TROPOMI Aerosol Index: detailed aerosol plume tracking and plans for future development

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The aerosol index (AER_AI) as calculated using data from the Tropospheric Monitoring Instrument (TROPOMI) onboard the ESA Sentinel 5 Precursor (S5P) platform was publicly released in July 2018. The operational AER_AI dataset is available from May 2018 through the present. It is a useful data product not only for tracking ultraviolet (UV) absorbing aerosol plumes of desert dust, volcanic ash, and smoke from biomass burning but also for monitoring the quality of the TROPOMI Level 1b (L1b) data since the AER_AI calculation is very sensitive to the absolute calibration of irradiance and radiance. The aim of this work is first to highlight the new level of detail seen in aerosol plume events based on the recent switch to a reduced pixel size of 3.5 x 5.5 km. Such high spatial resolution also presents specific challenges as non-Lambertian cloud features and 3-D effects of clouds are now visible in the TROPOMI AER_AI data. Plans for an approach to flag and correct these features in future AER_AI updates will be given. Secondly this work will include an overview of the impacts on AER_AI due to observed degradation in the TROPOMI measured irradiance and wavelength-dependent features in the radiance. As a result of these L1b effects, there is a steadily increasing negative bias in the global mean AER_AI value. Examples are given how the new version of the L1b data (2.0.0) will be used to correct for this degradation-driven bias. Recommendations are also given to guide data users looking to perform trend analysis or those using AER_AI as a filter for aerosol removal or detection in other L2 data products.