Contribution ID: **1076** Type: **Invited Speaker / Conférencier invité**

Canada's Triad of Atmospheric Space Instruments: A 21st Century Success Story

Wednesday 15 June 2016 13:15 (30 minutes)

18th December, 1999, February 20th, 2001 and 12th August, 2003 marked the launch dates of three Canadian atmospheric experiments: MOPITT, Odin/OSIRIS and SciSat/ACE. These three satellites, launched in the space of less than four years share another enviable characteristic: They are all still working after 13-16 years and between them they have accumulated over 45 years of on-orbit operating time. Not bad for missions whose planned lifetime ranged from 2-5 years!

The instruments of these missions all operate by sensing electromagnetic radiation, but differ in the instrumentation used to analyse the radiation. MOPITT uses correlation radiometry, OSIRIS uses a grating spectrometer and the ACE instruments use a Fourier transform spectrometer and a grating spectrometer. The differing techniques are suited to the atmospheric components and altitude ranges targeted by these instruments.

These global space-based measurements tackle some of the most significant atmospheric issues facing humanity today: ozone and atmospheric pollution, but also provide measurements relevant to climate change. After their several decades of operation each of them has a story to tell of atmospheric discoveries and new science.

MOPITT has given us a global picture of lower atmosphere pollution transport showing how carbon monoxide is changing over the planet and is influenced by El Nino, industrialisation and perhaps even the state of the world economy.

Over the past fifteen years OSIRIS has provided international climate scientists with a high resolution view of both the changing vertical distribution of ozone and the increase of stratospheric sulphate particles that result from volcanic eruptions and that cause noticeable surface cooling.

ACE has provided the most comprehensive view of composition of the Earth's atmosphere including measurements of more than 50 trace gases and isotopologues. It was designed to monitor the recovery of the ozone layer and was the first to measure CFC-113, HCFC-142b, HFC-134a, COClF, COCl2, and HFC-23 from orbit.

Financing for these instruments was provided by the Canadian Space Agency but many other agencies and organisations have also provided funding and support. We also acknowledge that the success of these instruments is due to the dedication and hard work of many people over several decades.

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Session Classification: W2-3 Remote Sensing (DASP) / Détection à distance (DPAE)

Track Classification: Atmospheric and Space Physics / Physique atmosphérique et de l'espace (DASP-DPAE)