EECLAT 2012/T4

POLAR STRATOSPHERIC CLOUDS

Réunion de coordination 2012-04-02, UPMC, Paris, FR

Based on contributions from P. Keckhut,V. Noel

T4 POLAR STRATOSPHERIC CLOUDS

1. Influence of atmospheric waves
2. Microphysical modelling
3. Improvements of heterogeneous ozone chemistry in models using PSC obs. from space and ground

4.1 INFLUENCE OF ATMOSPHERIC WAVES

OBJECTIVES 2011

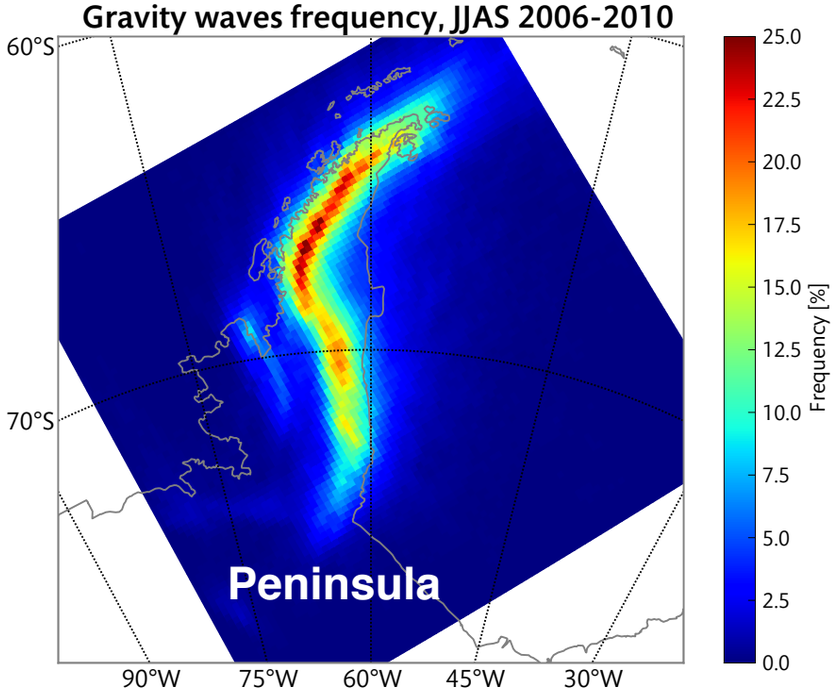
- Evaluate impact of ice PSC formation through GW on NAT nucleation (mountain-wave seeding)
    - Model stratospheric T using WRF (5°x5°), several years, large domain
        - Infer GW activity
        - Compare model T to H_2O and HNO_3 frost points derived from AIRS or MLS mixing ratios
            - Quantify volume of air able to sustain ice and NAT nucleation
- Relate NAT/ice PSC from CALIOP observations to GW activity

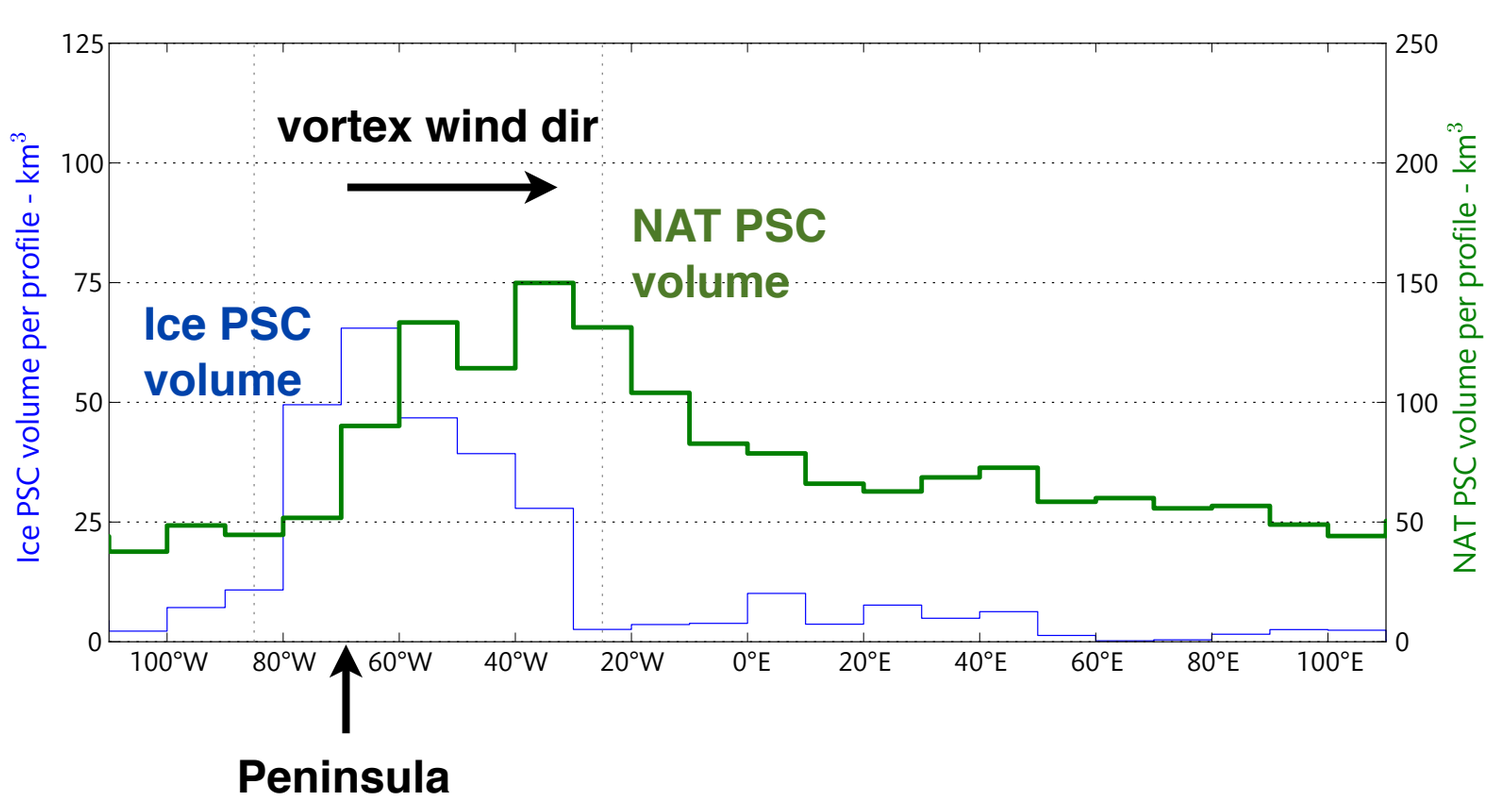
H. Chepfer, A. Hertzog, V. Noel, E. Riviere

4.1 INFLUENCE OF ATMOSPHERIC WAVES

RESULTS

- Quantified GW activity from WRF T 2006-2010 (JJAS)
- Classified PSC formation from CALIOP obs over the Peninsula



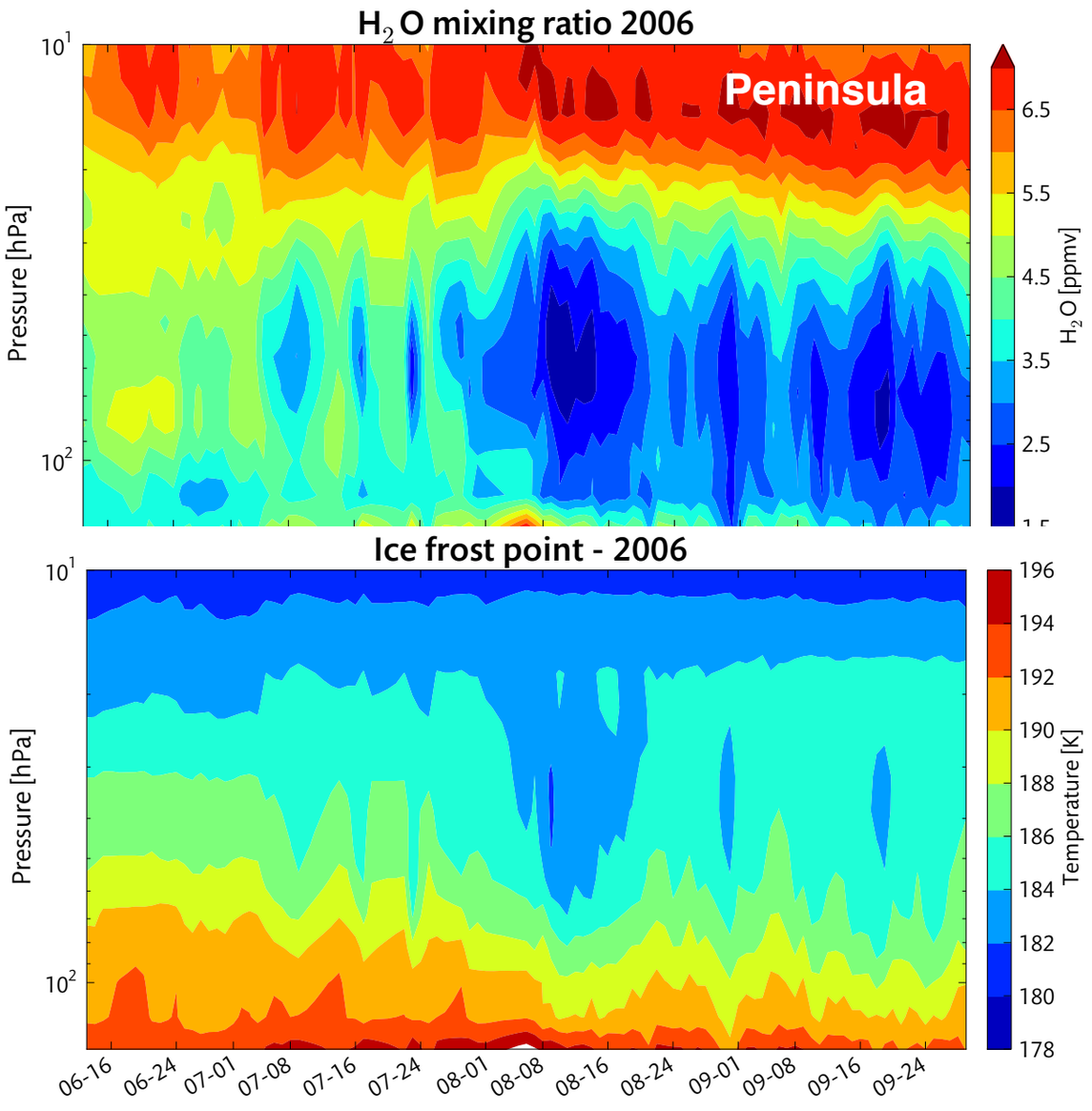


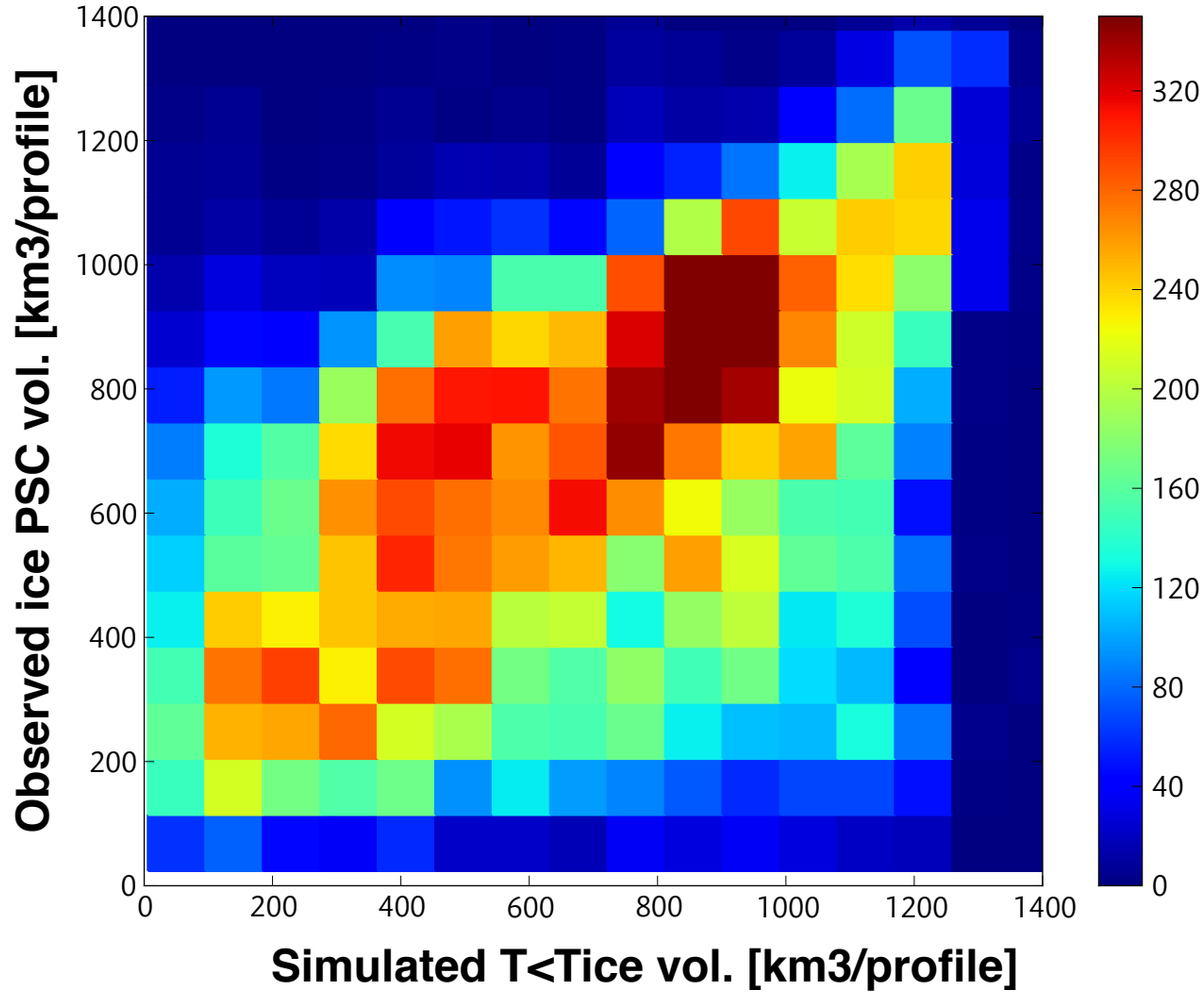
Noel and Pitts 2012, in rev

4.1 INFLUENCE OF ATMOSPHERIC WAVES

RESULTS

- Retrieved frost points from MLS, quantified PSC sustainable volume
- Compared with CALIOP obs. over the Peninsula





4.2 MICROPHYSICAL MODELLING

OBJECTIVES 2011

- Case studies Arctic PSC to lean about formation mechanism & threshold
    - focus: 2009-2010 Arctic winter (RECONCILE project campaign), CALIPSO obs.
    - synoptic or GW
        - check importance of mountain-wave seeding, het. nucleation on meteoritic particles
- WRF simulations during RECONCILE + MIPLASMO μφ modelling (FLEXTRA/ WRF trajectories)

A. Hertzog, F. Lefebvre, V. Noel, E. Riviere

4.3 HETEROGENEOUS OZONE CHEMISTRY IN MODELS USING PSC LIDAR OBS

OBJECTIVES 2011

- Retrieve PSC size distributions at ground-based stations
- Use parameters to validate Mimosa (Lagrange Chemistry Model) above ground-based stations
- Validate PSC field extension simulated with Mimosa using CALIPSO
- Quantify & compare ozone destruction in LMDz-Reprobus (Chemistry Climate Model) using surface particles from CALIPSO and Mimosa

P. Keckhut, J. Jumelet, A. Hauchecorne, S. Bekki, M. Marchand, A. Sarkissian, V. Noel, F.-J. Lubken, G. Baumgarten, J. Fiedler, R. Neuber, C. Ritter, M. Maturilli

4.3 HETEROGENEOUS OZONE CHEMISTRY IN MODELS USING PSC LIDAR OBS

RESULTS

- Eruptions of La Soufrière (2006), Merapi (10), Nabro (11)
  - significant particle injection in the stratosphere
  - monitored by CALIOP during several months
- Work done on the assimilation of CALIOP backscatter into a bin-resolved chemical transport model with a sulfuric aerosol scheme

4.3 HETEROGENEOUS OZONE CHEMISTRY IN MODELS USING PSC LIDAR OBS

RESULTS

- Eruption of the Eritrean Nabro (13°N 41°E) on June 14th, 2011
- Plume observed at ALOMAR observatory (Andoya 69°N) 1 month later
  - extremely small backscatter (~background levels, SR~1.35)
  - modelled assuming oxidation of SO_2 into H_2SO_4 aerosols
- good agreement between directly modelled and lidar-derived PSD