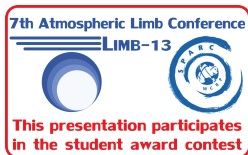


Retrievals of water vapour around PMCs from Odin-SMR

O. M. Christensen, P. Eriksson, J. Urban, D. Murtagh

Department of Earth and Space Sciences
Chalmers University of Technology

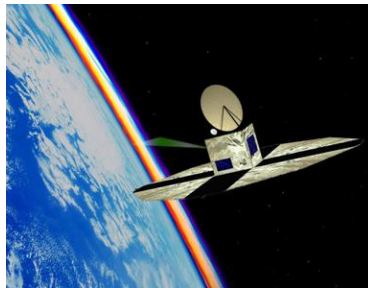


PMC formation

- PMC forms in the summer mesopause at high latitudes (76-85 km)
- Two important parameters for PMC formation is the background water vapour and temperature
- Sublimation and deposition of water
- Simultaneous coverage with high horizontal and vertical resolution

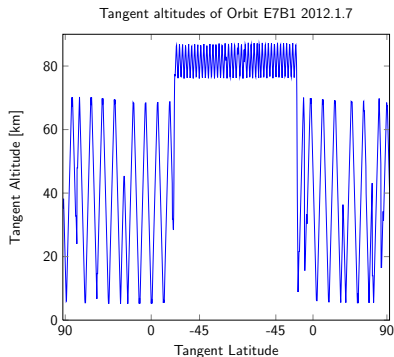


- Launched 2001
- OSIRIS, limb scattering
 - Measures PMC Clouds and Temperature
- SMR, Submillimeter radiometer
 - Measures Temperature and Water vapour using the strong 557 GHz H₂O line
 - Resolution:
 - Δz 3 km
 - Δx 4 deg

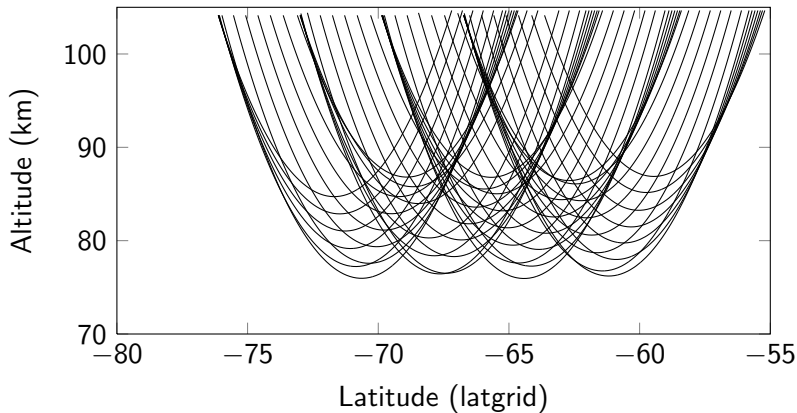


Tomographic Scans

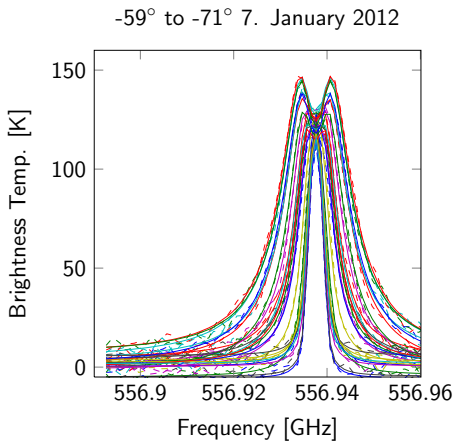
- Performed 3 consecutive days in June, July, Aug from 2010
- Performed 3 consecutive days in Nov, Dec, Jan from 2012



Tomographic Scans

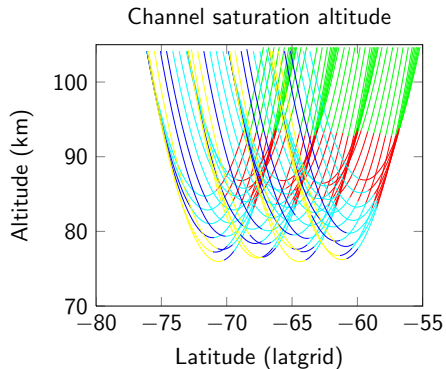
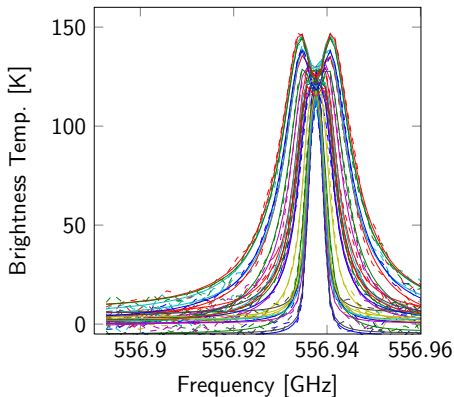


Tomographic Scans



Tomographic Scans

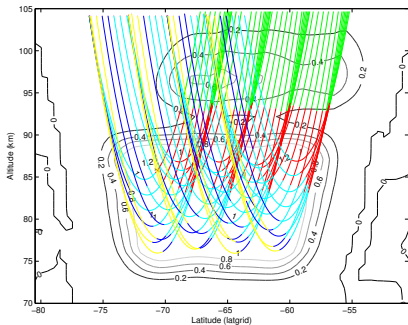
-59° to -71° 7. January 2012



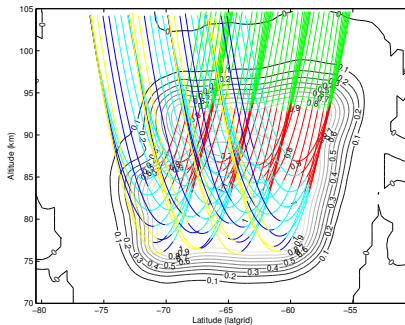
- ARTS 2 supports 2d and 3d calculations for all four stokes vectors
- Accompanying package Atmlab provides interface to do retrievals (OEM)
- Apriori taken from ECMWF, CIRA86 (p,z,t) and an custom climatology developed for SMR (H_2O)

Measurement Sensitivity

Water Vapour

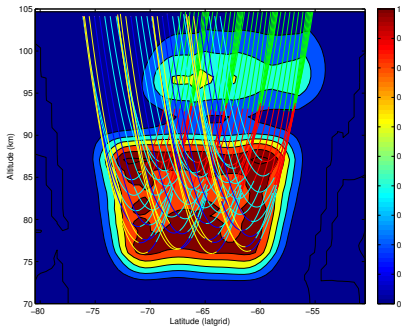


Temperature

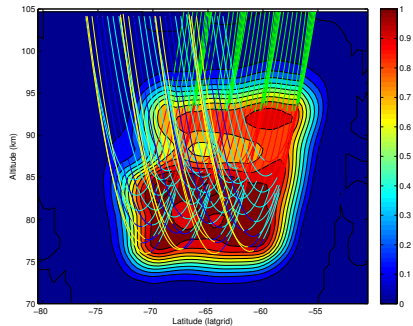


Measurement Sensitivity

Water Vapour

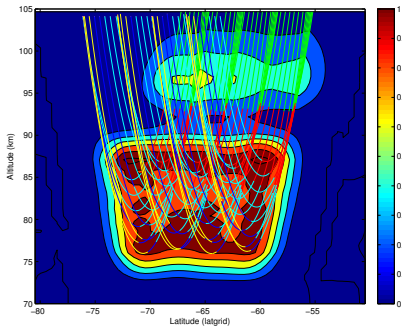


Temperature

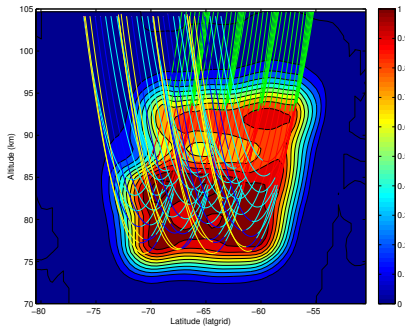


Measurement Sensitivity

Water Vapour

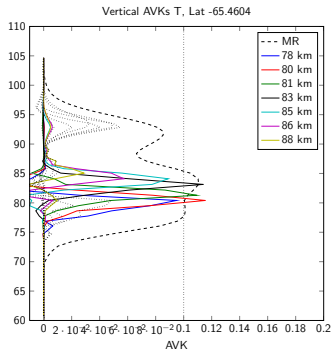
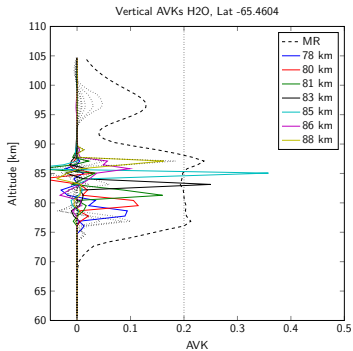


Temperature

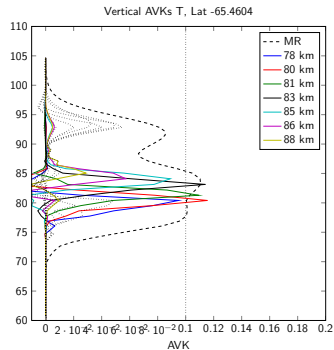
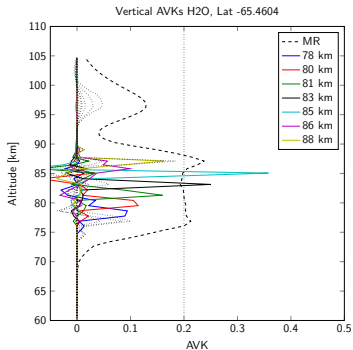


The measurements are sensible to changes in the expected area

Vertical Resolution

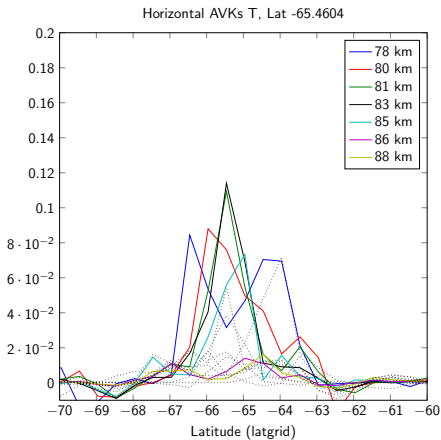
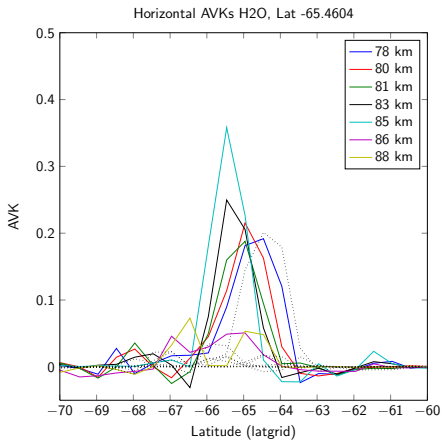


Vertical Resolution

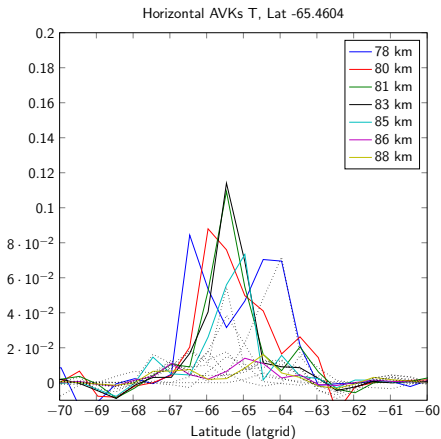
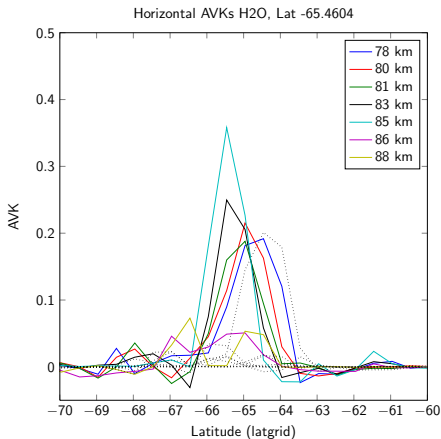


Vertical resolution: 1-2 km for H₂O , 2-4 km for Temperature

Horizontal Resolution



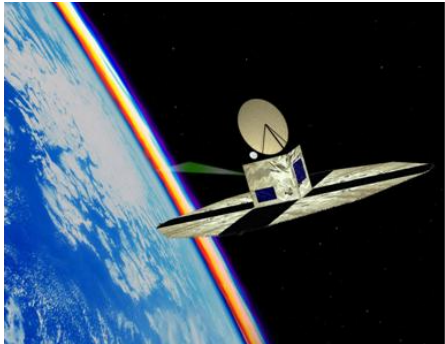
Horizontal Resolution



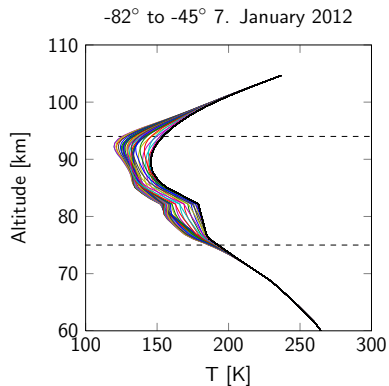
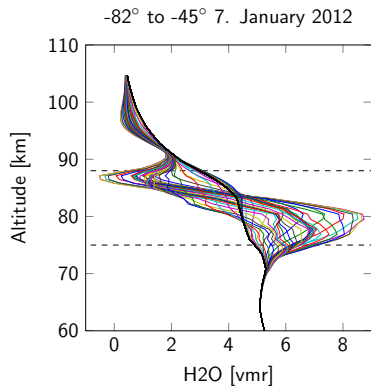
Horizontal resolution: 1-2 degrees for H₂O,
2-3 degrees for Temperature

Summary

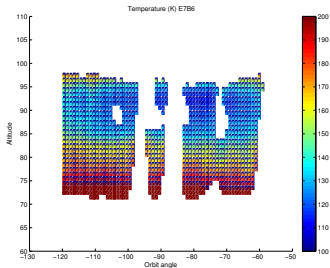
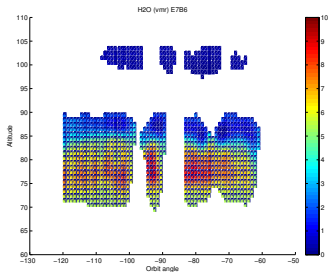
- Measurements seem to achieve their planned goal
- Arts 2 works for tomographic retrievals
- The retrieved VMR is sensitive to errors in the pressure a priori



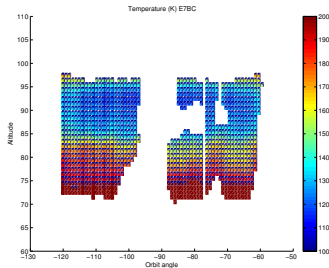
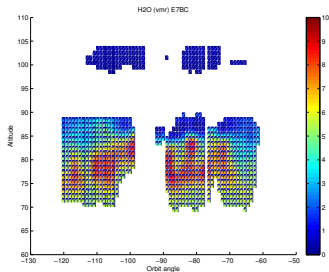
Preliminary Results



7. January 2012



8 January 2012



- Improve the pressure apriori
- Compare to the OSIRIS PMC data
- Compare to models

