A Consistent EPIC Visible Channel Calibration using VIIRS and MODIS as a Reference

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Introduction
* EPIC onboard the DISCOVR satellite at L1 lack onboard calibration
* Filter wheels radiometrically calibrated on the move to monitor stability
* EPIC’s constant view of the earth provides unique opportunity for inter-calibration of EPIC channels using well-calibrated instruments on low Earth orbit (LEO) satellites
* Inter-calibration is performed by ray-matching with MODIS on Aqua satellites and VIIRS on NPP-Suomi
* EPIC bands 1-4 are in the ultraviolet wavelengths and have no MODIS/VIIRS channel counterparts, and therefore are not considered here

Data
* EPIC L1B, bands 5-10
  - Version 01 is briefly used for navigation analysis
  - Version 02 is used for most of this study
* NPP-VIIRS Land PEATE L1B version 001
* Aqua-MODIS Collection 6 L1B
* EPIC L1B, bands 5-10
  - M-bands at 750 m resolution
  - 1-bands nominally at 370 m but sub-sampled to 750 m* Spatially average the EPIC (E7) and VIIRS (I1) imager pixels into 0.25º x 0.25º latitude by longitude grid for images within 15 minutes
  - All bands appear to be very stable, which is expected since the distance between Earth and DISCOVR is so vast
* ATO and DCC temporal trends for non-absorption band pairings are within 1% of each other

Conclusion
* EPIC Version 02 shows navigation improvement over version 01, but still could be further improved
* EPIC accounts for spatial differences and brings the offsets closer to zero
* The ray-trace improvements in V02 also bring the offsets closer to zero
* ATO or DCC temporal trends for all non-absorption band pairings are very similar, with their mean gains within 1%

References