Identifying atmospheric bioaerosol
Anne Perring

• Atmospheric bioaerosol is composed of airborne bacteria, fungal spores and pollen
• There is currently high uncertainty as to the loadings, transport and effects of these particles in the atmosphere
• CSD research in this field began in 2013 with laboratory evaluations of new instrumentation and ambient measurements in various locations
Atmospheric bioaerosol

- Can have numerous cloud effects including:
  - Temperature of glaciation via ice nucleation (IN) activity
  - Droplet size distribution
  - Onset of precipitation
- Feedback mechanism between the biosphere and atmosphere?
- Impacts for human health

➤ Existing measurements are so sparse that it is difficult to assess the true importance of bioaerosol on local, regional and global scales

Seasonal cycles

**Spracklen and Heal 2014**
Bioaerosol detection using autofluorescence

- New technique in atmospheric applications
- WIBS counts and sizes particles > 0.8 um
- Working with DMT on improvements and evaluation of WIBS capabilities and limitations.
- Collaboration w/ CU-Boulder to build a reference library

⇒ CSD-developed classification scheme allows good discrimination between bacteria, fungi and pollen based on measured properties

Colors show different response signatures

Hernandez, Perring et al., in prep. 2015
CloudLab Study

- 1st published airborne WIBS measurements
- Wide longitudinal extent and numerous ecosystem types
- Strong trends observed in bioaerosol characteristics and loadings

Flight track, fall 2013

Model-measurement comparison
Model underestimate  Good agreement

Bioaerosol size distributions
Larger in the west

Perring et al, 2015

In collaboration with DMT, Leeds, MIT, CU-Boulder
Bioaerosol at Reunion Island

**Objectives**

- Characterization of southern hemisphere and marine bioaerosol
- La Reunion is downwind of areas of high oceanic productivity
- Ground station with regular nighttime sampling of free tropospheric air
- First ambient comparison of WIBS observations with direct bacteria, spore and pollen counts

**Measurements**

*WIBS*: real-time fluorescent aerosol

*Collection via impaction*: optical microscopy, genetic and component analyses, size-segregated ice nuclei concentrations

*In collaboration with CU-Boulder, University of Denver, DMT, Blaise-Pascal Clermont, Meteo France and Universite de la Reunion*