CALIOP Aerosol Typing

CALIOP Aerosol Typing

- Original purpose was to estimate the lidar ratio used in extinction retrieval
  - But, it turned out aerosol type was interesting in its own right
- Each aerosol "type" is assumed to be a mixture of species
  - eg: "polluted continental" = sulfate + nitrate + BC + dust
- Typing is performed before the extinction retrieval
  - Therefore, must be based on Level 1 profile data
  - In the future, we may retrieve for each type and select the best solution

CALIOP Aerosol Types

Type	Criteria
•Dust	High depolarization
•Polluted Dust	Medium depolarization, assume dust is mixed with smoke
•Smoke	Higher altitude, Low depolarization
•Clean Continental	Over land, Low backscatter
•Polluted Continental	Higher backscatter, low depol, near surface
•Marine	Over ocean, in marine boundary layer

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A few limitations:

- **Arctic aerosol assumed to be either "clean" or "polluted continental"**
- **Didn't allow for dust in the marine boundary layer**
- **Have no type for organic aerosol (biogenic or SOA)**
- **etc.**

Algorithm Flowchart

(Omar et al., JTech, 2009)

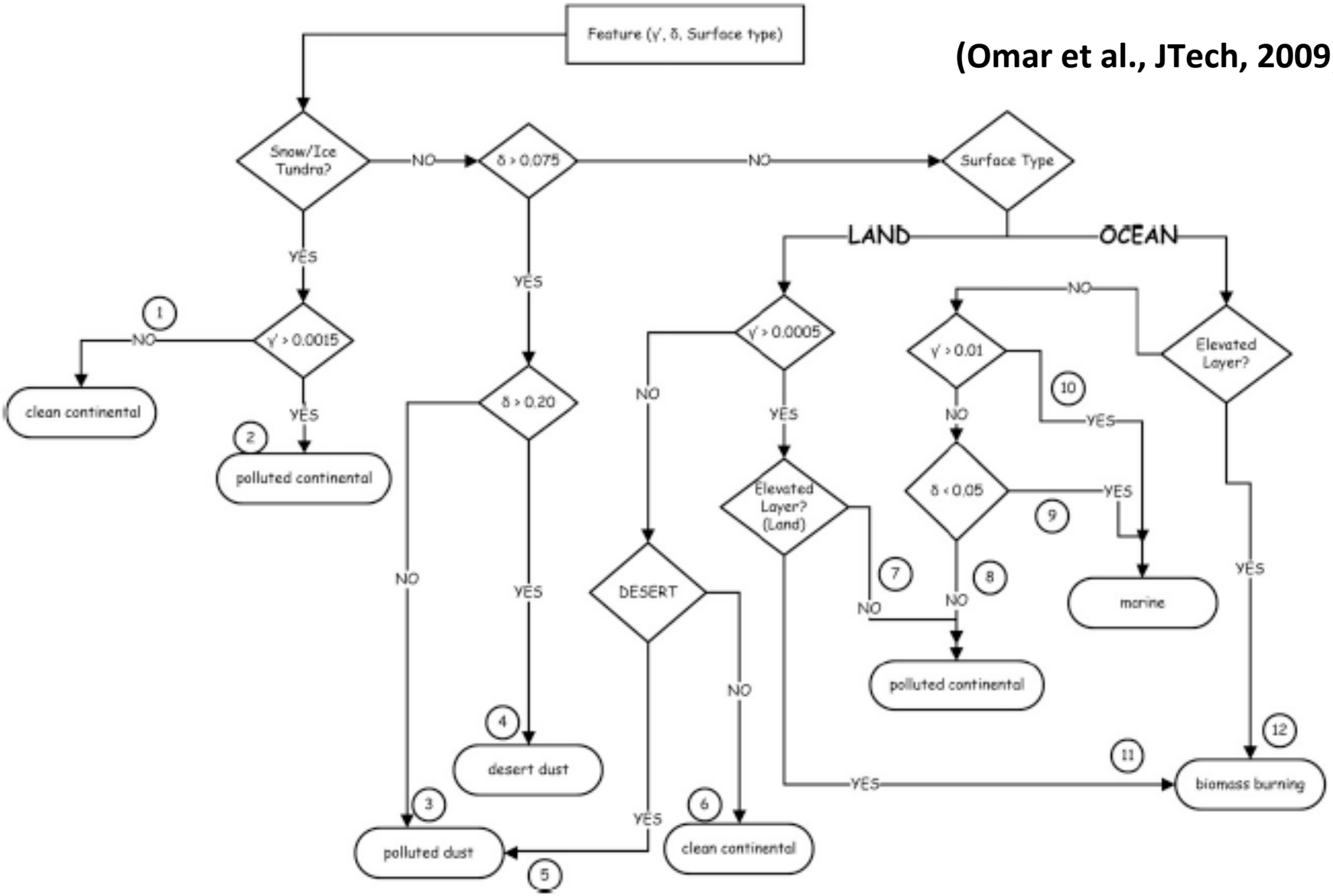
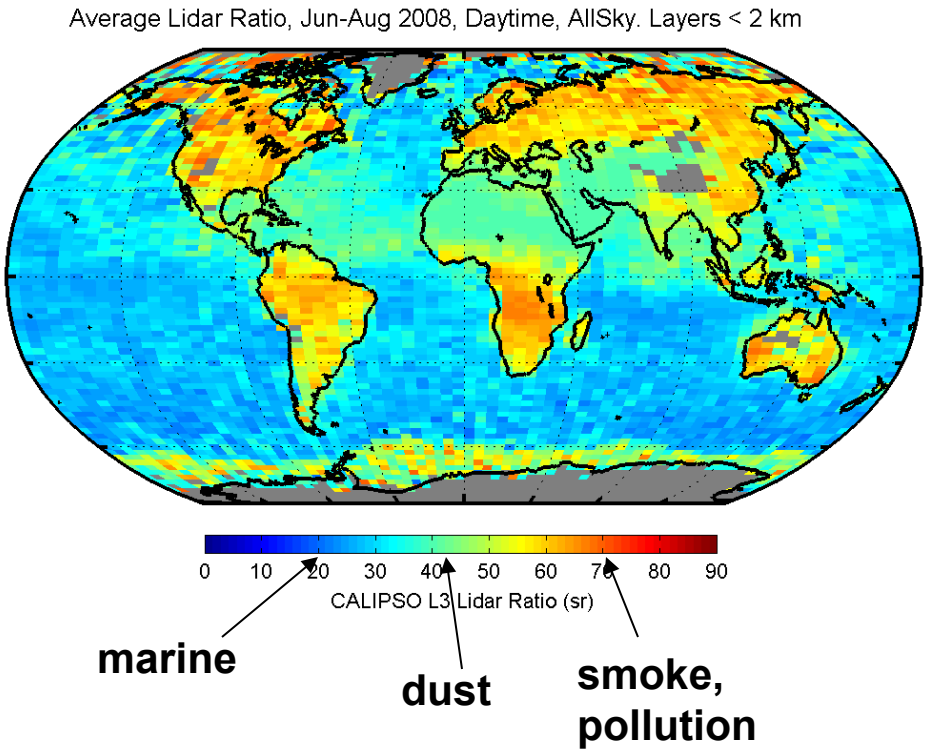
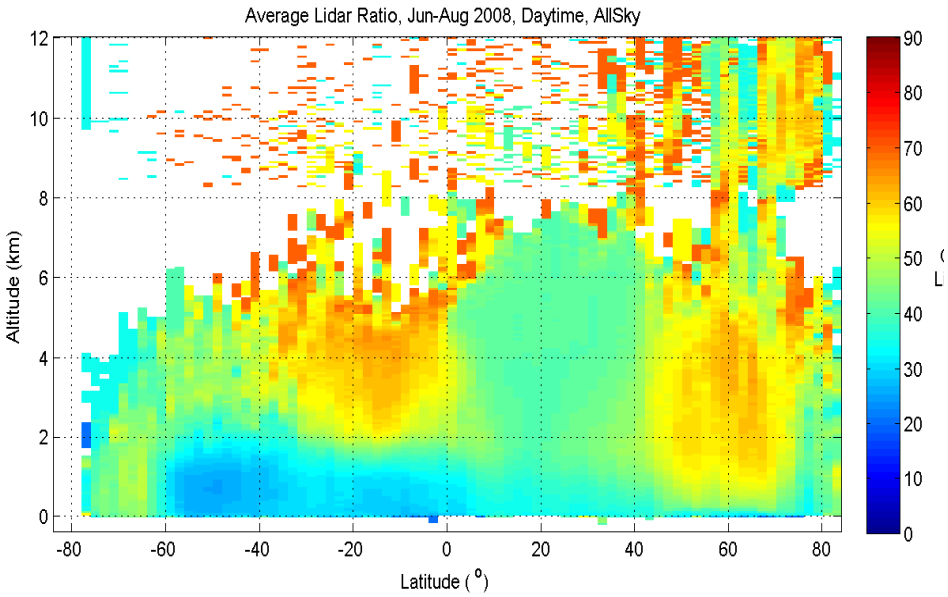


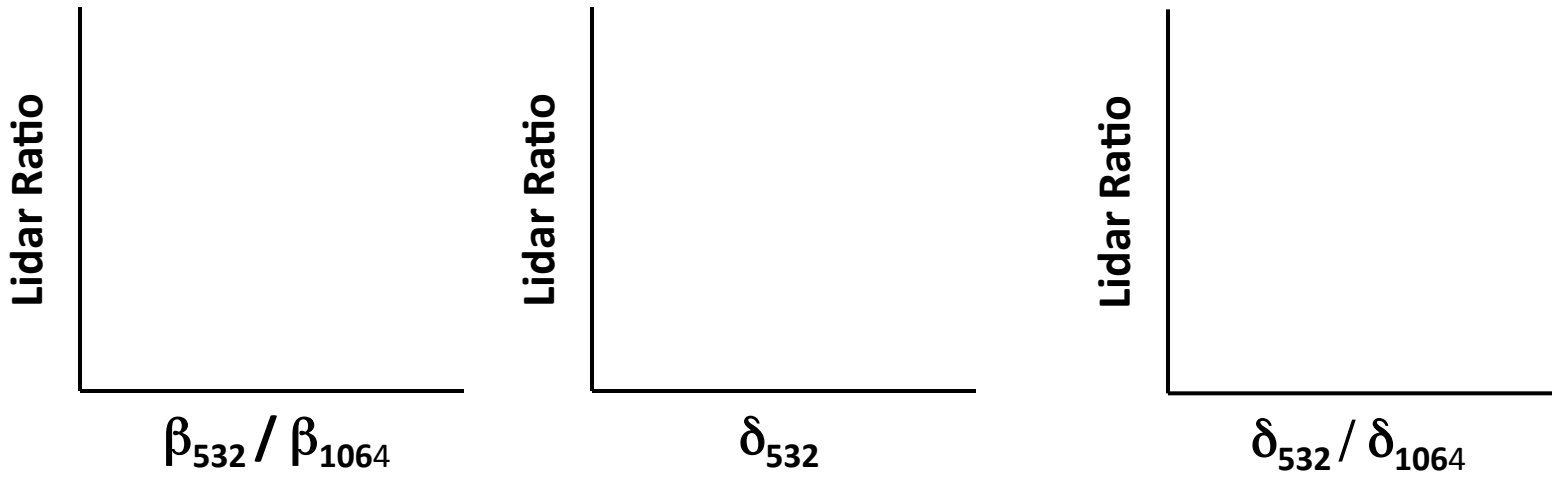
FIG. 2. Flowchart of the CALIPSO S_a selection scheme for tropospheric aerosols.

Aerosol Type, JJA 2008





HSRL Algorithm
(Burton et al: 2012, 2013)



8 types, based on 2 to 6 samples of each
No rules on magnitude of scattering, location, or altitude

HSRL Algorithm
(Burton et al: 2012, 2013)

Have defined 8 types

Classification performed using intrinsic aerosol properties

No rules on magnitude of scattering, location, or altitude

Notional clustering of three types: