

Deliverable D5B: Single-particle morphology and mixing state in different environments

Objectives:

1. Parameterize **BC mixing state, coating, morphology** during **CARES** and **ClearfLo** using SP2 and electron microscopy
2. **Characterize morphology and mixing state** of aged BC transported to the **Pico Mountain Observatory**, Azores, North Atlantic, using electron microscopy

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Funding status: **1** and **2** funded, but **2** ending soon

Challenges or needed resources/collaborators:

- **SEM/TEM:** very labor intensive, need to find new approaches for single particle morphological characterization with statistical significance
- We need to find a selected set of morphological parameters that modelers can use
- We need to find resources to continue sample at the Pico station

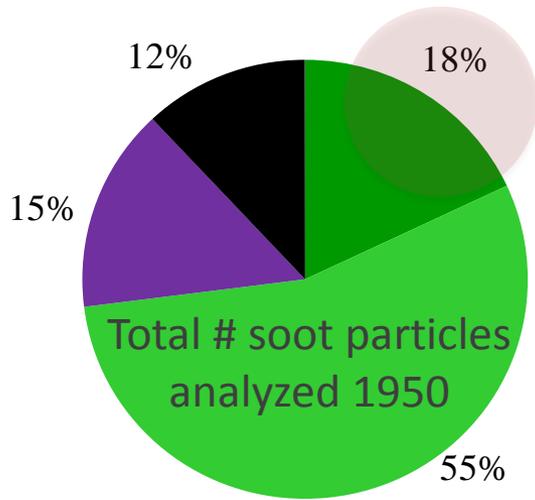
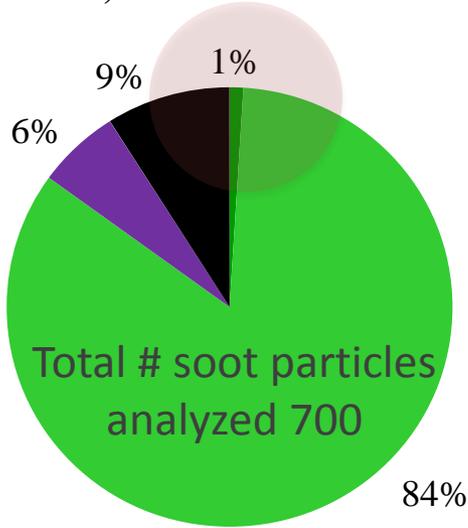
Summary of progress:

- **CARES:** ~100 (T1) and ~180 (T0) SEM membranes collected. Imaged more than 10% Several thousands single particles analyzed. Interpretation on-going.
- **ClearfLo:** ~ 36 SEM membranes collected ½ ambient, ½ denuded. Focused on 4 filters (based on optical properties). Several thousands single particles analyzed
- **Pico, AZ:** Year 2012 (season one) – 57 SEM membranes and 4 TEM grids (daily)
Year 2013 (season two) – 72 SEM membranes and 72 simultaneous TEM grids (daily)

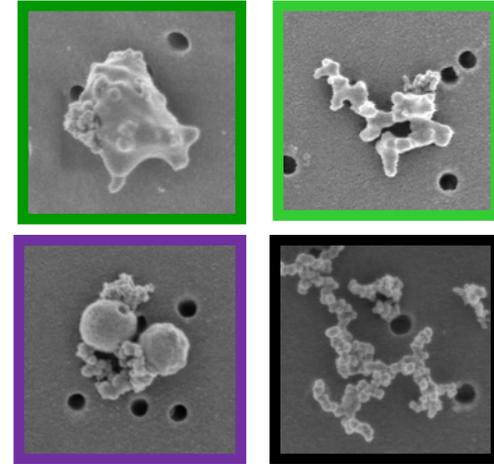
Some results – CARES, ClearfLo, Pico

CARES, CA T0 6/25/2010

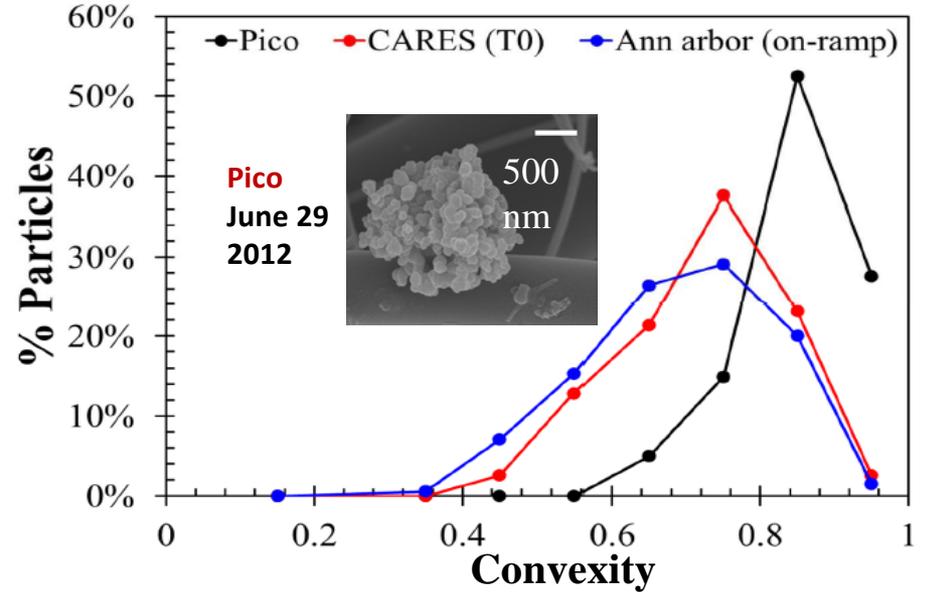
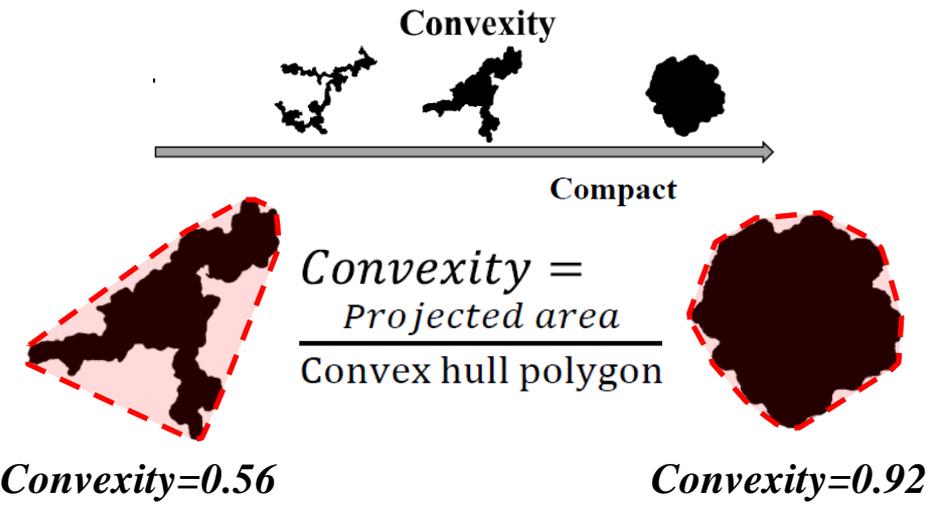
ClearfLo, Detling, UK 2012 *High E_{abs}* 2/11/12



- Embedded
- Partly Coated
- Inclusions
- Bare



China et. al. *Nature. Comm.* 2013 4, 2122 "Morphology and mixing state of individual freshly emitted wildfire carbonaceous particles"



Thanks to Swarup China and Noopur Sharma!!