German Aerospace Center (DLR)  
Earth Observation Center

Summary  
Most remote sensing applications require atmospheric correction of satellite images and an increasing part exploits multi-temporal data. Sentinel-2 satellites and Landsat-8 provide almost equivalent satellite images and a joint use of both data sources gives the advantage of a denser time series if the quality of atmospheric correction is consistent. The present study investigates the performance of atmospheric correction processor ATCOR and shows, that it gives consistent results for Sentinel-2 and Landsat-8 data enabling a combined use of both satellites. Both satellite sensors provide the same correct shape of surface reflectance spectra.

ATCOR is a widely used atmospheric correction tool which can process data of many optical satellite sensors including Sentinel-2 and Landsat-8 [2]. Parallel to maintenance and evolution of ATCOR itself the main ATCOR modules are being migrated to Python-based Atmospheric Correction chain PACO. PACO is designed for Big-Data solutions and being Python-based it alleviates the software maintenance and interoperability. PACO will provide the same performance as ATCOR.

Test data set  
10:02 Landsat-8  
10:10 Sentinel-2B

Fig. 2: Co-located Sentinel-2 and Landsat-8 images used for comparison acquired on May 4, 2018 Reference measurements on the ground are collected at Lake Stechlin (53.15°N, 13.03°E) (Germany).

Fig. 4: Example spectra of different surface types extracted from co-located images of Sentinel-2B and Landsat-8 acquired over North-East Germany on the same day.

Surface reflectance retrieval inter-comparison for more surface types  
• Extraction of example spectra for 120x120 m² regions of interest.  
• Spectral adjustment of Landsat-8 data to Sentinel-2 bands as before.  
• No correction for different viewing angles

CONCLUSION  
Atmospheric correction with ATCOR gives consistent results between Sentinel-2 and Landsat-8 data for the investigated example. Analysis has to be continued comparing results for more co-located acquisitions of Sentinel-2 and Landsat-8. It will be complemented in future on basis of AERONET corrected surface reflectance [3] at a reference.

References:  
https://sentinel.esa.int/web/sentinel/user-guides/sentinel-2-technical-documentation/  
MMI. Approved on 08/01/2019.  
2. Bringfried Pflug (2019). “Atmospheric Correction of Landsat 8 data: Co-located Sentinel-2 and Landsat-8 data for the investigated example.”  

Contact: Bringfried Pflug (bringfried.pflug@dlr.de)