

Climatology of Aerosol Optical Properties Over the High Arctic

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Sunphotometer/sky radiometer measurements have been acquired at the high Arctic Observatory in Eureka [Nunavut, Canada] since the spring of 2007. These (CIMEL) sunphotometers belong to the AEROCAN/Aerosol Robotic Network (AERONET) network and are part of Canadian Network for the Detection of Atmospheric Change (CANDAC). They are located at the Polar Environmental Atmospheric Research Laboratory (PEARL) Ridge lab and Zero Altitude PEARL Auxiliary Laboratory (ØPAL) sites in Eureka. ØPAL is located about 15 km southeast of the PEARL ridge lab, which is at an elevation of 610 m. This dual placement was designed to study the layer between the two sites, as well as provide an element of redundancy for the Aerosol Optical Depth (AOD) measurements.

Based on five years of continuous, spring/summer observations (2007-2011), we report results on the seasonal and inter-annual variations of AOD at Eureka (Figure 1). The AOD data were further resolved into fine (sub-micron) and coarse (super-micron) particle modes. The results are analyzed in the context of fine mode biomass burning events that occur typically during spring, known fine mode volcanic (sulphate) events (e.g., the Kasatochi eruption of August 2008 and the Sarychev eruption of June 2009), and coarse mode events. The AOD variations over Eureka are compared with measurements made at other Arctic sites, including Barrow [Alaska, USA] and Alert [Nunavut, Canada], acquired using NOAA Sunphotometers and the AEROCAN/AERONET sites in Resolute Bay [Nunavut, Canada], Thule and Kangerlussuaq [Greenland, Denmark], and Hornsund [Spitsbergen, Norway].

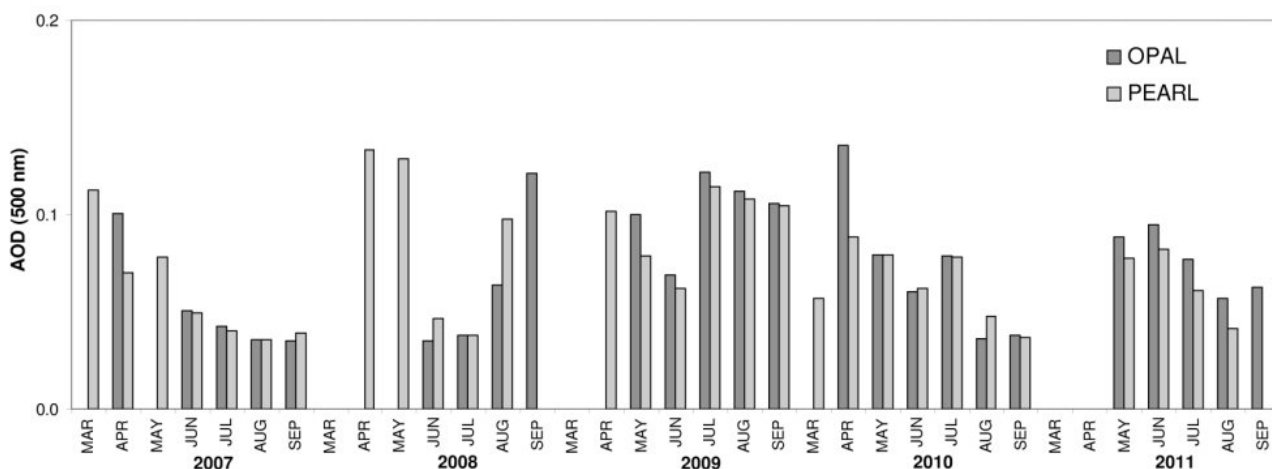


Figure 1. Monthly mean temporal variation of Aerosol Optical Depth (500 nm) at Eureka.