SP-AMS measurements in an aircraft for investigating shipping emissions

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MOTIVATION

New limitations for ship fuel sulfur content of marine fuels in Baltic sea:

• from 2010 the maximum sulfur content in marine fuels was restricted to 1.0% and in the European port areas to 0.1%

• from 2015 only the use of 0.1% sulfur marine gas oil is allowed in Baltic Sea, shipping globally has to switch to 0.5% sulfur fuel by 2020

How to monitor fuel sulfur content?
What is the impact on air quality/climate change?
MEASUREMENTS

- Aircraft: modified SHORT SC-7 Skyvan (Short Brothers and Harland Ltd, Northern Ireland, UK)

- Aerosol measurements: SP-AMS, EEPS (TSI), CPC
- Gas monitors: SO$_2$, CO$_2$, NO/NO$_x$
- First measurements were conducted in May 2013
CHASING SHIPS
SP-AMS RESULTS

[Graph showing sulfate, organics, r-BC, and nitrate levels for different ships over time.

- Ship 1: Green bars
- Ship 2: Black bars
- Ship 3: Blue bars
- Ship 4: Red bars
- Ship 5: Green bars
- Ship 6: Red bars
- Ship 7: Red bars

x-axis: Time (8:30 to 10:00)
y-axis: Concentration (μg m⁻³) for sulfate, organics, r-BC, and nitrate]
~20 different ships have been measured