

On the meteorological scenarios and main air mass paths at the LALINET Natal station (Northeastern Brazil)

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MOTIVATION

To continue the effort in understanding the role of aerosol particles on continental scale, the Latin American Lidar Network (LALINET) will spread its activities to the North-eastern part of South America in the near future. A new LALINET station will be deployed at Natal (Rio Grande do Norte, Brazil, 5.84° S, 35.20° W) with the aim of characterizing the transcontinental transport of aerosol particles from Africa to South America, mainly Saharan dust and biomass burning, before their potential contamination with local particles. This study is conceived as a preliminary characterization on the atmosphere over Natal based on meteorological features including air mass clustering using GDAS information (Global Data Assimilation System) as input in HYSPLIT model (Hybrid Single Particle Lagrangian Integrated Trajectory model) (version 4.9) from August 2006 to July 2010.

METHODOLOGY

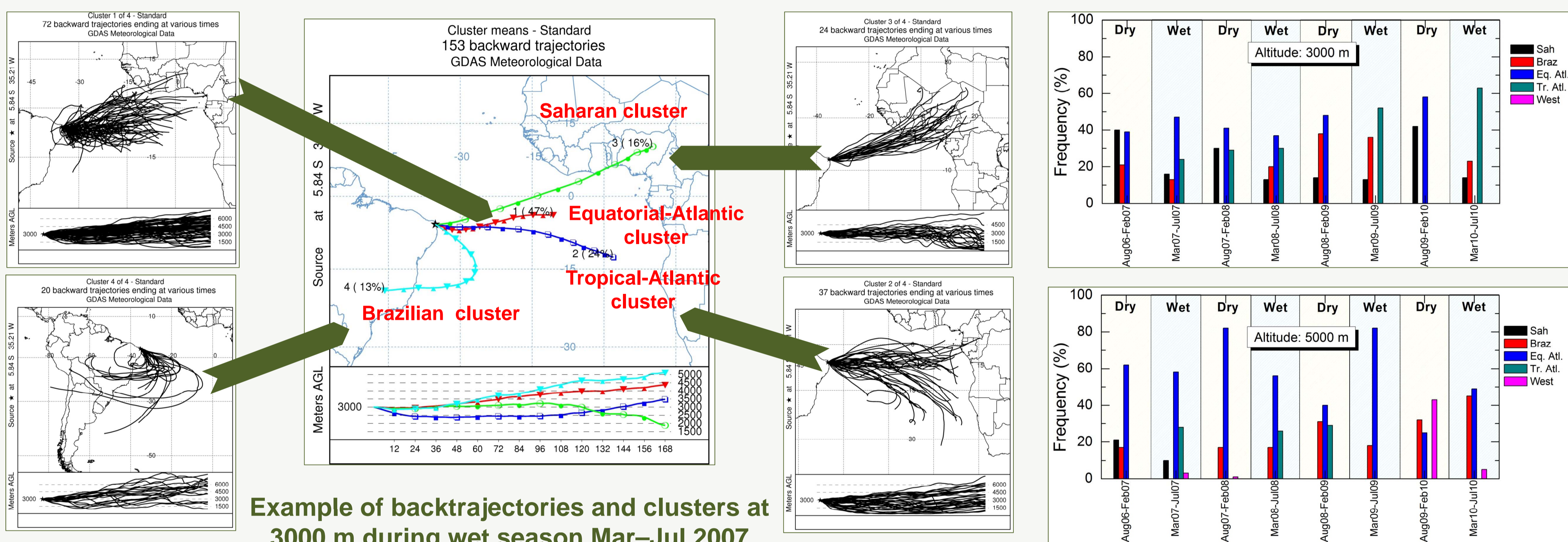
Advection (backtrajectory analysis)

- 168-h backtrajectories (7 days)
- Arrival time: 12 UTC
- Altitudes: 6 levels

Local meteorology

- Statistical analysis: radiosoundings over Natal each 3 hours
- Variables: temperature, potential temperature, relative humidity, wind speed and direction

RESULTS ON ADVECTION



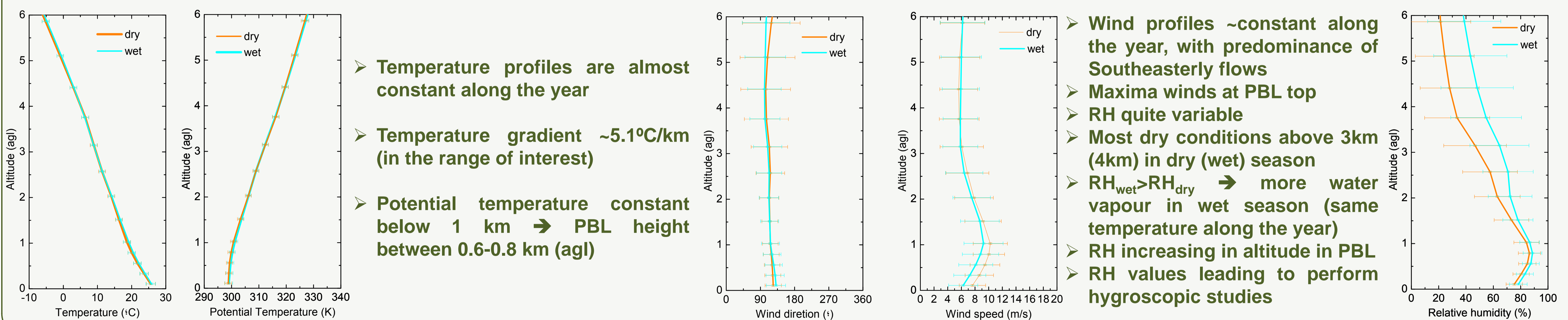
3000m-level:

- Saharan cluster is typically more relevant during dry season (>30% backtrajectories)
- Saharan cluster is more important at 3000 m than 5000 m
- Number of cluster in dry season less than in wet season

5000m-level:

- additional cluster (westerly) coming from higher altitudes
- large predominance of Eq. Atlantic cluster (40-80%)
- Saharan cluster only Aug06-Jul07(dry&wet)

RESULTS ON LOCAL METEOROLOGY



CONCLUDING REMARKS

- First attempt to study the meteorological conditions at Natal
- Different main pathways (clusters) have been identified: Saharan, Equatorial Atlantic, Tropical Atlantic and Brazilian clusters (and Westerly cluster at high altitudes)
- Saharan backtrajectories seem to be less relevant as altitude increases
- Statistical analysis on local meteorology indicates negligible dry/wet different for most of the meteorological differences analyzed. Only relative humidity exhibits important dry/wet differences above 1 km (agl)
- Future work: to extend these analysis to the present and to analyze more altitudes

ACKNOWLEDGEMENTS: This work was supported by FAPESP (Fundação de Amparo à Pesquisa do Estado de São Paulo) through the visiting professor grant ref. 2013/21087-7 and projects 2011/14365-5 and 2008/58104-8; by the program Ciências sem Fronteiras through project PVE-400430/2014-2 by the University of Granada through the contract "Plan Propio. Programa 9. Convocatoria 2013"; by the Spanish Ministry of Economy and Competitiveness through projects CGL2010-18782 and CGL2013-45410-R; and by the Andalusian Regional Government through projects P10-RNM-6299 and P12-RNM-2409.