

Table S1. Comparisons for meteorological variables between Melpitz radio-sounding measurements and WRF-Chem model results

	Slope	R
Potential Temperature	0.99	0.99
Wind Speed	0.90	0.96
Wind Direction	1.02	0.84
Water Vapor Mixing Ratio	0.81	0.92

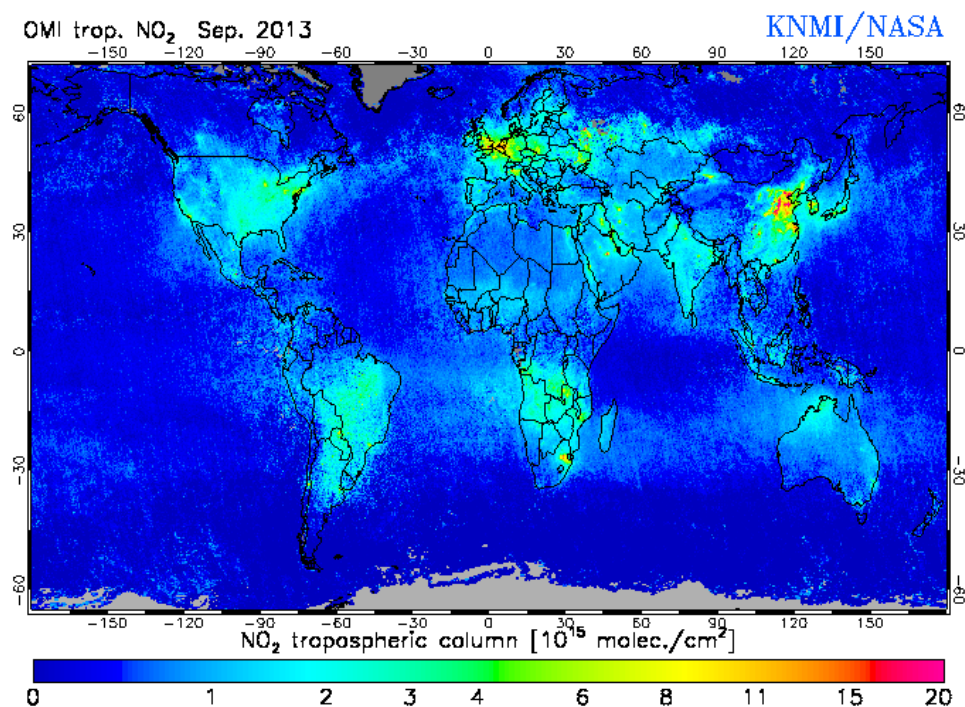


Figure S1. Global NO₂ tropospheric column concentration in September 2013 from OMI satellite.

Source: <http://www.temis.nl/airpollution/no2col/>, last access: November 04th, 2015

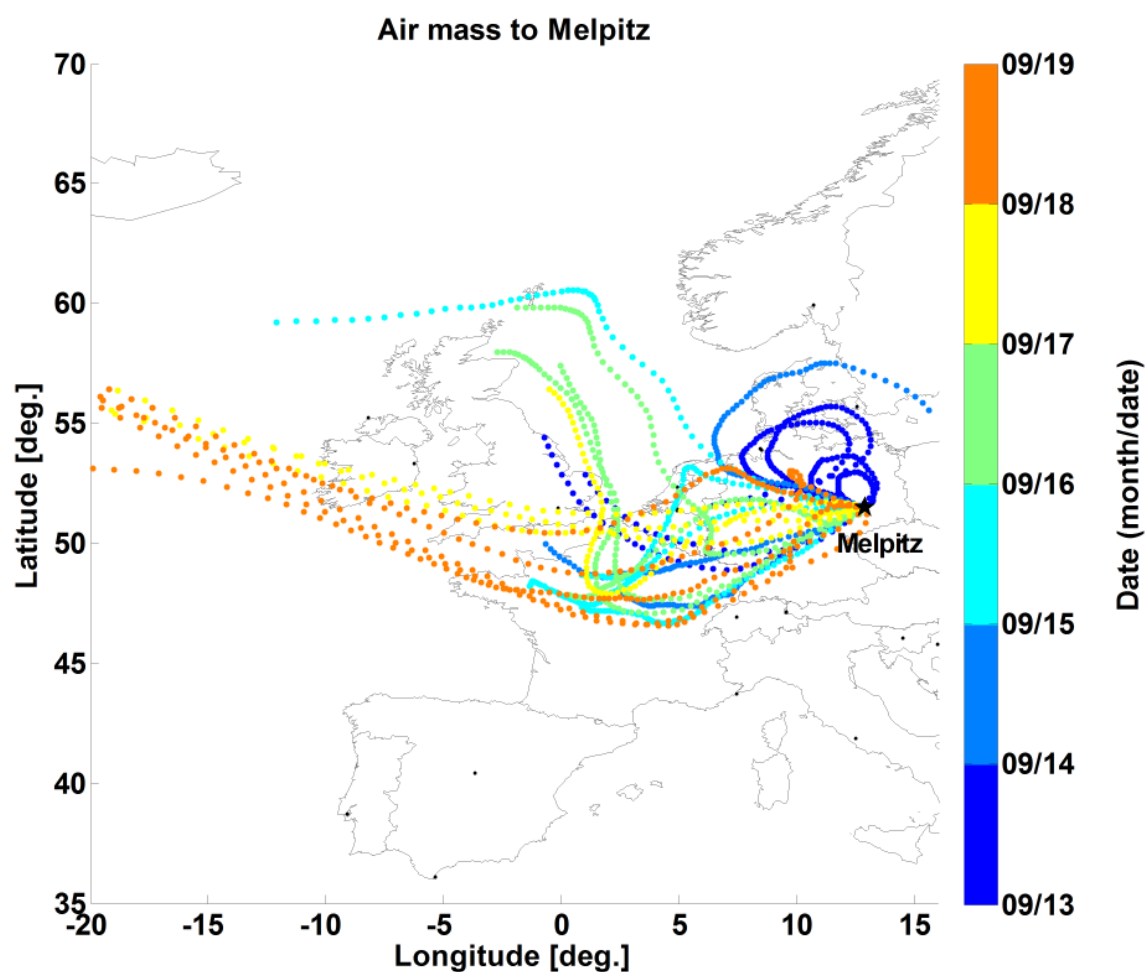
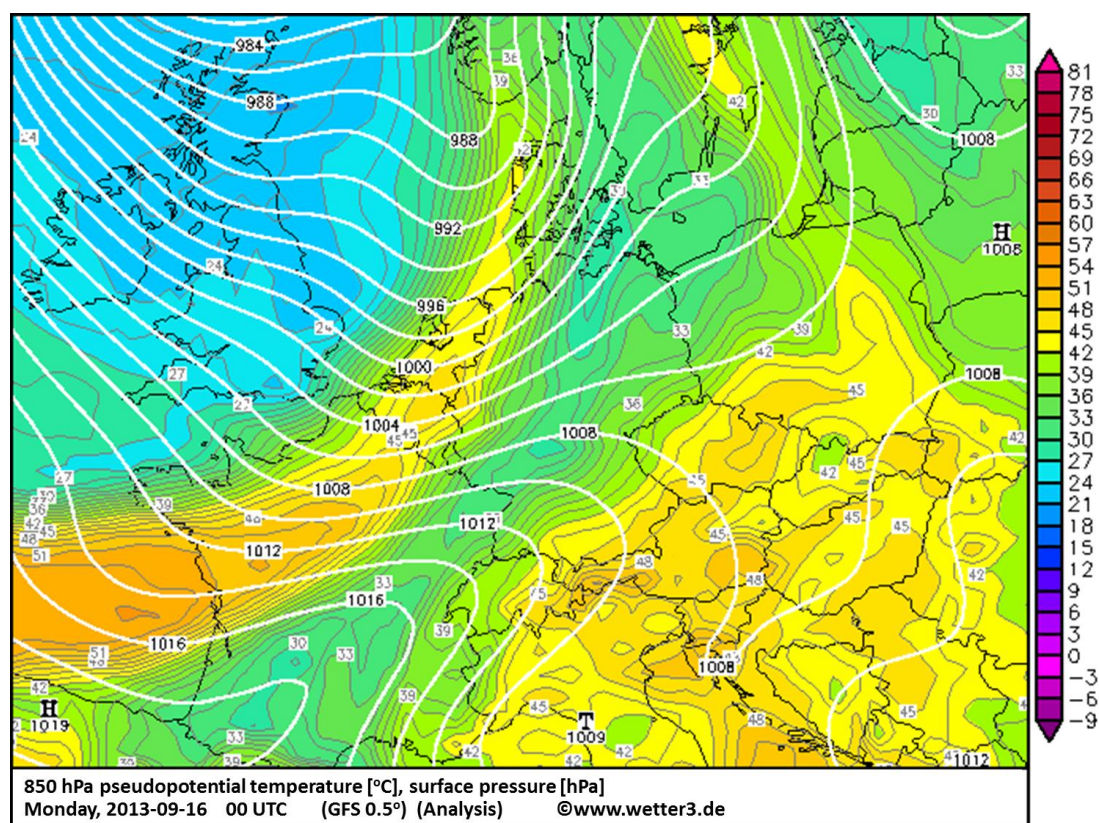
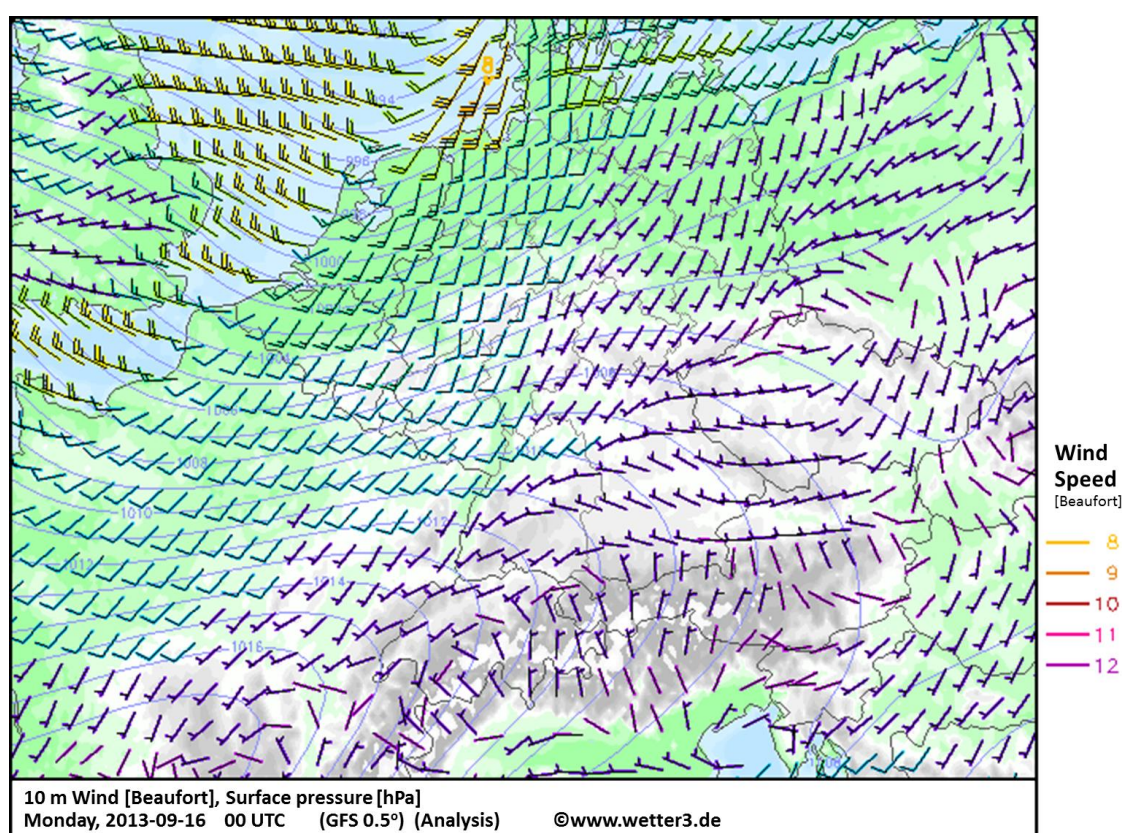


Figure S2. Three days back trajectories of Melpitz. The start time of back trajectories start from 2013-09-13 to 2013-09-19, with 6 hours interval. The back trajectories were calculated based on the GDAS (with 0.5° resolution) dataset with the Hysplit model (http://www.arl.noaa.gov/HYSPLIT_info.php).



(a)



(b)

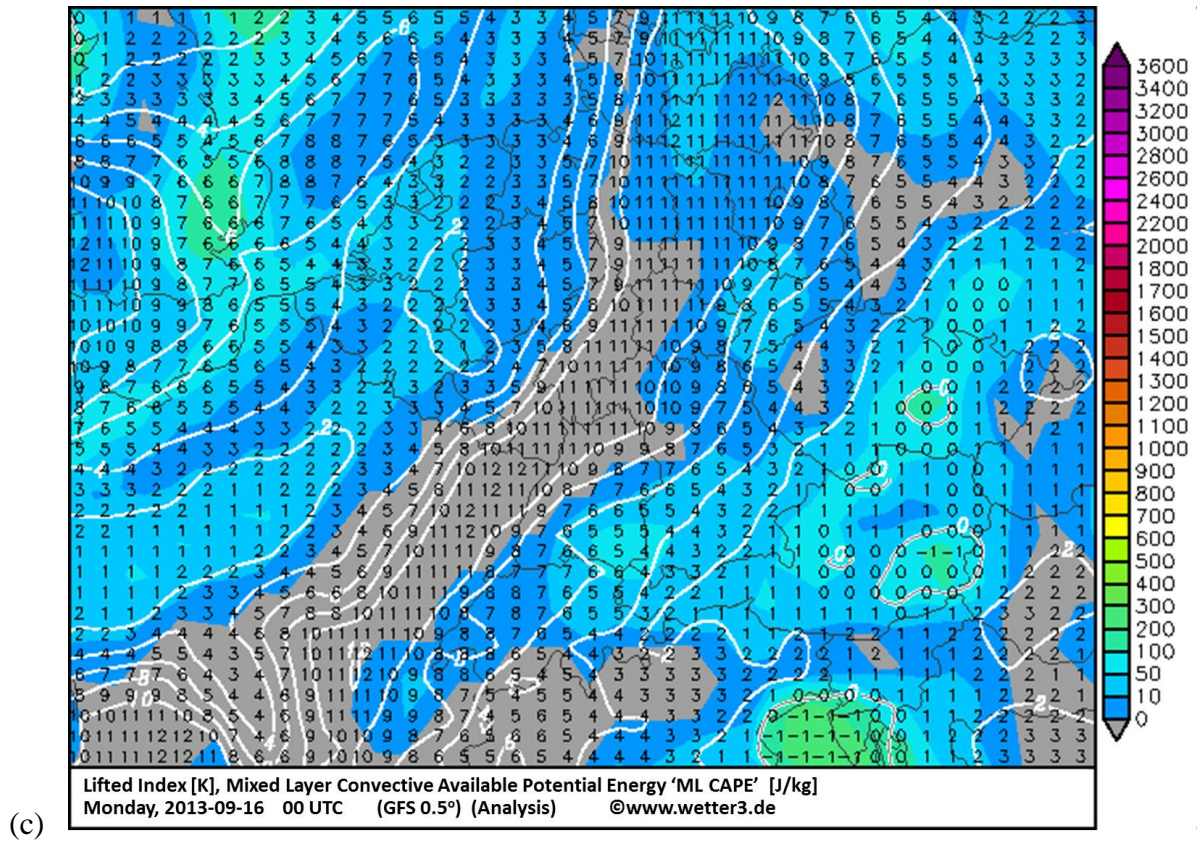


Figure S3. Weather map of Europe at 2013-09-16, 00:00 (UTC). (a) Surface pressure (white line) and pseudopotential temperature (color); (b) 10-meter wind field (arrows) and surface pressure (blue line); (c) lifted index (numbers and white line) and mixed layer convective available potential energy 'ML CAPE' (color)

Source: <http://www.wetter3.de/> (based on the GFS dataset with 0.5° resolution, last access: November 04th, 2015, reprint permission has been confirmed by www.wetter3.de)

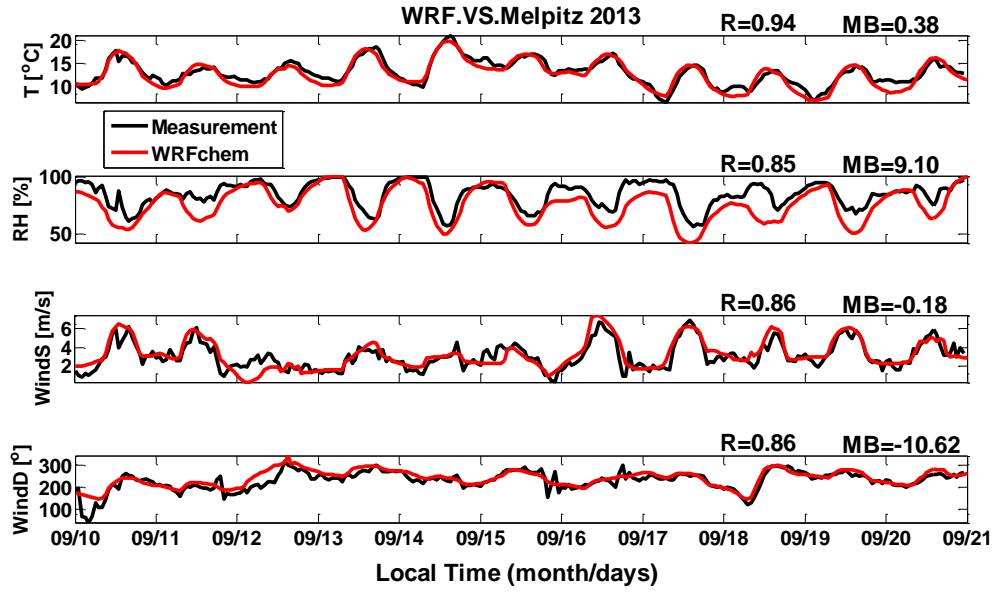


Figure S4. The comparisons between the simulation results and measurements at Melpitz near-ground layer. The correlation coefficient (R) and mean bias (MB) are marked on the top of each panel. (a) Temperature; (b) relative humidity (RH); (c) wind speed; (d) wind direction.

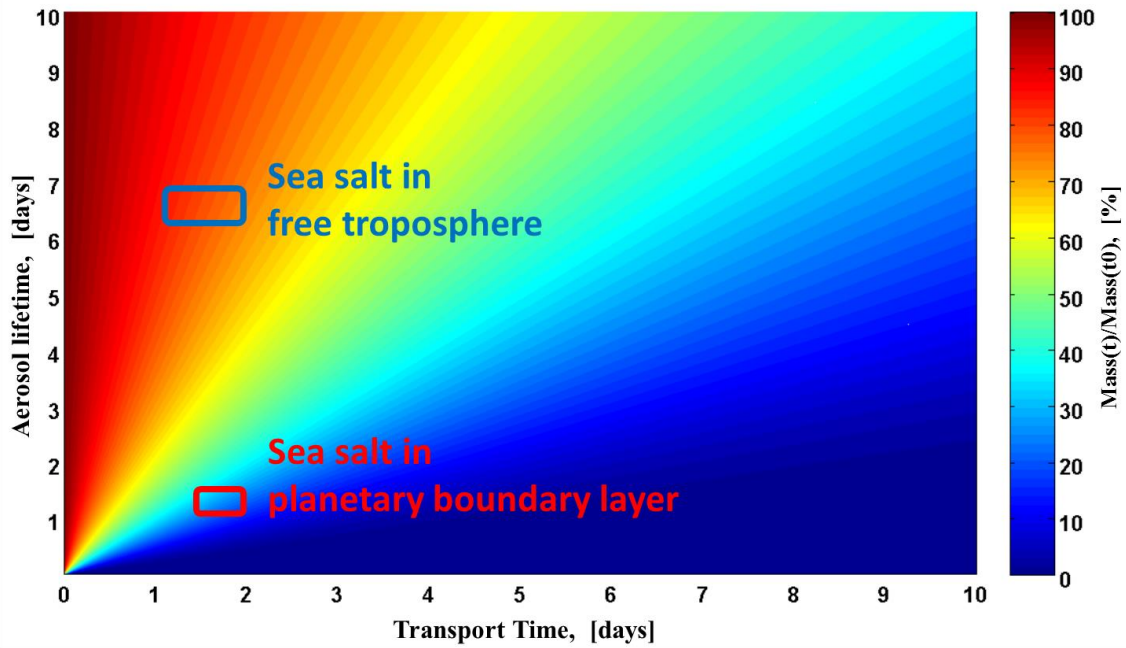


Figure S5. Sea salt mass residential rate with relationship of transport time and lifetime, based on the concept model (Chen et al., 2016). The color indicates the percentage of sea salt mass that can be transported from the coast to Melpitz

Reference:

Chen, Y., Cheng, Y. F., Nordmann, S., Birmili, W., Denier van der Gon, H. A. C., Ma, N., Wolke, R., Wehner, B., Sun, J., Spindler, G., Mu, Q., Pöschl, U., Su, H., and Wiedensohler, A.: Evaluation of the size segregation of elemental carbon (EC) emission in Europe: influence on the simulation of EC long-range transportation, *Atmos. Chem. Phys.*, 16, 1823-1835, 10.5194/acp-16-1823-2016, 2016.