



Satellite Observations of Stratospheric Injection of Carbonaceous Aerosols from Boreal Forest Fires

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Unprecedented amounts of tropospheric carbonaceous aerosols generated by wildfires in British Columbia (BC) on August and September 2017 were injected into the stratosphere on at least three different occasions. This extraordinary event was observed from space by both active and passive, profiling and mapping sensors. The Earth Polychromatic Imaging Camera (EPIC) onboard the Deep Space Climate Observatory (DSCOVR) at the L-1 point observed the spatial and temporal evolution of the aerosol plume for about six weeks since the onset of the wildfires in early August. EPIC's unique capability of observing the diurnal cycle during daylight hours at any point on the Earth's surface allowed following the progression of the BC smoke plume several times (as many as six) depending on the location. The EPIC's characterization of the BC plume was carried in terms of the qualitative UV Aerosol Index (UVAI) parameter and aerosol optical depth (AOD) as the plume traveled above tropospheric water clouds in some instances and in completely clear skies on others. Under cloud free conditions, an estimate of the plume's single scattering albedo (SSA) was also obtained. The unusually high UVAI values (in excess of 20) recorded by EPIC for this plume pointed to an elevated aerosol layer well above the tropopause. This event was promptly confirmed by CALIOP and OMPS-LP observations that clearly detected the presence of the stratospheric smoke plume in a layer between 12 and 16 km. The resulting stratospheric carbonaceous aerosol layer was quickly mobilized eastward across the Atlantic Ocean, reaching Europe and Asia in about five days. A detailed discussion of plume characteristics as seen from EPIC near UV space observations and the OMPS-LP will be presented.