Aqua Band 1-4 EV-based RVS discussion **January 14, 2015**

Attendance: Eric Vermote, Alexei Lyapustin, Gerhard Meister, Christina Hsu, Rob Levy, Andrew Sayer, Bill Ridgway, Sadashiva Devadiga, Amit Angal, Aisheng Wu, Brian Wenny, Xu Geng, Jack Xiong, Hongda Chen

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The meeting was organized to review and discuss the recommendation by MCST to extend the earth-view (EV) based RVS approach to Aqua MODIS bands 1-4. In the current Collection 6 (C6), the m1 and RVS for Aqua MODIS bands 1-4 are derived using the measurements from the on-board solar diffuser (SD) and lunar measurements. The SD and lunar measurements are acquired at two different angles of incidence (AOI) of the scan mirror, and a linear interpolation/extrapolation is used to derive the responses at other AOIs. As previously seen in the bands 8 and 9 of Aqua MODIS, and bands 1-4, 8-10 of Terra MODIS, this linear approximation proves inadequate in accurately characterizing the sensor response, and hence needs to be supported by EV response trending (e.g. over pseudo-invariant desert targets) at multiple AOIs. The current trends for Aqua MODIS bands 1 and 2 (mirror side 1), indicate a long-term drift in the top-of-atmosphere (TOA) reflectance trending, at nadir, of 1.4% and 1.8% respectively. Similar trends for bands 3 and 4 indicate about 1% change. At AOI other than nadir, at the SD and lunar scan-angles, the changes are smaller therefore indicating that the on-board calibrators continue to provide accurate calibration. MCST has conducted testing to apply the EV-based RVS approach to Aqua MODIS bands 1-4. Although current results show measurable reduction of the long-term drift, several issues have been raised during discussion that need to be examined before the recommended change (by MCST) to be made in Aqua C6 forward processing.

- Gerhard: Since the new LUT, derived from the desert sites, when applied back should cancel out (de-trend) the data completely. This is not the case in the results that were presented. Jack: MCST should examine results at other AOIs (not shown here) and make sure this is not caused due to the use of a simple quadratic fitting applied in the current testing, and perform a similar testing using a higher-order fitting for the RVS (an AI for MCST).
- Rob suggested using consistent data in each calendar year before a long-term trend is estimated.
- Alexei: Aisheng showed the Terra long-term results (desert and Dome C) for bands 1 & 2, as well as it's comparison with the VIIRS. Results from both trends show an upward bias for bands 1 and 2. Alexei suggested that this issue also needs to be resolved since Terra-Aqua consistency is critical. In addition to the Aqua fitting, MCST will revisit and review the fitting for Terra MODIS as well.
- A general consensus was to adopt this revised approach, pending the resolution of de-trending of Aqua (stated in bullet 1) and a science data test. MCST will deliver an entire mission test LUT to Sadashiva, and a test-data set for a year with new LUT will be generated for review. After approval from all participants in today's meeting, MCST will implement this change in forward processing.

Compiled by Amit Angal