

Impact of dry intrusion events on composition and mixing state of particles during winter ACE-ENA study

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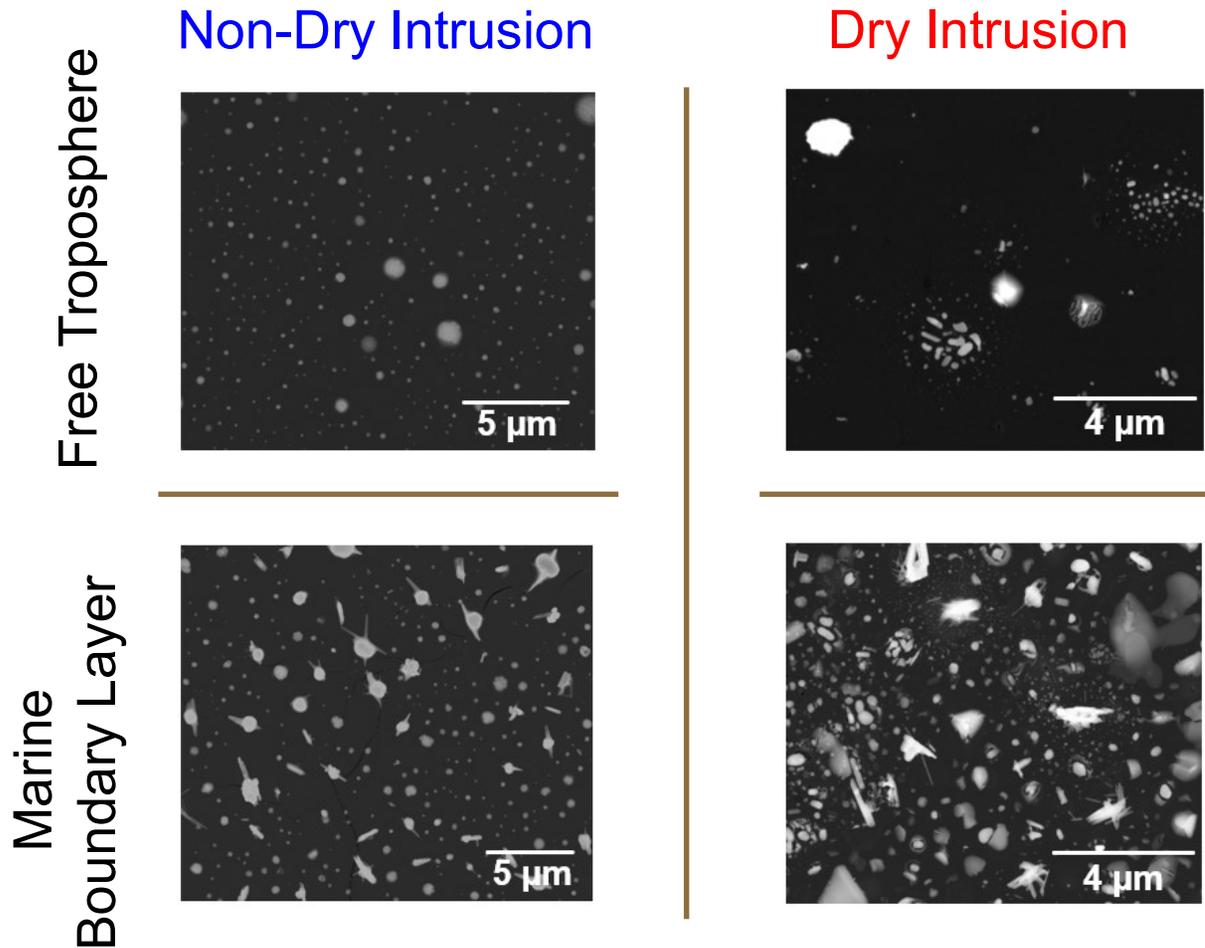
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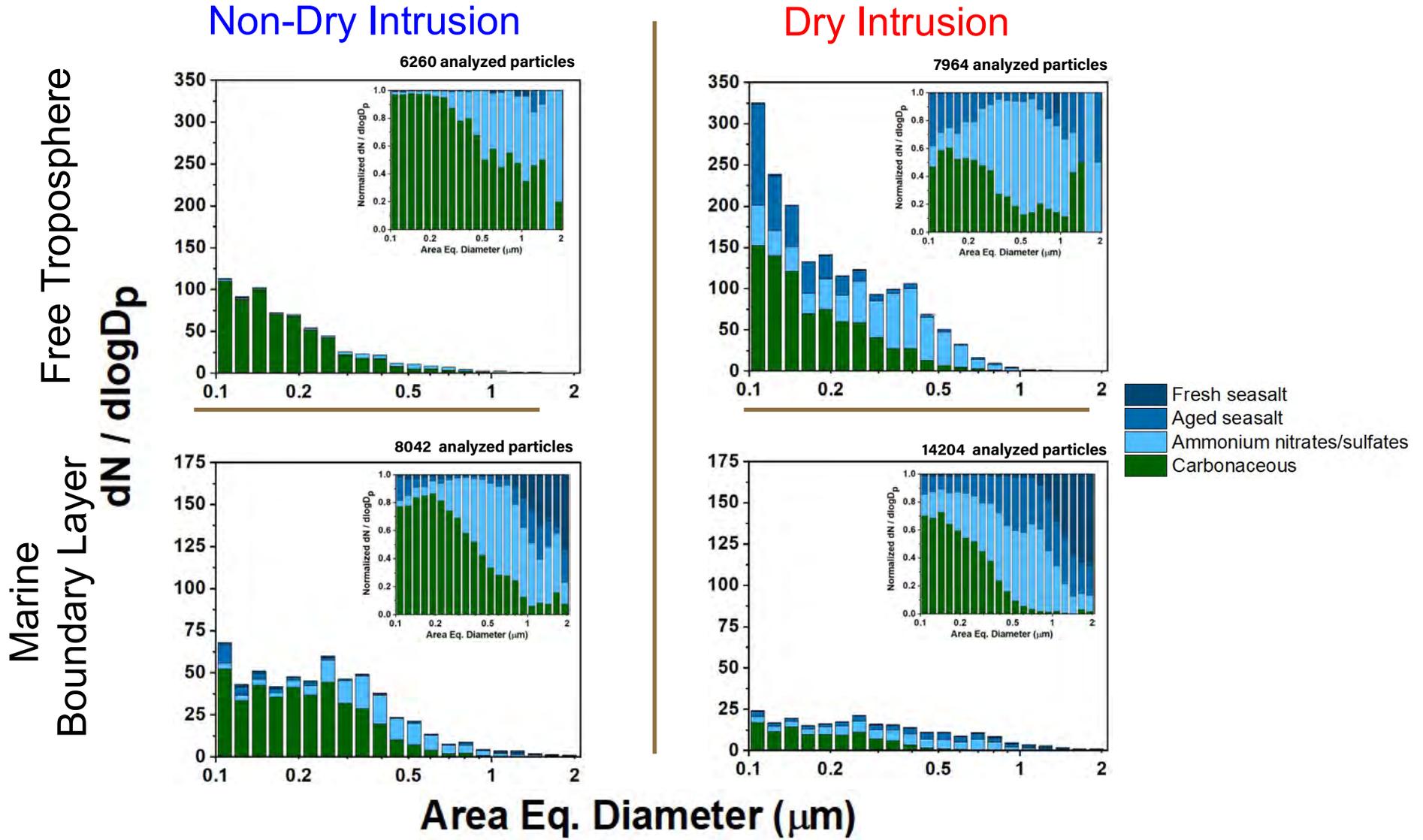
Representative SEM image

- 4 samples from 4 events in non-DI FT
- 8 samples from 5 events in DI FT
- 11 samples from 5 events in non-DI MBL
- 16 samples from 6 events in DI MBL

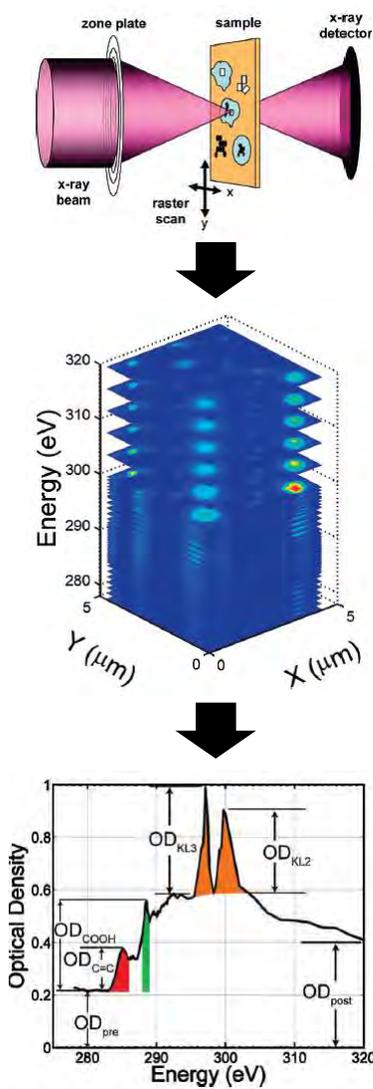
***all from
ACE-ENA IOP2*



CCSEM/EDX: K-means cluster analysis



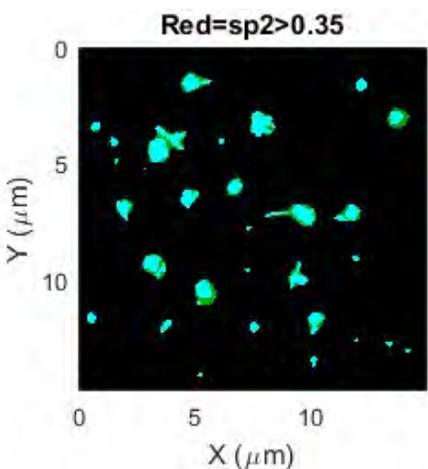
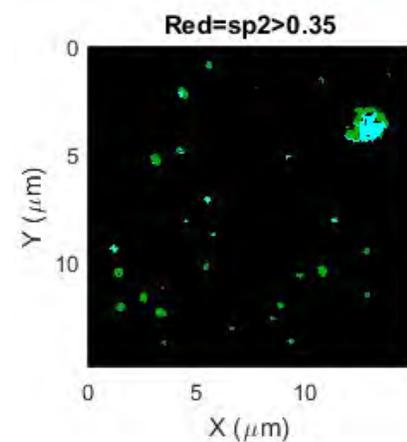
Representative STXM carbon K-edge mapping



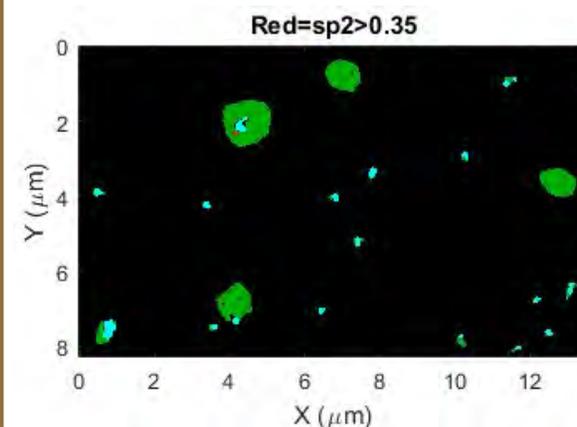
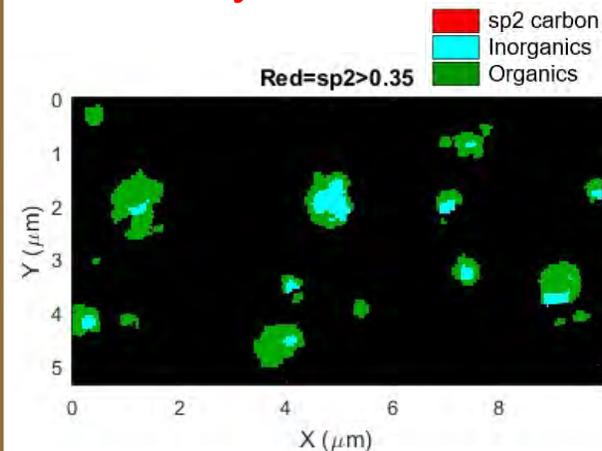
Free Troposphere

Marine Boundary Layer

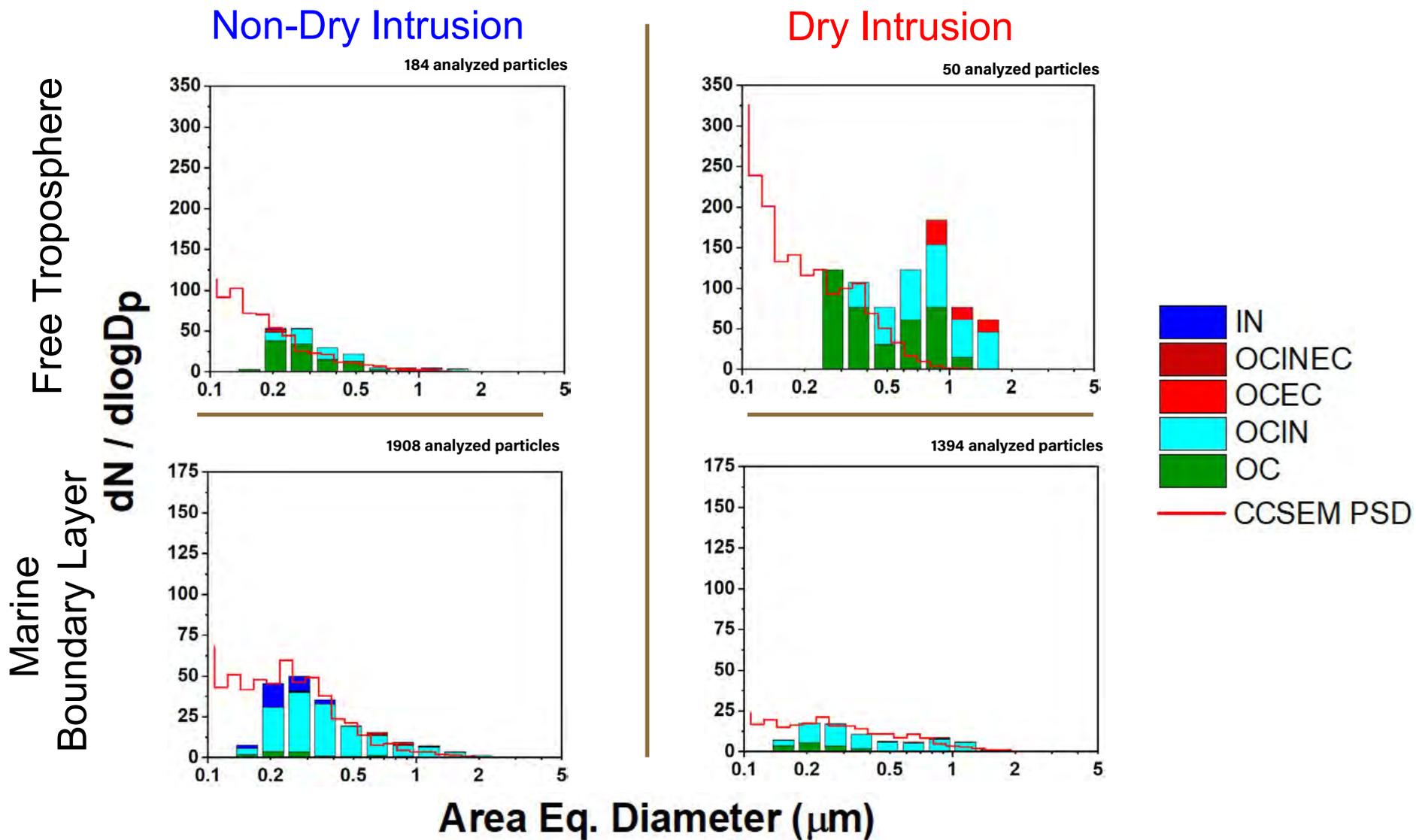
Non-Dry Intrusion



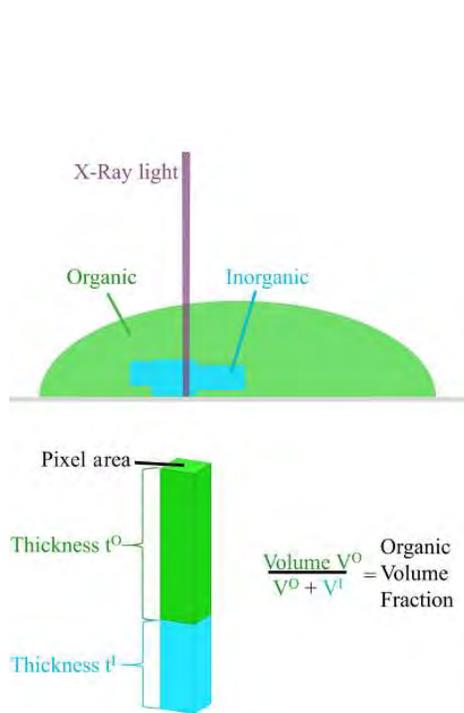
Dry Intrusion



Combined mixing state analysis



Organic volume fraction based on STXM-NEXAFS



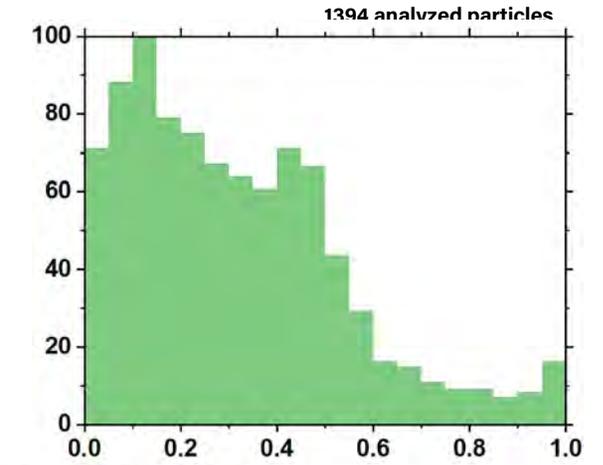
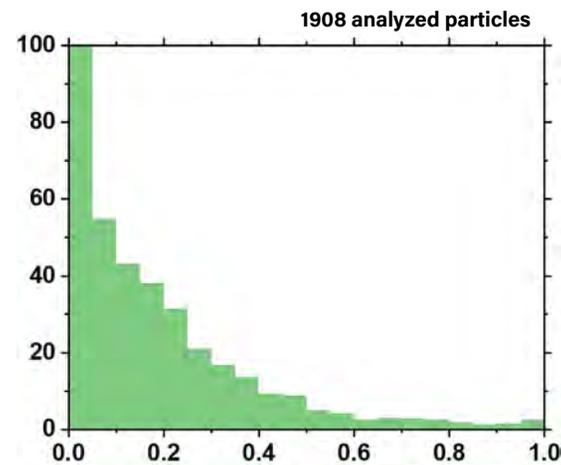
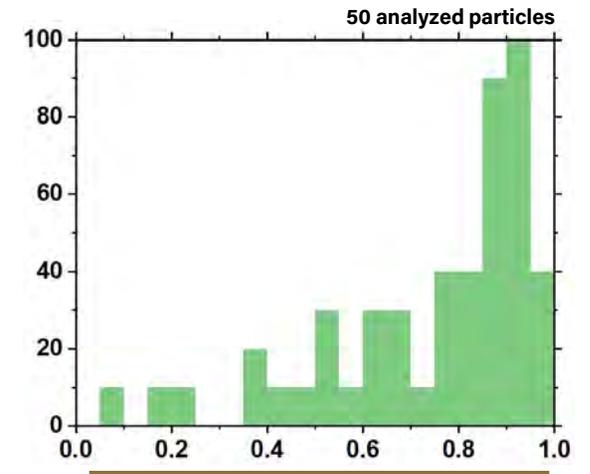
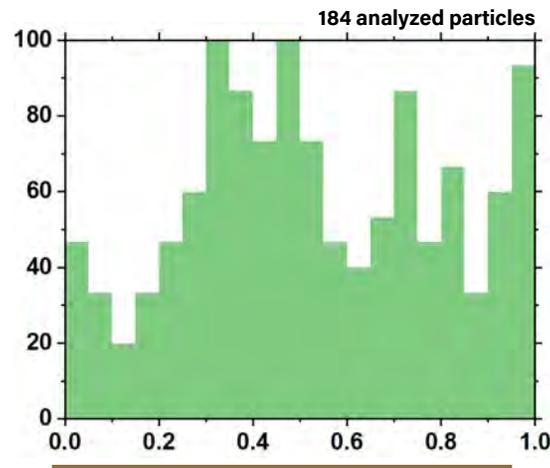
Free Troposphere

Marine Boundary Layer

Percent Contribution (%)

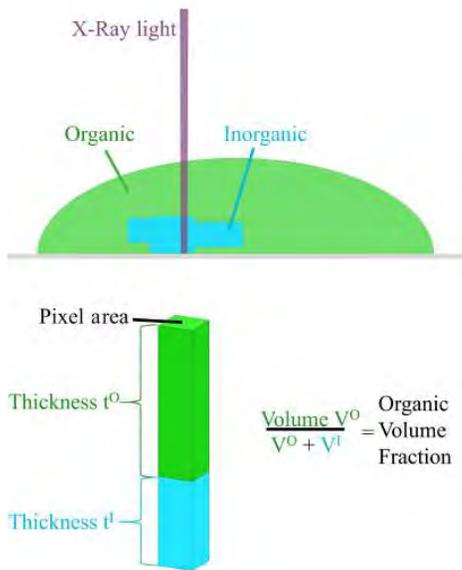
Non-Dry Intrusion

Dry Intrusion



Organic Volume Fraction

Organic volume fraction based on STXM-NEXAFS

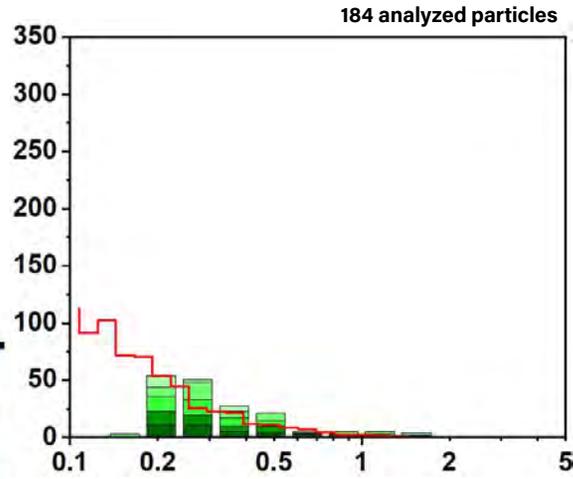


$$\frac{\text{Volume } V^o}{V^o + V^i} = \text{Organic Volume Fraction}$$

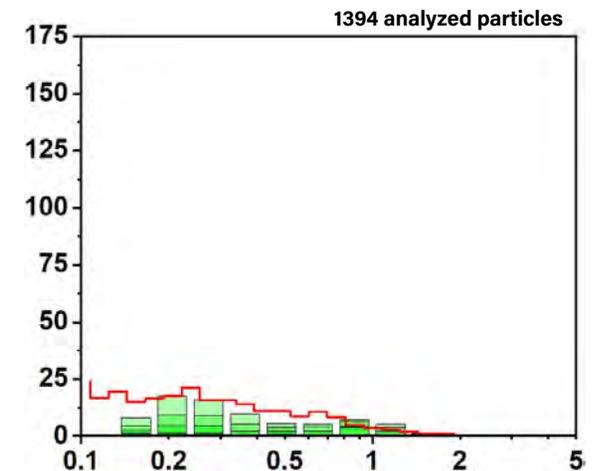
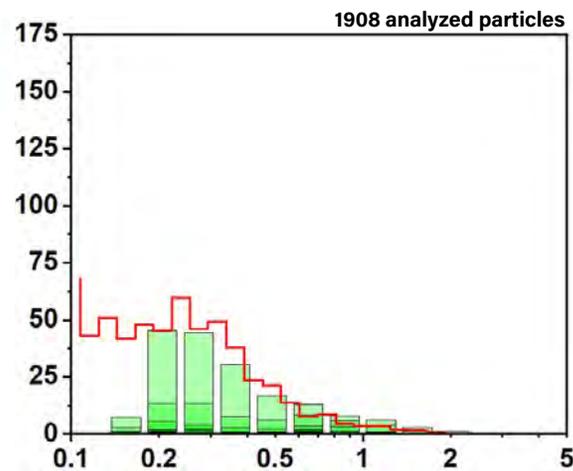
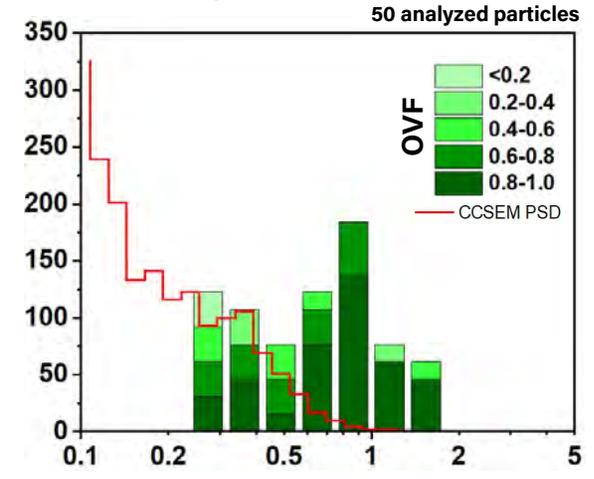
Free Troposphere

Marine Boundary Layer

Non-Dry Intrusion

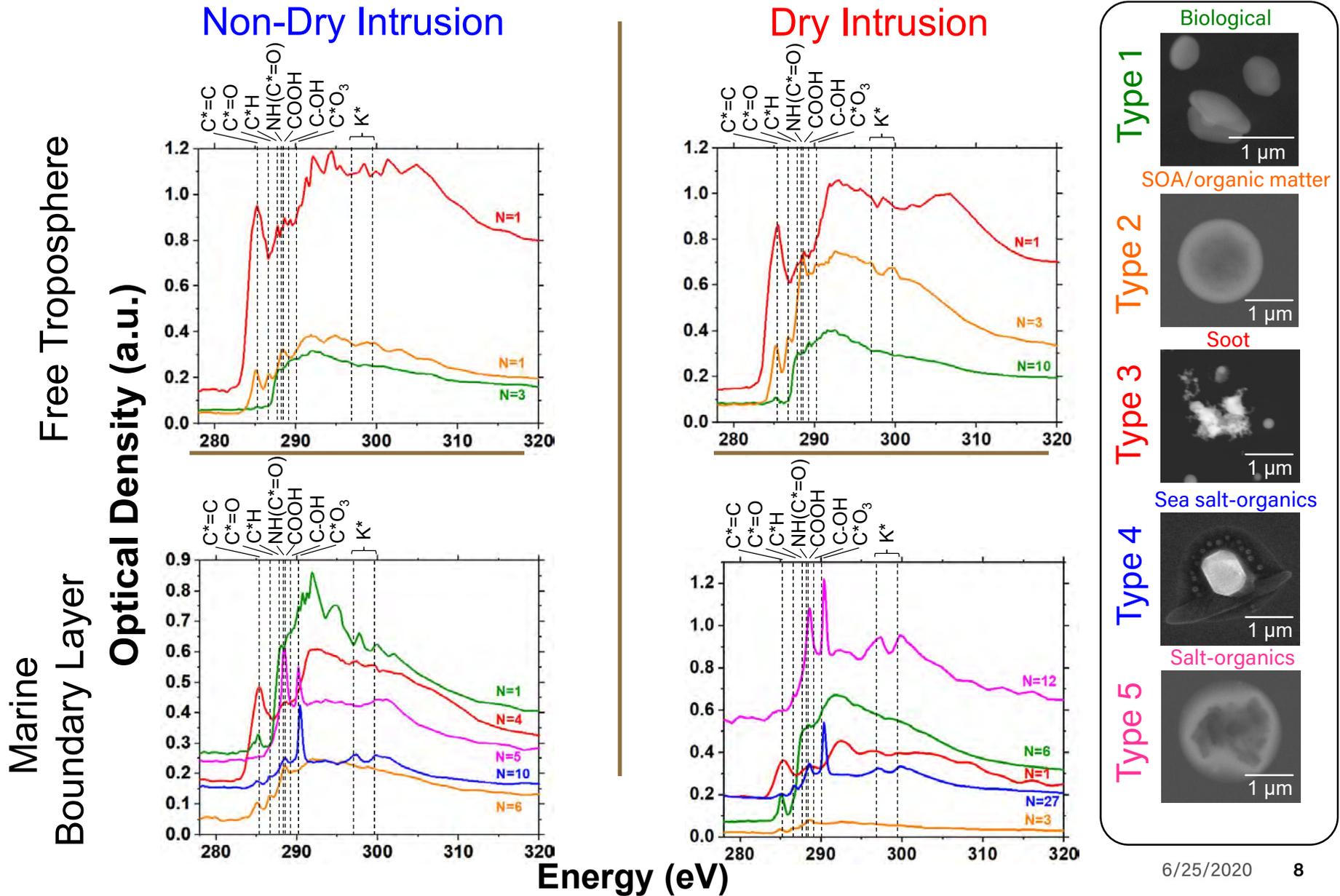


Dry Intrusion



Area Eq. Diameter (μm)

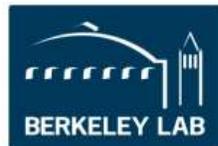
Chemical characterization of carbon by STXM-NEXAFS



Summary and conclusion

- DI events bring new particles (organic/nitrates/sulfates) into the region
- Organic volume fractions of individual particles are higher during DI events. Observed in both FT and MBL
- Free troposphere aerosols contain large contribution of organic particles chemically different from those present in MBL
- Biological particles were observed in the FT. Possible long range transport due to DI events.

Acknowledgements



The AAF crew and scientist involved in the ACE-ENA campaign