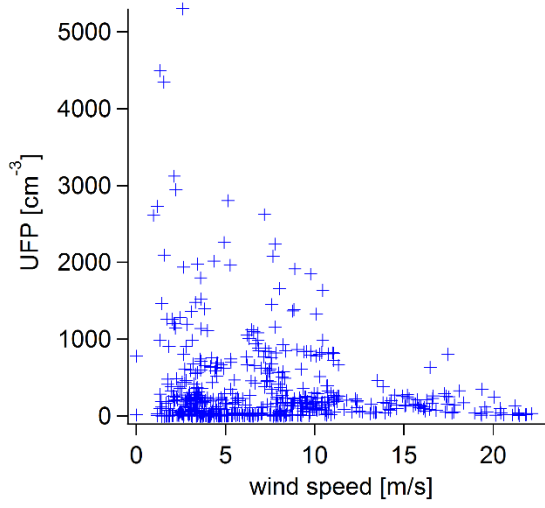
1   **Supplemental Material**

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5   S Figure 1. UFP vs wind speed within the BL for the entire campaign.
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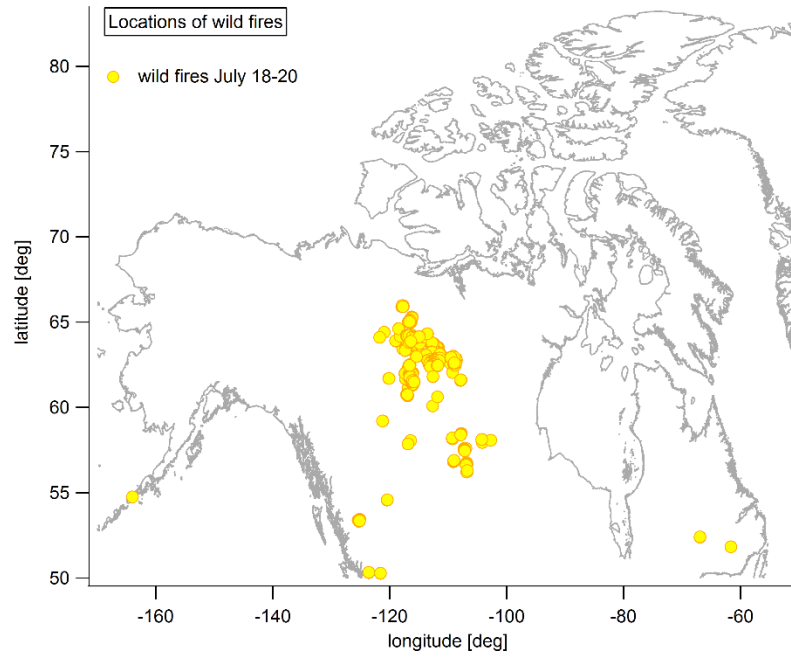
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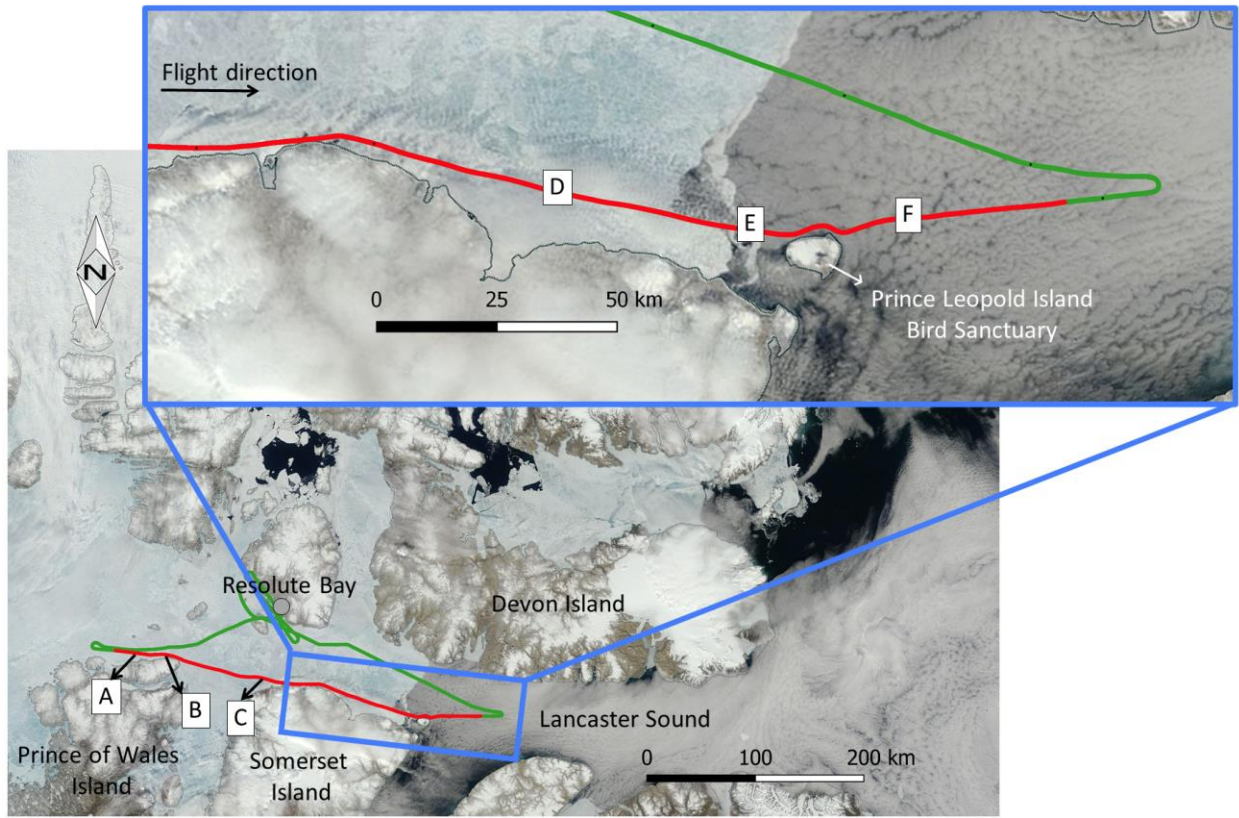
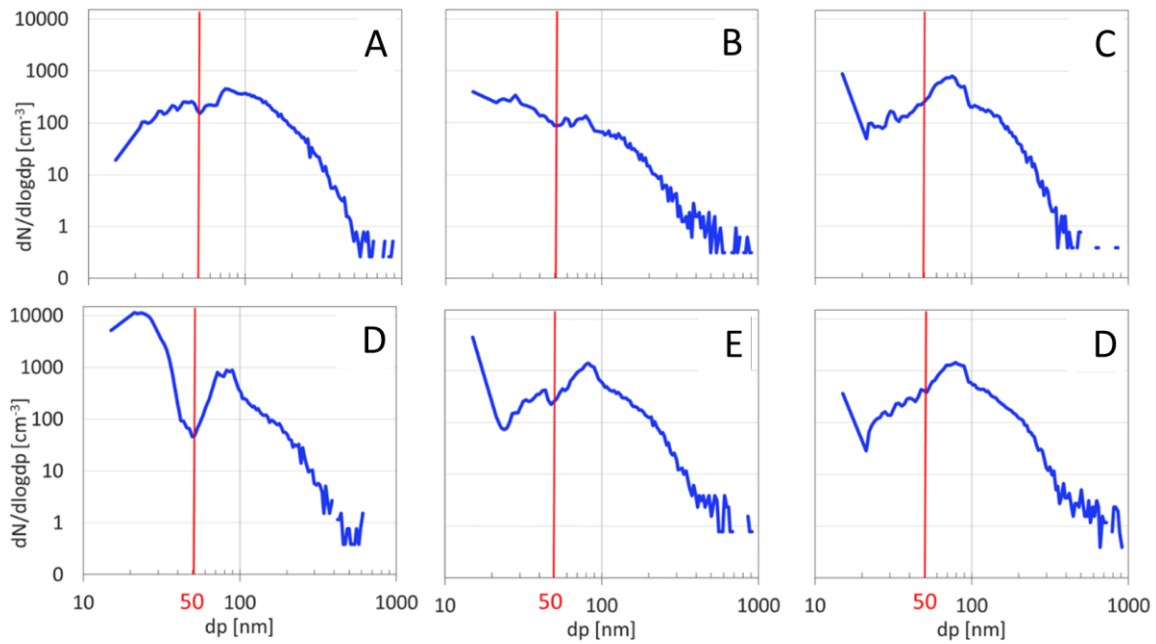
S Figure 2. Location of wild fires relevant to the southern air mass period. The data is obtained
from the NASA databank (MODIS Active Fire Detections extracted from MCD14ML distributed
by NASA FIRMS, available online: https://earthdata.nasa.gov/active-fire-data).

S Figure 3. Flight track of the case study on July 8. The flight track highlighted in red corresponds to the part of the flight discussed in the case study. The five locations (B)-(F) are located within the BL and air mass histories are discussed in detail. At location (A) the aircraft was still above the BL. The enlarged area shows the section where cloud patches started to reach the ice (also visible on the satellite picture) and the locations where highest concentrations of UFP were observed: (D) in cloud vicinity and (E) around the ice edge.

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26 S Figure 4. Size distributions at locations i-vi. Above the BL a mode of UFP is missing (A). The
27 most pronounced mode of UFP was observed above cloud (D). At this time increased particle
28 concentrations extend almost up to 50nm suggesting particle nucleation with subsequent growth.

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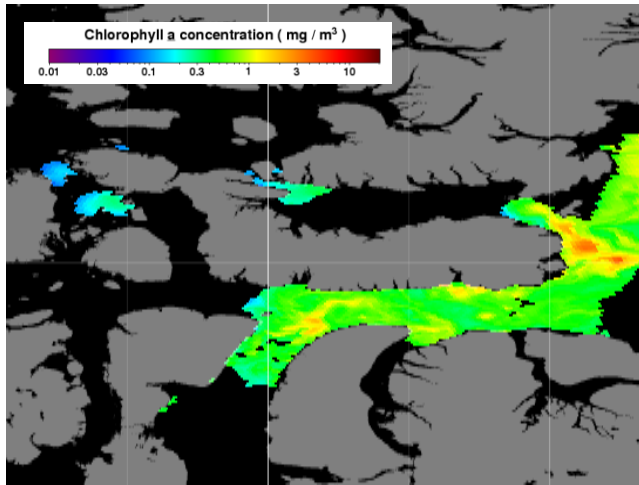
S Figure 5: Chlorophyll a concentrations on July 5th 2014 estimated from satellite measurements
(Visible and Infrared Imager/Radiometer Suite) by NASA
(http://oceancolor.gsfc.nasa.gov/cgi/l3).