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The Arctic Observing Mission (AOM) is a satellite mission concept currently under study by the Government of Canada (GOC) for potential implementation with prospective U.S. and European partners. AOM would use two satellites in a Highly Elliptical Orbit (HEO) to make geostationary-like observations of greenhouse gases (GHGs), other atmospheric composition and meteorological variables, and space weather over northern regions. AOM is currently undergoing a pre-formulation study (PFS) to be completed by late 2024 as a step toward a future funding request. A key component of the PFS is a mission design contract in which an industry team is assessing payload and orbit options, updating conceptual designs for the GHG instrument and estimating costs for the mission. AOM would make CO2, CH4, CO and solar induced fluorescence observations using an Imaging Fourier Transform Spectrometer (IFTS). The IFTS, coupled with cloud data from the meteorological instrument to enable an intelligent pointing approach, would deliver unprecedented hourly CO2, CH4, CO and SIF observations over cloud-free land from ~40-80°N as described in a new publication (https://doi.org/10.3389/frsen.2023.1233803). Exploration of new focal plane array options and flexibility in pixel binning could enable CO2, CH4, CO and SIF imaging with a spatial resolution potentially as fine as ~0.7 km (depending on satellite altitude and observing mode) for applications where spatial resolution takes priority over precision. AOM's new GHG observations would improve our ability to detect and monitor changes in northern carbon cycles, including CO2 and CH4 emissions from boreal forests, wetlands, permafrost thaw or anthropogenic sources. This presentation will give an update on AOM's progress and status, international partnership scenarios, the GHG IFTS design and related AOM studies.
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