Latin America LIdar NETwork – LALINET CAL/VAL

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EarthCARE Status – May 2021

2nd ESA EarthCARE Validation Workshop

25-28 May 2021 (online)

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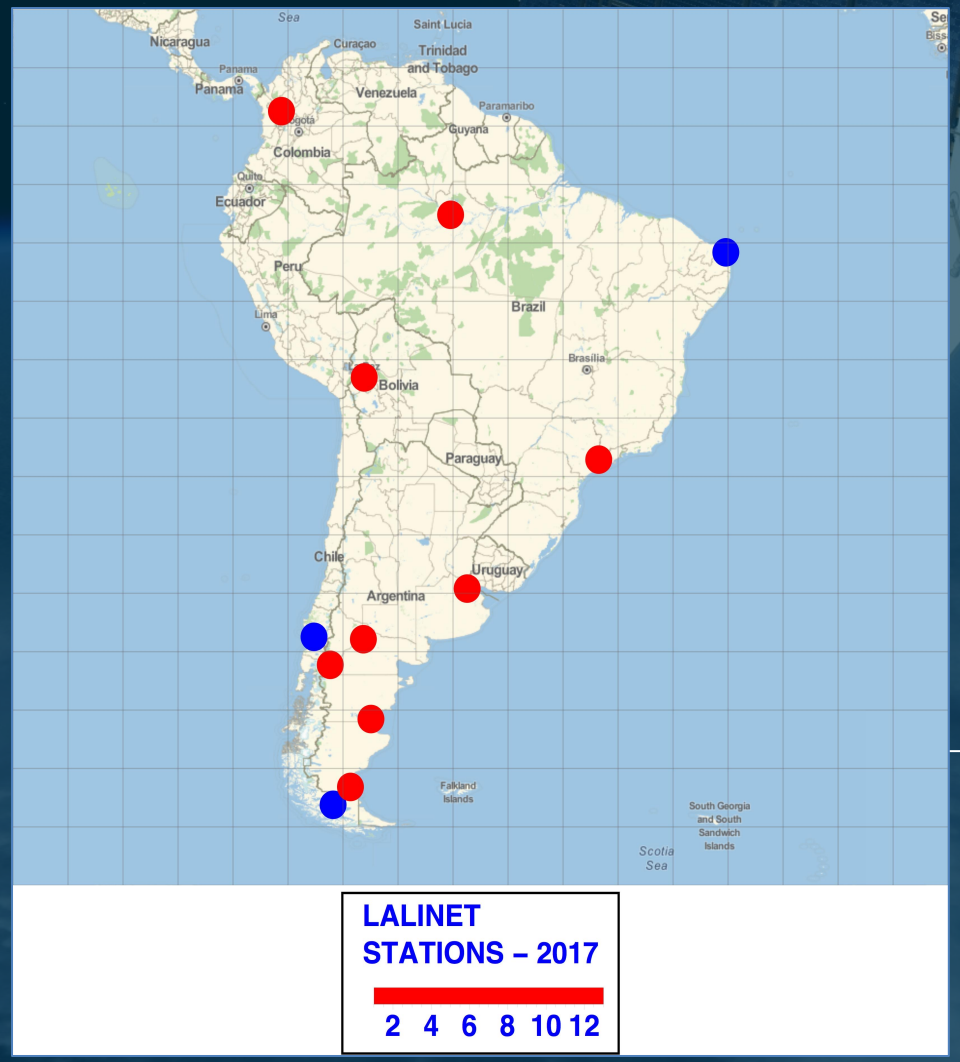

ST.	ID	LAT(S) LON(W)	Channels (nm)
Buenos Aires	*AEP*	34.56°S 58.42°W	*1064, 532^{p} & 355^{p}*
Buenos Aires	*VMA*	34.56°S 58.51°W	*1064, 607, 532^{p}, 387 & 355^{p}*
Neuquen	*NQN*	38.95°S 68.13°W	*1064, 532^{p} & 355^{p}*
Barilo-che	*BRC*	41.15°S 71.16°W	*1064, 607, 532, 387 & 355*
Commo doro	*CDR*	45.79°S 67.46°W	*1064, 532 & 355*
Gal-legos	*RGL*	51.61°S 69.31°W	*1064, 532^{p} & 355^{p}*
Punta Arenas	*PAR**	53.13°S 70.88°W	*1064, 607, 532^{p}, 408, 387 & 355^{p}*
S. Paulo	*SPU*	23°13′ 46°28′	*1064, 607, 532, 408, 387 & 355*
S. Paulo	*SPT*	*VAR*	*607, 532*
Man-aus	*MAO*	02.60°S 60.21°W	*408, 387, 355*
Natal	*NAT*	05.82°S 35.20°W	*1064, 532^{p} & 355^{p}*
*Temuco**	*TMU**	38.74°S 72.62°W	*1064, 532^{p} & 355^{p}*
Medellin	*MED*	06.26°N 75.58°W	*532 & 355*
La Paz	*LPZ*	16.54°S 68.07°W	*1064, 532^{p} & 355^{p}*

- Validation of EarthCARE products of aerosol and cloud profiles of backscatter, extinction and lidar-ratio, backscatter and extinction Ansgtrom Exponent and Color ratio
- Assessment of spatio-temporal representativeness of EarthCARE aerosol and cloud products
- Data will be used from:
  - The (historical) LALINET database,
  - Correlative measurements performed by selected LALINET stations during close proximity EarthCare overpasses

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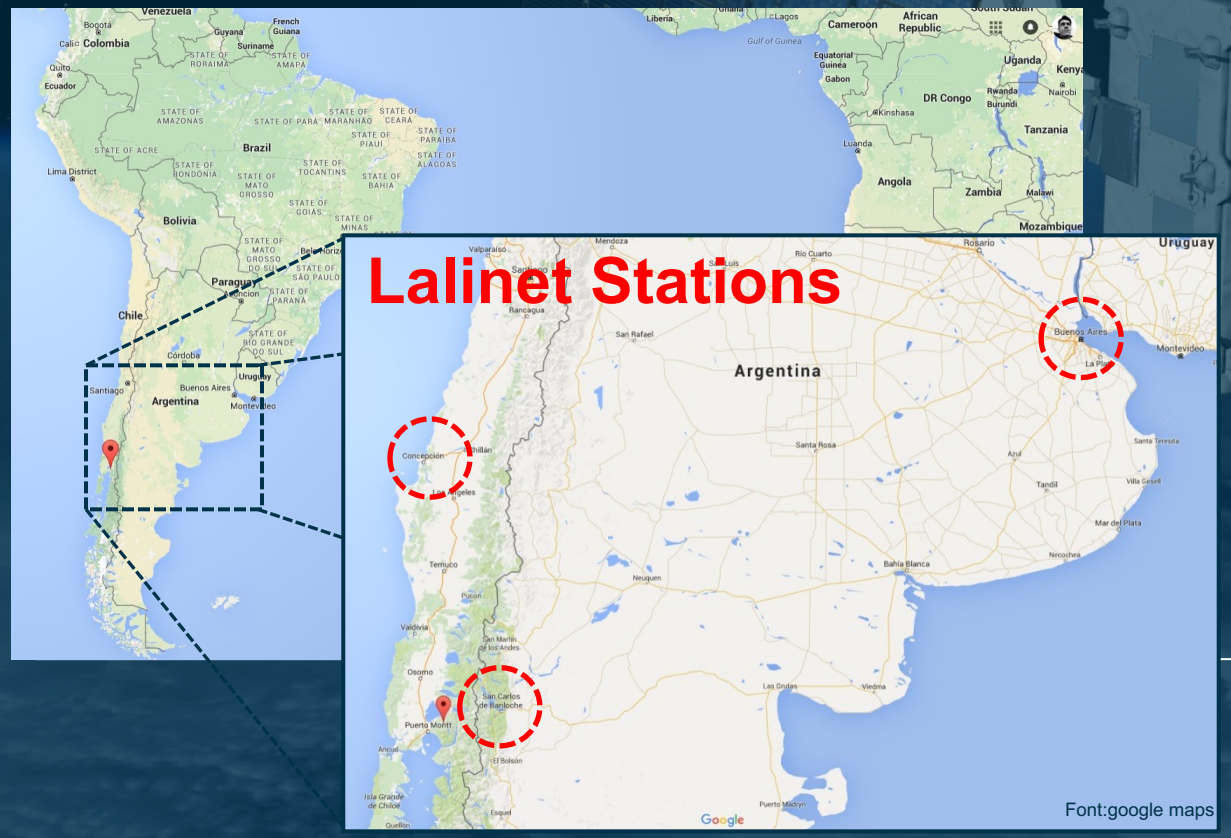
DUST TRANSPORT

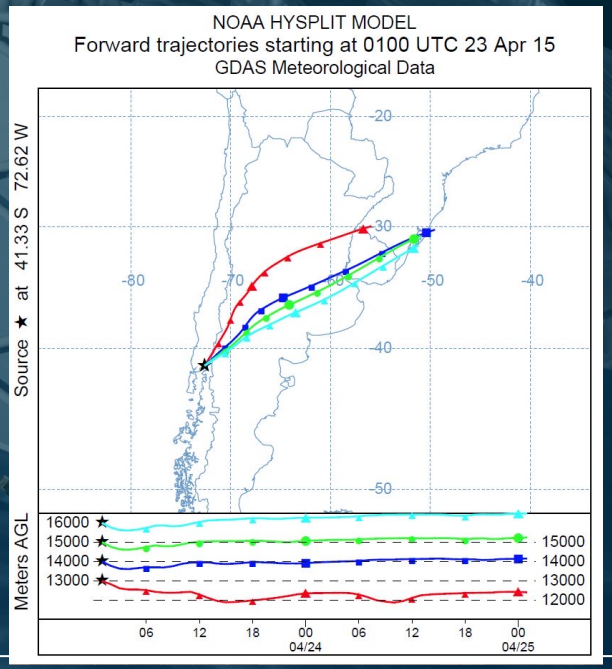
BIOMASS BURNING

VOLCANIC ASHES & PLUMES

VOLCANIC ASHES & PLUMES

- 22nd – 23rd of April, 2015 – Calbuco volcano began eruption





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- First eruption since 1972
- Ash cloud achieved above 15 km of altitude

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- Measurements of 1064 nm, 532 nm and 355 nm from elastic and multi-wavelength lidar systems in order to retrieve backscatter, extinction, lidar ratio profiles, plus backscatter and extinction Ansgtrom Exponent and Color ratio.

- 3+ hour measurements centered on the closest approach of EarthCARE for each station - for overpasses within horizontal range distances of 120 km for each station .

- Statistical validation - for at least 7 stations distributed over South America, i.e., Manaus-Brasil, São Paulo-Brasil, Medellin-Colombia, Buenos Aires-Argentina, Punta Arenas-Chile, Temuco-Pucon-Chile, La Paz-Bolivia.

Lessons from the past – Alcantara

- Implementation of QA/QC for some LALINET stations similar to EARLINET program
  - Handbook of instruments
  - Implementation of the Standard operating procedures
  - Implementation of QA tests
    - Dark current, Zero bin, Telecovers,Bin-shift, Rayleigh fit
  - Identification of problems and optimization

  - Implementation of SCC data format
- Implementation of Single Calculus Chain (SCC) data format and processing

Lessons from the past – Alcantara

	Lidar specifications	Measured parameters	Application
SPU	Emission: 1064, 532, 355nm Detection: 1064, 607, 532, 408, 387, 355nm Range: 1- 15 km	- backscatter coefficient at 355, 532, 1064nm - extinction coefficient at 387 and 607nm - derived optical parameters: lidar ratio, extinction derived Angstrom, color ratio - water vapor mixing ratio	- aerosol layering and dynamics - typing based on backtrajectories and sun photometer - advanced aerosol typing: NATALI (low res) - long range transport studies (backtrajectories and sun-photometer)
MAO	Emission: 355nm Detection: 408, 387, 355nm Range: 0.7 – 15 km	- backscatter coefficient at 355nm - extinction coefficient at 387nm - derived optical parameters: lidar ratio - water vapor mixing ratio	- aerosol layering and dynamics - typing based on backtrajectories and sun photometer
NAT	Emission: 1064, 532, 355nm Detection: 1064, 532p, 532c, 355 nm Range: 1 - 15 km	- backscatter coefficient at 355, 532, 1064nm - volume and particle linear depolarization ratio - derived optical parameters: color ratio	- aerosol layering and dynamics - typing based on backtrajectories, depolarization parameters and sun

esa

APEL

Assessment of atmospheric optical Properties during biomass burning Events and Long-range transport of desert dust

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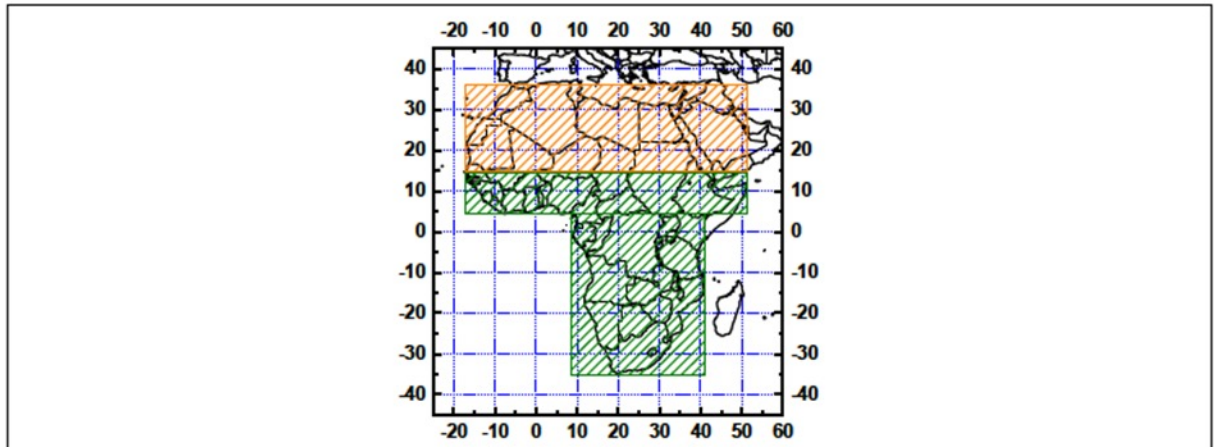
Lessons from the past – Alcantara



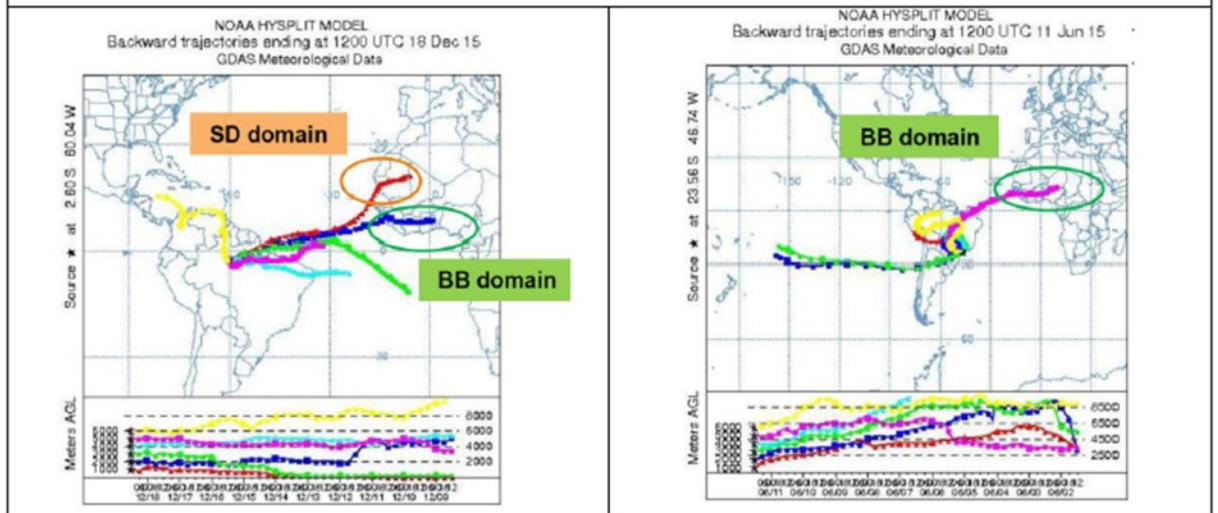
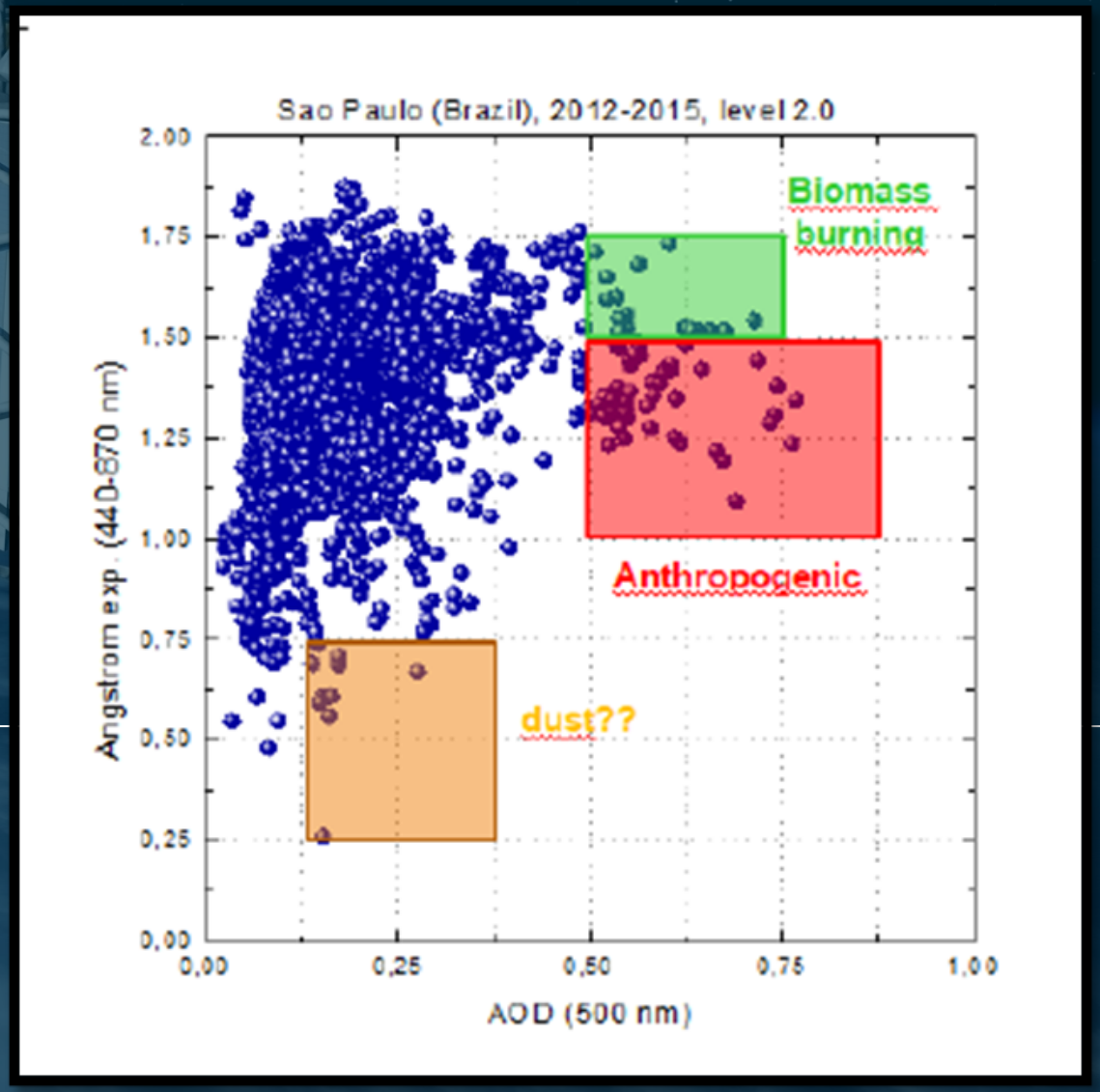


Figure 59: Domains used for the backtrajectories analysis of historical data in the period 2012-2015: Saharan dust domain (orange) and biomass burning domain (green). Back trajectory example – BB and SD domains.



Validation approaches and strategies

- All LALINET stations involved in EarthCARE validation work together with AERONET.
  - Sun-photometer products will be integrated in synergy with lidar systems in order to intercompare with EarthCARE synergistic products

- Use of LALINET historical database to derive the aerosol and cloud predominant properties of South America Continent

Funding status

- At the present only maintenance and operation are fully covered by individual institutions
- A joint project to commit to special operations and CAL-VAL acitivities is under study for submission involving all LALINET participant stations.
- An Alcantara like project would be welcome = 2 EU + LALINET