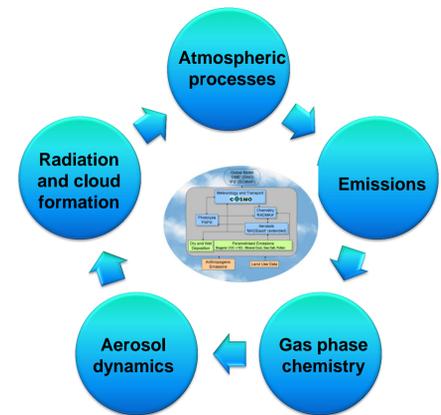


Quantifying the effect of soot aerosol on the 2003 heatwave with COSMO-ART

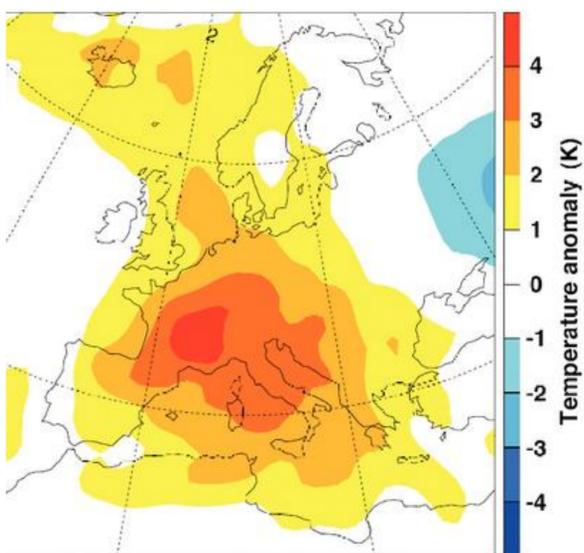
Tobias Schad¹, Andrew Ferrone, Heike Vogel¹, Inga Gözl¹, Christoph Kottmeier¹, and Bernhard Vogel¹

In order to quantify the feedback processes between aerosols and the state of the atmosphere on the continental to regional scale the fully online integrated model system COSMO-ART with two-way interactions between different atmospheric processes was developed (Vogel et al., 2009; Knote et al., 2011; Bangert et al., 2012). The operational weather forecast model COSMO of the Deutscher Wetterdienst (Baldauf et al., 2011) was extended to treat secondary aerosols as well as directly emitted components like soot, mineral dust, sea salt and biological material and their feedback with radiation and clouds.

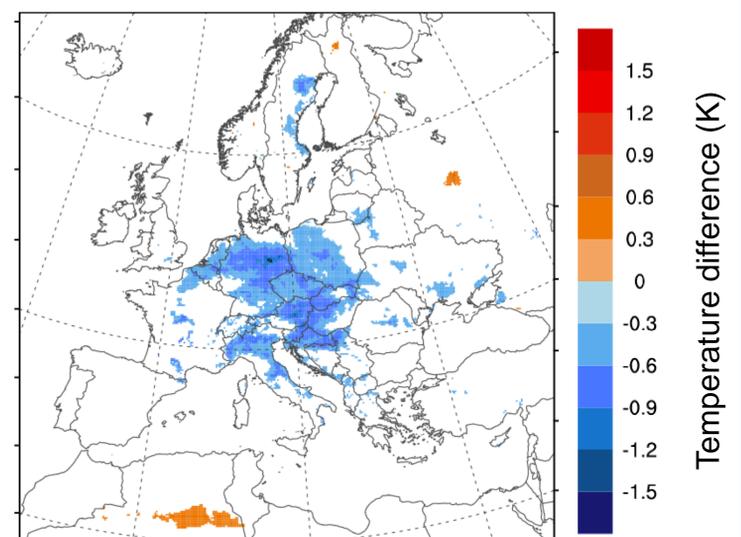


The online regional scale model system COSMO-ART

Impact of aerosol on the heat wave of 2003



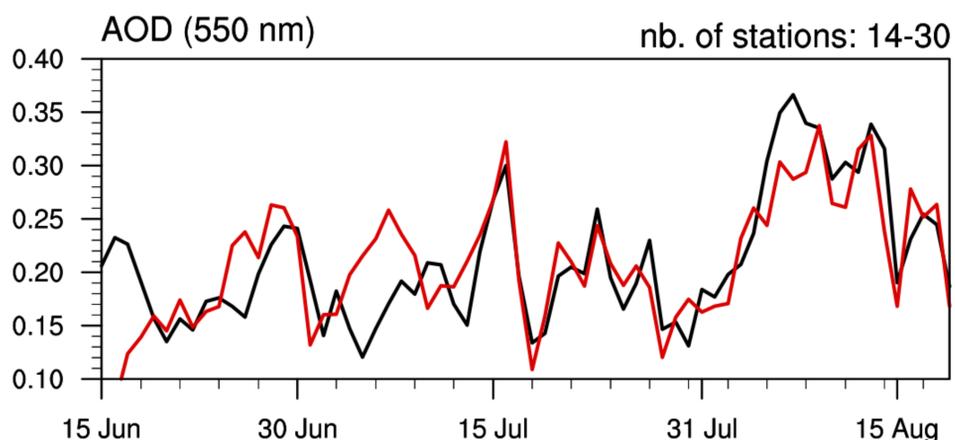
Left: Temperature anomalies of June, July, August 2003 with respect to climatological values from 1961 to 1990. (Schär et al., 2004)



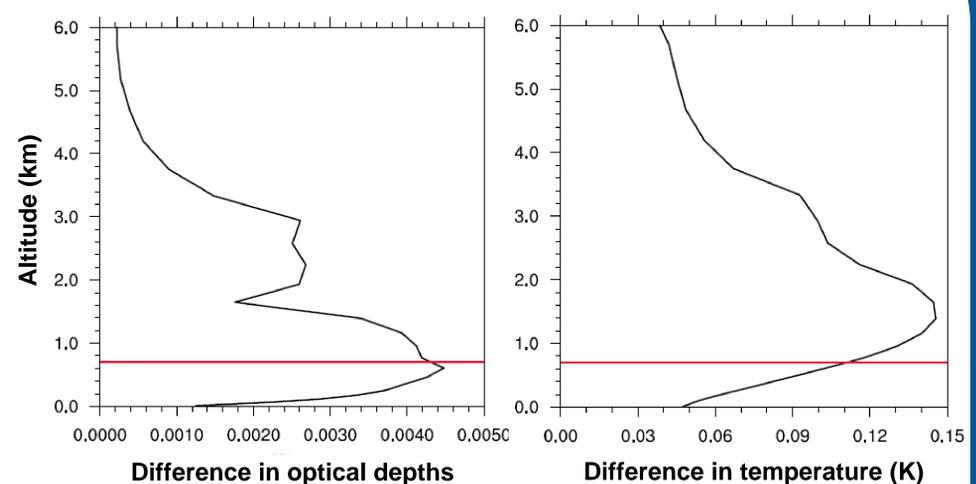
Right: Temperature differences at 2 m between a run with a clean atmosphere and one with prognostic aerosols. Coloured pixels indicate that a t-test is significant at least at the 66% level.

Aerosol reduced temperature by up to 1K

Impact of soot on the state of the atmosphere



Times series of results from simulation (red) and measured by AERONET network (gray) of aerosol optical depth at 550nm. Full line indicate median value over all stations (shaded areas : 5th and 95th percentile). Mean value is indicated by dotted line.



Differences of mean values over the model domain on the integration period of a run with and a run without soot emissions.

Soot leads to a stabilization of the atmosphere