

***Polar Stratospheric Cloud
Composition Studies
using CALIPSO Lidar Data***

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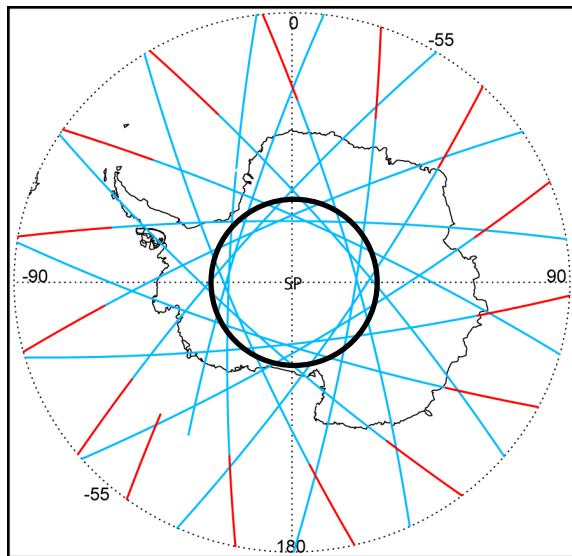
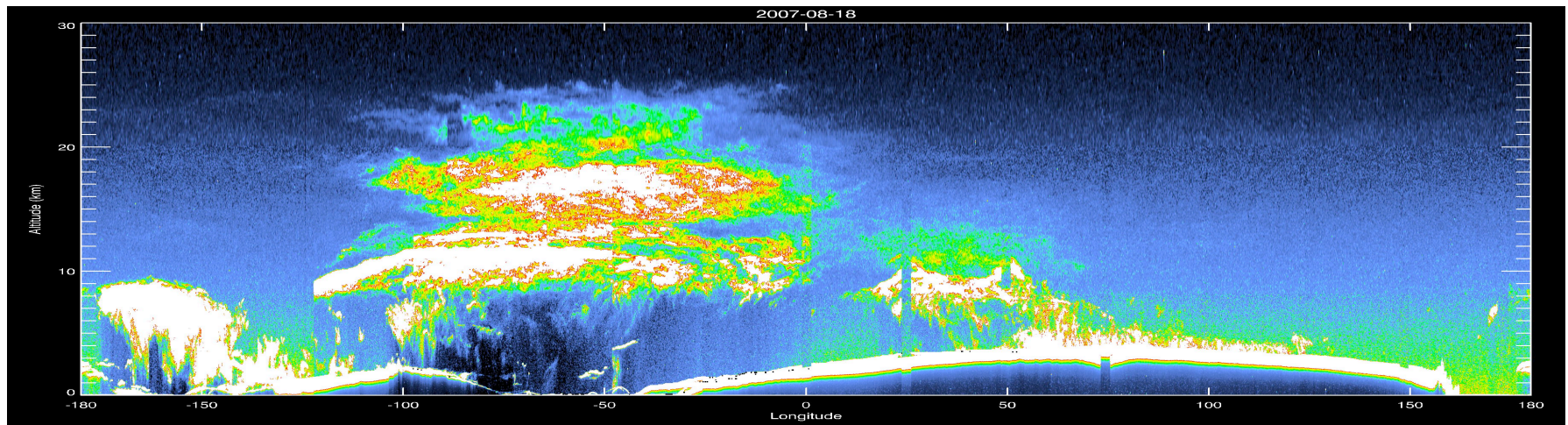
²Science Systems & Applications, Inc., Hampton, VA

SPARC 4th General Assembly

Bologna, Italy 31 August – 5 September , 2008



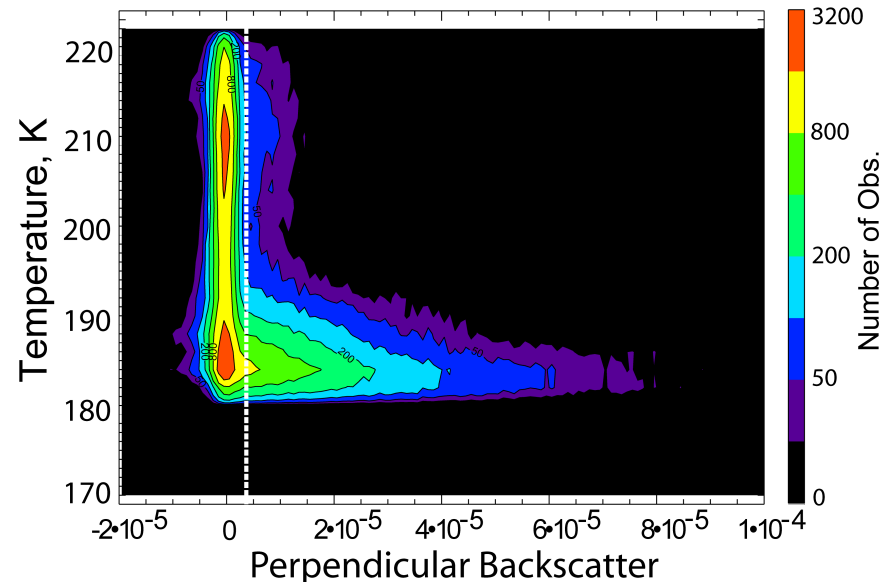
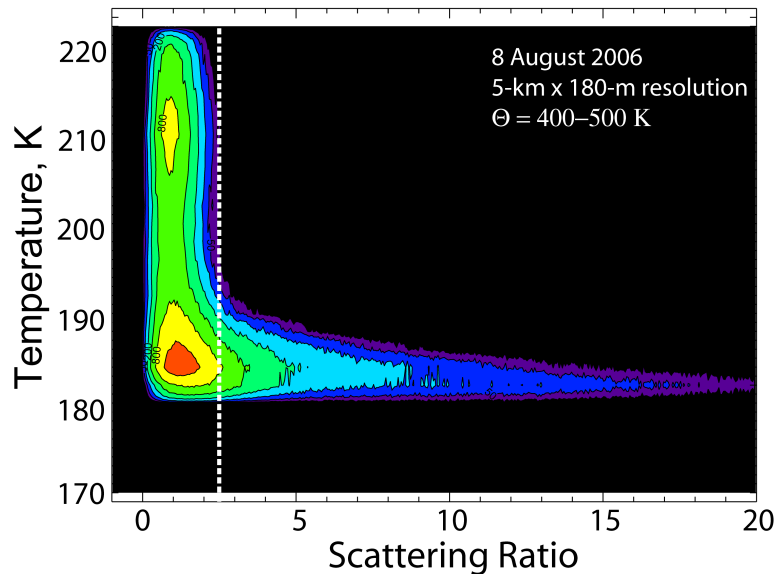
CALIPSO Is Providing A Wealth of Information on Polar Stratospheric Clouds



- CALIPSO is part of the 'A-Train' satellite constellation
 - Operating nearly continuously since mid-June 2006
 - Measurements made at latitudes up to 82°
 - High spatial resolution (5-km horizontal x 180-m vertical resolution PSC product)
- Lidar backscatter data collected in 3 channels
 - 532-nm parallel polarized
 - 532-nm perpendicular polarized
 - 1064-nm total backscatter



CALIPSO PSC Detection Algorithm (Second Generation)

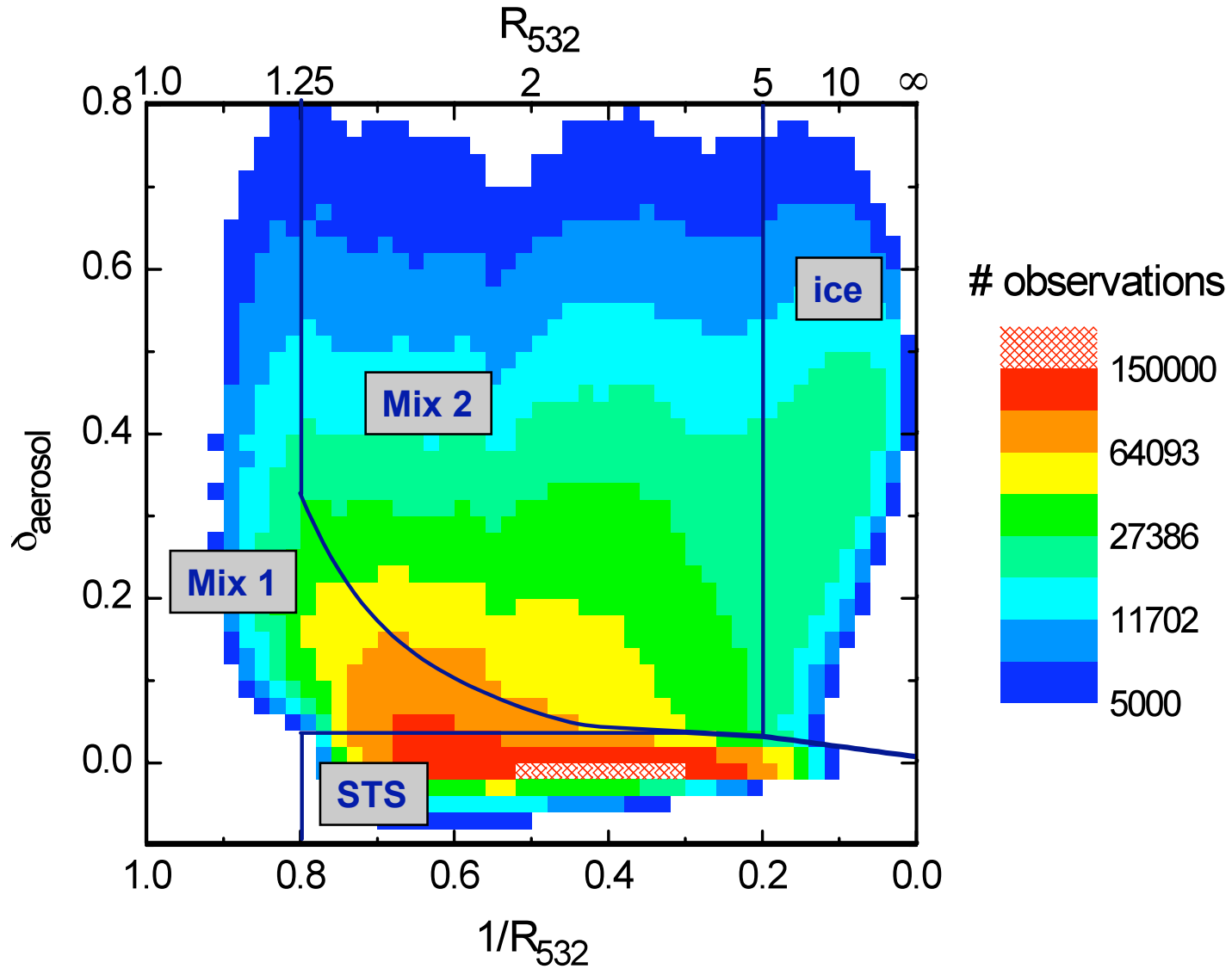


- PSCs are detected as statistical outliers in scattering ratio (total /molecular backscatter) or β_{\perp} at 532 nm.
- Successive horizontal averaging (5, 15, 45, & 135 km)
- Spatial coherence test to minimize false positives
- Aura MLS H₂O and HNO₃ and derived meteorological products (vortex, tropopause)

Pitts et al., CALIPSO Polar Stratospheric Cloud Observations: Second Generation Detection Algorithm and Composition Discrimination, *Atmos. Chem. Phys. Discuss.*, in prep., 2008.



CALIPSO PSC Composition Classification

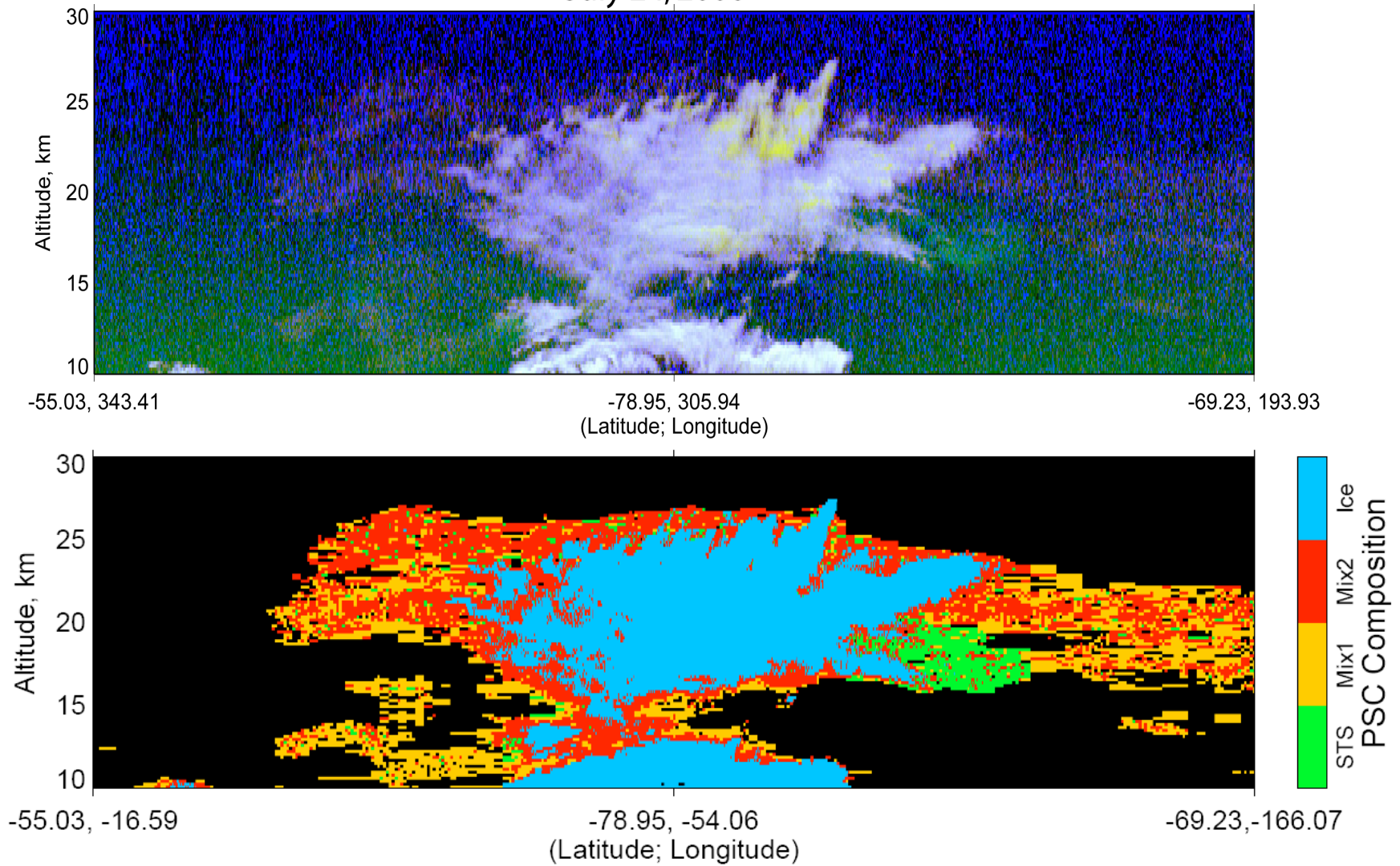




PSC Composition Example



July 24, 2006

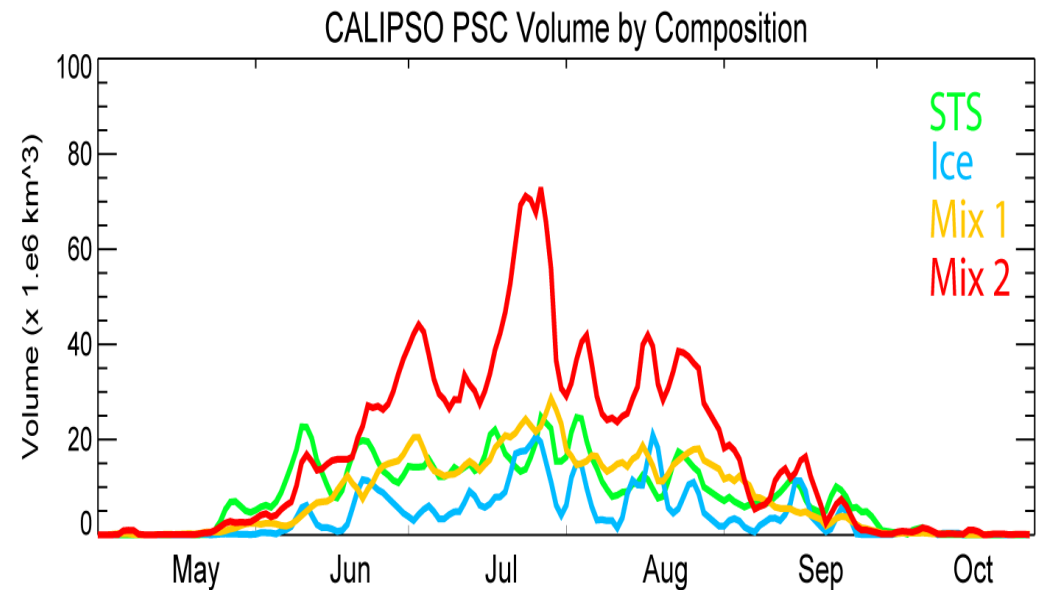
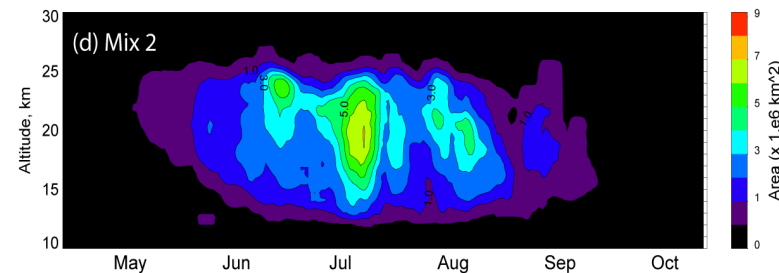
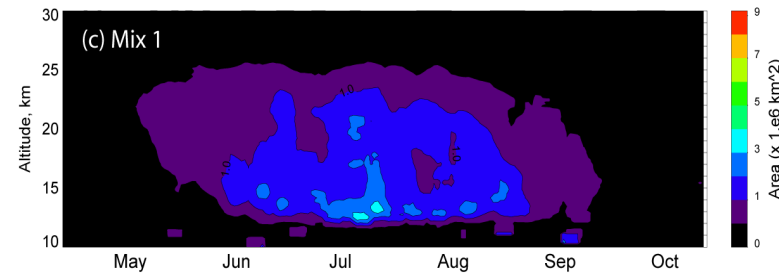
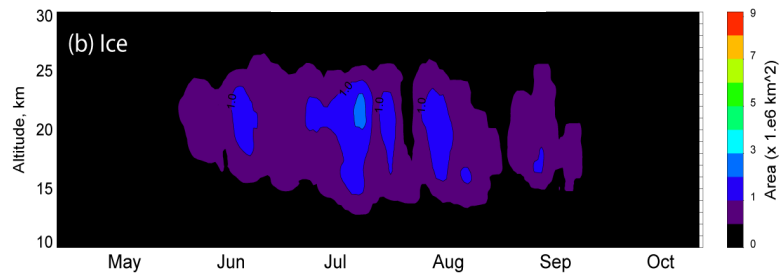
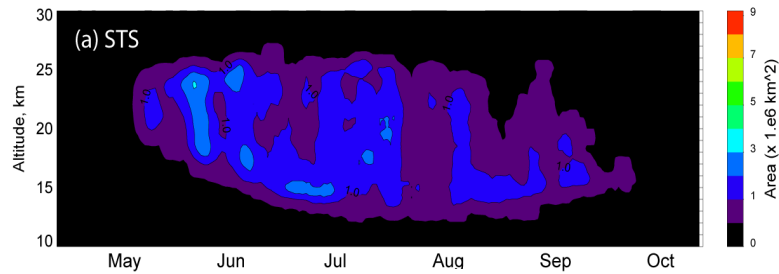




Seasonal Evolution of PSC Composition

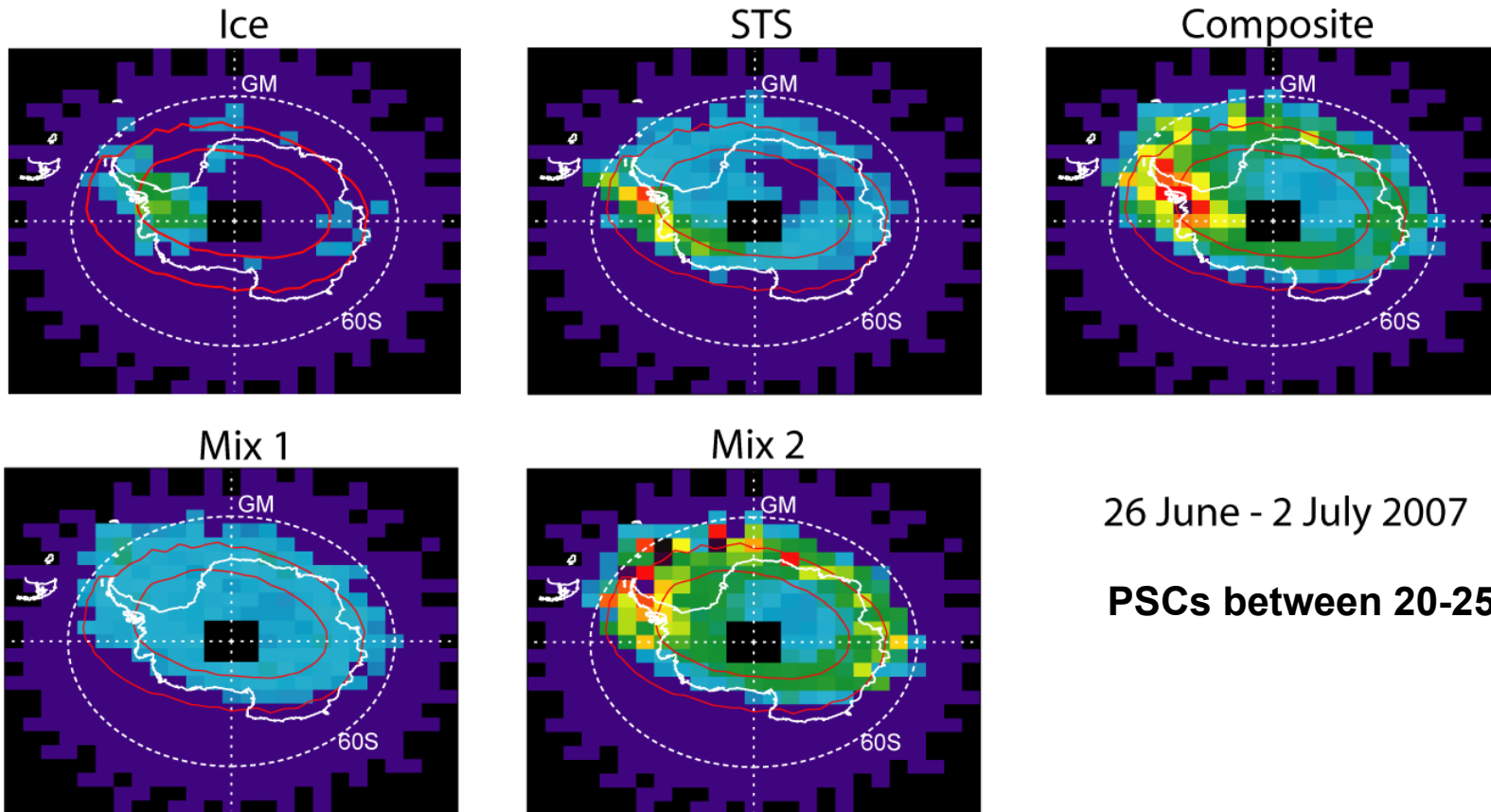


Antarctic 2007 Season



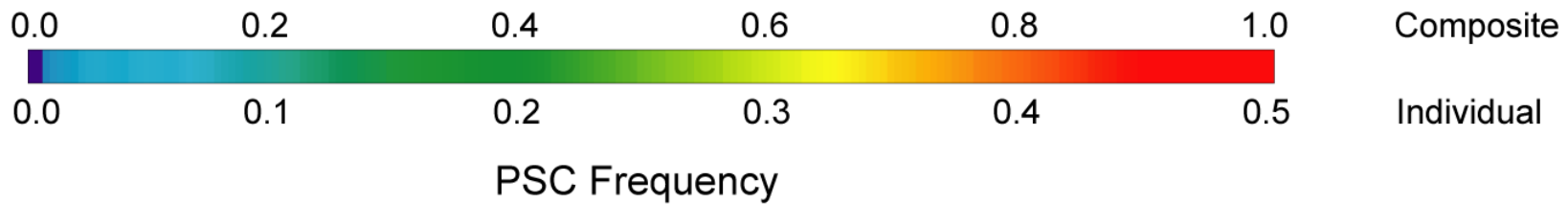


Composition Spatial Distribution



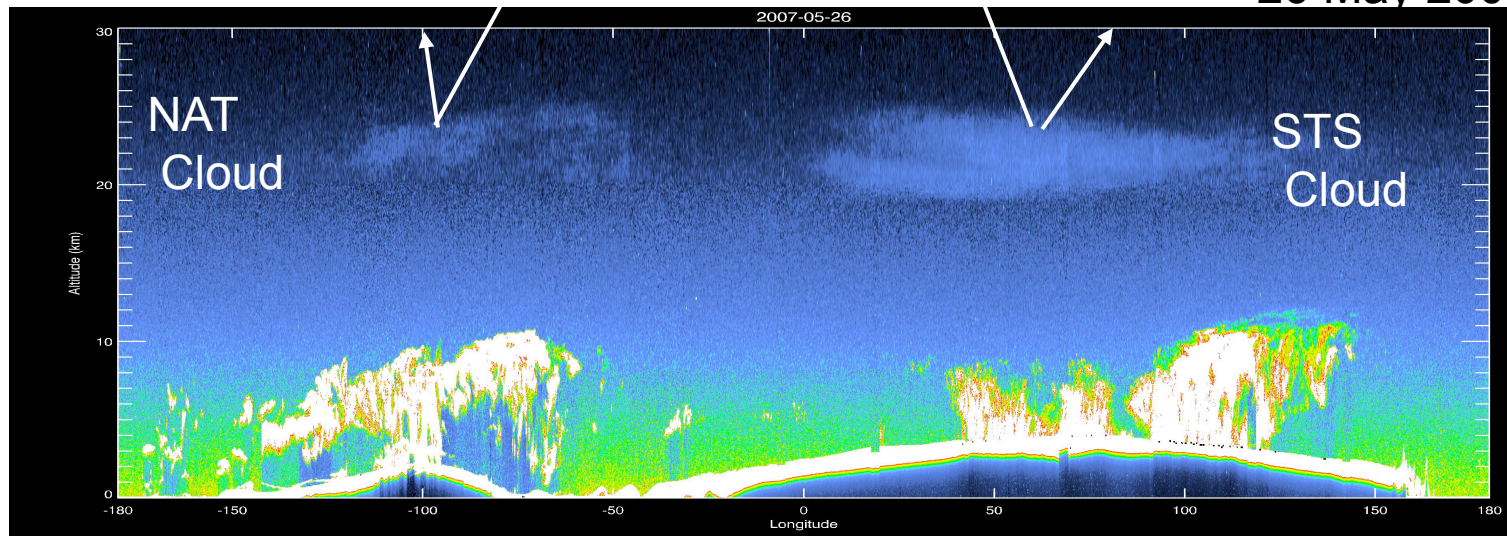
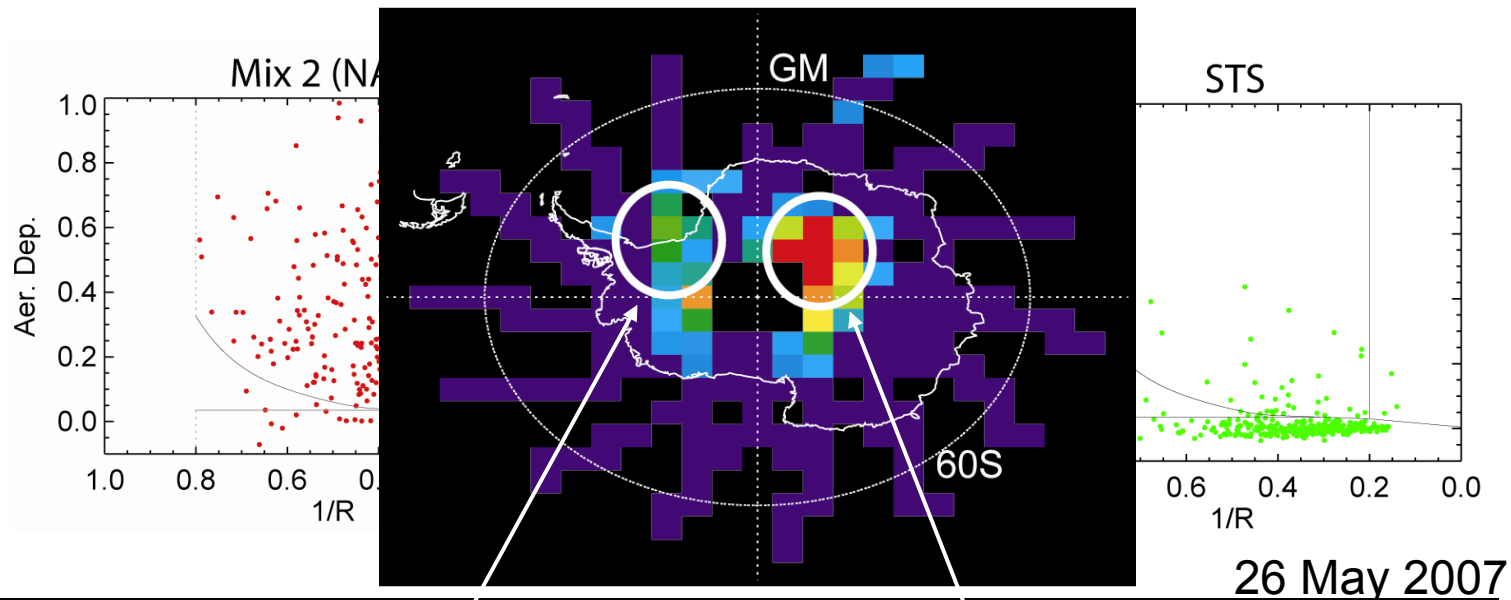
26 June - 2 July 2007

PSCs between 20-25 km



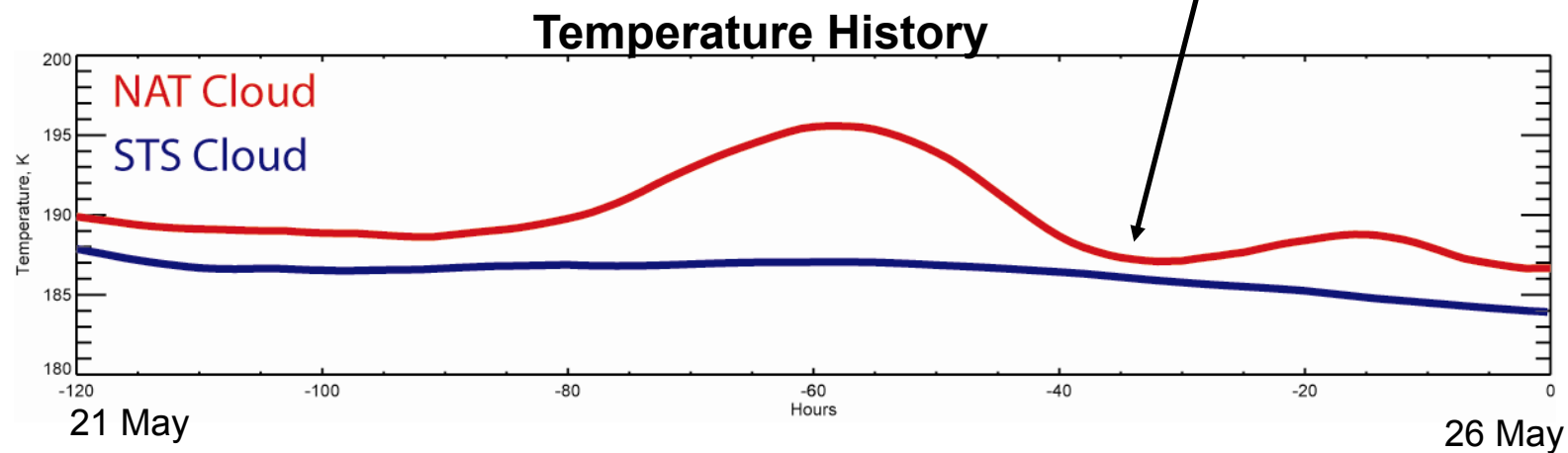
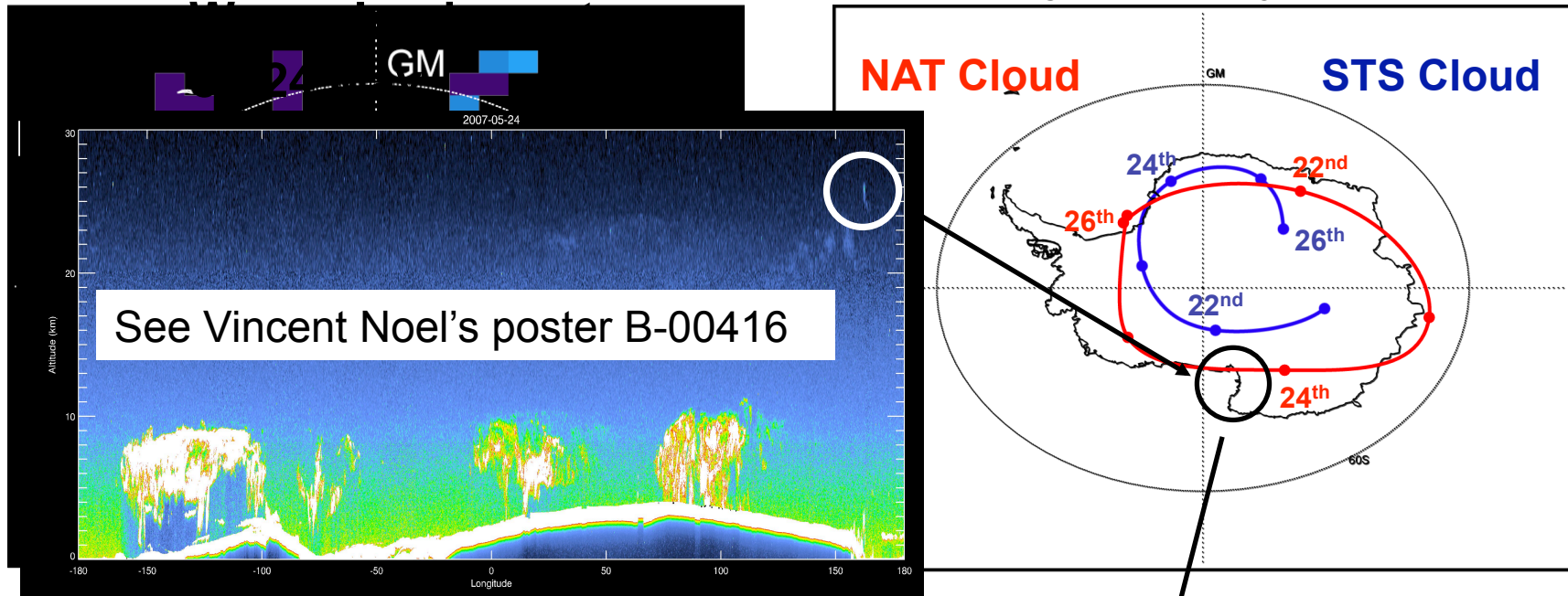


Onset of PSCs in May 2007



Onset of PSCs in May 2007

5-day Back Trajectories





Summary and Future Work



- Robust second generation PSC detection and composition discrimination algorithms have been developed.
- Forging partnerships with modeling groups for detailed process studies and larger-scale CTM simulations (Niels Larsen, DMI and Frank Daerden, BIRA).
- Participating in 'Match' campaign with Antarctic ground-based lidars (see Christine David's Poster B-00442).
- Comparing CALIPSO data with limb emission spectra from MIPAS to assess composition discrimination (Michael Hoepfner, IMK)



2007 Antarctic PSC Season "The Movie"

