VIIRS (Visible Infrared Imager Radiometer Suite) onboard the Suomi NPP (National Polar-orbiting Partnership) satellite has been acquiring Earth observations for near two years. During that time, SNO (Simultaneous Nadir Overpass) events have provided many opportunities for inter-comparisons between VIIRS and the MODIS (Moderate Resolution Imaging Spectroradiometer) instruments from the Aqua and Terra satellites. The SNOs have occurred over snow-covered Antarctica, which provided bright surfaces in the visible and near-infrared bands, as well as over northern Alaska, Canada, Greenland, Scandinavia, Siberia, and polar oceans, with both dark and bright scenes that frequently include clouds. Top-of-atmosphere reflectance values measured by VIIRS during the SNO events were found to be highly correlated with the MODIS data for the corresponding spectral bands. The SNO comparisons have helped improve VIIRS radiometric performance and accuracy of its data products.

Comparing VIIRS with two MODIS instruments has not only reduced uncertainty of the SNO measurements, but also allowed for inter-comparisons between the MODIS instruments from the two spacecraft. For most of the reflective solar bands, biases between VIIRS and MODIS are small and are similar for both MODIS instruments. Radiative transfer modeling has shown that the observed discrepancies can be attributed to differences between spectral responses of VIIRS and MODIS. With some exceptions, inferred biases between MODIS measurements are within uncertainty of the radiometric calibrations. The largest bias occurs in the case of the 488-nm band from MODIS on Terra, despite improved radiometric calibration of the MODIS Level 1B Collection 6 data products. For other bands, biases between Aqua and Terra MODIS Collection 6 data are smaller than in Collection 5.