

Improving dust forecasts through assimilation of ESA-Aeolus wind profiles

Antonis Gkikas^{1,*}, Georgios Papangelis¹, Eleni Drakaki¹, Emmanouil Proestakis¹, Christos Spyrou¹, Anna Gialitaki^{1,2}, Eleni Marinou¹, Angela Benedetti³, Michael Rennie³, Anne Grete Straume⁴, Theodoros Christoudias⁵, Jonilda Kushta⁵, Jean Sciare⁵ and Vassilis Amiridis¹

¹Institute for Astronomy, Astrophysics, Space Applications and Remote Sensing, National Observatory of Athens (IAASARS/NOA), Athens, Greece
²Laboratory of Atmospheric Physics, Aristotle University of Thessaloniki (AUTH), Thessaloniki, Greece
³European Centre for Medium range Weather Forecasts (ECMWF), Reading, UK
⁴European Space Agency (ESA/ESTEC), Noordwijk, Netherlands
⁵Climate and Atmosphere Research Center, The Cyprus Institute (CyI), Nicosia, Cyprus

*corresponding author: agkikas@noa.gr

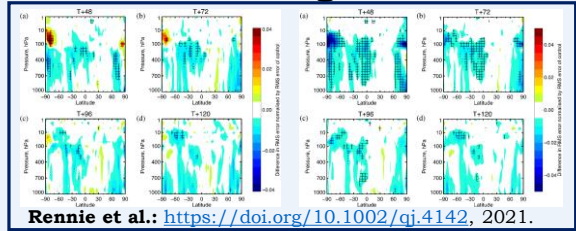


ImproviNg dust monitoring and forEcasting through Aeolus Wind daTa assimilatIOn [NEWTON]

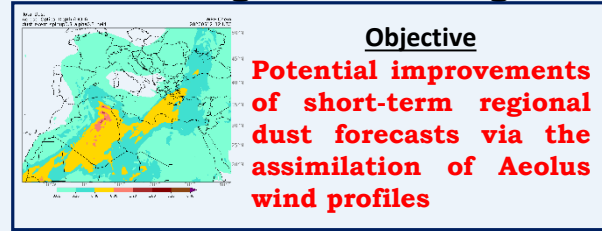
ESA - Aeolus wind profiles

- Aeolus launched on 22nd August 2018
- European Space Agency (ESA)
- Atmospheric LAsER Doppler INstrument [ALADIN]
- Ultraviolet (UV; 355nm) High Spectral Resolution Lidar (HSRL)
- Rayleigh-clear and Mie-cloudy HLOS wind profiles

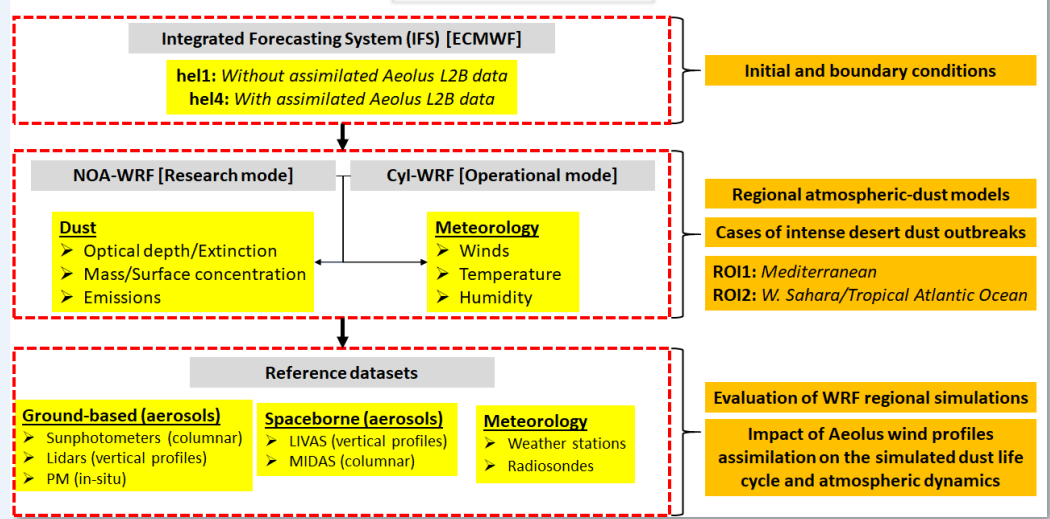
Advancing NWP



Dust regional modelling



NEWTON workflow



Amiridis et al.: <https://doi.org/10.5194/acp-15-7127-2015>, 2015.
 Giles et al.: <https://doi.org/10.5194/amt-12-169-2019>, 2019.
 Gkikas et al.: <https://doi.org/10.5194/amt-14-309-2021>, 2021.
 Engelmann et al.: <https://doi.org/10.5194/amt-9-1767-2016>, 2016.

newton.space.noa.gr

NEWTON team acknowledges support by ESA in the framework of Aeolus+Innovation (ESA AO/1-9544/20/I/NS)

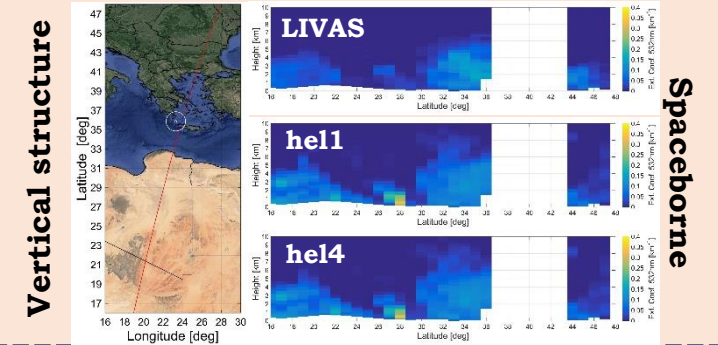
RESULTS

WRF vs AERONET [columnar]

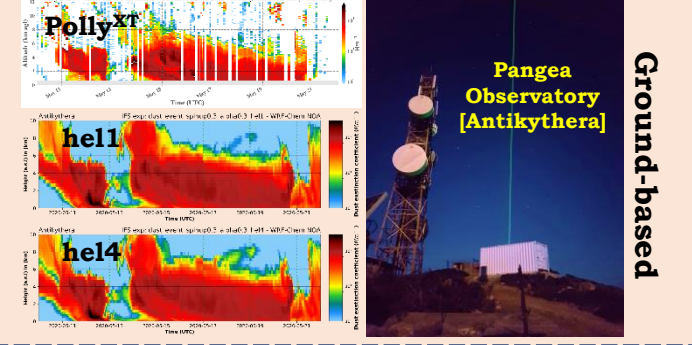


- Several cases with improved dust forecasts via Aeolus wind assimilation (blue boxes)
- Strong dependency on time and space

WRF vs LIVAS



WRF vs Polly^{XT} lidar



Pangea Observatory [Antikythera]

Ground-based