

1        **Continuous atmospheric boundary layer observations in the coastal**  
2                                    **urban area of Barcelona during SAPUSS**

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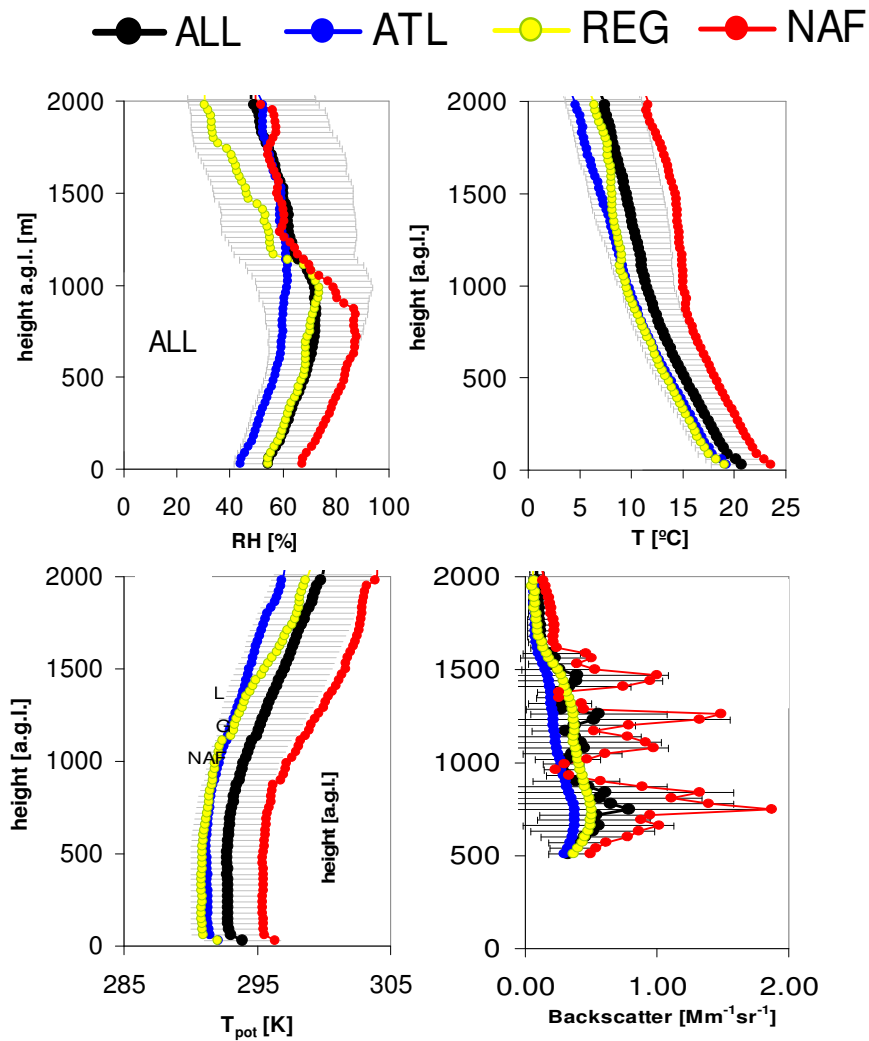
4                    *Pandolfi M.<sup>1,\*</sup>, Martucci G.<sup>2</sup>, Querol X.<sup>1</sup>, Alastuey A.<sup>1</sup>, Wilsenack F.<sup>3</sup>, Frey S.<sup>4</sup>,*  
5                                    *O' Dowd C. D.<sup>2</sup>, and Dall'Osto M.<sup>1</sup>*

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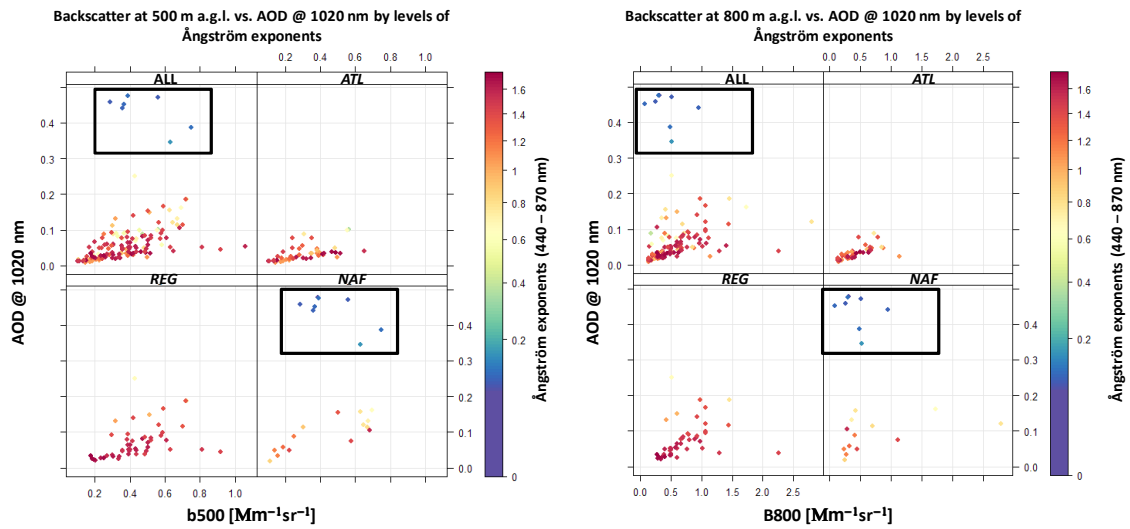
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11       *Laser, Optik, Systeme GmbH (Germany).*

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15       **Supporting Material**

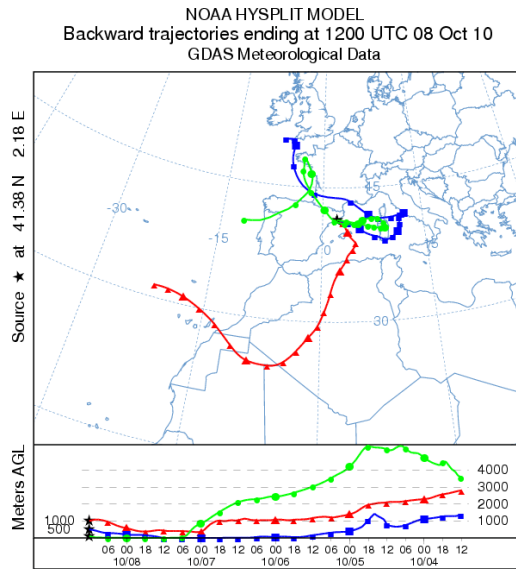
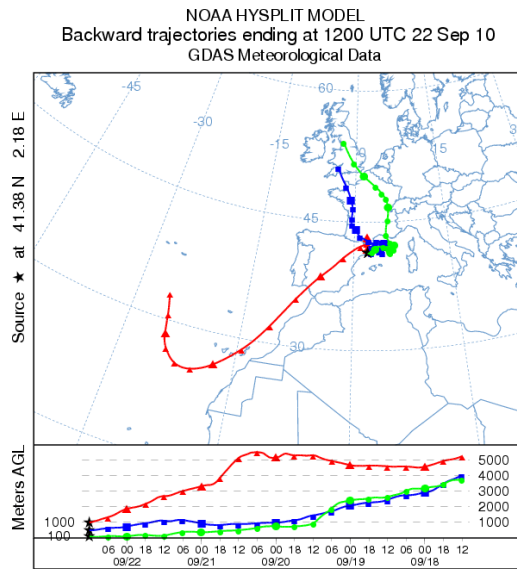


20 **Figure SI-1:** Mean vertical profiles of relative humidity (RH), temperature (T), potential temperature  
 21 ( $T_{pot}$ ) from radiosoundings launched at 12:00 UTC during SAPUSS and Backscatter coefficient mean  
 22 vertical profiles from ceilometer (integrated between 12:00 and 12:30 UTC) for the entire SAPUSS  
 23 campaign (ALL) and for the three detected scenarios: Atlantic (ATL), regional (REG) and African  
 24 (NAF). Error bars represent one standard deviation from the mean calculated over the entire SAPUSS  
 25 campaign (ALL).



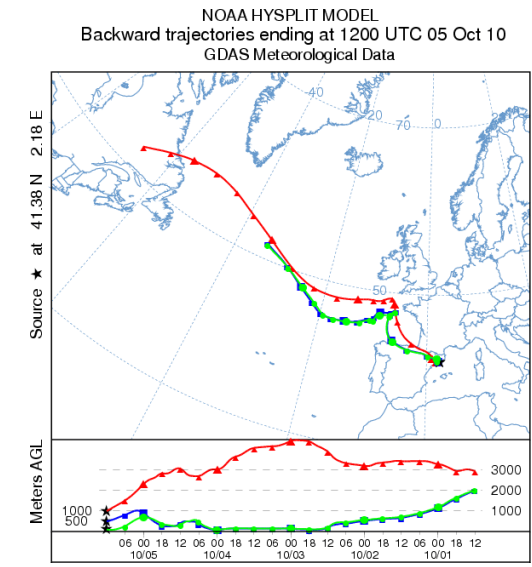
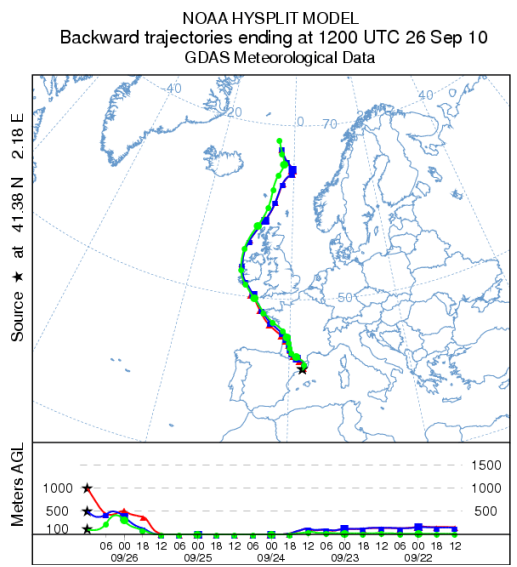
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**Figure SI-2:** Relationship between simultaneous diurnal hourly data of AOD at 1020 nm from AERONET and b500 (left) and b800 (right) from ceilometer by levels of Ångström exponents for the entire SAPUSS campaign (ALL) and for the three detected scenarios: Atlantic (ATL), regional (REG) and African (NAF). Black rectangles highlight data collected on 7 October between 07:00 and 16:00 UTC during an important Saharan dust outbreak causing the highest AOD ( $>0.3$ ) and the lowest Ångström exponents ( $<0.12$ ) observed during SAPUSS. All data presented in the Figure are diurnal data.



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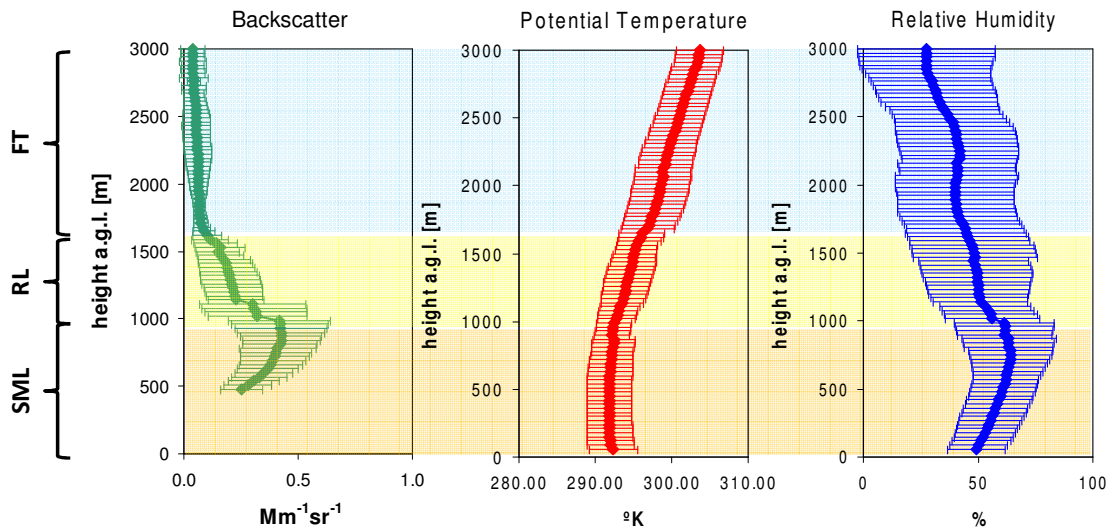
**Figure SI-3:** 5-days backtrajectories ending at Barcelona at 12:00 UTC at 100 m, 500 m, and 1000 m above ground level (a.g.l.) calculated for one day during NAF\_W scenario (22-Sept 2010; left) and one day during NAF\_E scenario (8-Oct 2010; right) .



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**Figure SI-4:** 5-days backtrajectories ending at Barcelona at 12:00 UTC at 100 m, 500 m, and 1000 m above ground level (a.g.l.) calculated for two days during ATL scenario: 26-Sept 2010 (left) and 5-Oct 2010 (right).

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**Figure SI-5:** Mean vertical profiles of aerosol backscatter coefficient (green line), potential temperature (red line) and relative humidity (blue line) obtained by averaging 14 cloud-free and African-dust free profiles. Error bars indicate one standard deviation of the mean. The figure shows with the different coloured areas the Surface Mixed Layer (SML; orange area), the Residual Layer (RL; yellow area), and the Free Troposphere (FT; blue area).