectroradiometer (MODIS) on both the Terra and Aqua platforms, the Visible Infrared Imaging Radiometer Suite (VIIRS) and the ECOsystem Spaceborne Thermal Radiometer Experiment on Space Station (ECOSTRESS). In all cases the standard products have been validated including the standard radiance at sensor, radiance at surface, surface temperature and surface emissivity products. We will present results from the validation of the mid and thermal infrared data from several of the aforementioned instruments and cross compare those results.