



Canadian Space Agency

Overview for the
CEOS – 3rd WG Climate

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Canadian Space Agency
Agence spatiale
canadienne



Overview

- Update:
 - CSA is proud to have the opportunity to become the CEOS Chair for 2013. The chair priorities are:
 - Support the implementation of the CEOS Self-Study action plan.
 - Support the development of the GEO post 2015 work plan.
 - Initiate the development of 2013 CEOS work plan with an horizon of 3 years
 - Sustained emphasis on :
 - Impact of Climate Change on polar regions
 - Improving Disaster Risk Management through closely coordinated actions
- CSA strategic objective:
 - Canada’s exploration of space, provision of space services and development of its space capacity meet the nation’s needs for scientific knowledge, innovation and information.
- To achieve this objective the Agency has three core programs:
 - **Space Data, Information and Services**
 - Space Exploration
 - Future Canadian Space Capacity



CSA - Space Data, Information and Services



- This Program:
 - Includes the provision of space-based solutions (data, information and services) and the progression of their utilization.
 - serves to install and run ground infrastructure that processes the data and operates satellites.
 - utilizes space-based solutions to assist Government of Canada (GoC) organizations to deliver on the key national priorities, such as sovereignty, defense, safety and security, resource management, environmental monitoring and the North.
 - provides academia with data required to perform its own research.



CSA: Sun-Earth System Sciences Group



- Earth system science missions:
 - Missions in operation (SCISAT, OSIRIS, MOPITT, CloudSat, NIRST/Aquarius)
 - Data products: atmosphere composition, ozone, and cloud and biomass fire properties
 - New developments (CASS and SWOT)
 - Data to be produced: atmospheric composition, surface water and ocean topography
- Satellite Data Activities supported:
 - Support to take SCISAT and OSIRIS into FCDR quality datasets
 - Support to WCRP: Polar Climate Predictability/SPARC
 - Support SMAP validation and future data exploitation
 - Support GOSAT data validation
- Numerical model development supported:
 - Carbon data assimilation system
 - Canadian Middle Atmosphere Model: develop a nudged configuration to produce a 20-year reanalysis spanning the period 1991-2011, encompassing the entire neutral atmosphere and including chemical species.

The CSA is looking for partnership to enable the implementation of the CASS mission

CASS and CEOS



- The **Chemical and Aerosol Sounding Satellite (CASS)** mission is a response to the national and international need for continuation of atmospheric composition vertical distribution measurements.
- It is a science mission to provide climate quality atmospheric composition measurements from a low Earth orbit satellite platform
 - Following loss of Envisat (3 limb sounding instruments), SciSAT & OSIRIS represent 50% of current limb profiling capability to measure atmospheric composition.
 - The consequence of a gap (from CEOS ACC assessment report, 2009) is the introduction of ambiguity in the series of ozone and climate trend measurements

High Resolution Ozone Vertical Profiles

Mission / Instrument	Launch	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
Odin / OSIRIS	2001-02	Current baseline											11	Current Extended																		
ENVISAT	2002-03	Current Extended										10	Future Planned																			
SCISAT/ACE-FTS	2003-08	Future Planned							9	Future Considered																						
Aura / MLS	2004-07	Future Considered								8	Outdated Consideration																					
NPP /OMPS	2011-11	Outdated Consideration											1																			
SAGE 3 on ISS	Plan													Future Planned																		
CASS	Plan																			Future Planned			Future Considered									
Proba x / ALTIUS	Plan													Outdated Consideration																		
PREMIER	Plan																			Future Considered												
GACM-1	Plan																									Outdated Consideration						

X Full Years of Operation



Chemical and Aerosol Sounding Satellite (CASS)



Mission Science Objectives

CASS Science Goals are to further our understanding of:

- How the Earth's atmospheric composition is evolving and responding to both natural and anthropogenic changes [Climate Change Monitoring]
- The coupling between the recovery of the ozone layer from the effect of ozone-depleting substances and climate change [Montreal Protocol Assessment]
- The processes and dynamics that control the role of the upper troposphere/lower stratosphere (UT/LS) region and the links with the surface climate [New Climate Science]

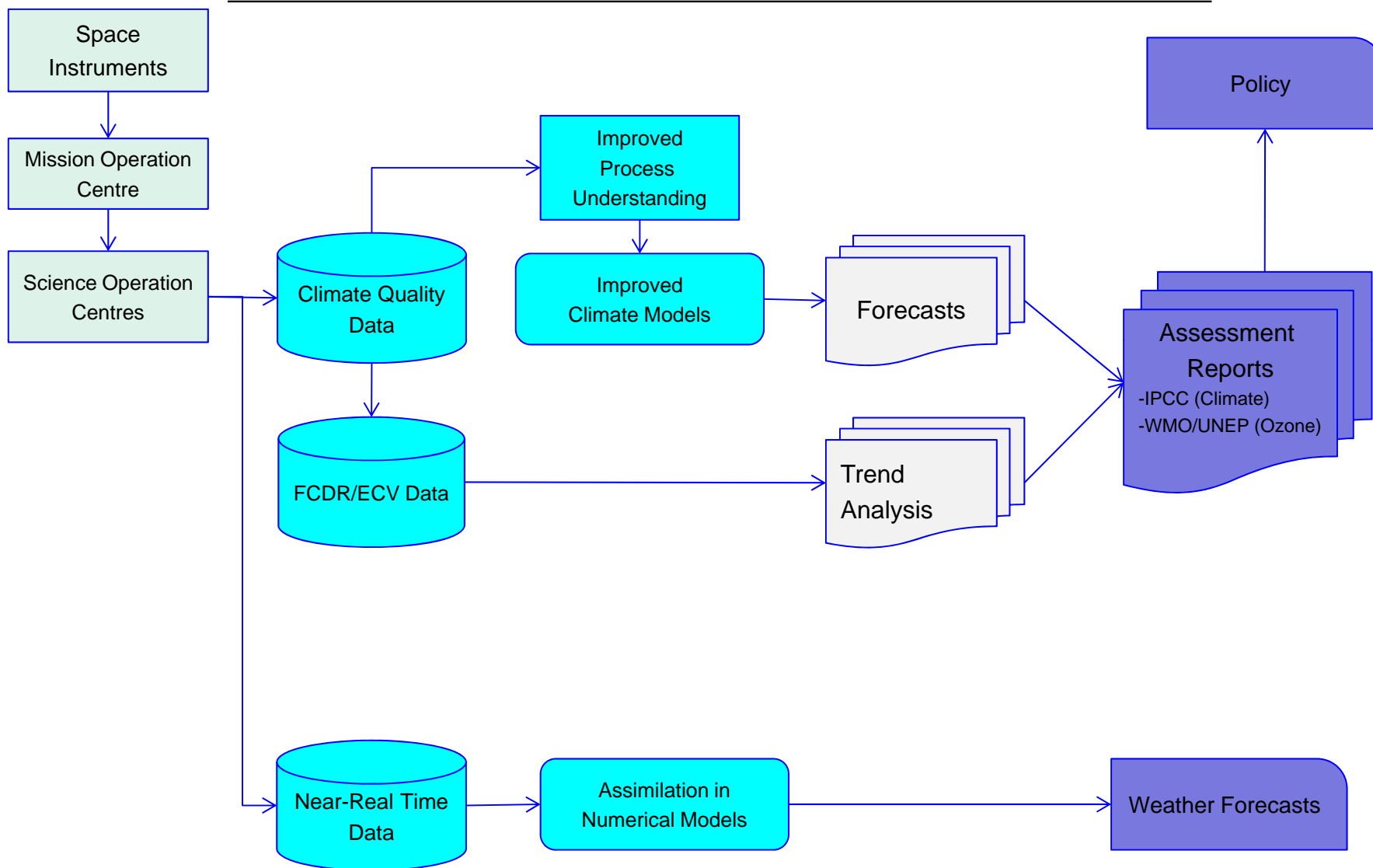
Phase 0 (Mission Definition Phase) was completed in spring 2012.

CASS will build on the strong heritage of the Odin/OSIRIS (launched 2001) and SCISAT/ACE (launched 2003) missions



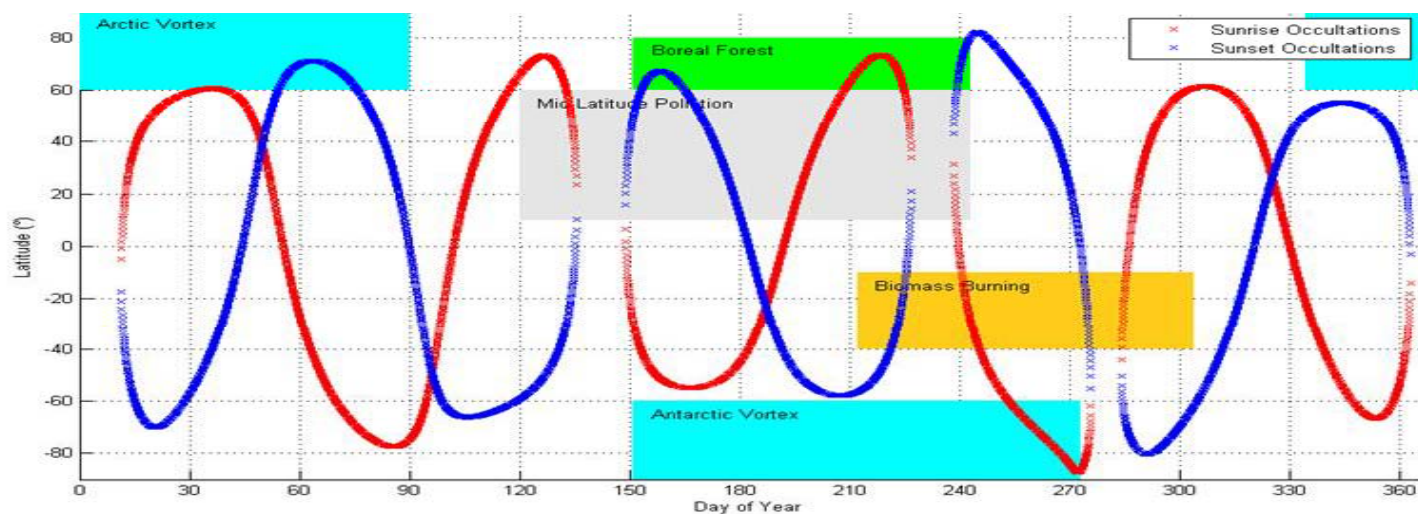


Data & Information Flow

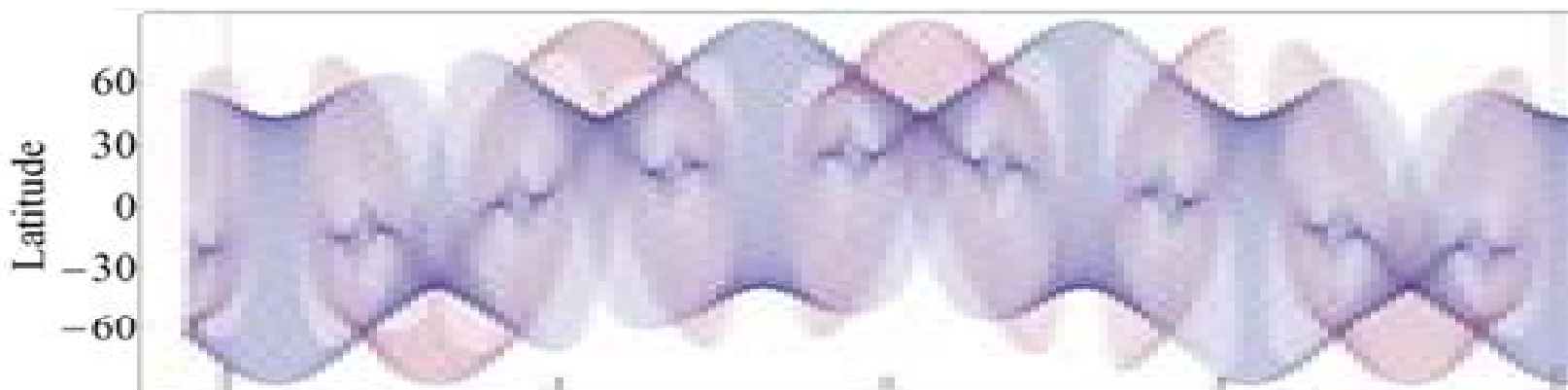


Annual Coverage

CASS-FTS Solar Occultation Coverage



CASS-CATS Limb Coverage



CASS Concept Overview



Item	CASS
Bus	Small Satellite Bus
Instrument 1	CASS-FTS Fourier Transform Spectrometer
Instrument 2	CASS-CATS Canadian Atmospheric Tomography System (diffraction grating spectrometer)
Possibility to a guest instrument	Exploit synergies
Precision Pointing System	CASS-PPS

S/C Budget est.	Approximate figures
Mass	550 kg
Peak Power	590 W
Average Power	330 W
Orbit	580 km
Orbit inclination	65.4 deg



Solar-occultation Fourier Transform Spectrometer (FTS) based on the Atmospheric Chemistry Experiment FTS on SCISAT

- 580 km Orbit Altitude *
- 65.4° Inclination
- Jan 1 RAAN between 220° and 270°
- Circular orbit

Pointing requirement: goal: $K \leq \pm 50$ m (Req $\leq \pm 100$ m)



Limb-scanning atmospheric scatter instrument (CATS) based on the Optical Spectrograph and Infra-Red Imaging System (OSIRIS) on Odin

