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EVALUATION OF A SEVERE AIR QUALITY EPISODE IN HELSINKI IN AUGUST 2006 USING TESTBED AND OTHER OBSERVATIONS

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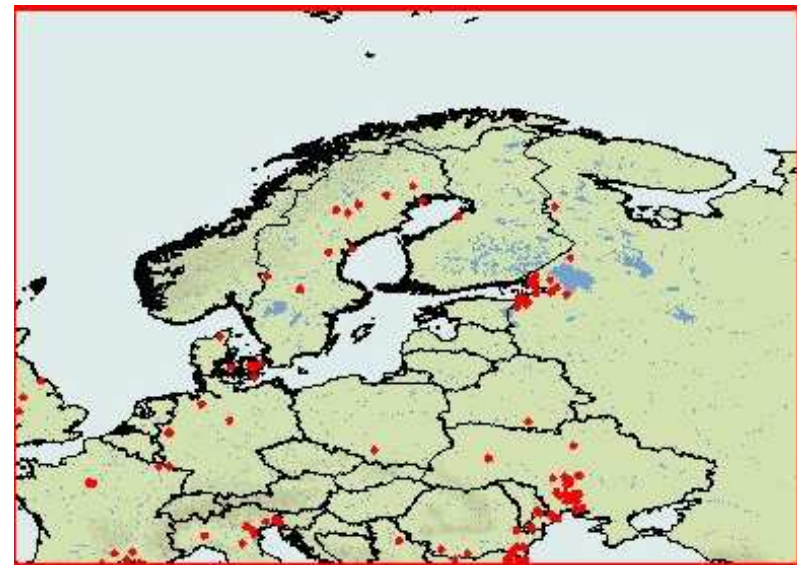
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Introduction

- The summer of 2006 was exceptionally dry in the areas surrounding the Gulf of Finland
- Easterly winds were prevailing for an exceptional long period in August 2006
- Wild land fires, especially in Russia and Estonia led frequently occurring elevated fine particle concentrations from 18 July to 28 August



The synoptic situation at 21 August 00UTC over Europe





Data

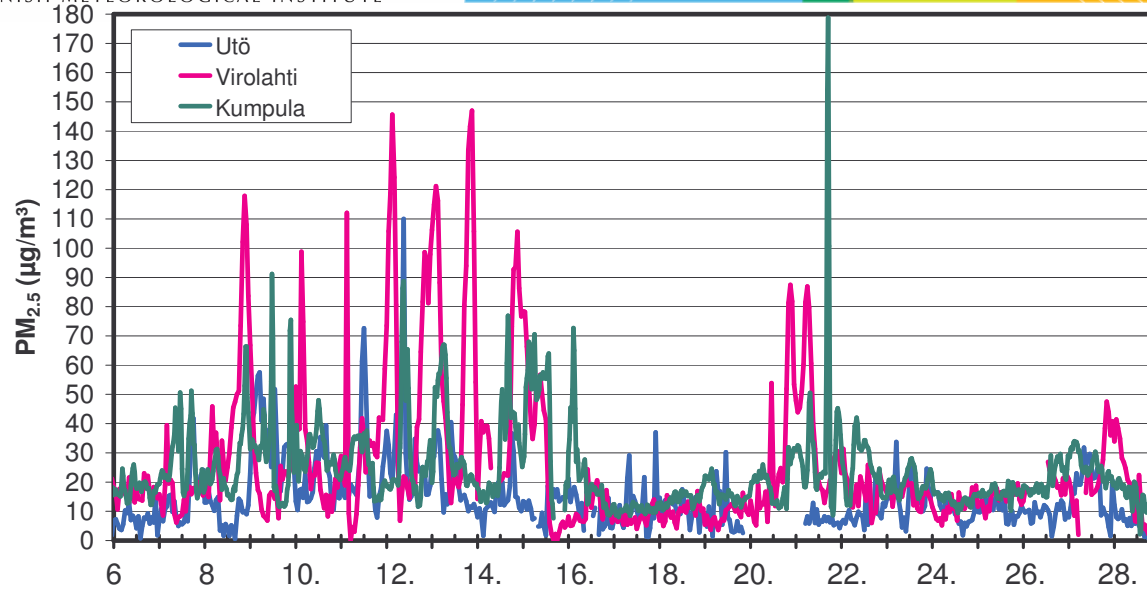
- Synoptic and Testbed surface observations
- Testbed
 - Ceilometer and Doppler lidar
 - SODAR
 - Soundings
- Radar and satellite
- YTV and FMI concentration observations



***Testbed ceilometer (lidar) measurement locations. Radiosoundings are performed at the site “Vantaanlaakso”.
(<http://testbed.fmi.fi>)***

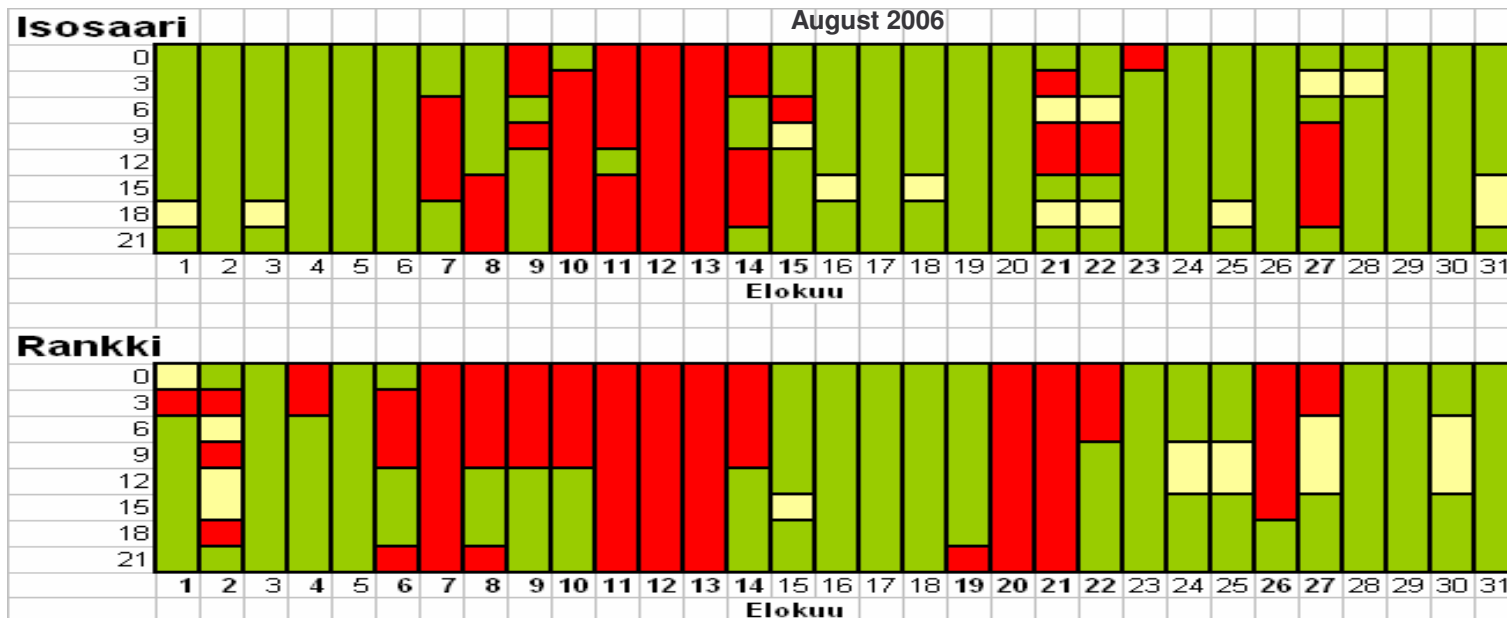


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- No significant weather
- Smog
- Something else, like fog

UTC

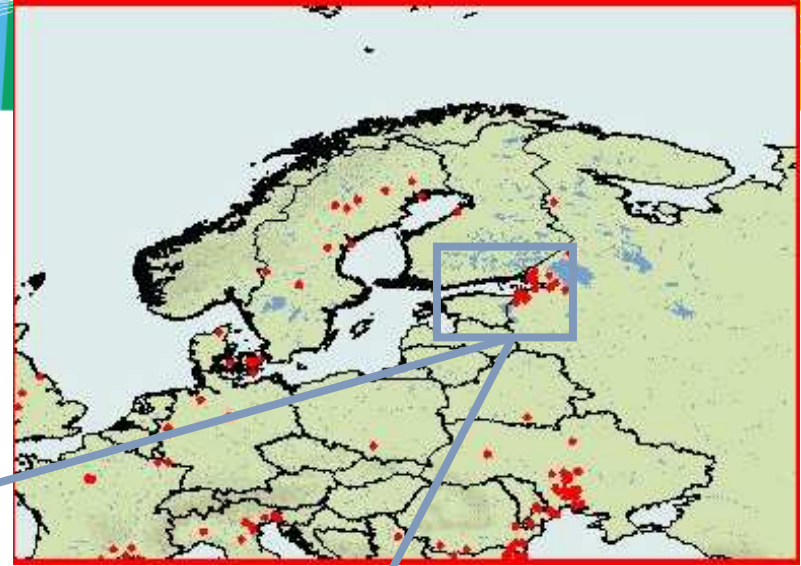
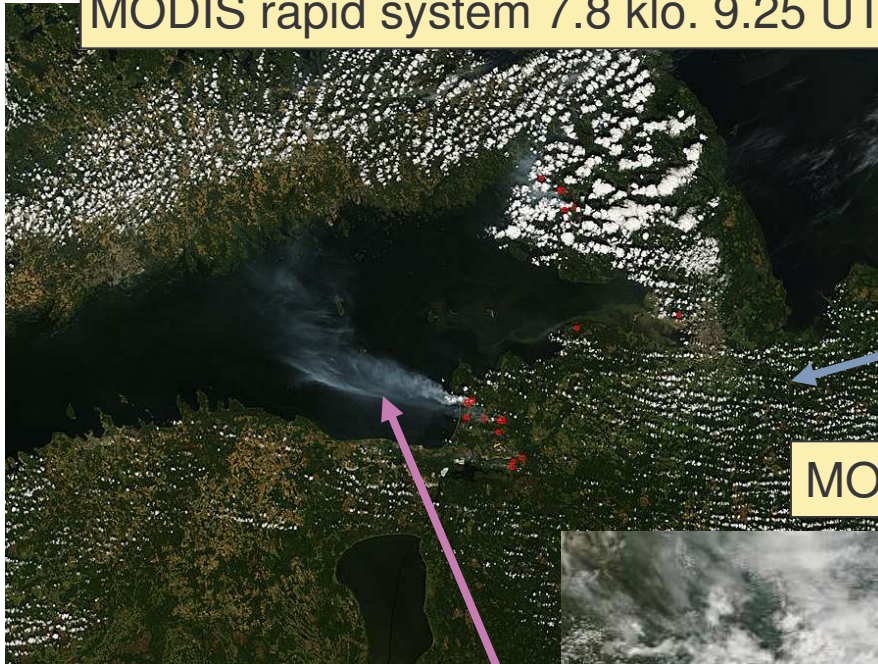


UTC+3h=LT
0UTC=03:00 LT



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MODIS rapid system 7.8 klo. 9.25 UTC



MODIS rapid system 21.8 klo. 9.40 UTC



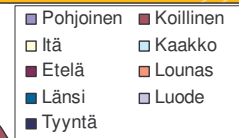
Smoke plume



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Hki-Vantaa 6.8-28.8.06

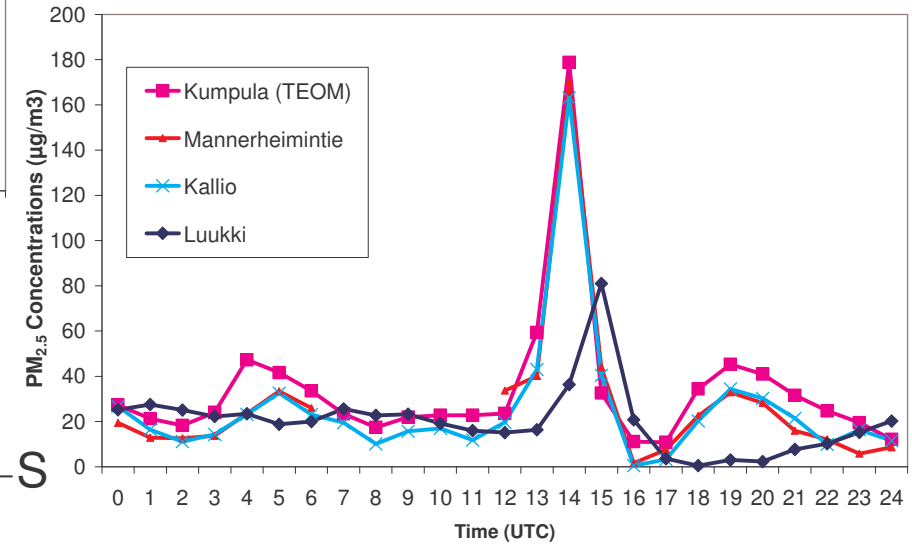
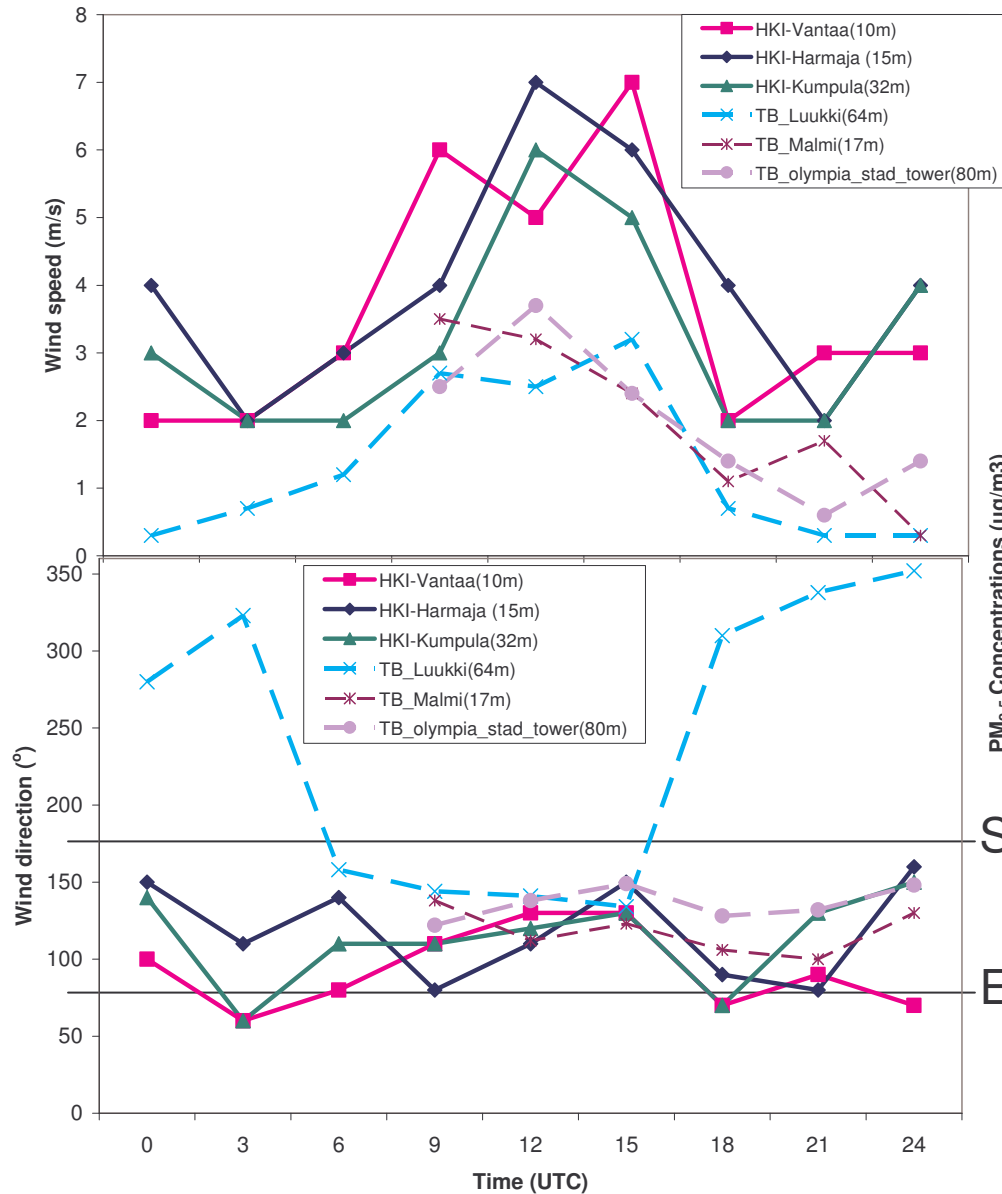
Wind direction



NORTHEAST

SOUTHEAST

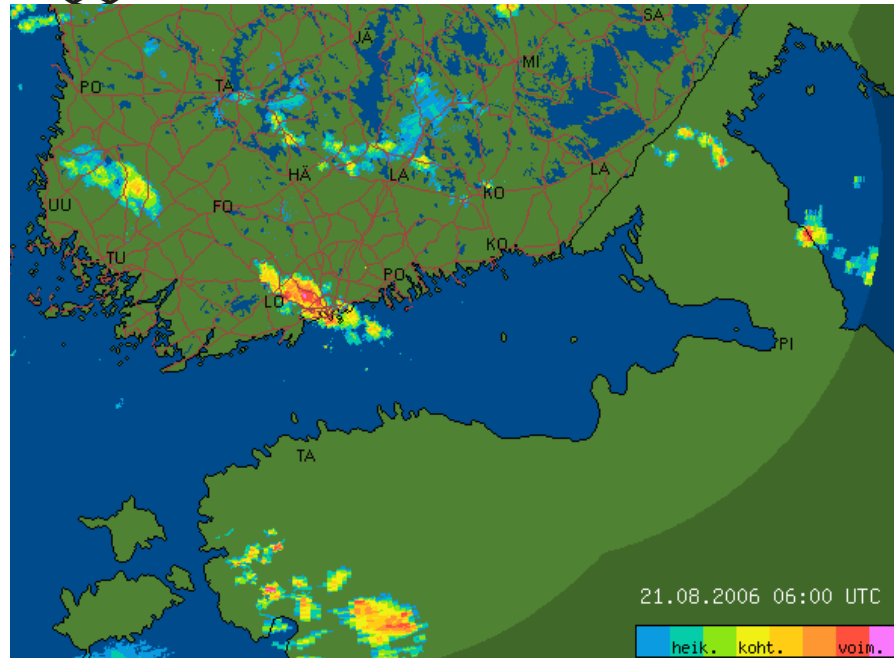
EAST



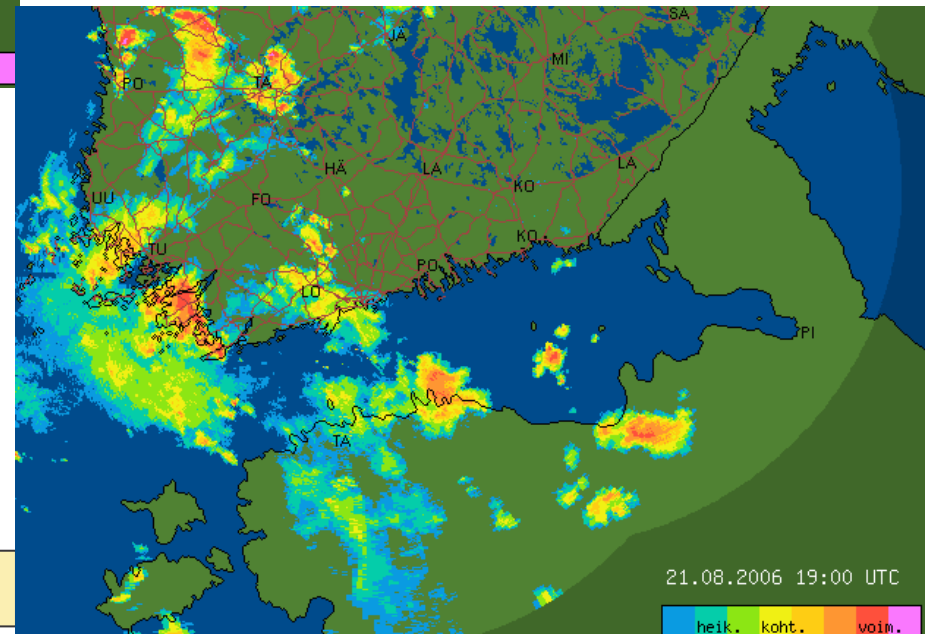
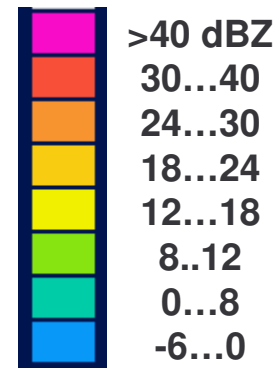
21 August 2006



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21.8 klo. 6.00 UTC

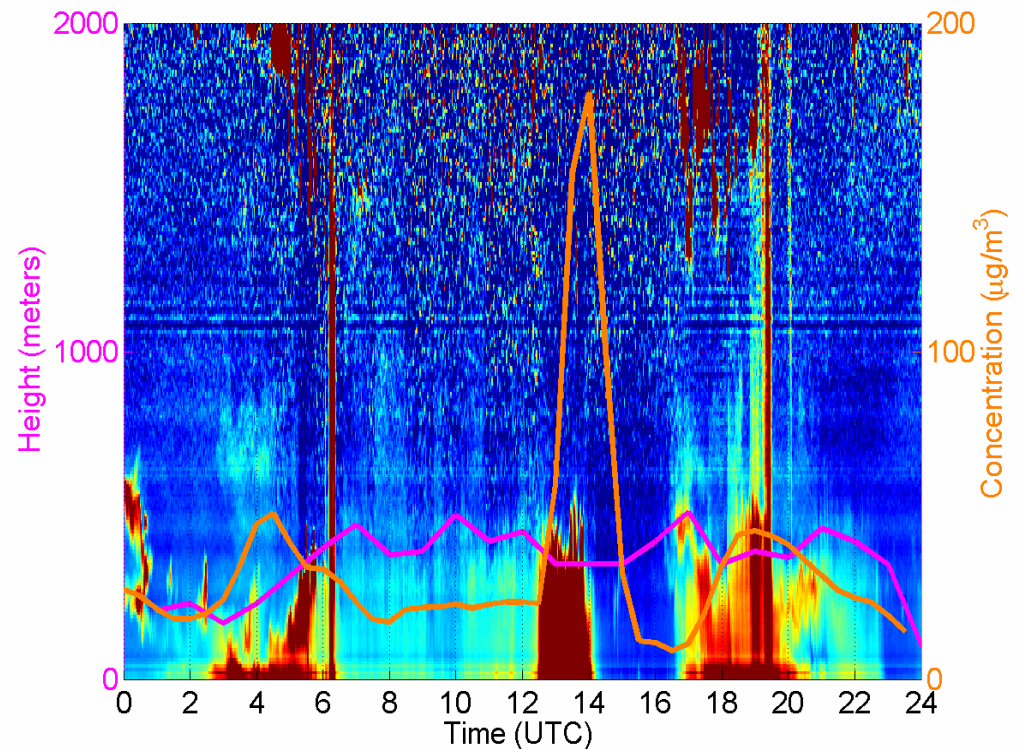


21.8 19.00 UTC



21 August 2006

- A 24-h period of ceilometer echo intensity observations at Vallila.
- The height of the MHs determined by the ceilometer and radiosoundings are superimposed on the ceilometer raw echo data.
- a very strong backscatter distinguishes the pollutant situation from a normal situation

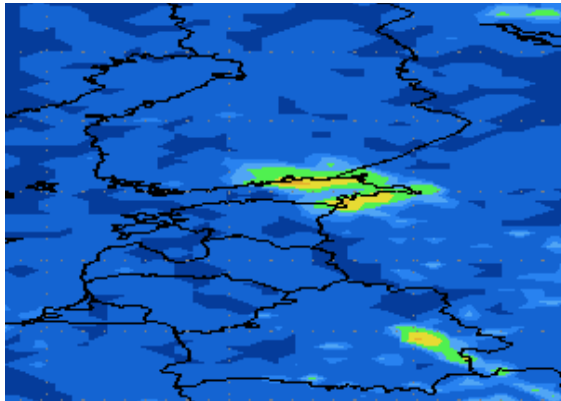




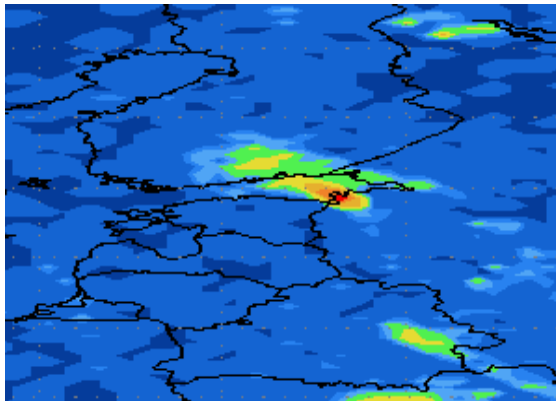
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Trajectories with one hour intervals 7-18UTC

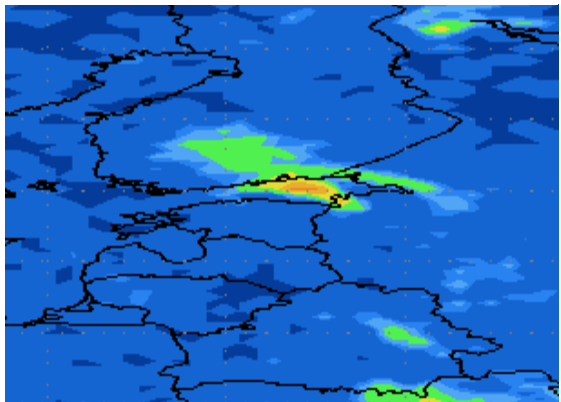
00Z21AUG2006



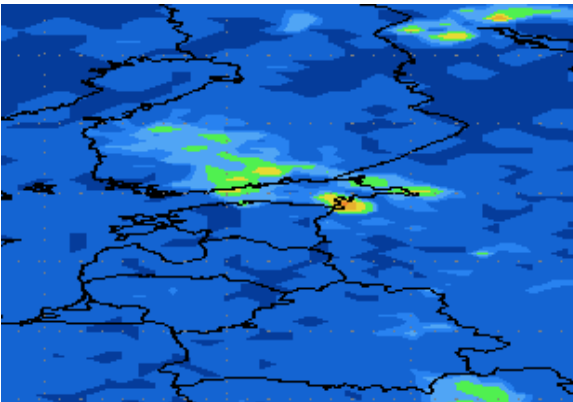
06Z21AUG2006



12Z21AUG2006

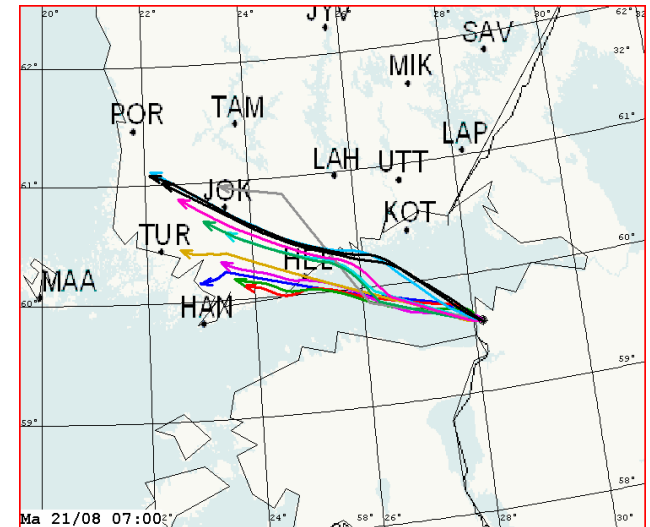


18Z21AUG2006

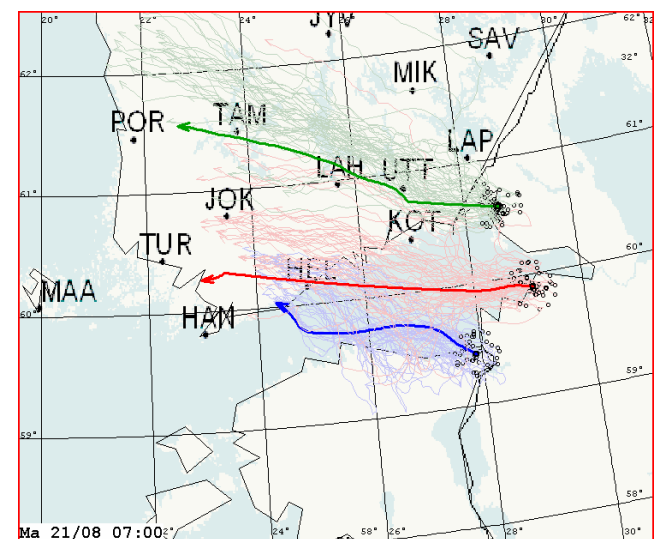


Testbed 12.4.2007

Minna Rantamäki FMI



Trajectories 7UTC





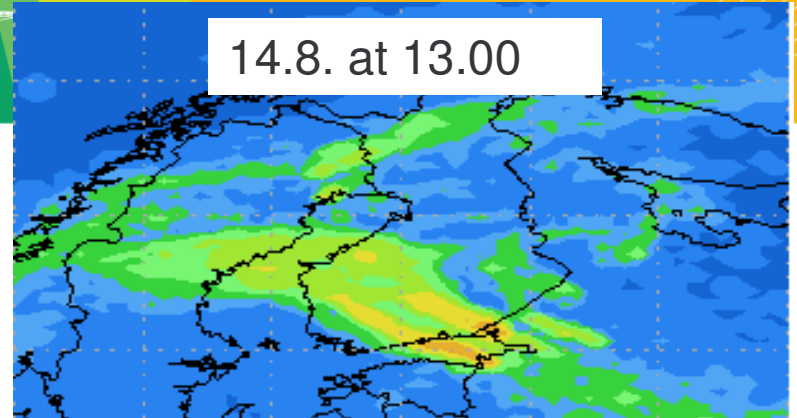
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Model forecast of the fine PM originated from Russian wild land fires in August 2006.

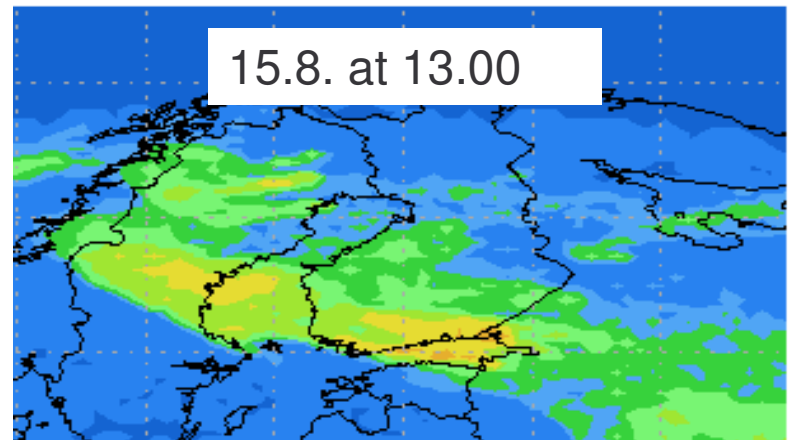
**First, the south-easterly (14.8) and
easterly (15.8.) flow transports the
smoke plumes across Southern
Finland.**

**The wind direction subsequently
changes to the south (16.8.), and the
plumes are mainly transported to
the Russian territory, east of
Finland.**

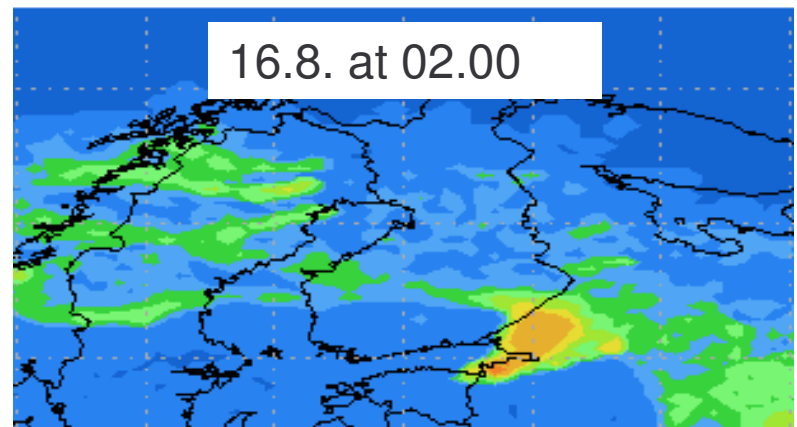
14.8. at 13.00



15.8. at 13.00



16.8. at 02.00





Results & Conclusions

- Measurements and modelling confirm that exceptionally high concentrations in Southern Finland were caused by a narrow and low-level smoke plume
- The smog situations can be clearly distinguished from normal “clear air” situations because of a very strong lidar backscattering
- The ceilometers give information on the smog periods but these measurements alone are not enough
- Testbed-observations provide information on the regional meteorology, but some problems discovered:
 - part of August testbed data was missing
 - the reliability of the data (winds) was a little bit weak

