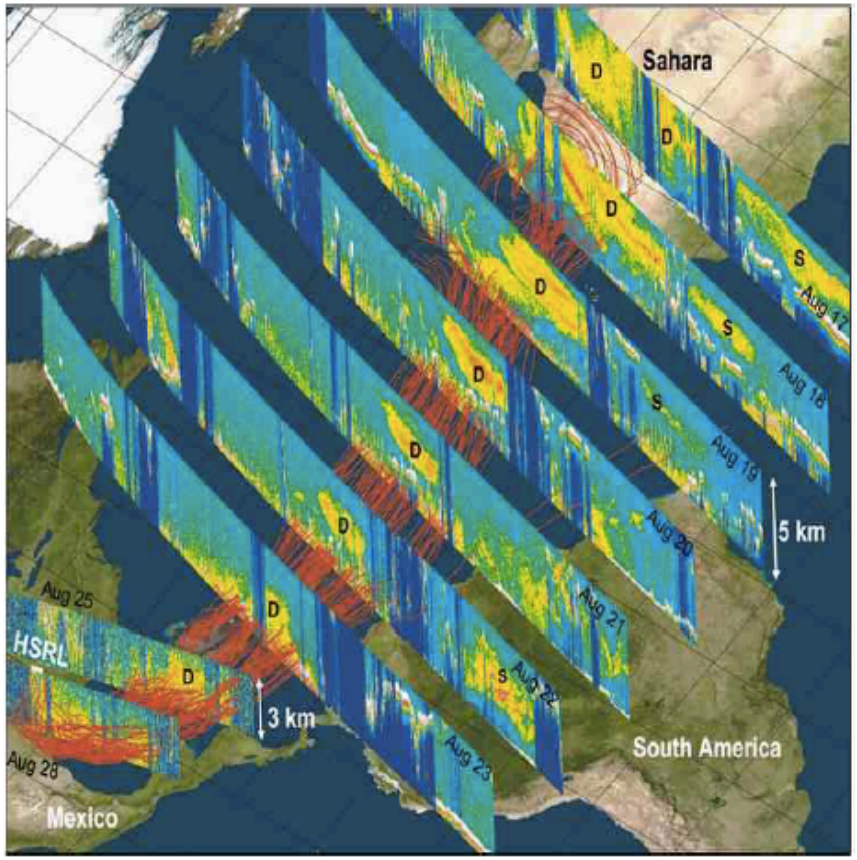
Observation and Characterization of the transcontinental aerosol trasport from Africa to the South American Continent – Introducing a new Lidar system to LALINET

Eduardo Landulfo, Fabio Lopes, Juan Luis Guerrero Rascado, Lucas Alados Arboledas, Neusa Paes Leme, Judith Hoelzmann, José Henrique Fernandes

SAHARAN DUST INTRUSION IN SOUTH AMERICA



Saharan Dust :

- Triggers storm & hurricanes in Caribbeans
- Can act as na epidemic vector
- Affects the Energetic Balance in the atmosphere

Z. Liu, A. Omar, M. Vaughan, J. Hair, C. Kittaka, Y. Hu, K. Powell, C. Trepte, D. Winker, C. Hostetler, R. Ferrare, and R. Pierce, *Calipso lidar observations of the optical properties of saharan dust: a case study of long-range transport*, J. Geophys. Res. **113** (2008), D07207.

SAHARAN DUST INTRUSION IN SOUTH AMERICA

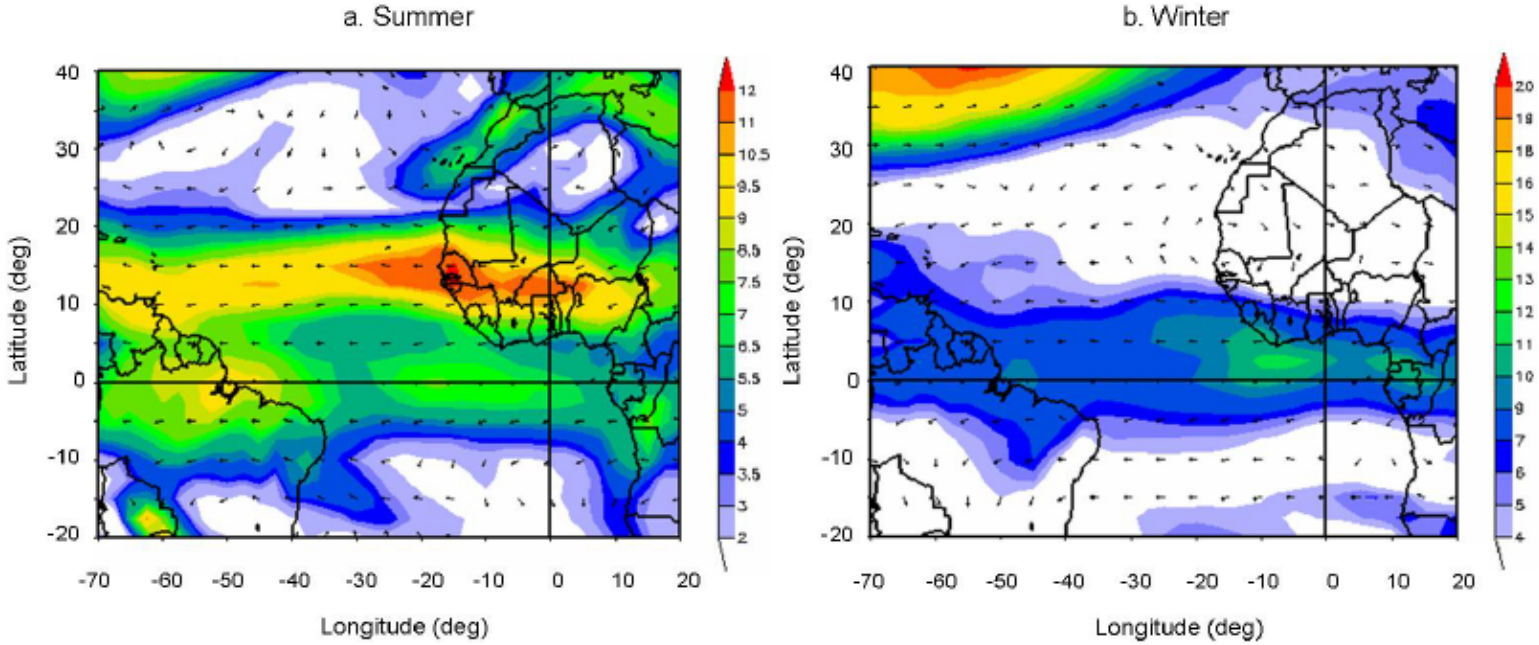


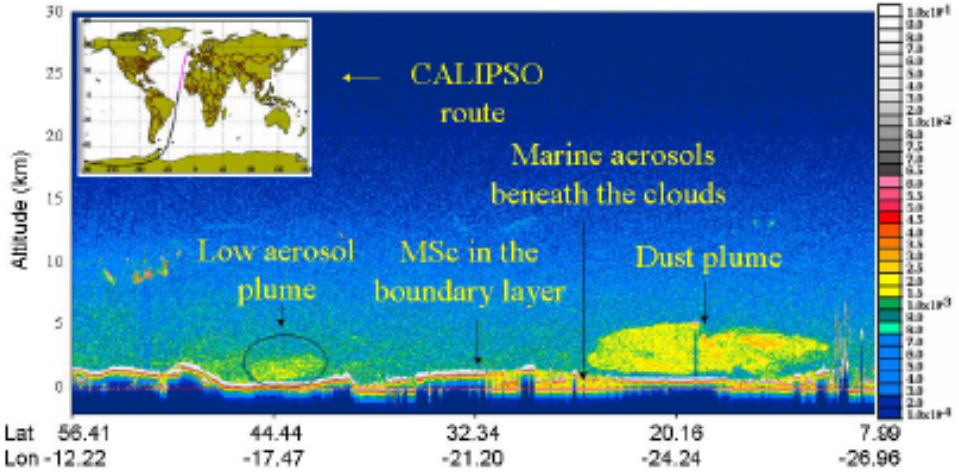
Fig. 1. 700 mb level winds ($m\,s^{-1}$) for the (a) summer (June–August 2006) and (b) winter (December 2006–February 2007) based on National Center for Environmental Prediction (NCEP) re-analysis.

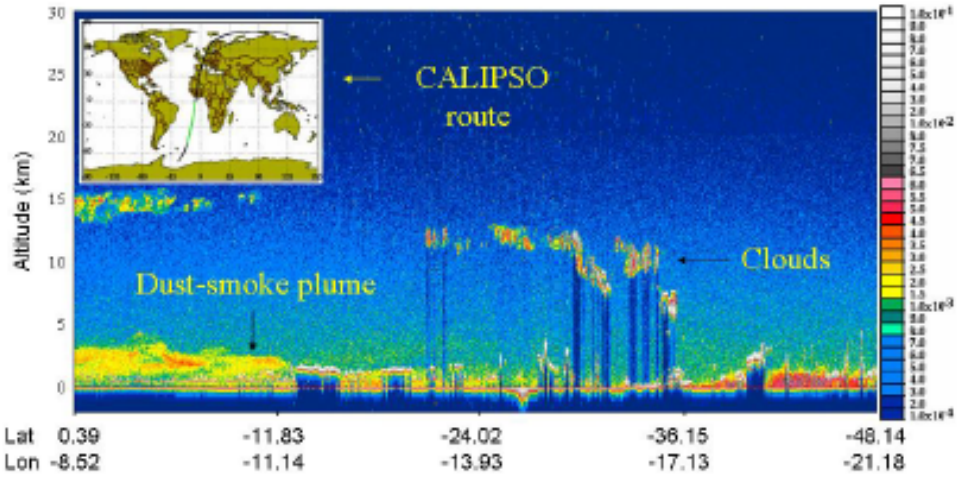
Patterns of North African dust transport over the Atlantic: winter vs. summer, based on CALIPSO first year data

Y. Ben-Ami, I. Koren, and O. Altaratz

Department of Environmental Sciences and Energy Research, Weizmann Institute of Science, Rehovot, Israel

SAHARAN DUST INTRUSION IN SOUTH AMERICA





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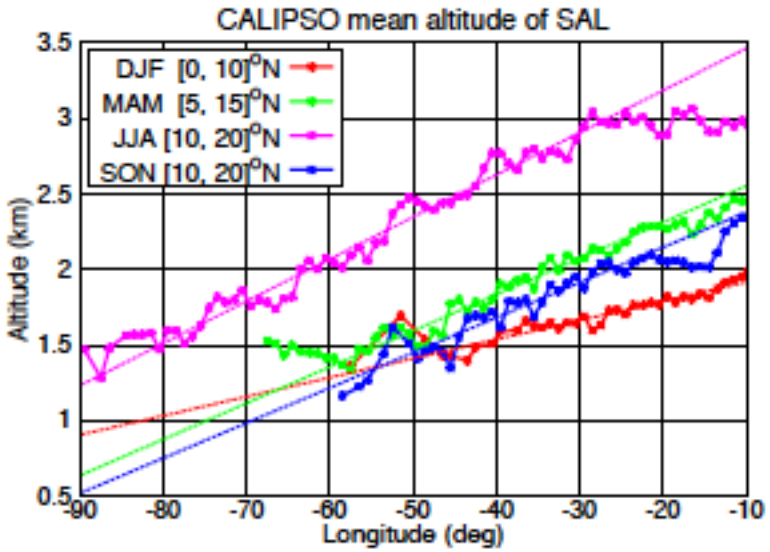
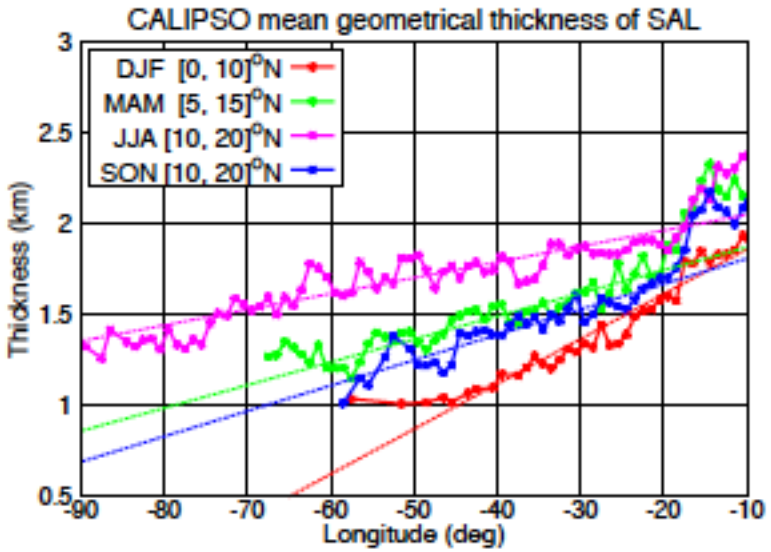
SAHARAN DUST INTRUSION IN SOUTH AMERICA





The seasonal vertical distribution of the Saharan Air Layer and its modulation by the wind

C. Tsamalis[1,*], A. Chédin[1], J. Pelon[2], and V. Capelle[1]

SAHARAN DUST INTRUSION IN SOUTH AMERICA

Saharan Dust Transport

ITCZ

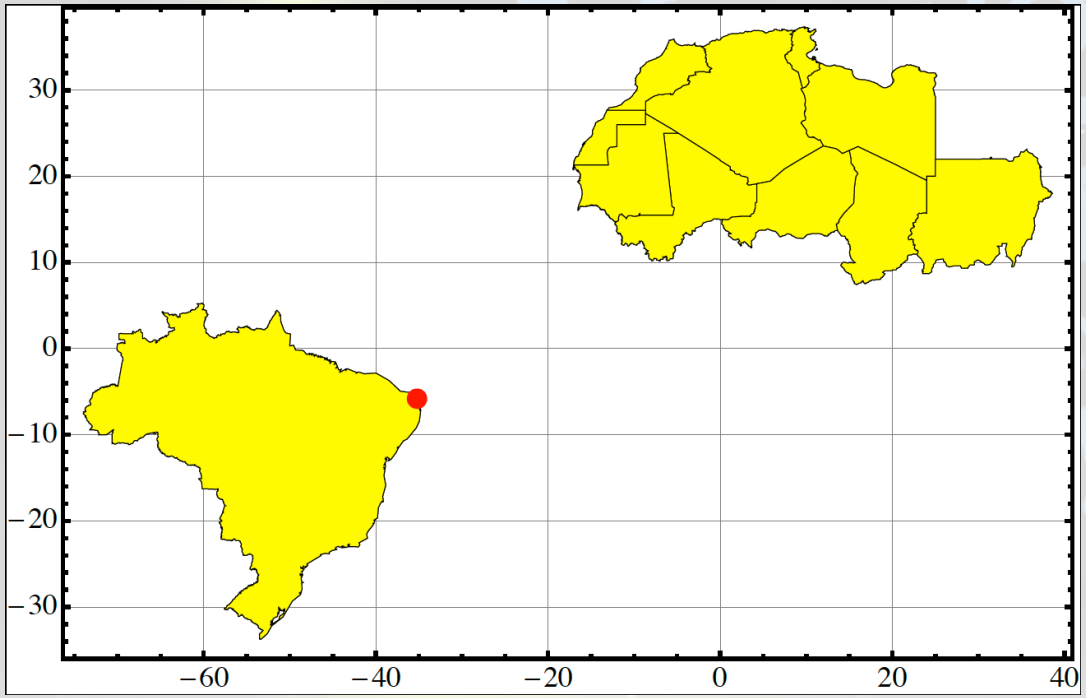
Dust Layer Altitude ?

ENSO

How Pristine does it arrive ?

How does it affect air quality ?

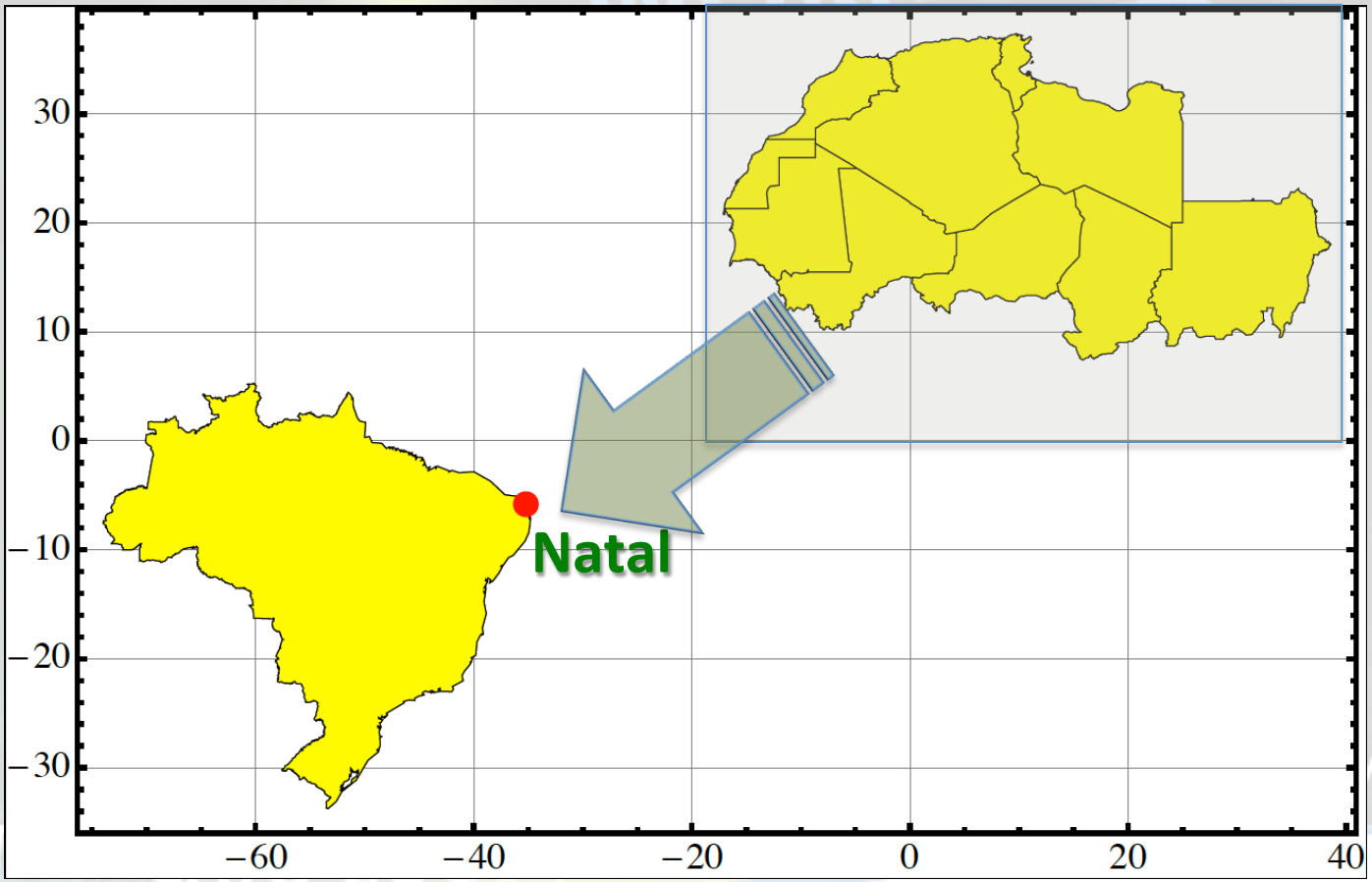
SAHARAN DUST INTRUSION IN SOUTH AMERICA



R. Swap, M. Garstang, S. Greco, R. Talbot, and P. Kallberg, *Saharan dust in the amazon basin*, Tellus **44B** (1992), 133–149.

R. Swap, S. Ulanski, M. Cobbett, and M. Garstang, *Temporal and spatial chracteristics of saharan dust outbreaks*, J. Geophys. Res. **101** (1996), 4205–4220.

SAHARAN DUST INTRUSION IN SOUTH AMERICA



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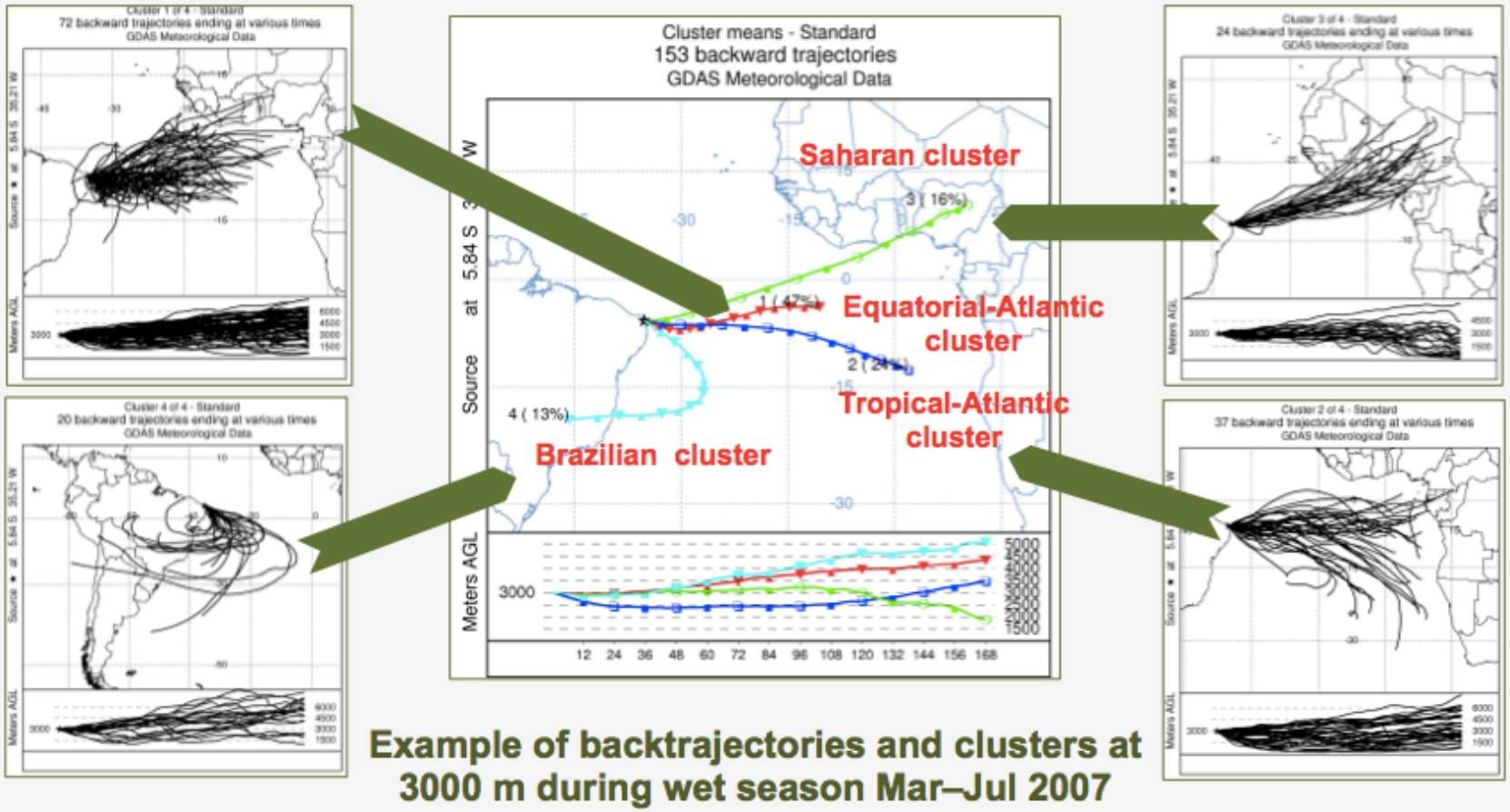


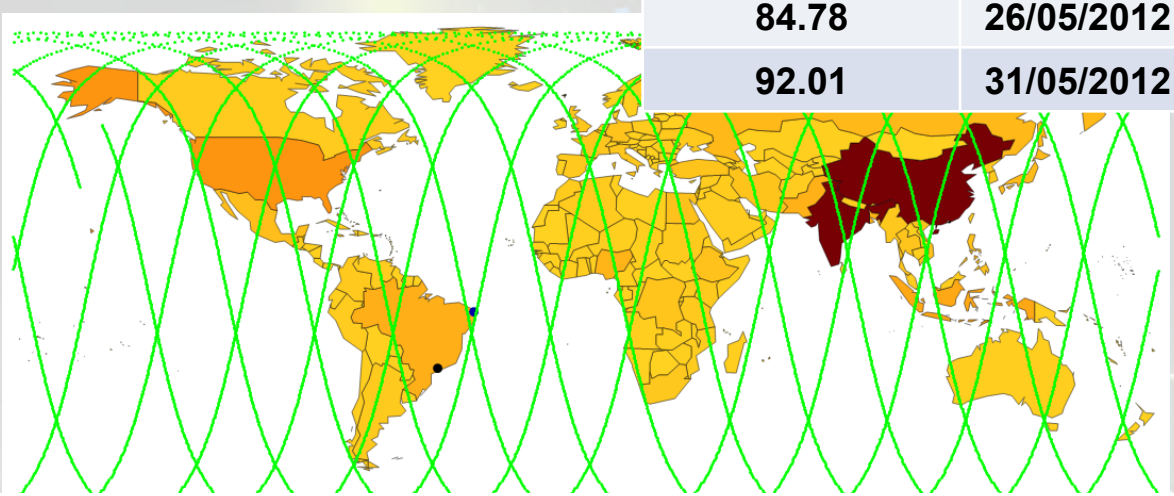
Example of backtrajectories and clusters at 3000 m during wet season Mar–Jul 2007

See J.L. Guerrero's Poster

DAY SELECTION FOR CALIPSO OVERPASSES

Horizontal closest distances CALIPSO ground-track/ CRN/INPE at Natal-Brazil

Distance (km)	Date	UTC time
82.22	01/05/2012	16:11:52
67.87	08/05/2012	03:59:43
81.70	10/05/2012	16:05:46
84.75	17/05/2012	16:11:55
64.10	24/05/2012	03:59:37
84.78	26/05/2012	16:05:42
92.01	31/05/2012	04:05:30



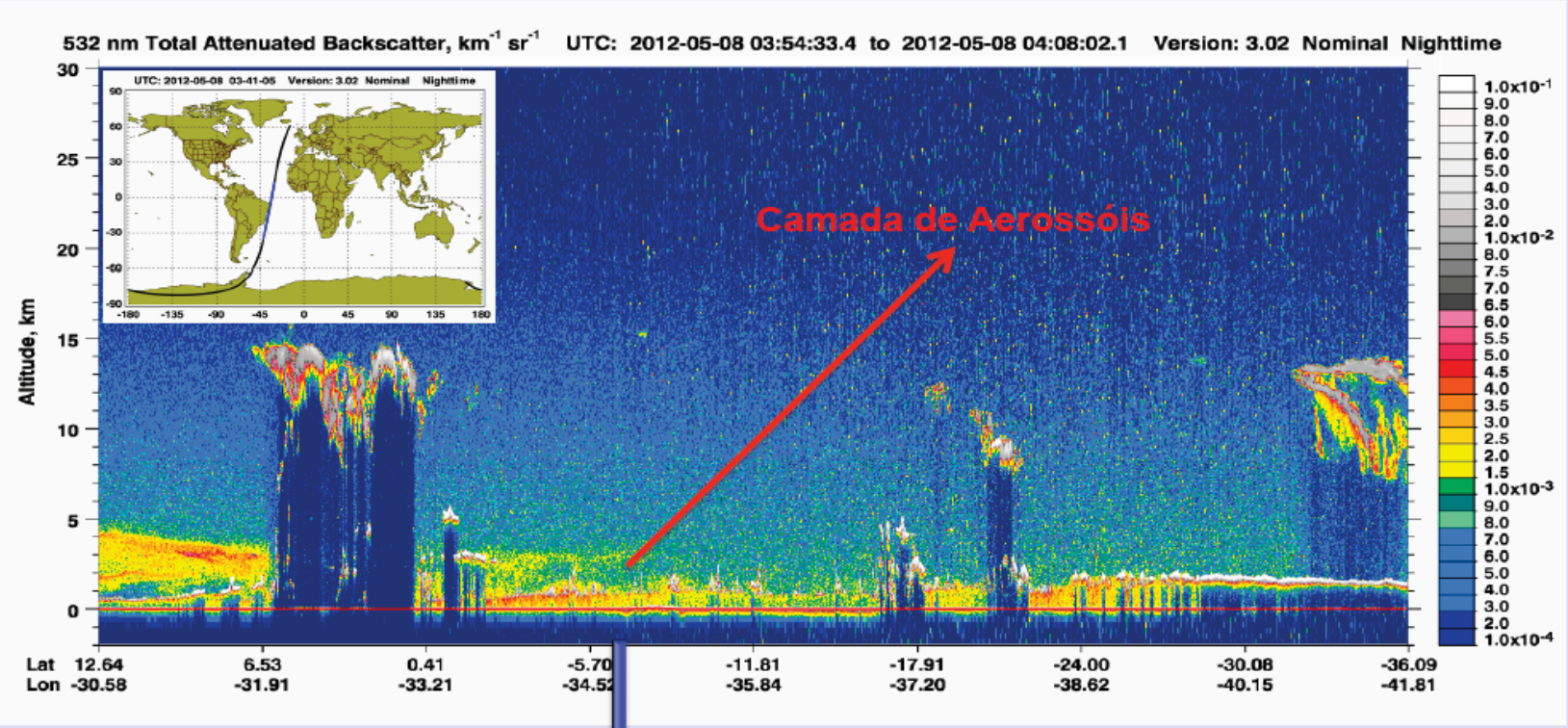
COVERLAI SATELLITE OVERPASS TRACK GENERATED ON MAY 08 th 2012

Identify date, time and closest distance of the CALIPSO overpasses for any location using as input CALIPSO ground-track files and Lat/Long site information

DUST AEROSOL LAYER IDENTIFICATION

CALIOP ATTENUATED BACKSCATTERING SIGNAL MAY 08 2012

MAX APPROACH = 67,87 km

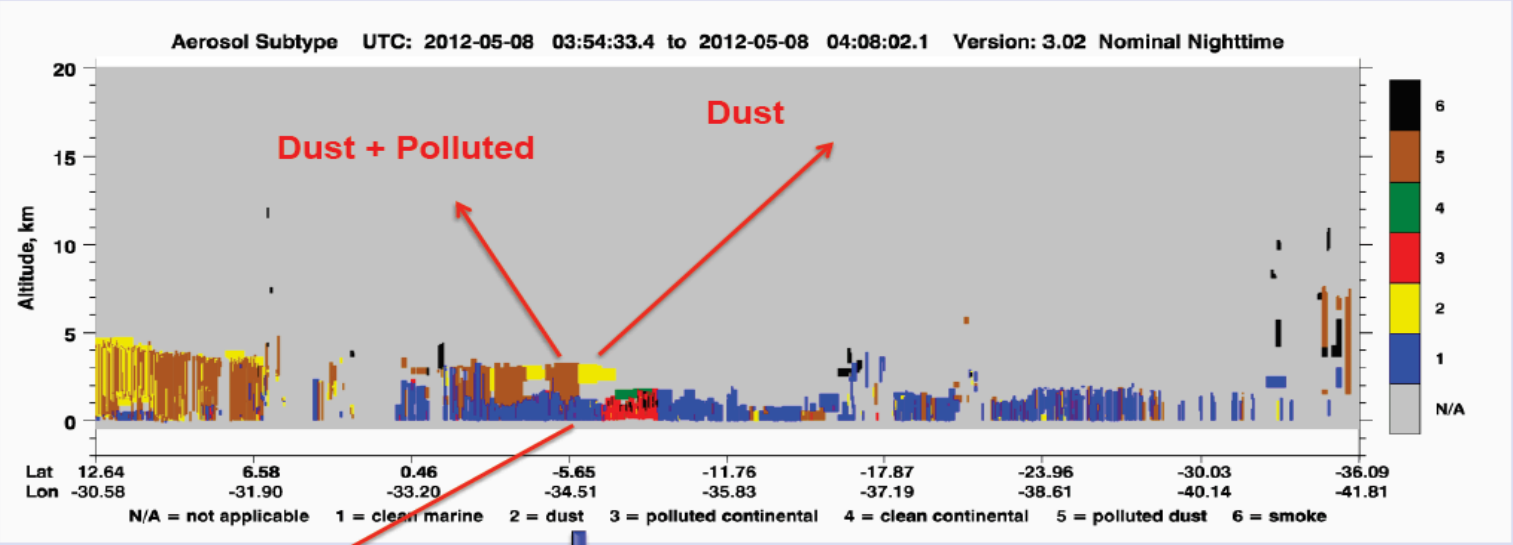


CRN/INPE – Natal (RN)

Lat ~ -5,837 Long ~ -35,208

DUST LAYER IDENTIFICATION – AEROSOL SUBTYPING

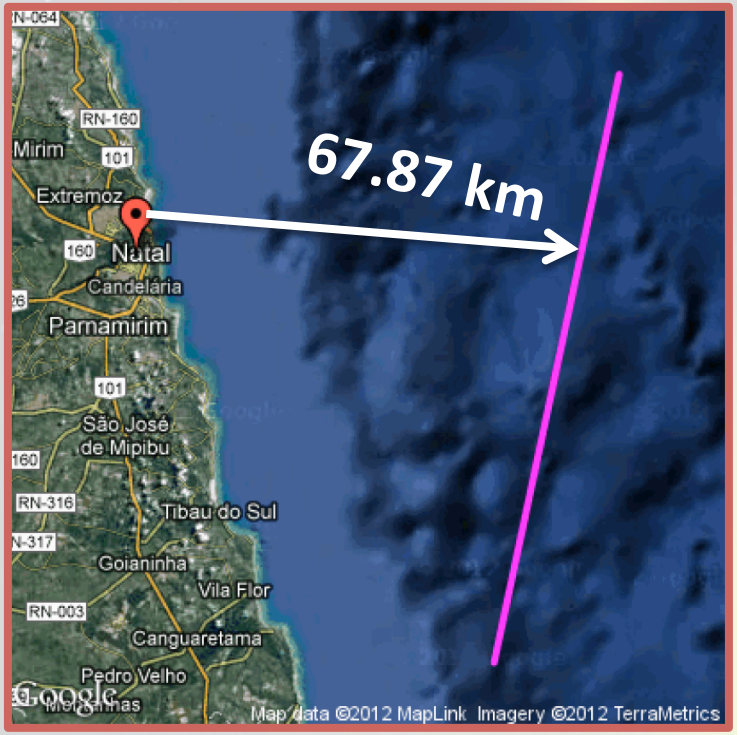
AEROSOL TYPE – CALIPSO-CALIOP BACKSCATTERING MAY 08, 2012

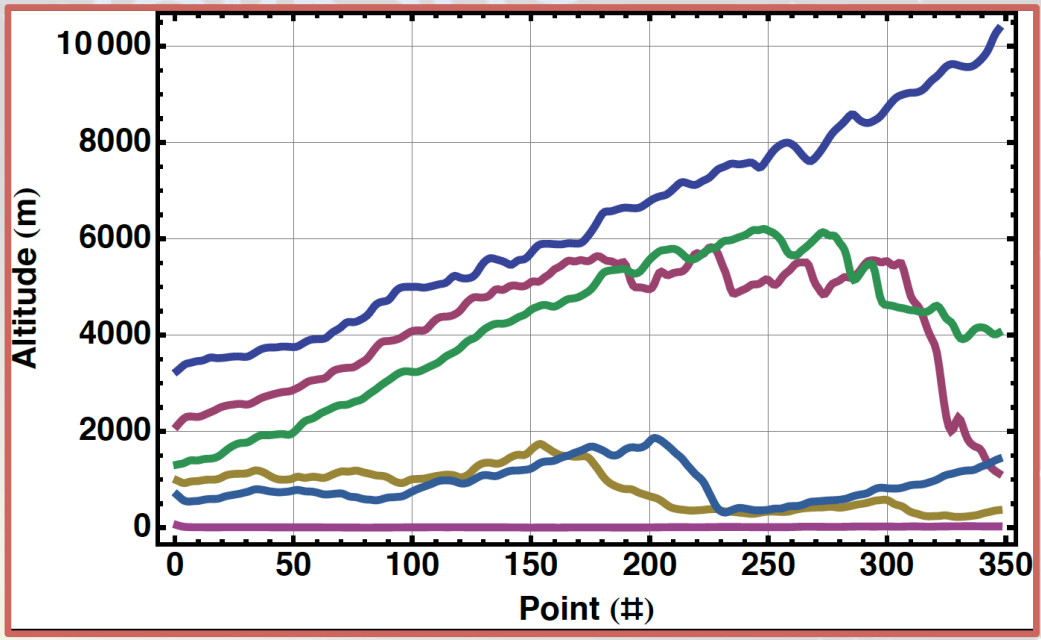


CRN/INPE – Natal (RN)

Lat ~ -5,837 Long ~ -35,208

DUST LAYER CHARACTERIZATION - GEOPOSITION

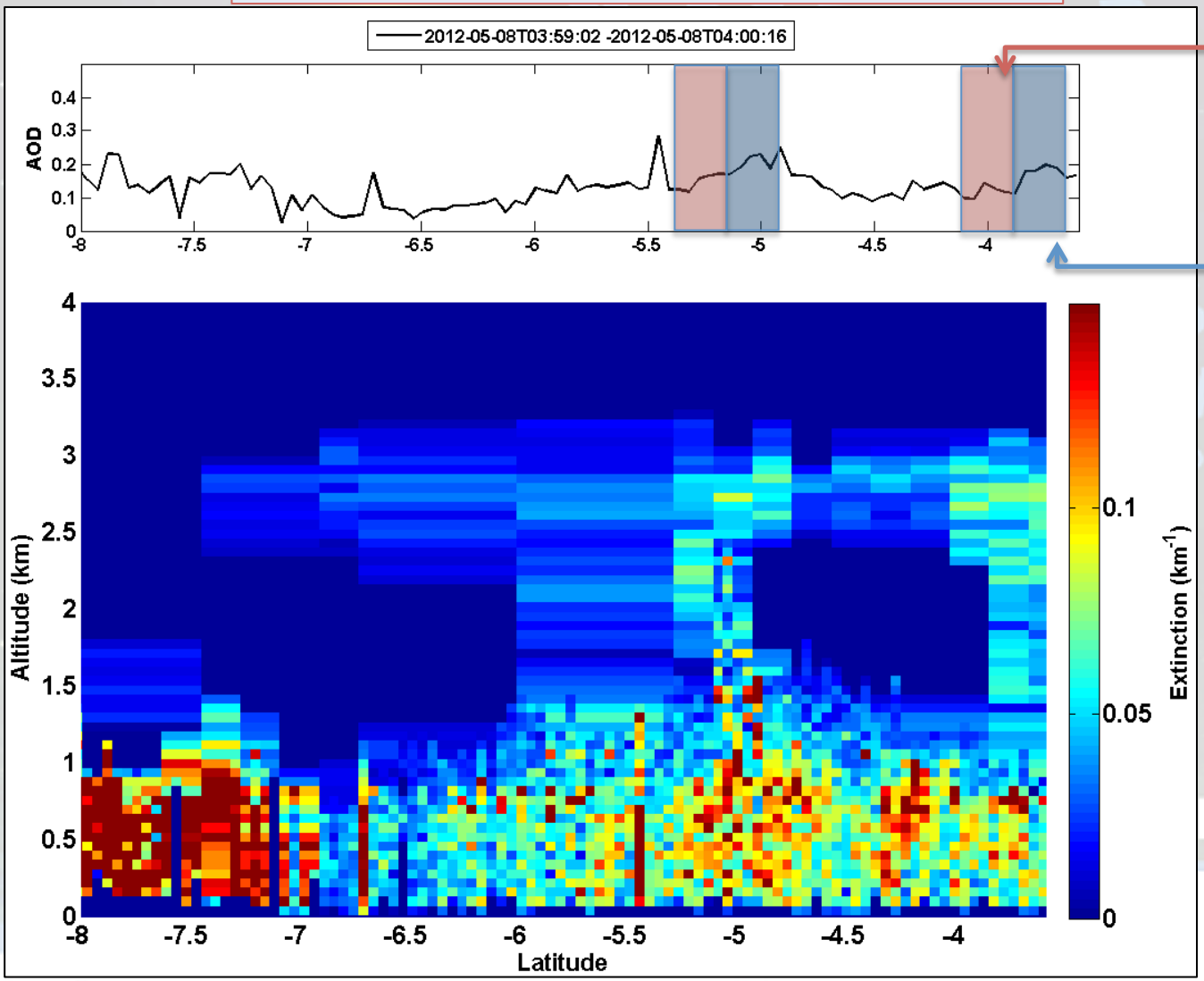




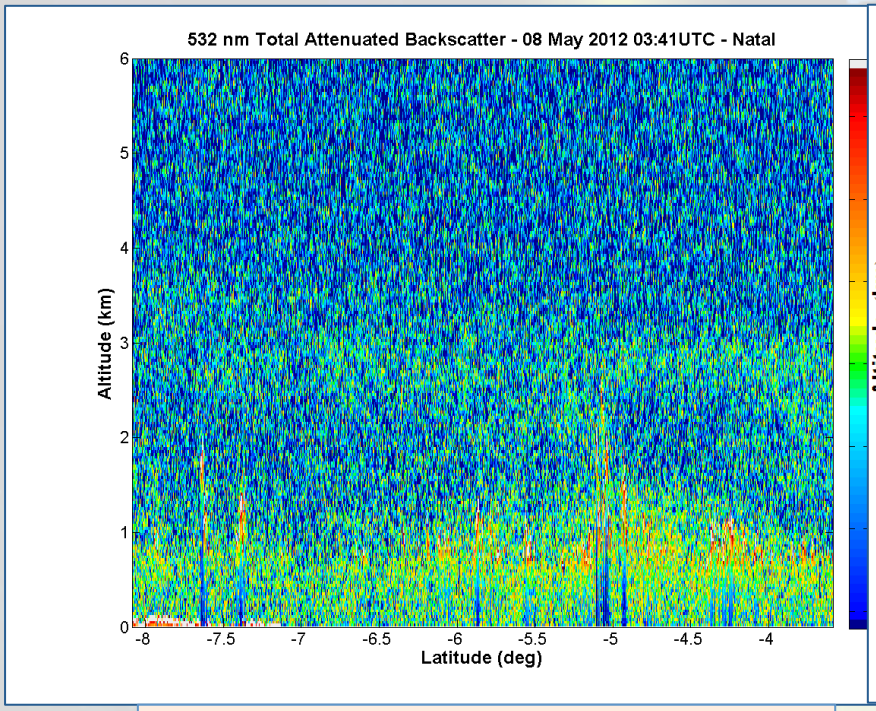
LAYER BACKTRAJECTORY ID – OVERSEA [1,4,5,6]
OVERLAND[2 & 3]

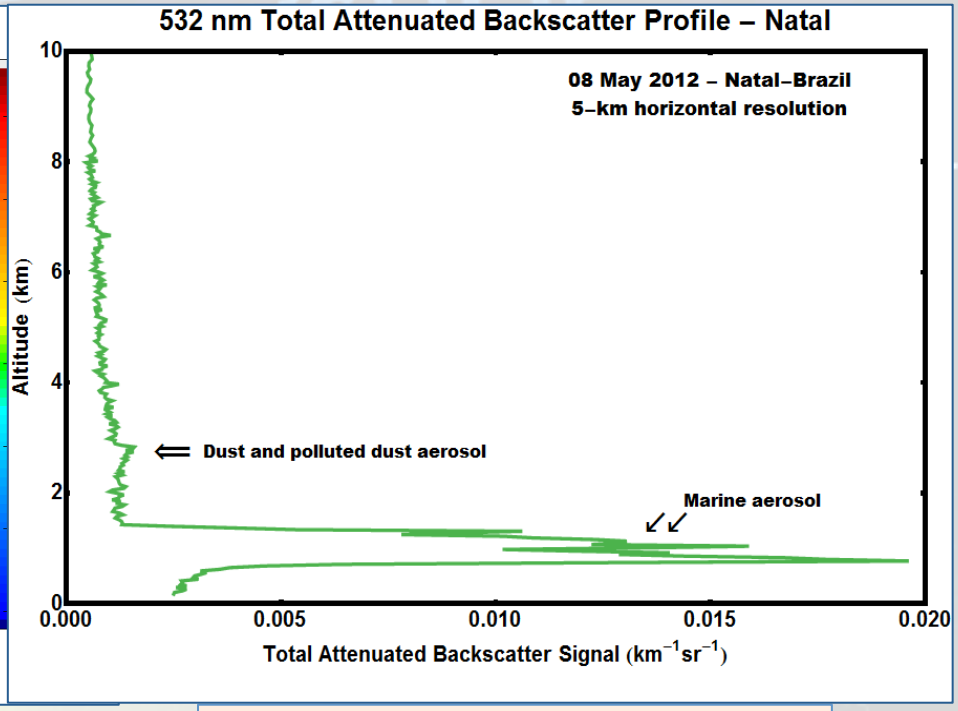
CALIPSO CLOSEST APPROACH TO NATAL, BRAZIL – MAY 8

DUST LAYER CHARACTERIZATION
AOD ENHANCEMENT



DUST LAYER – AEROSOL PROFILING





TAB PROFILE – NATAL "WINDOW"

TAB PROFILE – NATAL 5 km HR

DUST LAYER – AEROSOL PROFILING

These observed events should trigger local climatic changes as well regional modifications as the cloud coverage is intensified over the the area and micro climatic patterns could be observed.

In the near feature it is expected to deploy a ground level LIDAR for aerosol detection and typification by means of polarization channel in the system as well to have additional support from modelwhich could forecast these events and simulatetheir climatic influence over the area.

DUSTER

300 mm Cassegranian Telescope
(Carbon Plastic – I. Veselovskii's design)

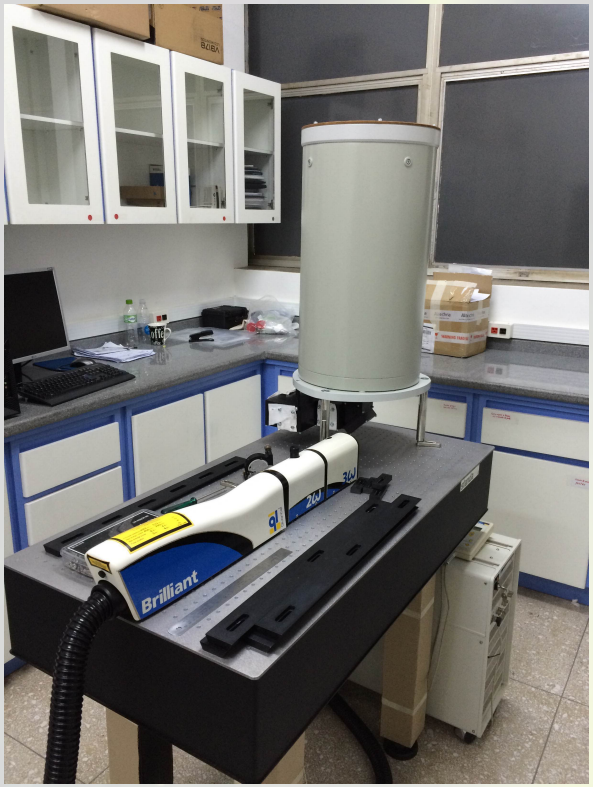
1064 nm
532 nm(s+p)
355 nm

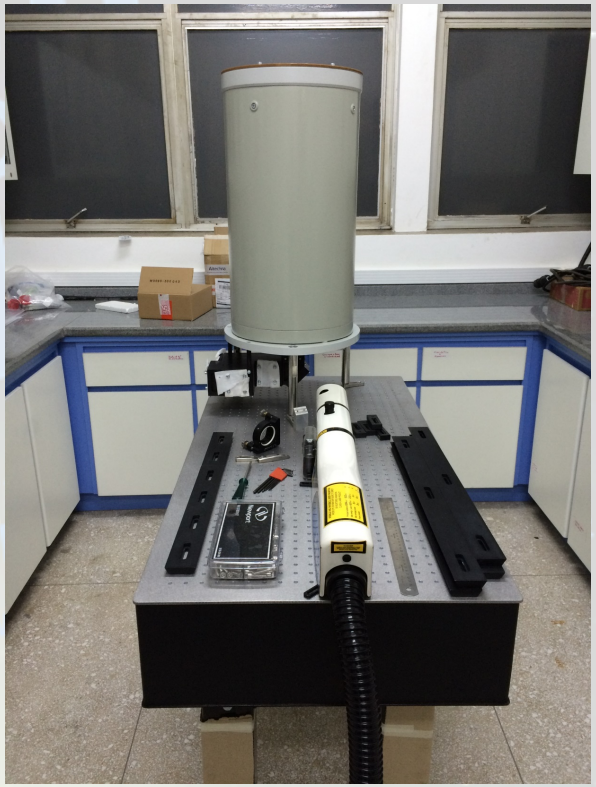
Nd:YAG- Quantel

300 mJ/160mJ/60mJ

20 Hz

DUSTER IN NATAL – SCHEDULED 8/2015





Dr. Juan Luis Guerrero-Rascado for providing the support of generating HYSPLIT trajectories.

CALIPSO team of the NASA Langley Research Center for the provision of the CALIPSO data.

GRANTS: 2008/58104-8, 2011/14365-5

GRANTS: 472706/2012-8, 479252/20111-4