

Fifteen Years of the Canadian Arctic ACE/OSIRIS Validation Project at PEARL

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Ground-based measurements provide critical data to validate satellite retrievals of atmospheric trace gases and to assess the long-term stability of these measurements. As of February 2017, the Canadian-led Atmospheric Chemistry Experiment (ACE) satellite mission has been making measurements of the Earth's atmosphere for nearly fourteen years and Canada's Optical Spectrograph and InfraRed Imager System (OSIRIS) instrument on the Odin satellite has been operating for over sixteen years. As ACE and OSIRIS continue to operate far beyond their planned two-year missions, there is an ongoing need to validate the trace gas profiles from the ACE-Fourier Transform Spectrometer (ACE-FTS), the Measurement of Aerosol Extinction in the Stratosphere and Troposphere Retrieved by Occultation (ACE-MAESTRO) and OSIRIS. In particular, validation comparisons are needed during Arctic springtime to understand better the measurements of species involved in stratospheric ozone chemistry.

To this end, fifteen Canadian Arctic ACE/OSIRIS Validation Campaigns have been conducted during the spring period (February - April in 2004 - 2018) at the Polar Environment Atmospheric Research Laboratory (PEARL) in Eureka, Nunavut (80N, 86W). For more than a decade, these campaigns have been undertaken in collaboration with the Canadian Network for the Detection of Atmospheric Change (CANDAC). The spring period coincides with the most chemically active time of year in the Arctic, as well as a significant number of satellite overpasses. A suite of as many as 12 ground-based instruments, as well as frequent balloon-borne ozonesonde and radiosonde launches, have been used in each campaign. These instruments include: a ground-based version of the ACE-FTS (PARIS - Portable Atmospheric Research Interferometric Spectrometer), a terrestrial version of the ACE-MAESTRO, a SunPhotoSpectrometer, two CANDAC zenith-viewing UV-visible grating spectrometers, a Bomem DA8 Fourier transform spectrometer, the CANDAC Bruker 125HR Fourier transform spectrometer, a Systeme d'Analyse par Observations Zenithales (SAOZ) instrument, and several Brewer spectrophotometers. In the past several years, these results have been used to validate the measurements by the ACE-FTS, ACE-MAESTRO, and OSIRIS instruments as well as the TANSO-FTS instrument on the Japanese Greenhouse Gases Observing Satellite (GOSAT). This presentation will focus on an overview of the measurements made by the ground-based, balloon-borne and satellite-borne instruments during the recent ACE/OSIRIS Arctic Validation campaigns and highlight how these have been used for satellite validation.