

Supplement of Atmos. Chem. Phys., 16, 10521–10541, 2016
<http://www.atmos-chem-phys.net/16/10521/2016/>
doi:10.5194/acp-16-10521-2016-supplement
© Author(s) 2016. CC Attribution 3.0 License.



Atmospheric
Chemistry
and Physics
Open Access
EGU

Supplement of

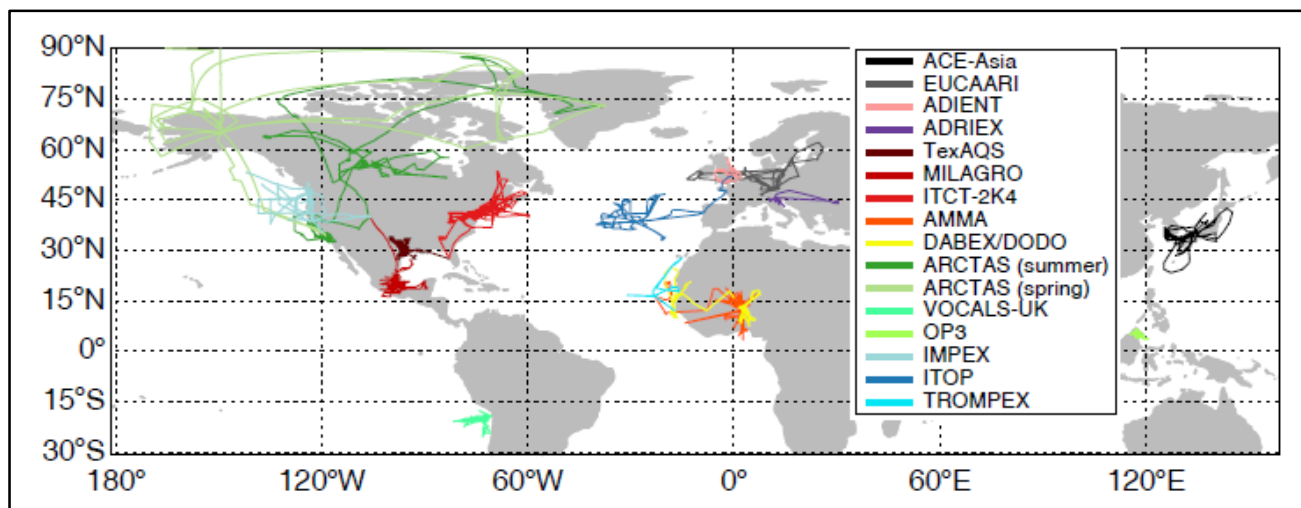
Impacts of aviation fuel sulfur content on climate and human health

Zarashpe Z. Kapadia et al.

Correspondence to: Zarashpe Z. Kapadia (pm08zzk@leeds.ac.uk)

The copyright of individual parts of the supplement might differ from the CC-BY 3.0 licence.

55 **Figure S1: Flight tracks aircraft field campaigns used to evaluate the nitrate-extended version of TOMCAT-**
56 **GLOMAP-mode coupled model – taken from Heald et al. (2011).**



57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93

94 **Table S1: Aircraft campaigns collated used to obtain sulfate, nitrate, ammonium and organic carbon observational data – adapted from Heald et al. (2011).**

| Campaign | Aircraft | Location | Date | Regional Class | Reference |
|-----------|----------|-------------------------------|---------------------------------------|-------------------------------|-------------------------|
| ACE-Asia | C-130 | NW Pacific, near Japan | 30/03 – 04/05/01 | Pollution (mid-latitude) | (Maria et al., 2004) |
| ITCT-2K4 | NOAA P3 | E North America | 05/07 – 15/08/04 | Pollution/Fire (mid-latitude) | (Sullivan et al., 2006) |
| ITOP | BAE-146 | Azores | 12/07 – 03/08/04 | Remote (mid-latitude) | (Lewis et al., 2007) |
| ADRIEX | BAE-146 | N Italy; Adriatic & Black Sea | 27/08 – 06/09/04 | Pollution (mid-latitude) | (Crosier et al., 2007) |
| DABEX | BAE-146 | W Africa | 13/01 – 01/02/06 | Fire (tropics) | (Capes et al., 2008) |
| DODO | BAE-146 | W Africa | 03/02 – 16/02/06 | Fire (tropics) | (Capes et al., 2008) |
| MILAGRO | C130 | Mexico city | 04/03 – 31/03/06 | Pollution/Fire (sub-tropics) | (DeCarlo et al., 2008) |
| IMPEX | C130 | W North America & E Pacific | 17/04 – 15/05/06 | Remote + aged (mid-latitude) | (Dunlea et al., 2009) |
| AMMA | BAE-146 | W Africa | 20/07 – 25/08/06 | Fire (tropics) | (Capes et al., 2009) |
| TexAQS | NOAA P3 | Texas | 11/09 – 13/10/06 | Pollution (mid-latitudes) | (Bahreini et al., 2009) |
| ADIANT | BAE-146 | EU/Atlantic | 18/12/07 -25/09/08 | Pollution (mid-latitudes) | (Morgan et al., 2010) |
| EUCAARI | BAE-146 | N EU | 06/05 – 22/05/08 | Pollution (mid-latitudes) | (Morgan et al., 2010) |
| ARCTAS | DC-8 | Arctic/N EU | 01/04/ - 20/04/08 18/06 – 13/07/08 | Fire (high-latitudes) | (Cubison et al., 2011) |
| OP3 | BAE-146 | Borneo | 10/07 – 20/07/08 | Remote (tropical) | (Robinson et al., 2011) |
| VOCALS-UK | BAE-146 | Eastern S Pacific | 27/10 – 13/11/08 | Remote (tropical) | (Allen et al., 2011) |

95
96

97 **References**

- 98 Allen, G., Coe, H., Clarke, A., Bretherton, C., Wood, R., Abel, S., Barrett, P., Brown, P., George, R., and Freitag,
99 S.: South East Pacific atmospheric composition and variability sampled along 20 S during VOCALS-REx,
100 Atmospheric Chemistry and Physics, 11, 5237-5262, 2011.
- 101 Bahreini, R., Ervens, B., Middlebrook, A., Warneke, C., De Gouw, J., DeCarlo, P., Jimenez, J., Brock, C.,
102 Neuman, J., and Ryerson, T.: Organic aerosol formation in urban and industrial plumes near Houston and
103 Dallas, Texas, Journal of Geophysical Research: Atmospheres, 114, 2009.
- 104 Capes, G., Johnson, B., McFiggans, G., Williams, P., Haywood, J., and Coe, H.: Aging of biomass burning
105 aerosols over West Africa: Aircraft measurements of chemical composition, microphysical properties, and
106 emission ratios, Journal of Geophysical Research: Atmospheres, 113, 2008.
- 107 Capes, G., Murphy, J., Reeves, C., McQuaid, J., Hamilton, J., Hopkins, J., Crosier, J., Williams, P., and Coe, H.:
108 Secondary organic aerosol from biogenic VOCs over West Africa during AMMA, Atmospheric Chemistry and
109 Physics, 9, 3841-3850, 2009.
- 110 Crosier, J., Allan, J., Coe, H., Bower, K., Formenti, P., and Williams, P.: Chemical composition of summertime
111 aerosol in the Po Valley (Italy), northern Adriatic and Black Sea, Quarterly Journal of the Royal
112 Meteorological Society, 133, 61-75, 2007.
- 113 Cubison, M., Ortega, A., Hayes, P., Farmer, D., Day, D., Lechner, M., Brune, W., Apel, E., Diskin, G., and Fisher,
114 J.: Effects of aging on organic aerosol from open biomass burning smoke in aircraft and laboratory studies,
115 Atmospheric Chemistry and Physics, 11, 12049-12064, 2011.
- 116 DeCarlo, P., Dunlea, E., Kimmel, J., Aiken, A., Sueper, D., Crounse, J., Wennberg, P., Emmons, L., Shinozuka,
117 Y., and Clarke, A.: Fast airborne aerosol size and chemistry measurements above Mexico City and Central
118 Mexico during the MILAGRO campaign, Atmospheric Chemistry and Physics, 8, 4027-4048, 2008.
- 119 Dunlea, E., DeCarlo, P., Aiken, A., Kimmel, J., Peltier, R., Weber, R., Tomlinson, J., Collins, D. R., Shinozuka, Y.,
120 and McNaughton, C.: Evolution of Asian aerosols during transpacific transport in INTEX-B, Atmospheric
121 Chemistry and Physics, 9, 7257-7287, 2009.
- 122 Heald, C. L., Coe, H., Jimenez, J. L., Weber, R. J., Bahreini, R., Middlebrook, A. M., Russell, L. M., Jolleys, M.,
123 Fu, T. M., Allan, J. D., Bower, K. N., Capes, G., Crosier, J., Morgan, W. T., Robinson, N. H., Williams, P. I.,
124 Cubison, M. J., DeCarlo, P. F., and Dunlea, E. J.: Exploring the vertical profile of atmospheric organic aerosol:
125 comparing 17 aircraft field campaigns with a global model, Atmos. Chem. Phys., 11, 12673-12696,
126 10.5194/acp-11-12673-2011, 2011.
- 127 Lewis, A., Evans, M., Methven, J., Watson, N., Lee, J., Hopkins, J., Purvis, R., Arnold, S., McQuaid, J., and
128 Whalley, L.: Chemical composition observed over the mid - Atlantic and the detection of pollution signatures
129 far from source regions, Journal of Geophysical Research: Atmospheres, 112, 2007.
- 130 Maria, S. F., Russell, L. M., Gilles, M. K., and Myneni, S. C.: Organic aerosol growth mechanisms and their
131 climate-forcing implications, Science, 306, 1921-1924, 2004.
- 132 Morgan, W., Allan, J., Bower, K., Highwood, E. J., Liu, D., McMeeking, G., Northway, M., Williams, P., Krejci,
133 R., and Coe, H.: Airborne measurements of the spatial distribution of aerosol chemical composition across
134 Europe and evolution of the organic fraction, Atmospheric Chemistry and Physics, 10, 4065-4083, 2010.
- 135 Robinson, N., Hamilton, J., Allan, J., Langford, B., Oram, D., Chen, Q., Docherty, K., Farmer, D., Jimenez, J.,
136 and Ward, M.: Evidence for a significant proportion of Secondary Organic Aerosol from isoprene above a
137 maritime tropical forest, Atmospheric Chemistry and Physics, 11, 1039-1050, 2011.
- 138 Sullivan, A., Peltier, R. E., Brock, C., De Gouw, J., Holloway, J., Warneke, C., Wollny, A., and Weber, R.:
139 Airborne measurements of carbonaceous aerosol soluble in water over northeastern United States: Method
140 development and an investigation into water - soluble organic carbon sources, Journal of Geophysical
141 Research: Atmospheres, 111, 2006.

142
143
144
145
146
147
148
149