Supplement of

Physicochemical characterization of free troposphere and marine boundary layer ice-nucleating particles collected by aircraft in the eastern North Atlantic

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This Supplement comprises of nine figures (S1-S9).

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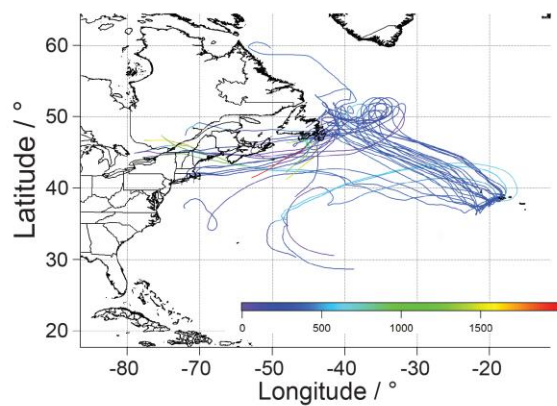
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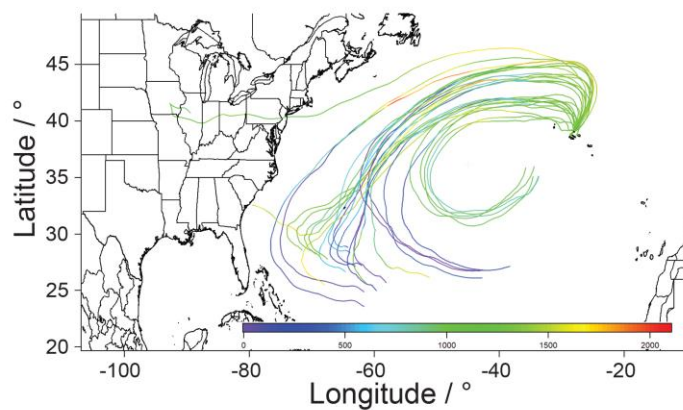
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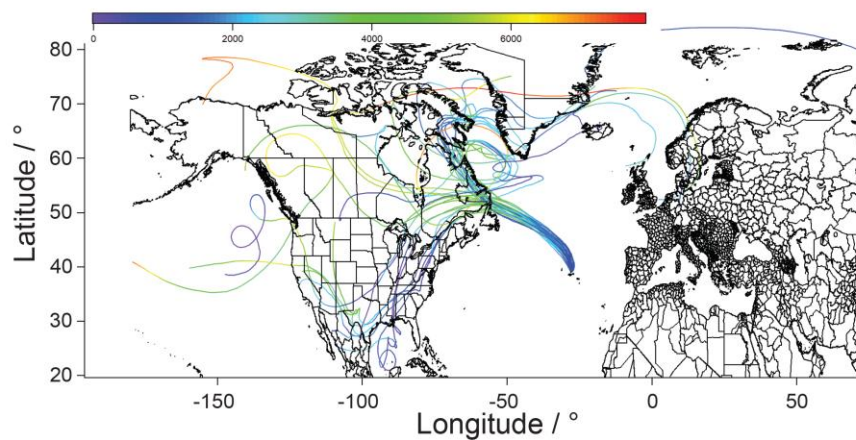
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Figure S1: Representative 10-day backward trajectories for examined airborne-collected marine boundary layer (MBL) and free troposphere (FT) particle samples starting at given sampling altitude. The trajectories are colored by their altitude (m).

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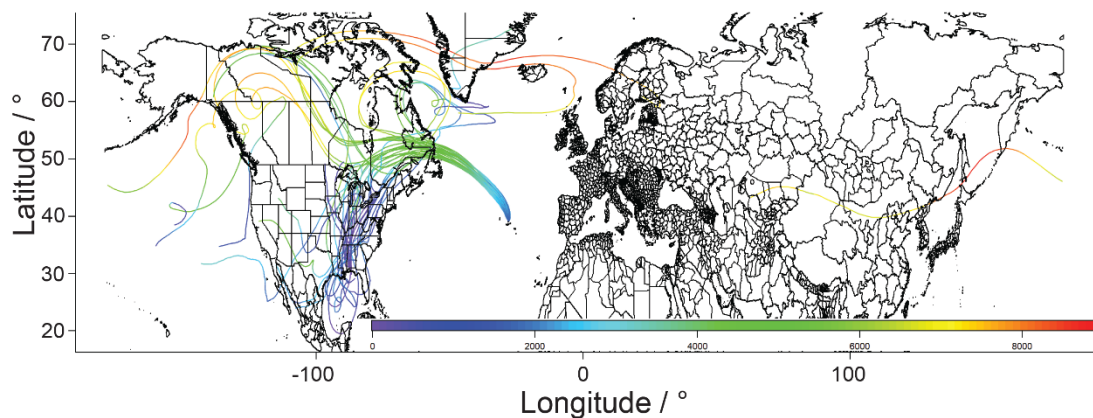
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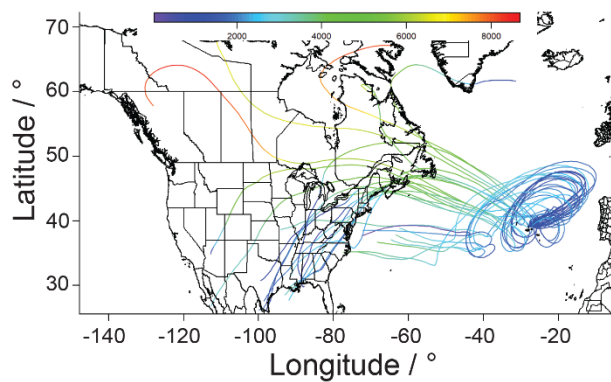
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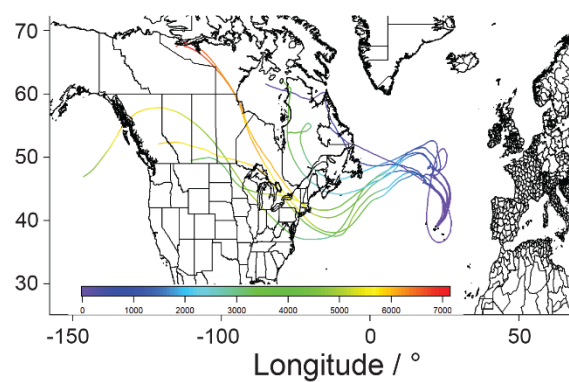
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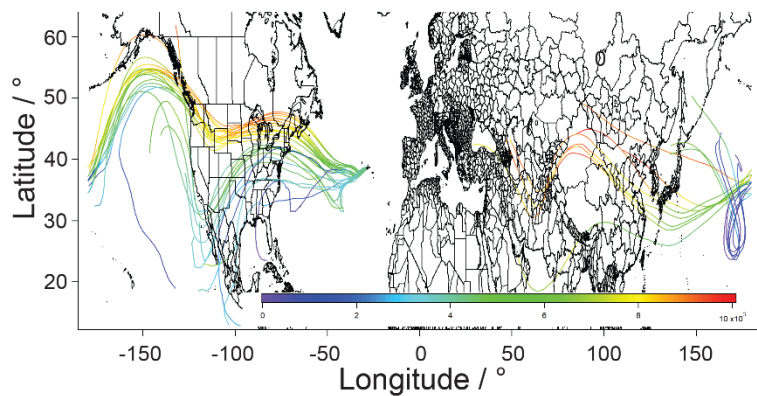
Figure S2: Representative 10-day backward trajectories for examined airborne-collected marine boundary layer (MBL) and free troposphere (FT) particles starting at given sampling altitude. The trajectories are colored by their altitude (m).

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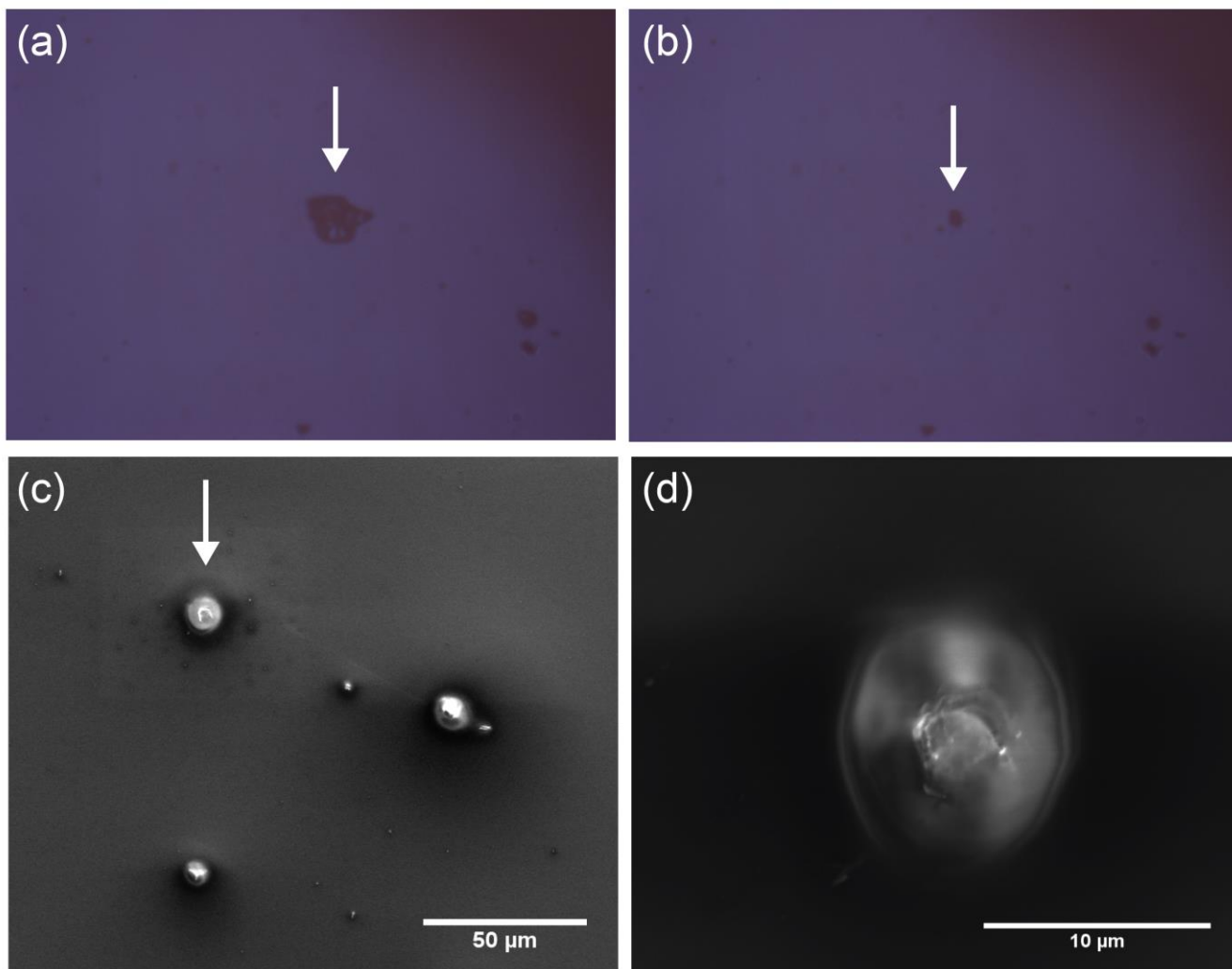
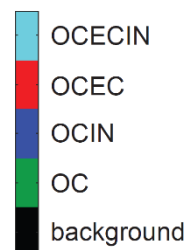
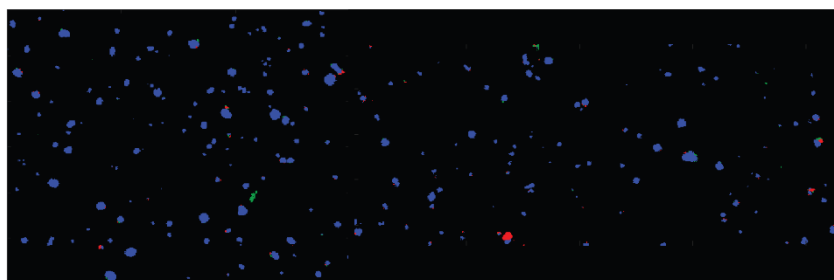


Figure S3: Procedure to identify the ice nucleating particle (INP) from optical microscope images (panels a and b) in scanning electron microscopy (panels c and d). Panel (b) shows the residual particles after ice crystal sublimation. White arrow indicates the INP.

07/07/17 IOP1-MBL1

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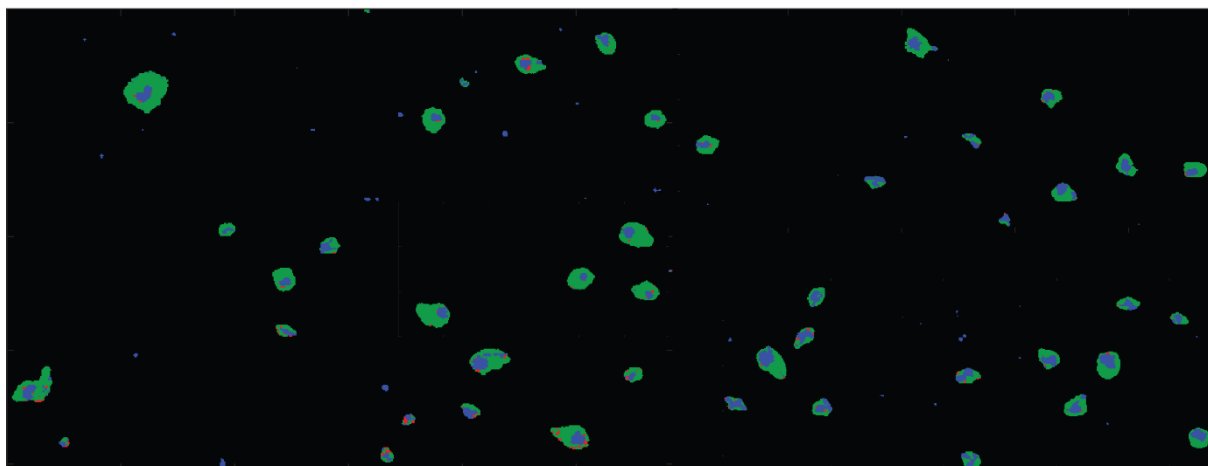
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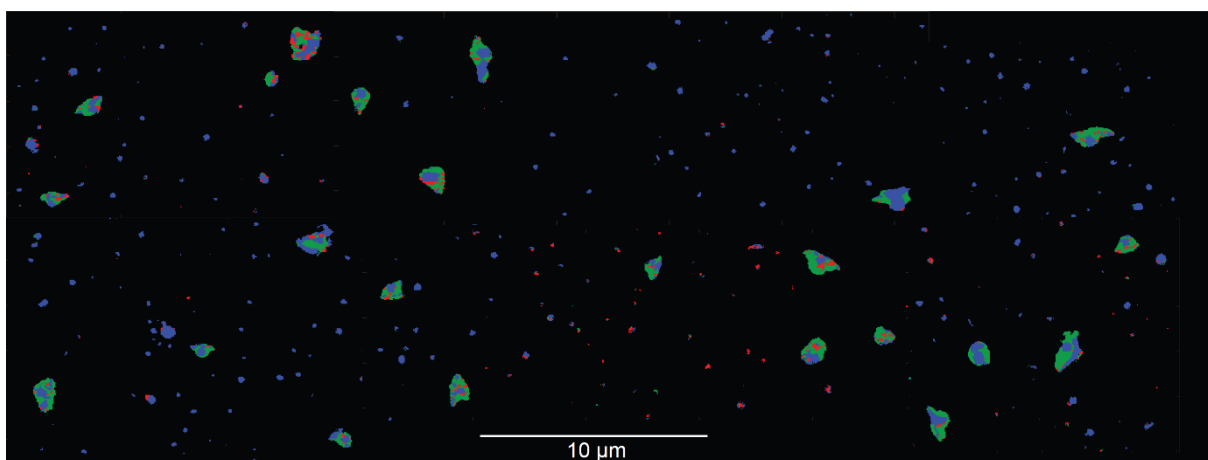
Figure S4: Representative particle mixing state analysis of particle samples collected in the marine boundary layer (MBL) where IN - inorganic, EC - elemental carbon, and OC - organic carbon. The scale bar holds for all panels.

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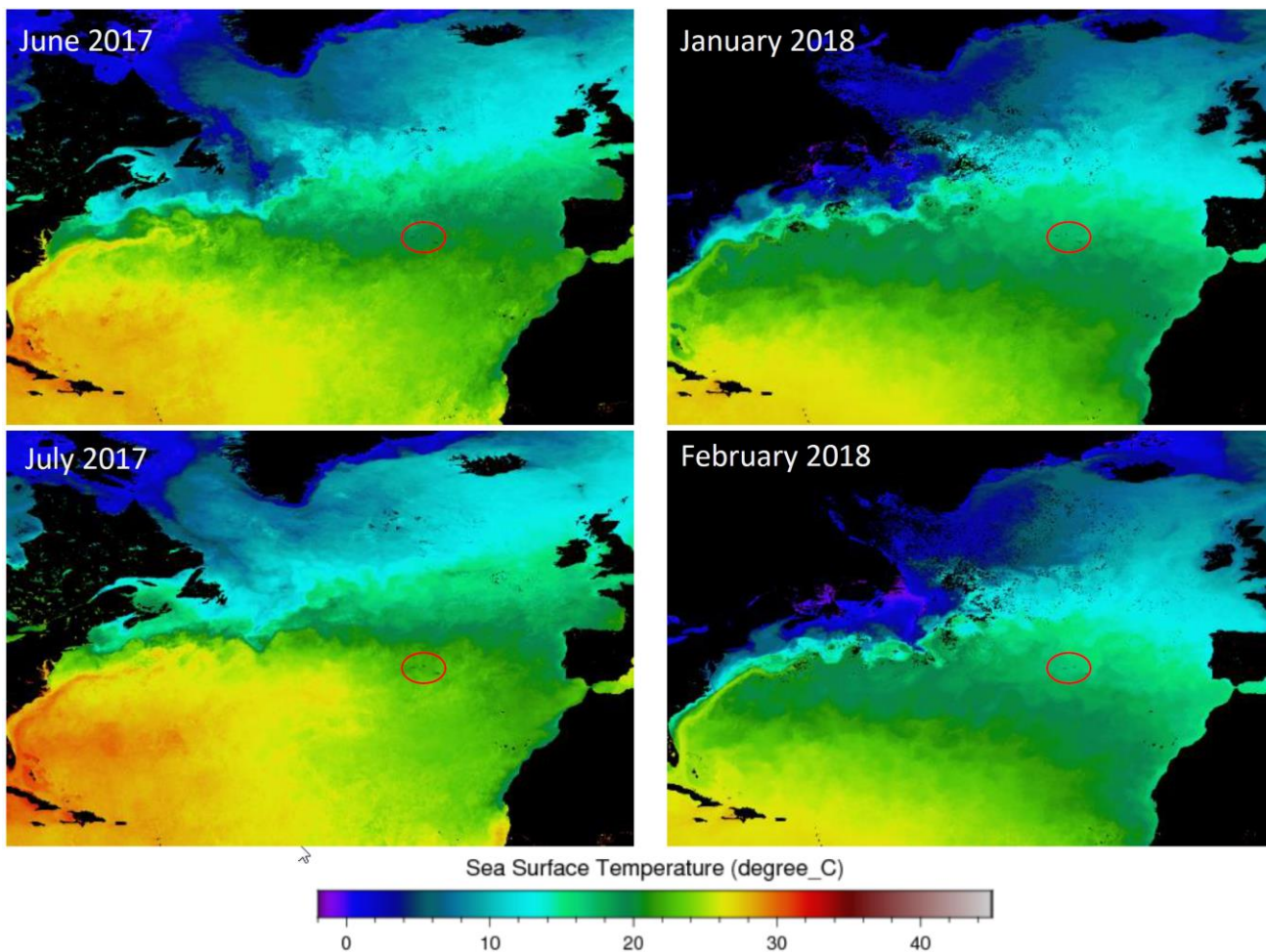
60   **Figure S5: Monthly mean sea surface temperature derived by Aqua MODIS (Moderate Resolution Imaging Spectroradiometer) during daytime at 11 μm and 4 km resolution (NASA Goddard Space Flight Center, 2019). Red circles indicate location of Azores Islands.**

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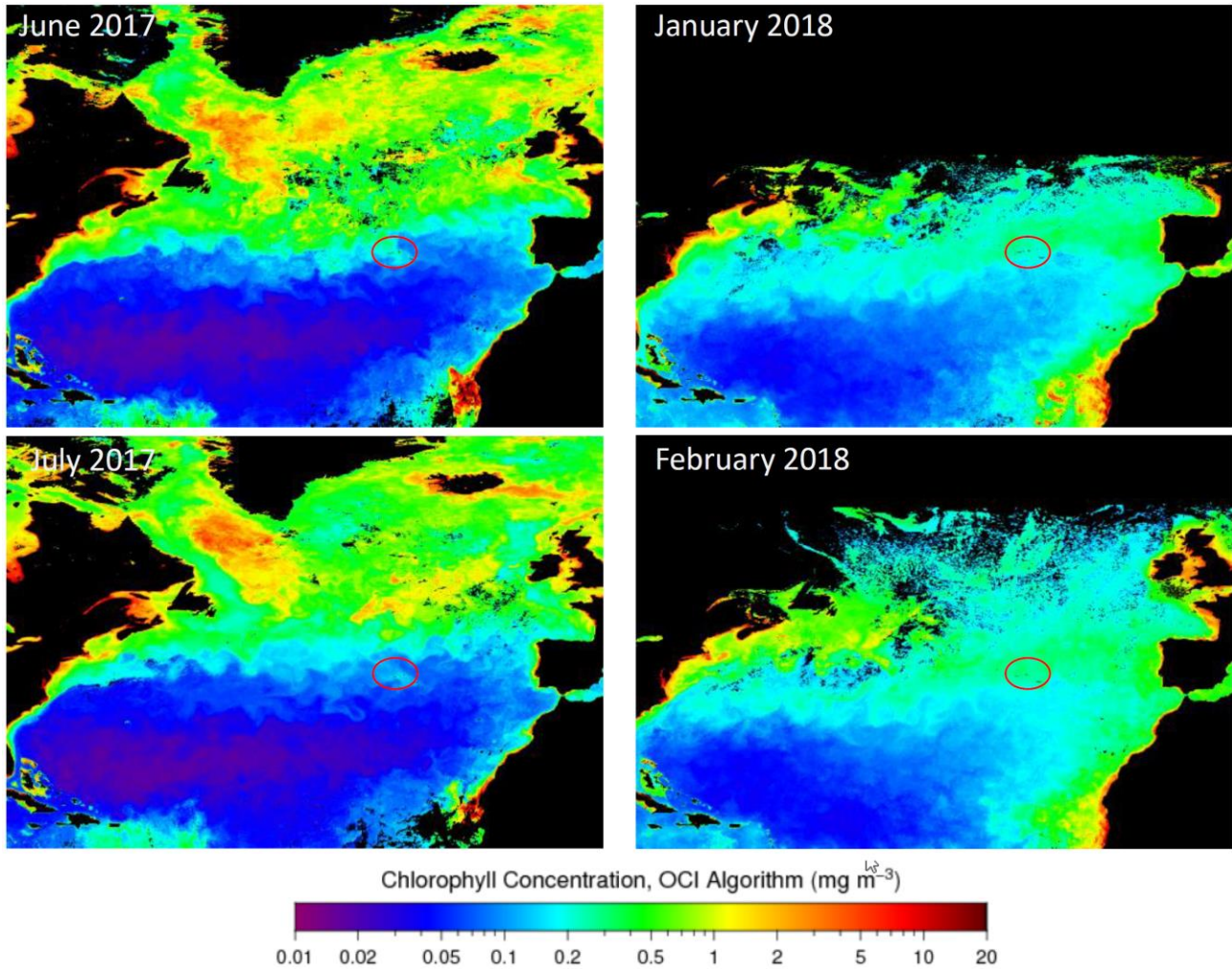
Figure S6: Monthly mean chlorophyll a concentration derived by Aqua MODIS (Moderate Resolution Imaging Spectroradiometer) at 4 km resolution (NASA Goddard Space Flight Center, 2022). Red circles indicate location of Azores Islands.

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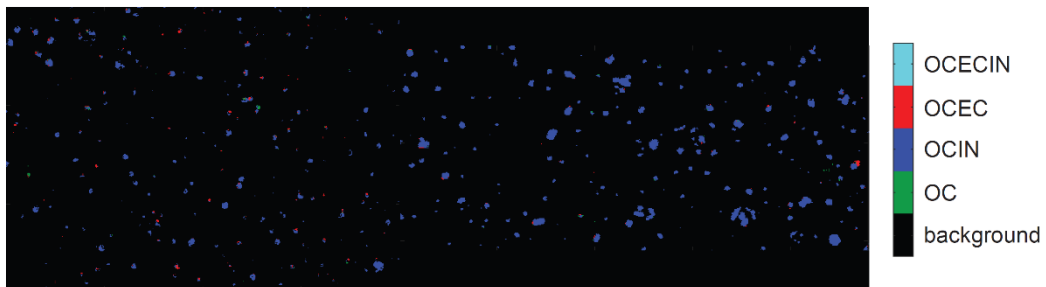
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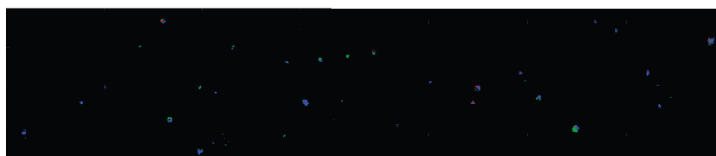
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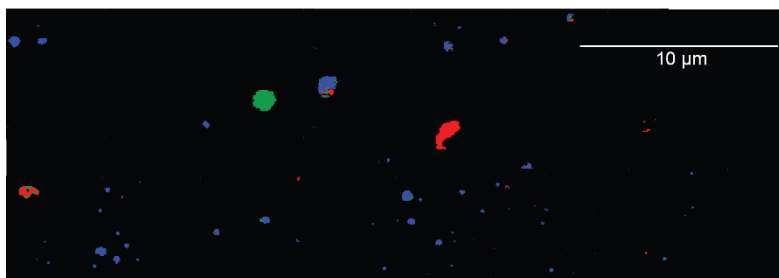
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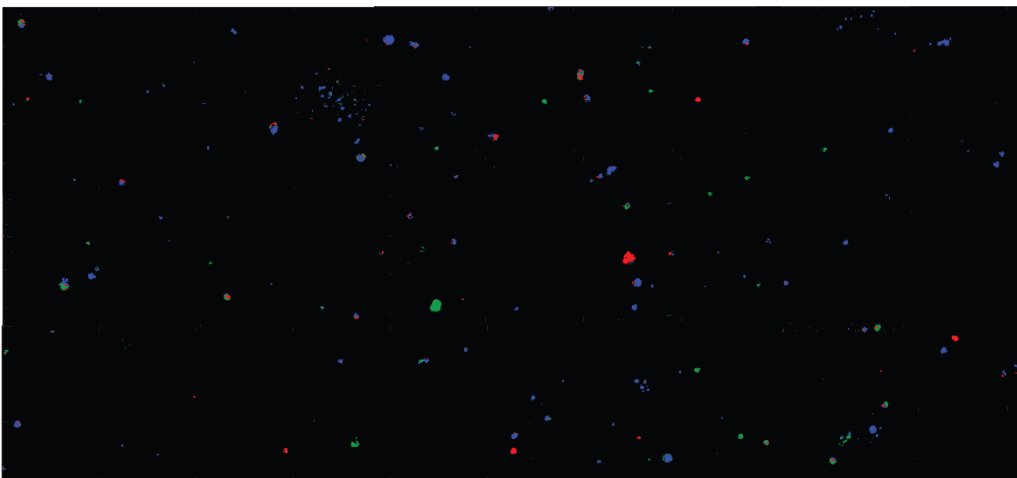
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Figure S7: Representative particle mixing state analysis of particle samples collected in the free troposphere (FT) where IN - inorganic, EC - elemental carbon, and OC - organic carbon. The scale bar holds for all panels.
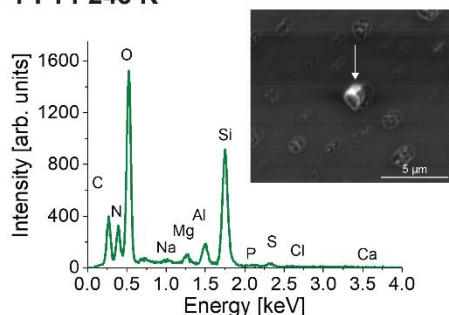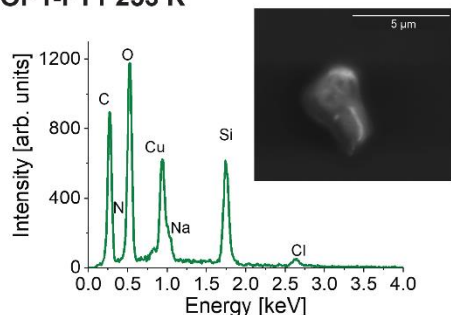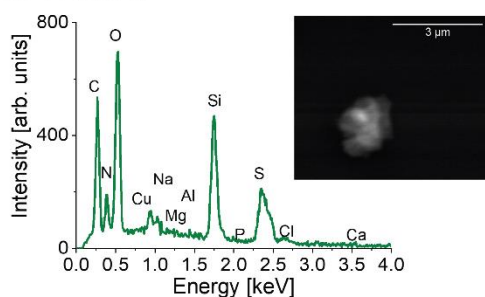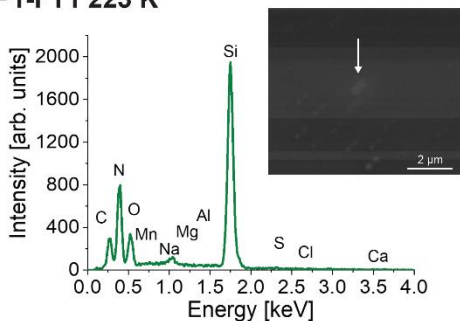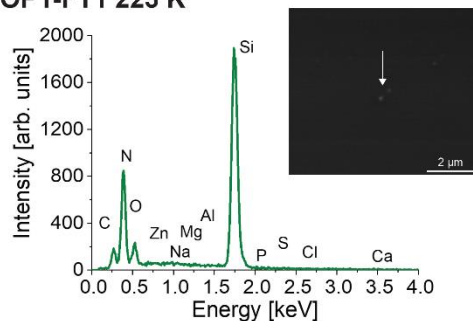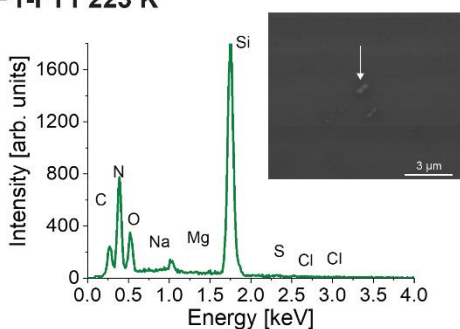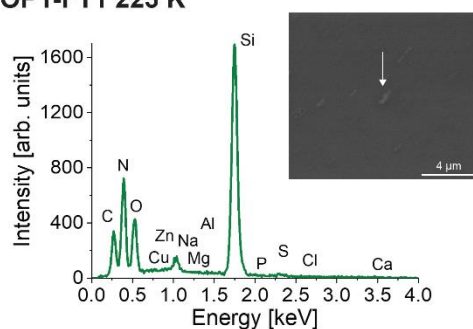
Figure S8: EDX spectra of identified INPs from particles samples collected during IOP1 under free troposphere (FT) conditions with corresponding SEM obtained particle image. Si and N signals stem from the substrate (Si₃N₄ coated silicon wafer chips) and the chamber/holder (Al).

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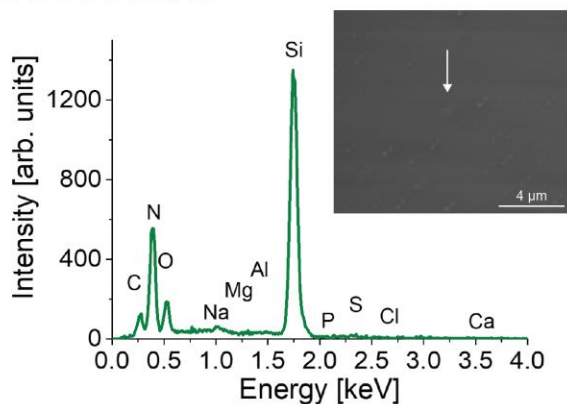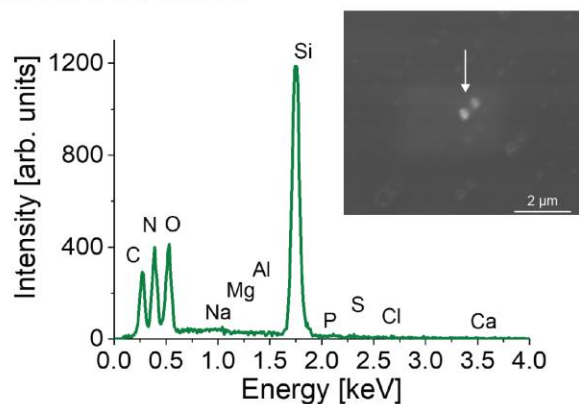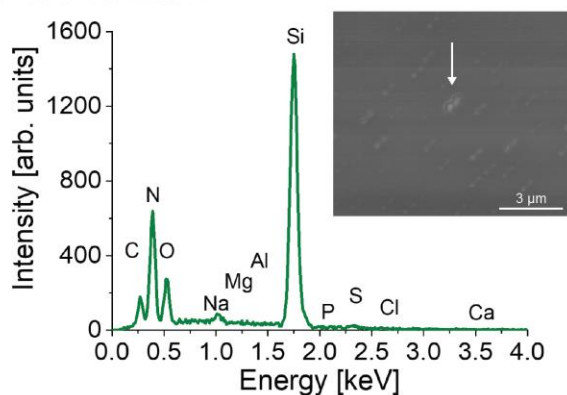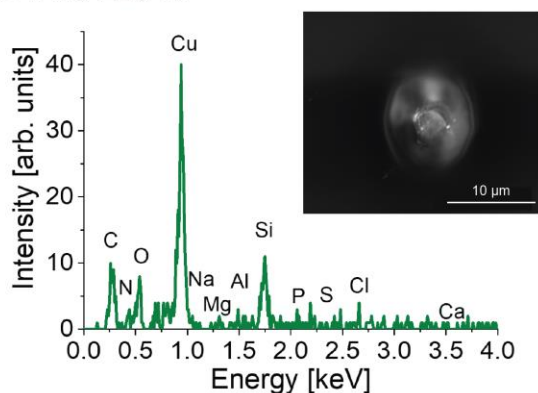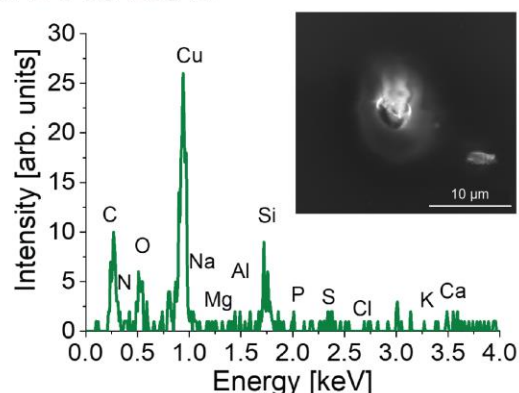
Figure S9: EDX spectra of identified INPs from particles samples collected during IOP2 under free troposphere (FT) conditions with corresponding SEM obtained particle image. Si and N signals stem from the substrate (Si₃N₄ coated silicon wafer chips) and the chamber/holder (Al).

References

NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group. Moderate-resolution Imaging Spectroradiometer (MODIS) Aqua Global Level 3 Mapped SST. Ver. 2019.0. PO.DAAC, CA, USA. Dataset accessed [2023-03-21] at https://doi.org/10.5067/MODSA-MO4D9.

NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group. Moderate-resolution Imaging Spectroradiometer (MODIS) Aqua Chlorophyll Data; 2022 Reprocessing. NASA OB.DAAC, Greenbelt, MD, USA. doi: 10.5067/AQUA/MODIS/L3B/CHL/2022. Accessed on 03/21/2023

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