# EVALUATION OF THE CONSISTENCY OF LANDSAT-5 TM, LANDSAT-7 ETM+ AND LANDSAT-8 OLI SURFACE REFLECTANCE PRODUCTS

M. Claverie [a, *], E. Vermote [a], B. Franch Gras [a,b], J. Masek [a]

[a] NASA/GSFC, Greenbelt, MD, USA
[b] UMD, Department of Geographical sciences, College park, MD, USA

**KEY WORDS:** Landsat, MODIS, surface reflectance

**ABSTRACT:**

Maintaining consistent data sets of Surface Reflectance (SR) is an important challenge to ensure long term quality of Climate Data Record. Landsat 5, 7 and 8 data archive and future acquisitions offer a unique data source to monitor land surface globally at high spatial resolution. Continuous consistency evaluation of SR products, derived from the Landsat Ecosystem Disturbance Adaptive Processing System (LEDAPS), is thus required.

Two consistency evaluation approaches are treated in this paper. First approach, already introduced by other studies, is based on the full AERONET data set for the period 2000 to 2013. This account for 489 sites over which 8500 coincident Landsat 5 TM and 7 ETM+ scenes were selected. The approach refers to the comparison of a 10x10km subsets of LEDAPS-derived Landsat SR and AERONET-derived SR. The latter was computed using Landsat TOA reflectance, AERONET measurements and 6S model. Second, we introduced a new methodology to cross-compare Landsat data and MODIS data. The analysis was based on 5000 random scenes globally distributed from 2000 to 2013. This method 3includes: (i) a BRDF adjustment, based on the VJB model, to adjust Terra and Aqua MODIS data to the same day Landsat 5 TM and 7 ETM+ sun-view geometry, (ii) a spectral adjustment based an artificial neural network trained with PROSAIL vegetation radiative transfer model.

The overall results of both approaches showed a good matching over 80% of the scenes, i.e. the uncertainty remains under a pre-defined specification (0.05rho+0.005). The worst performances were obtained over the blue band, used in LEDAPS to characterize the AOT. The second approach confirmed the good performance of the VJB model by decreasing the scattering between Landsat and MODIS (Terra and Aqua) SR. The spectral adjustment removed part of the biases due to spectral responses differences. Global analysis was used to identify inaccurate AOT retrieval over specific scene, mostly over bright surfaces. The results did not display any significant temporal variation from 2000 to 2013, which highlights the quality of Landsat data calibration and LEDAPS algorithm.

Finally, we will present the currently-developed atmospheric correction chain for Landsat-8 OLI data. The results will focus on the evaluation of the SR products using the two approaches and on the evaluation of the cloud, cloud-shadow and snow masks.

* Corresponding author. This is useful to know for communication with the appropriate person in cases with more than one author.