



Remote Sensing of Arctic and Boreal Atmospheric Composition from a Highly Elliptical Orbit

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The Polar Communications and Weather (PCW) mission is a proposed Canadian mission that aims to provide continuous meteorological observations and communications capacity over the Arctic and northern latitudes from a pair of satellites in a highly elliptical orbit (HEO) configuration. The Weather, Climate and Air quality (WCA) concept is a mission enhancement that completed a Phase A study through the Polar Highly Elliptical Orbit Science (PHEOS) program. The PHEOS-WCA instrument suite would consist of a high resolution Fourier Transform Spectrometer (FTS) operating in the mid-, near- and shortwave infrared and a UV-Visible grating Spectrometer (UVS), both with 2-dimensional imaging capability. These instruments would enable dense measurements of numerous quantities important for understanding weather (H_2O and temperature profiles), climate (column-averaged CO_2 and CH_4) and air quality (tropospheric O_3 , CO , NO_2 , SO_2 , NH_3 , HCN , CH_3OH , BrO , aerosols, . . .) with a pixel size of $10 \times 10 \text{ km}^2$ or better and repeat time targeted at 2 hours or less. Our studies have demonstrated that HEO observations of CO_2 offer major advantages over those from low earth orbit (LEO) for constraining CO_2 surface sources and sinks in the Arctic and boreal regions, especially in the summer when there is the potential for the release of CO_2 from permafrost thaw and boreal forest disturbances. This presentation will give an overview of the PHEOS-WCA mission concept, discuss its complementarity with upcoming international missions and provide an update on recent progress and challenges in moving forward.