Airborne Lidar Measurements during the SCIA-VALUE campaign

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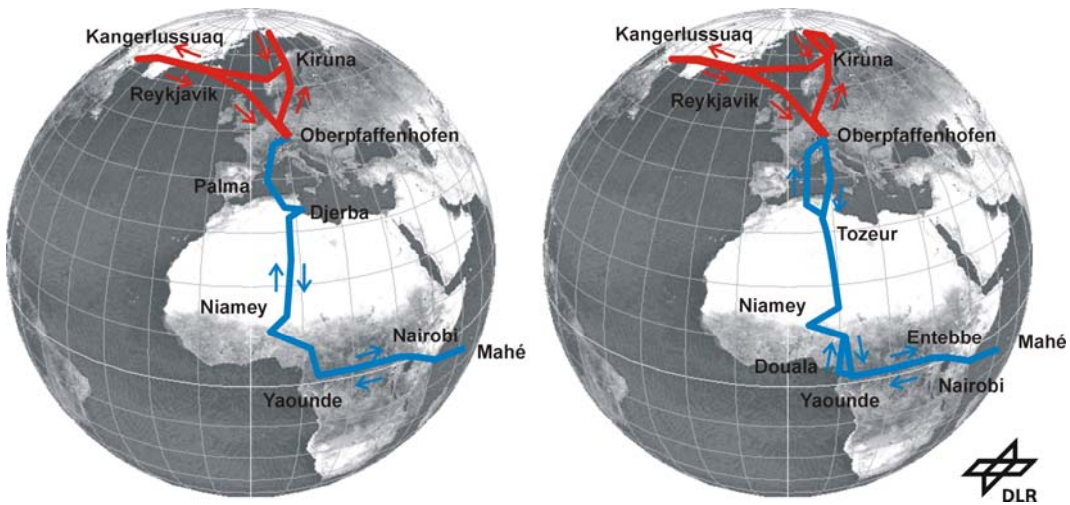
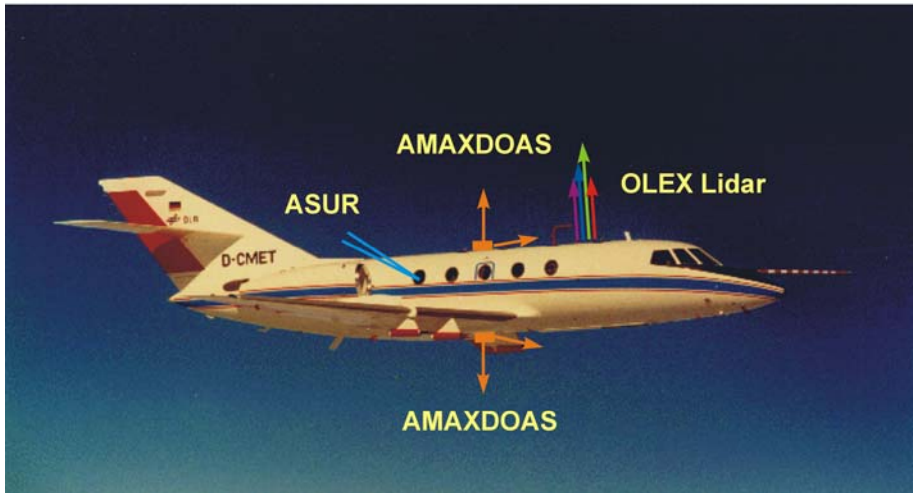
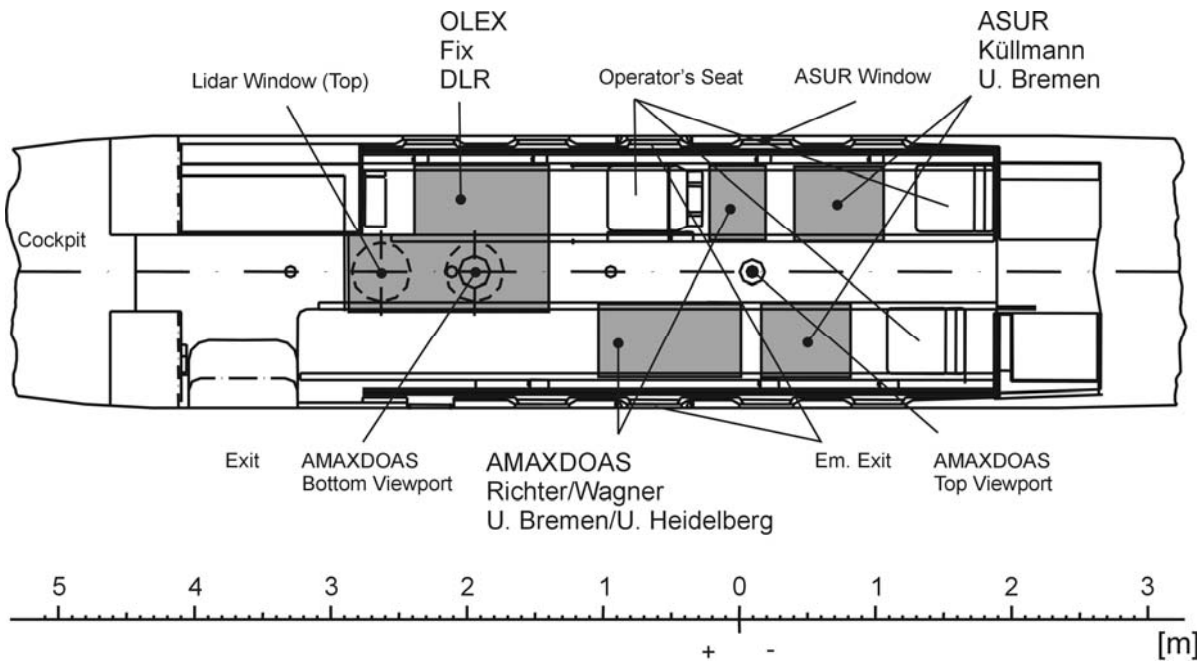


Outline

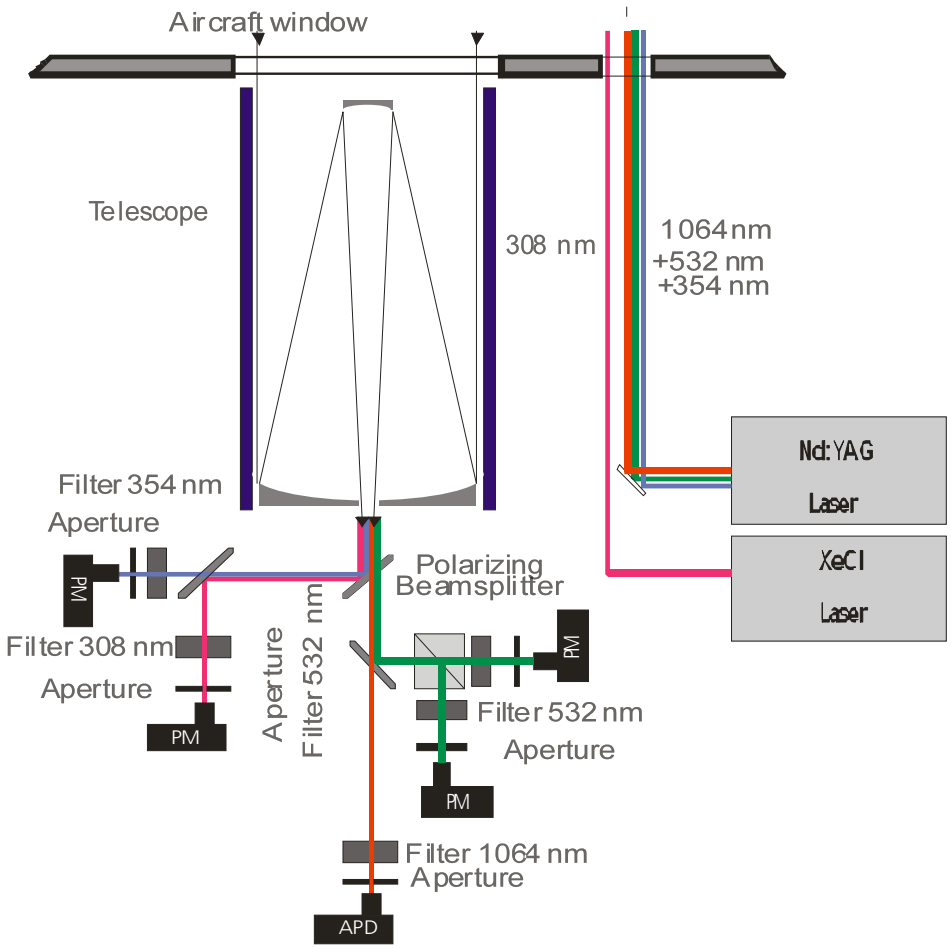
- Introduction
- The OLEX Instrument
- Data Quality
- Measurements
- Outlook

OLEX as part of the Falcon payload





The OLEX Instrument



OLEX: Horizontal and Vertical Resolution

Species	Parameter	Resolution (typical)	
		Horizontal	Vertical
Ozone	Number density		
(Range: 12-19km)		< 50 km	0.38 km
(Range: 19-24km)		< 50 km	0.75 km
(Range: 24-30km)		< 50 km	1.50 km
Aerosols/PSCs	Backscatter ratio	30 km	150 m
	Optical depth (OD)		
Clouds (i.e. high cirrus)	Geometric distribution	100 m	50 m
Polar Stratospheric Clouds	Geometric distribution	100 m	50 m
	Type classification		

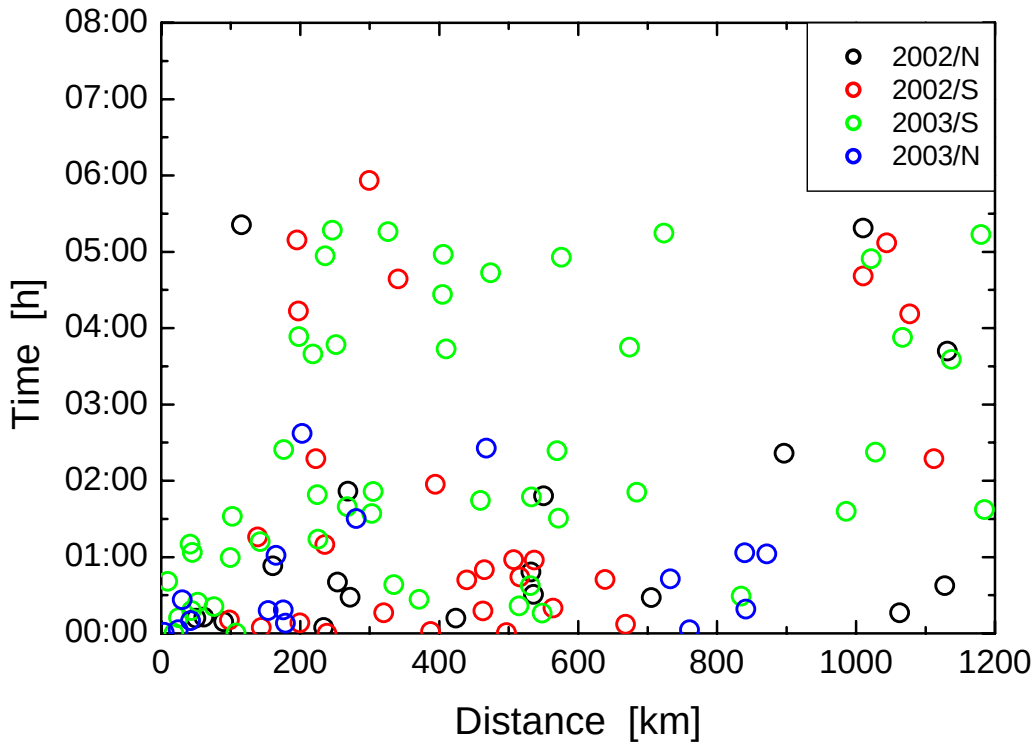
Data Availability & Satellite Overpasses

- No instrument failure (during 113 hours of operation)
- OLEX practically measured all the time
- Minor gaps over the Sahara due to overheating
- Minor gaps over the Equator due to direct sunlight
- Range ~28km in the North and ~26km in the South

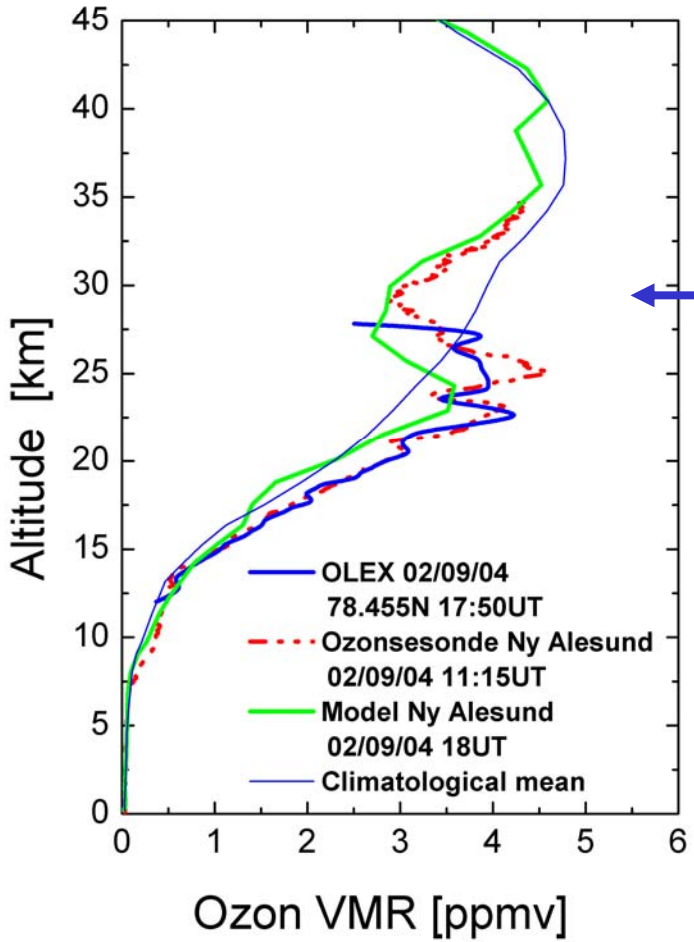
Coincidences in Time and Space:
(to SCIA limb pixels)

112 Events considered

49 SCIA pixels targeted

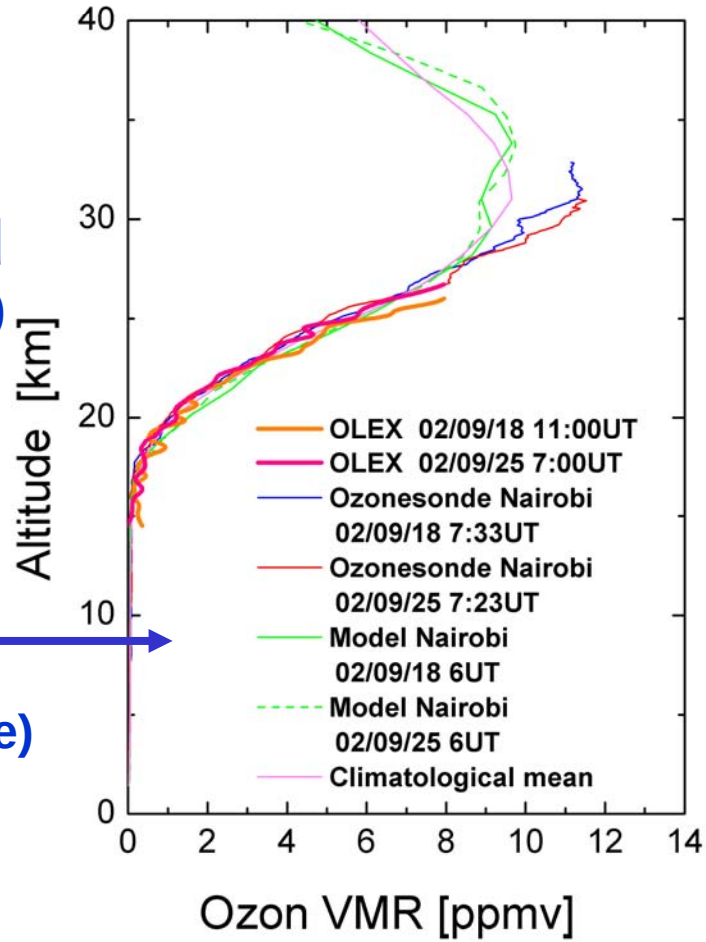


Data Quality: Vertical Profiles Comparison to Ozonesondes



Ny Ålesund
(courtesy: AWI)

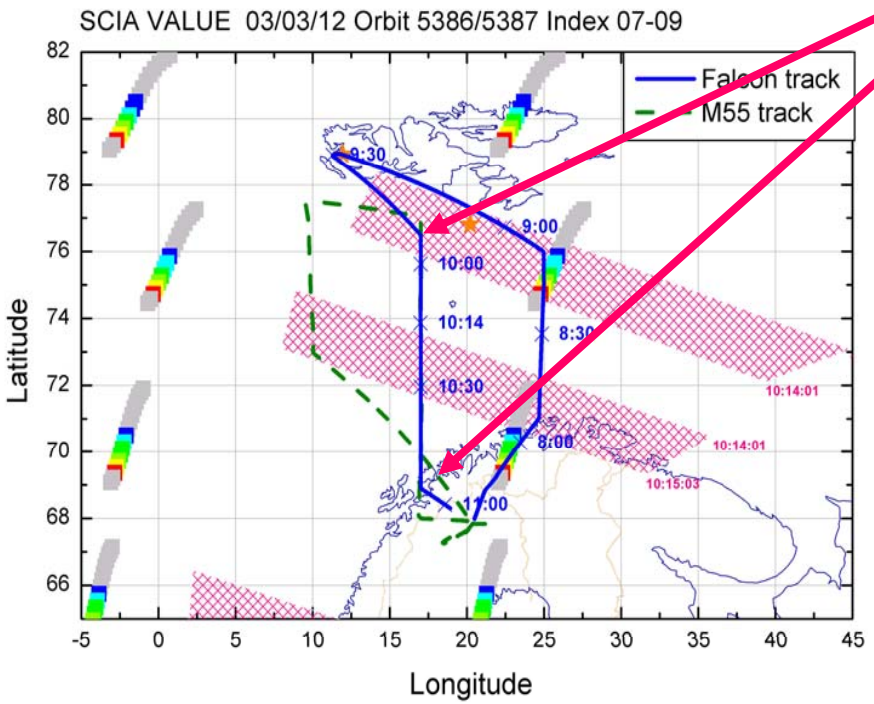
Nairobi
(courtesy: KMI/MeteoSuisse)

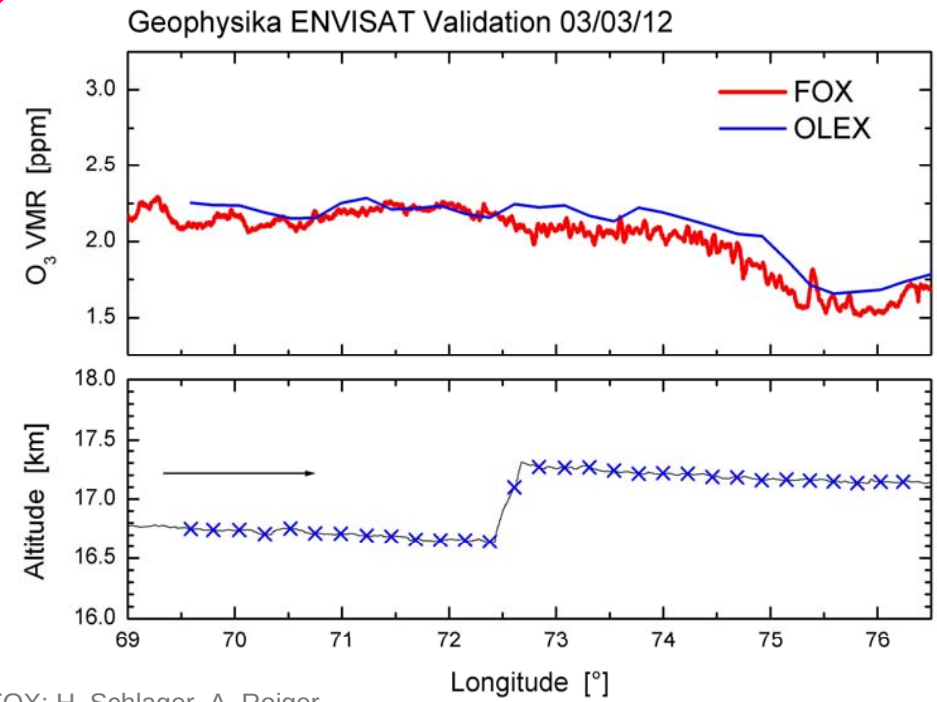


Data Quality: Horizontal Profiles Comparison to Airborne in-situ Sensor

- **Exellent agreement to the FOX in-situ sensor on the M55-Geophysika**
- **Altitude: ~17 km**

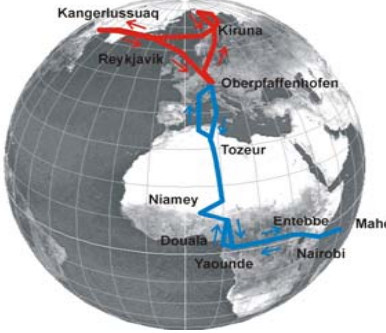
Compared Flight Leg



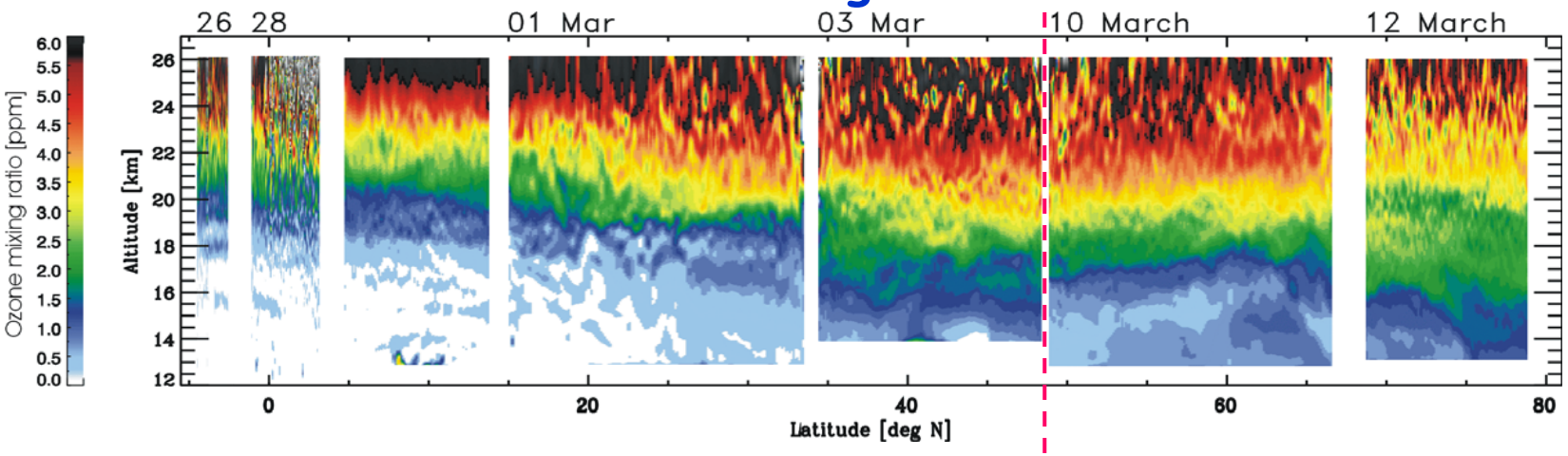


FOX: H. Schlager, A. Roiger

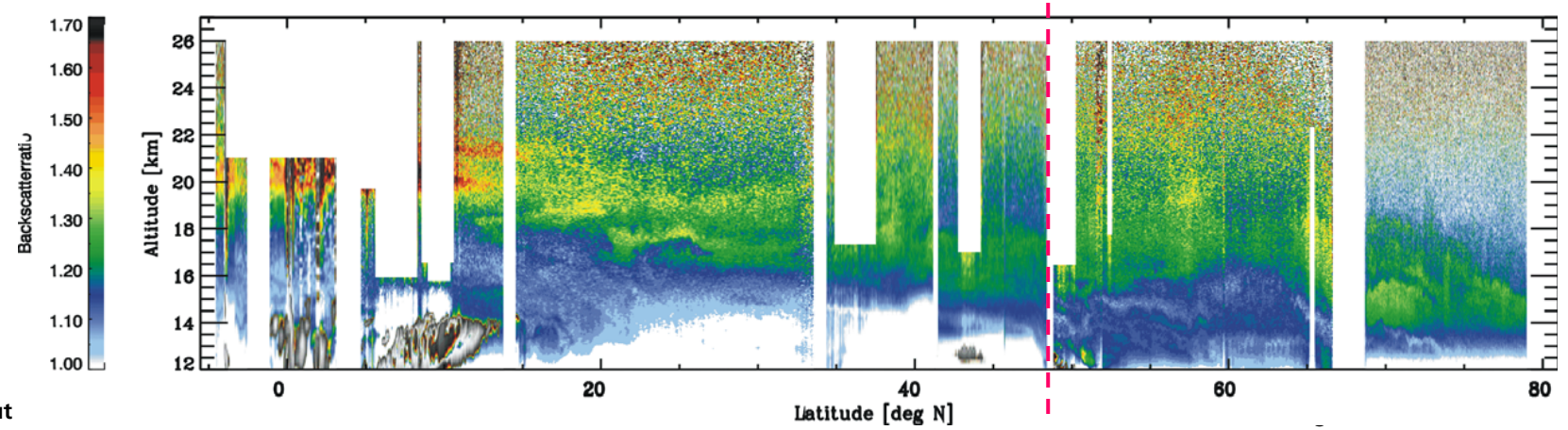
Meridional Sections
February-March 2003



Ozone mixing ratio



Particle backscatter ratio



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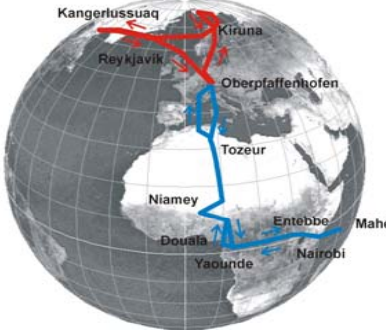
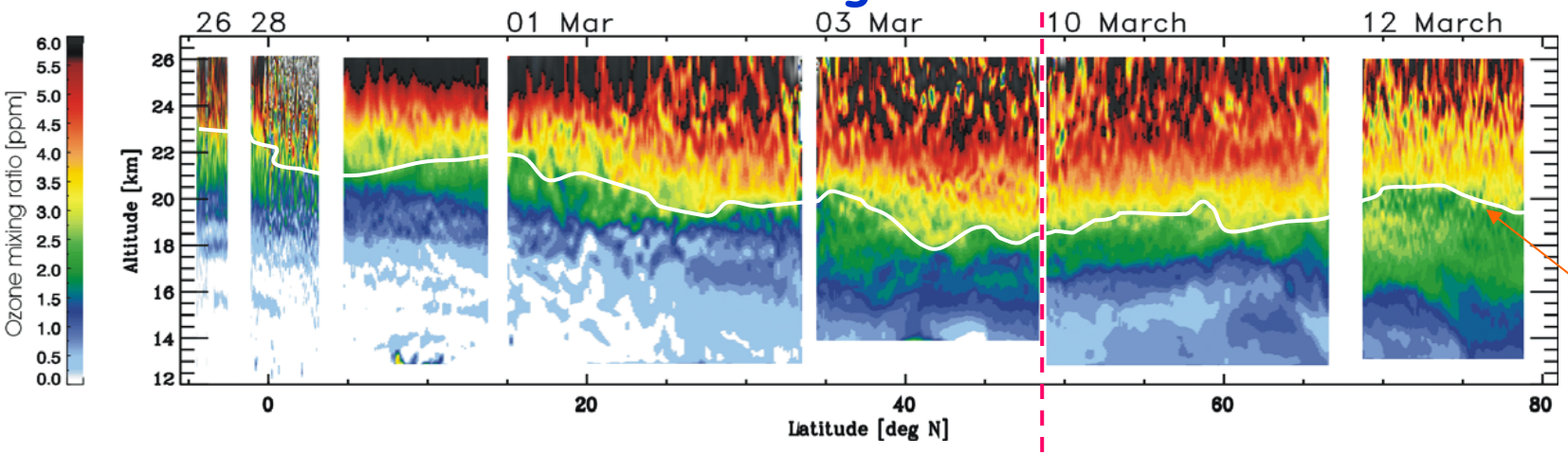
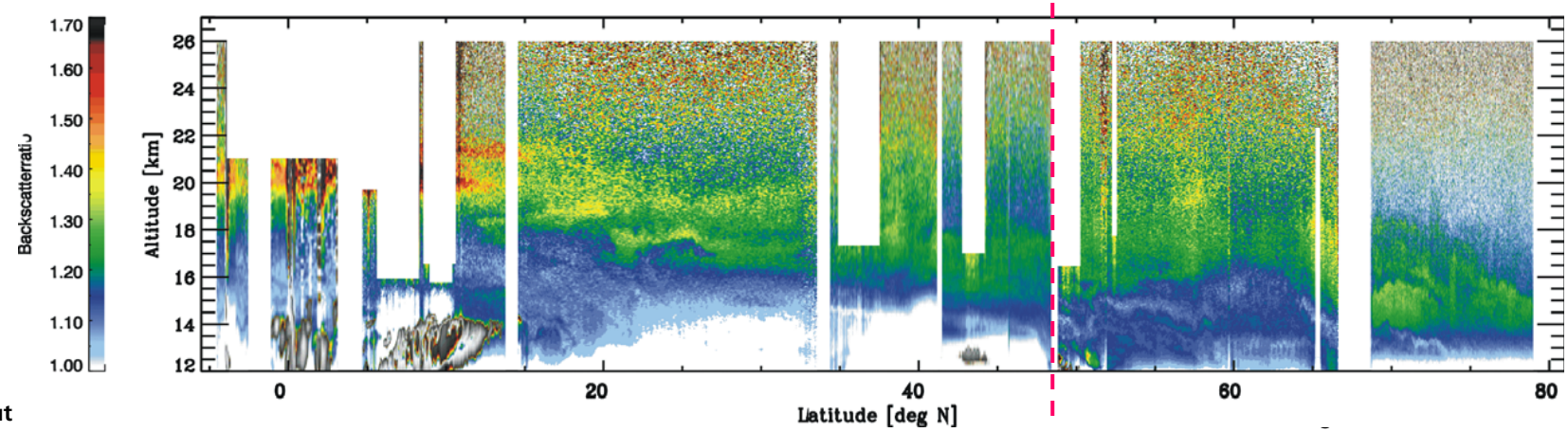


Ozone mixing ratio



3 ppm

Particle backscatter ratio



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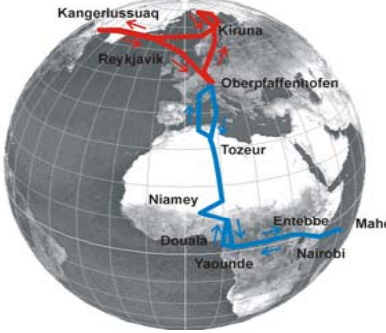

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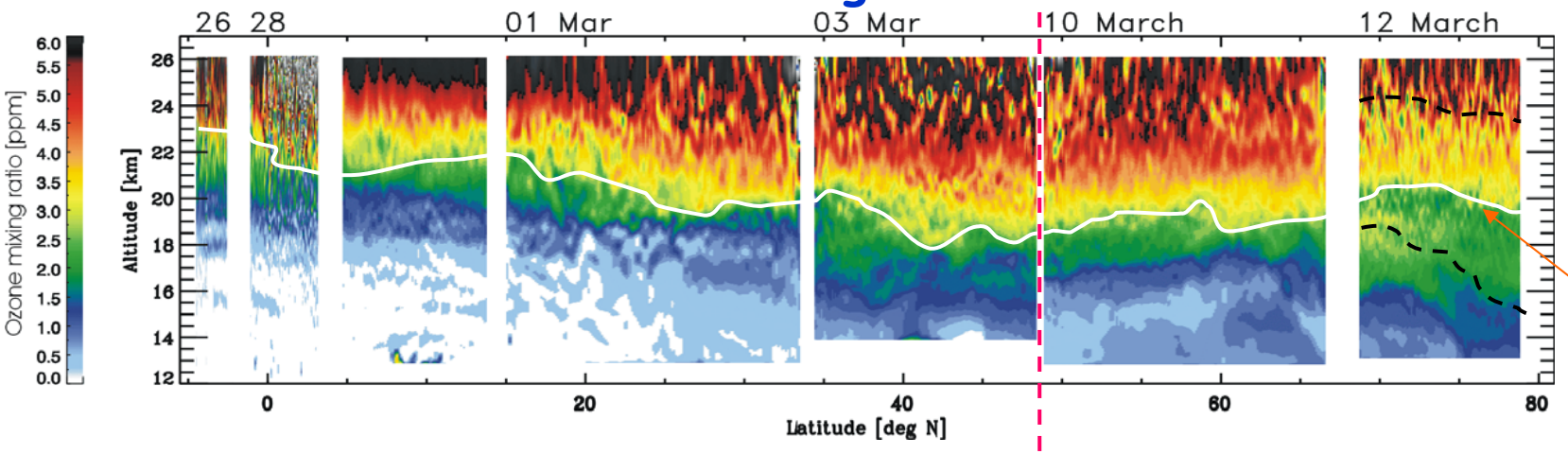

3 ppm

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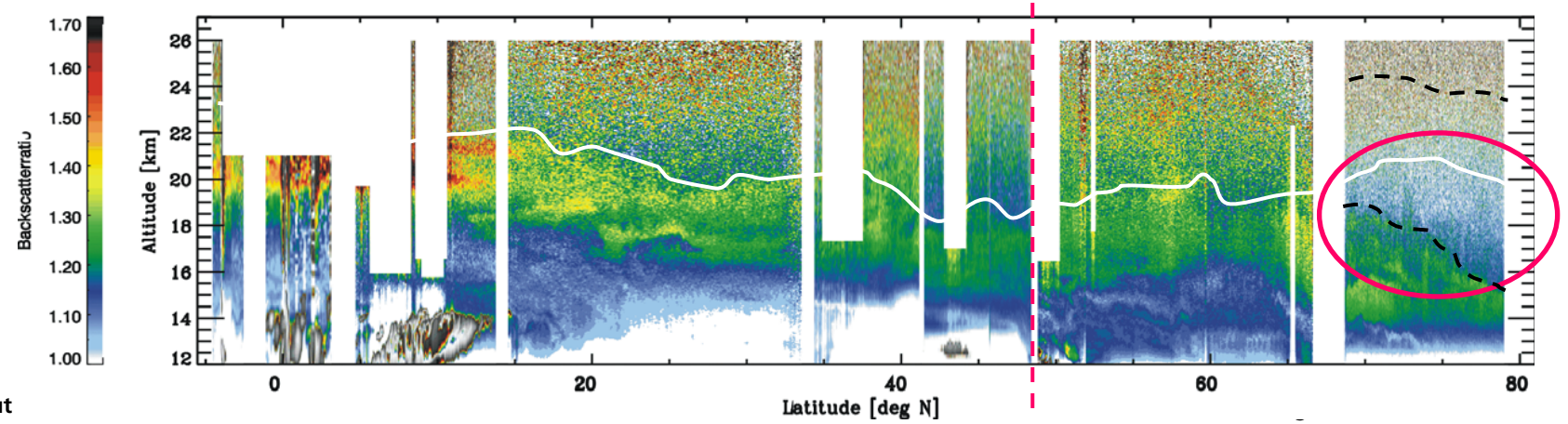
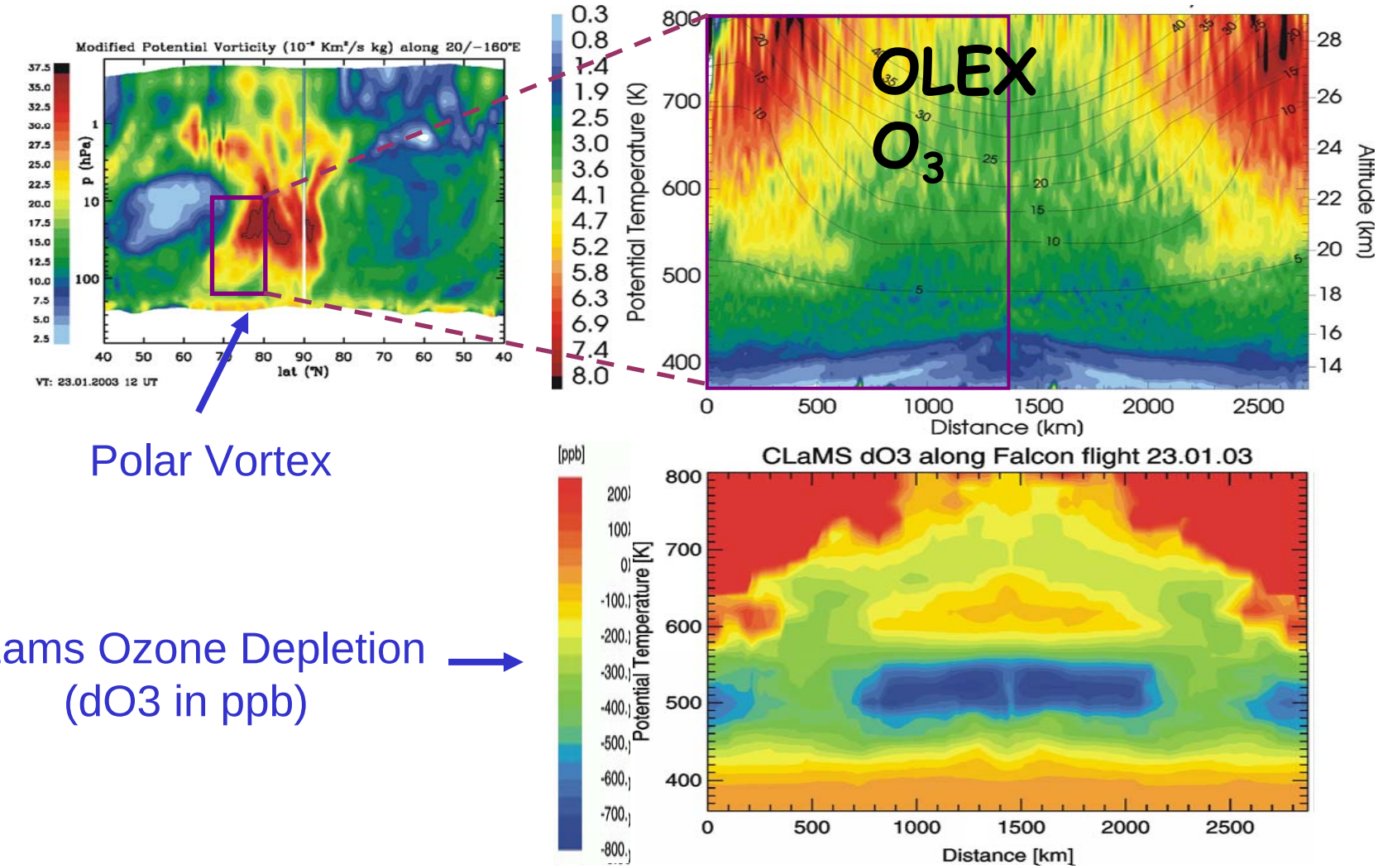


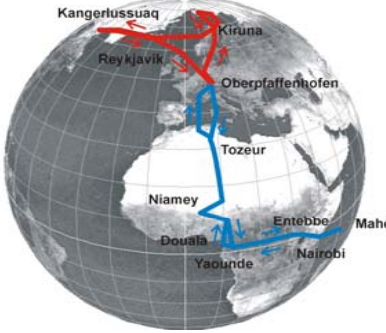
OLEX Flight on 23 Jan. 2003
Comparison to CLaMS Model

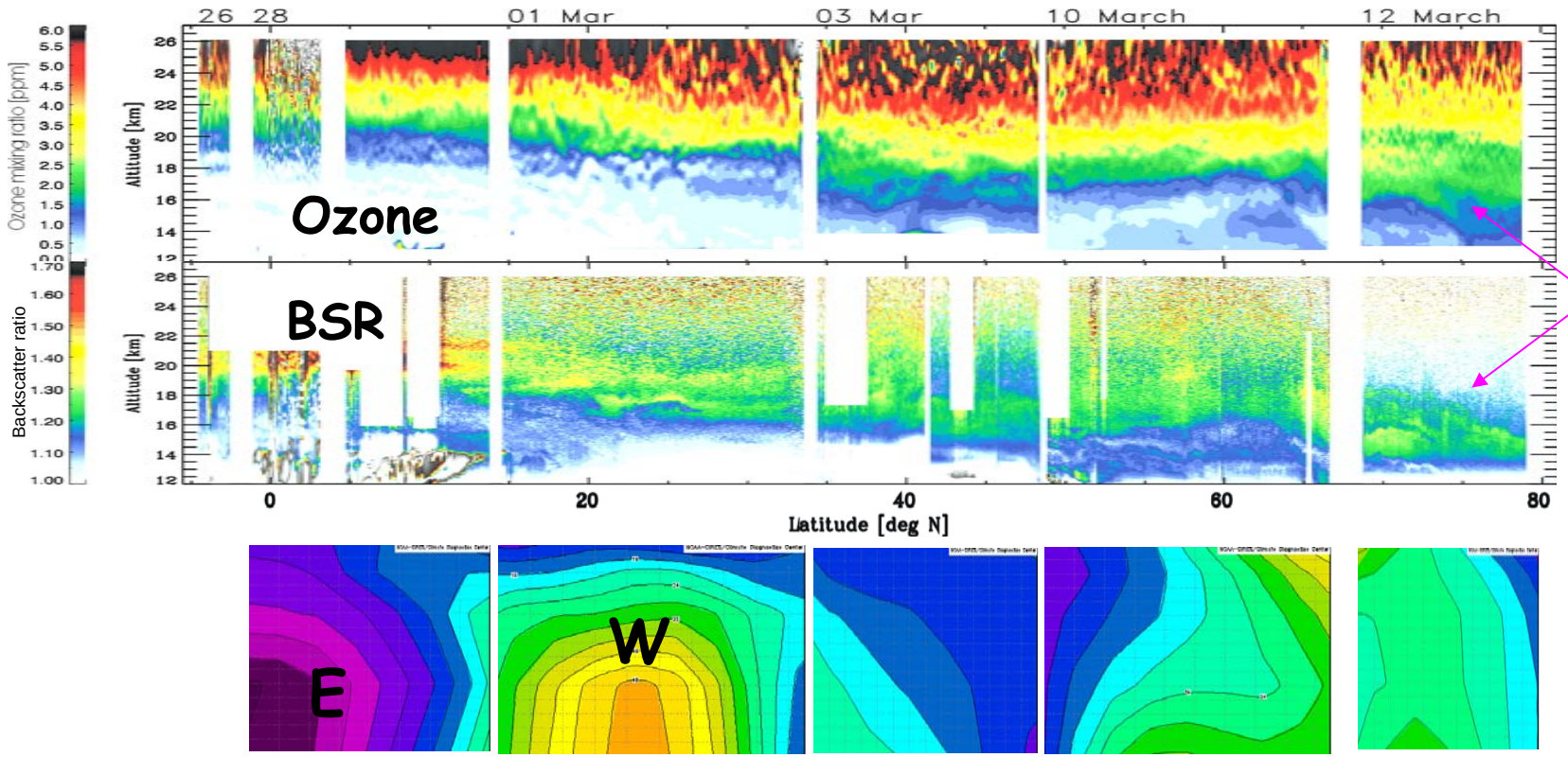


Polar Vortex

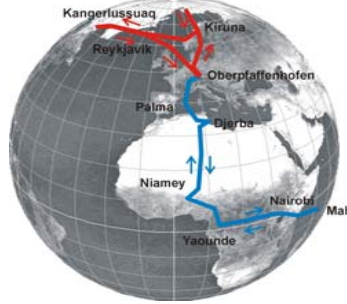
CLams Ozone Depletion (dO3 in ppb)

Meridional Sections
February-March 2003

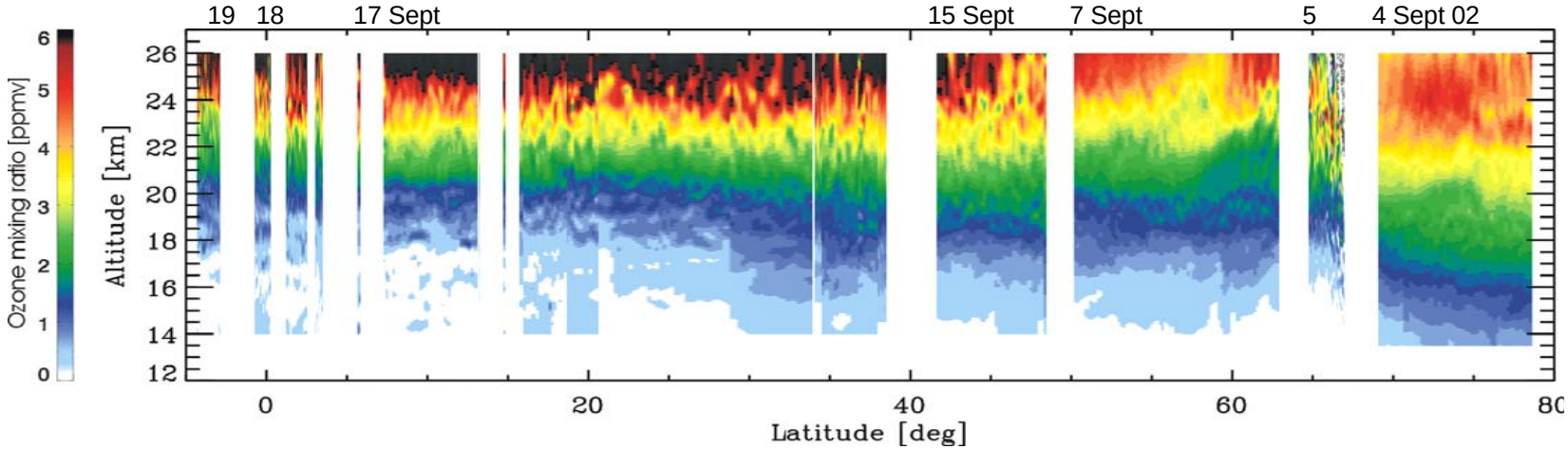




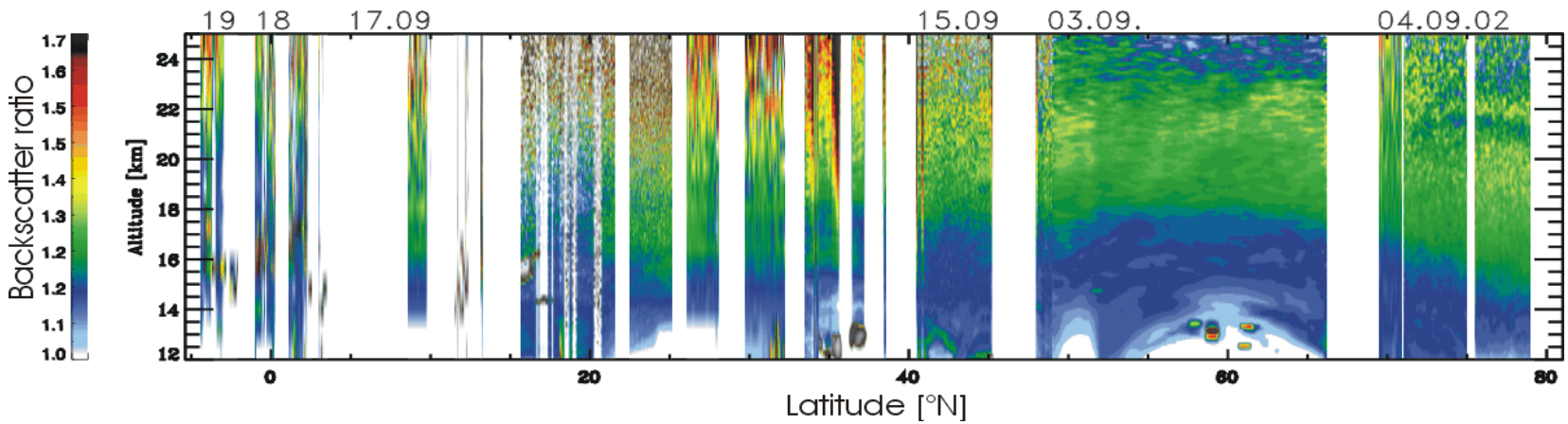
Meridional Sections September 2002



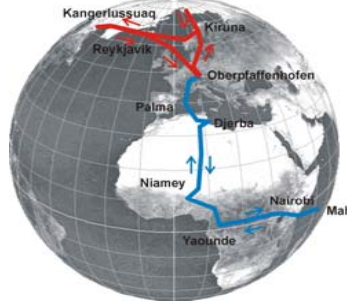
Ozone mixing ratio



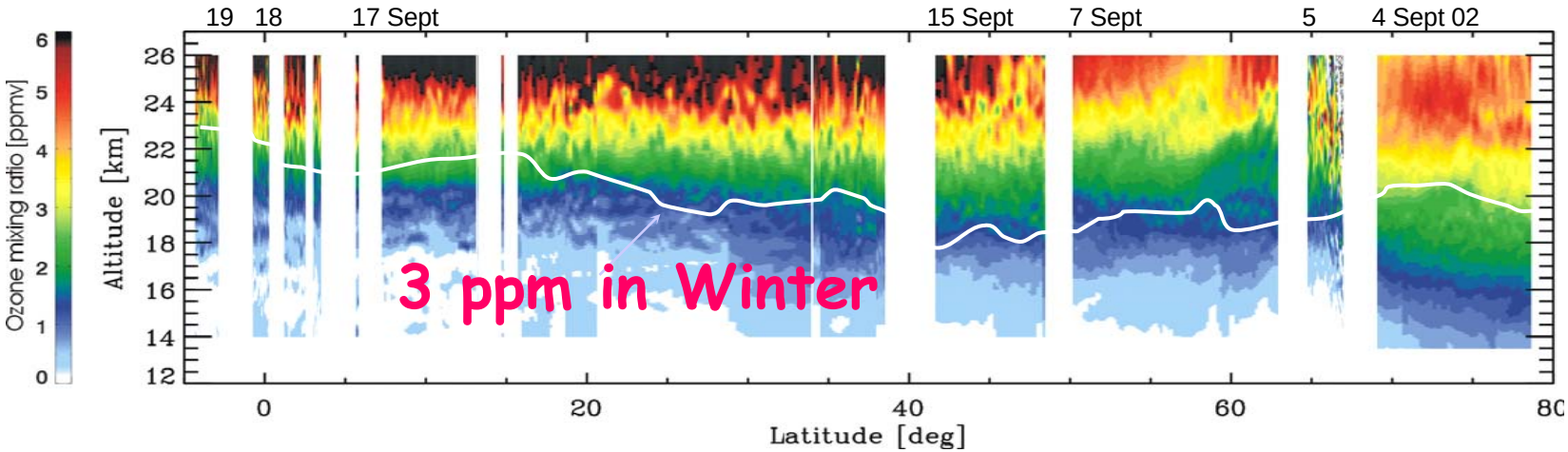
Particle backscatter ratio



Meridional Sections September 2003



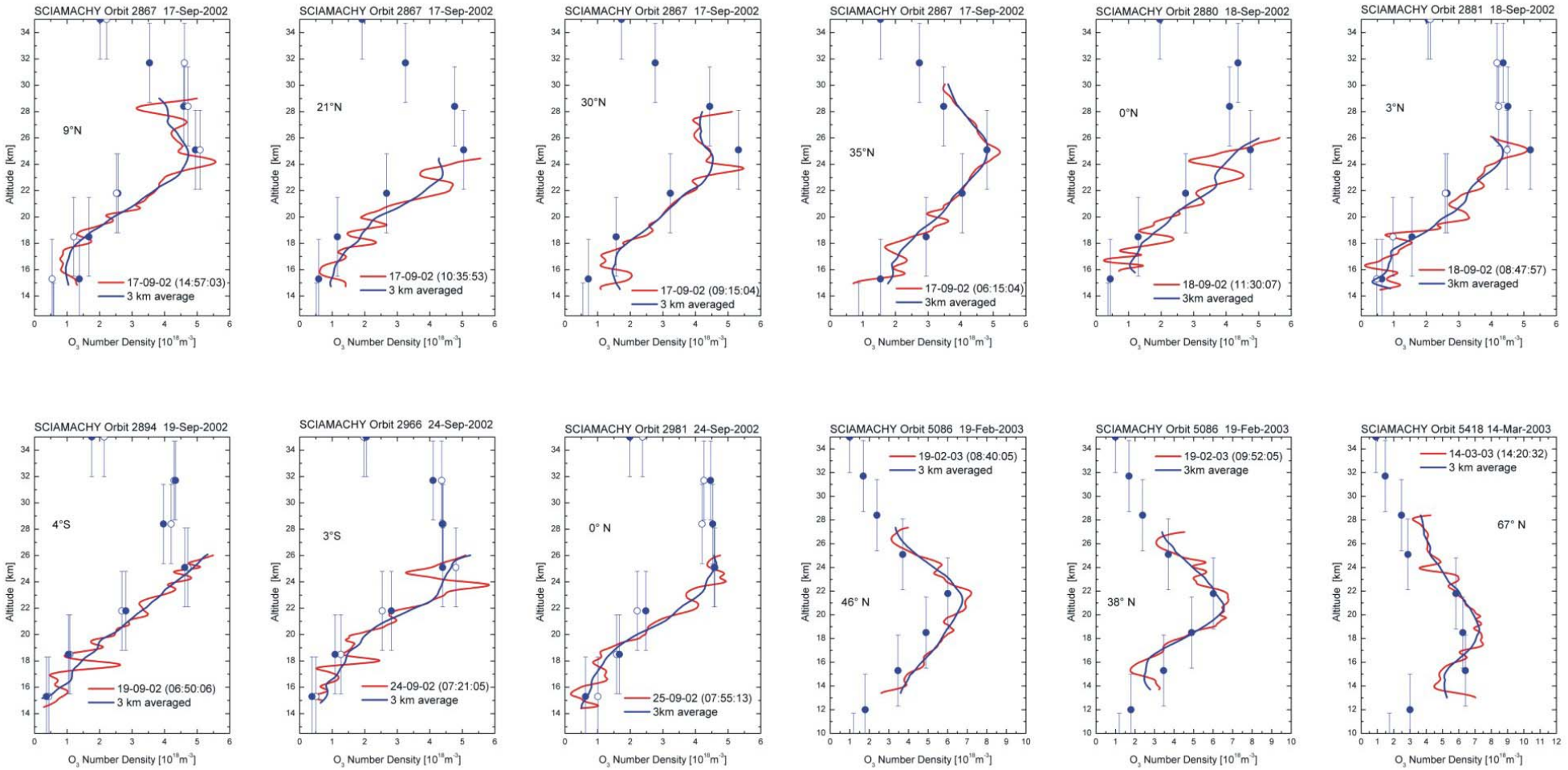
Ozone mixing ratio



Position of the 3ppm Iso-line of O_3-mixing ratio

Can we see this also with SCIAMACHY data?

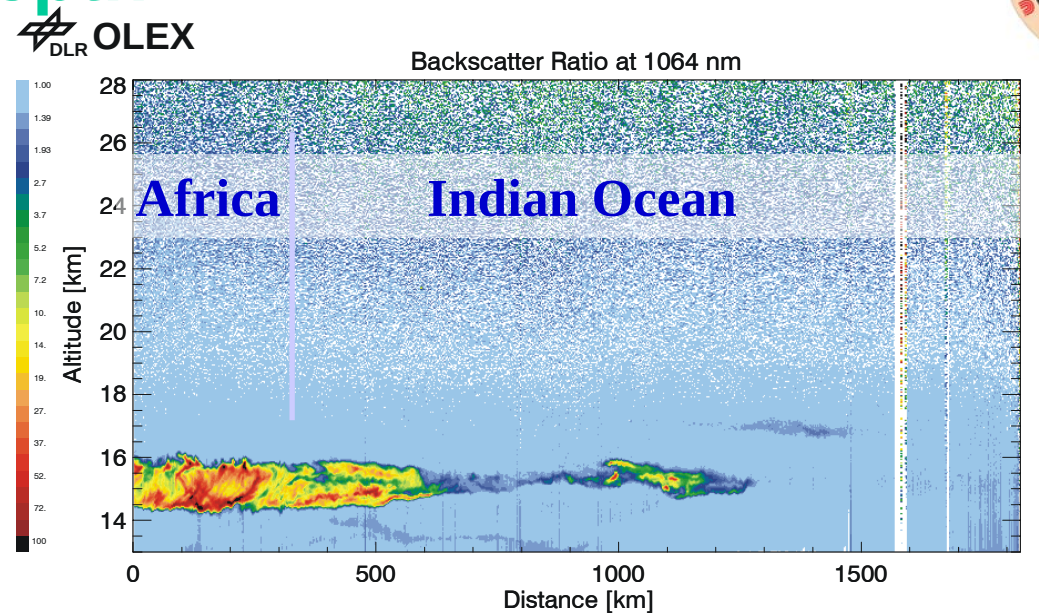
Comparison to U Bremen SCIA Processor

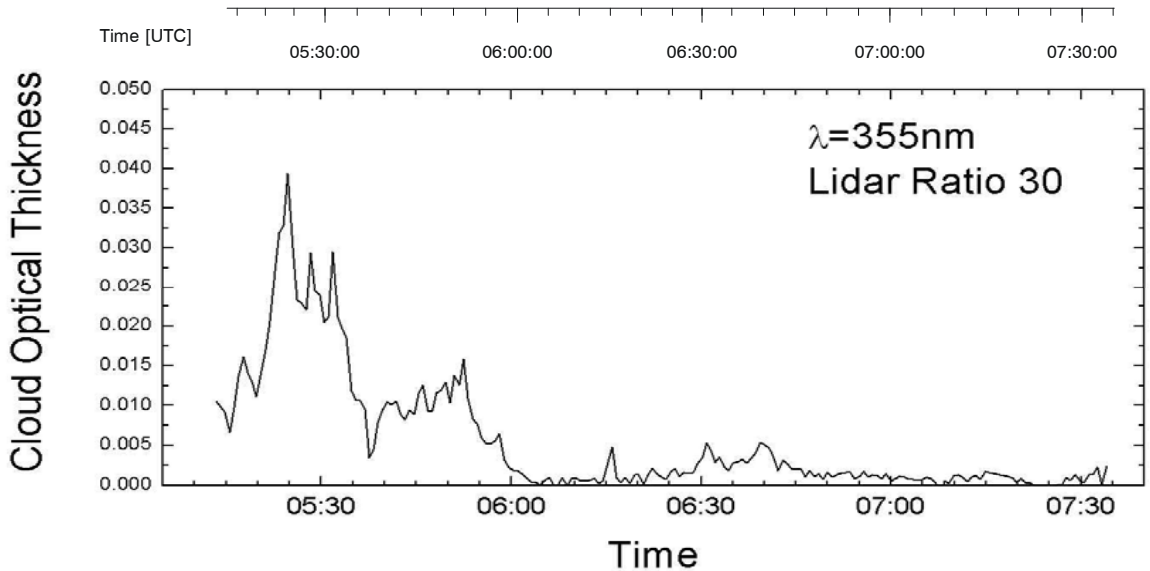


Courtesy: C. v. Savigny

Cirrus Optical Depth

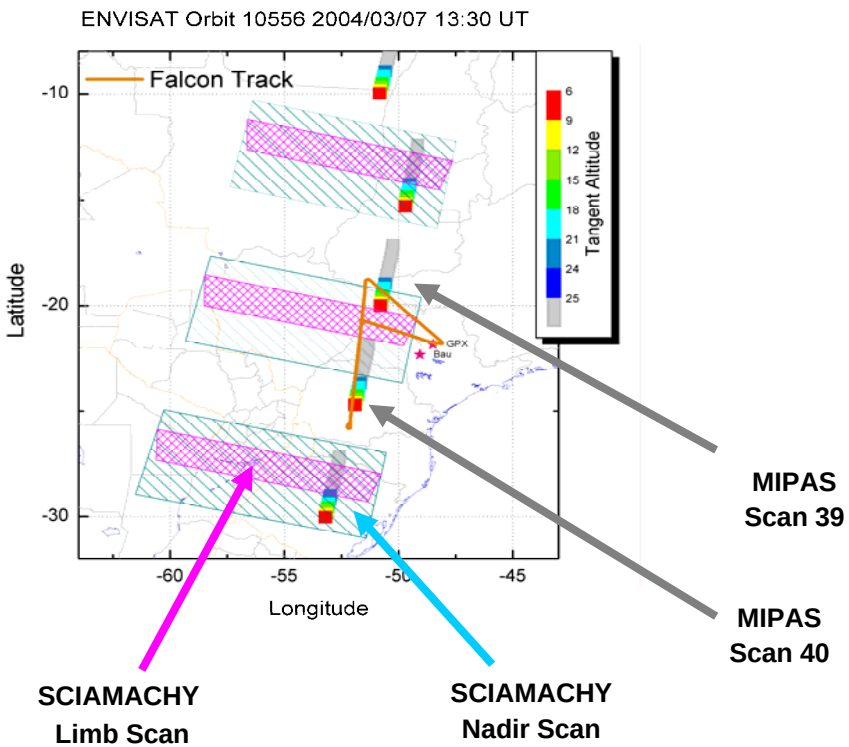
The aerosol or cloud optical thickness derived from OLEX can be used as input to calculate the airmass factors required by AMAXDOAS



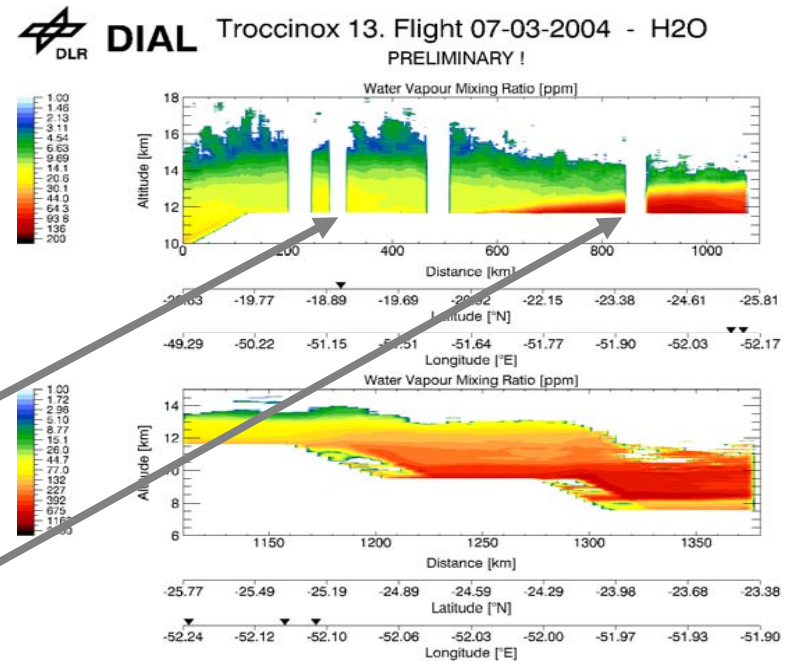


Outlook: SCIA Validation is going on
Example: TROCCINOX campaign / Brazil

Flight Pattern:



Results from H_2O DIAL:



Another possibility for validation in the Tropics: TROCCINOX 2

Conclusion

- Unique and high-quality data set
- Synergy effects with the other Falcon sensors (ASUR, AMAXDOAS)
- Payload has proven to be a very effective instrumentation for satellite validation -> (A. Fix et al., ACPD 2004)
- ENVISAT validation is going on
- ENVISAT data are very useful for future airborne missions