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Abstract: **AOT Retrievals of China Smog Events (Winter 2015-2016) Using Two Different S-NPP VIIRS AOT Products**

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Frequent occurrence and large areal extent of air pollution events in China have caused increasing public health concerns over recent years. While instrumentation on the ground can best characterize the concentration and composition of these events, in a local area, the spatial coverage of these events and estimation of magnitude of the health hazard in between ground stations requires more widespread measurements. Satellites can provide broad spatial measures of particulate loading in the cloud-free atmospheric column (aerosol optical thickness - AOT), which has been shown to be a good indicator of severe air pollution. To be useful, satellite-derived AOT must be reliably available. During the data validation of the Suomi-National Polar-orbiting Partnership (S-NPP) Visible Infrared Imaging Radiometer Suite (VIIRS) aerosol products, we investigate several significant China air pollution events during the 2015-2016 winter season using the products from two VIIRS aerosol algorithms, the current operational IDPS algorithm and the newly developed Enterprise (EPS) algorithm. In this investigation we compare the availability of AOT retrievals from the two algorithms, and the ability of these algorithms to characterize the spatial extent of the pollution events. We find that the IDPS aerosol product frequently fails to retrieve AOT over highly polluted pixels and consequently only provides partial regional coverage of the events. Several root causes for the lack of availability of retrievals include over screening for clouds and snow, and a maximum retrievable AOT of 2.0. The new EPS aerosol algorithm demonstrates much improved capability in detecting Chinese air pollution events by employing less aggressive screening and extending the AOT range up to 5.0. With the new EPS AOT retrievals, we were able to characterize the spatial extent of extreme aerosol loading during the events and create

probability distributions of the satellite-retrieved aerosol optical properties. Such new capability not only demonstrates the advancing of the EPS aerosol algorithm from data validation perspective, but also represents the important value of the VIIRS aerosol products in real world application such as monitoring the occurrence and regional dispersion of this serious public health hazard in China and other regions with the same air pollution concerns.