Spatial and Temporal variation in aerosols across Namibia: implications for remote sensing

N.M. Knox¹, B. Holben²

1. Namibia University of Science and Technology
2. Goddard Space Flight Center, NASA
Background - Aerosols

• Primary aerosol sources from Namibia come in the form of:
  – Dust
  – Fog and marine aerosol
  – Burning Biomass
  – Smaller localised quantities of industrial pollution

• The location of the aerosols tend to be spatially disparate

• Quantities vary through the year
• Optical remote sensing provides ability to monitor extensive areas
• Particularly useful in a country which largely unpopulated and inaccessible
• To analyse long term environmental changes and systems requires that images are comparable
• Requires atmospheric correction to BOA reflectance
• Current practice (due to lack of a better regional models) use either “Sub-tropical - summer” model or dark object subtraction (DOS)
Current study

- Use of ground in-situ sun photometer network to monitor aerosol optical depth
- Determine if through this network we can gain an understanding on what the spatial and temporal dynamics of aerosols across Namibia are
- Based on this can we start planning for the development on either local or regional atmospheric correction models
AERONET distribution in Namibia

- 7 stations
- E-W transect
- N-S transect
- Capture different dust sources:
  - Dust (Etosha, Desert)
  - Marine aerosol
  - Burning biomass

* S. Piketh & P. Formenti -> Gobabeb and Henties Bay
New Version 3: AERONET Algorithm Advances

• AOD is less contaminated by optically thin cirrus clouds

• AOD is available for high aerosol loading biomass burning smoke events previously removed by Version 2

• Improved corrections including temperature

• AOD products are automatically controlled in NRT using new algorithms derived from manual QA methods (Level 1.5)
Indonesian Fires 2015 (Palangkaraya) – Current V2

Cloud cleared NRT data (Level 1.5)

Cirrus contamination
Smoke not detected

Aquaf MODIS
20151005T06:05 UTC

Aqua MODIS
20151005T06:05 UTC

Palangkaraya
Version 3 L2
Cloud Screened & QA

Optically thin cirrus clouds removed

Biomass burning smoke restored for high aerosol loading events
Temporal variability - monthly
Aerosol variability (AOD vs AE)
Temporal variability - daily
Remote Sensing implications

• Using a single model for atmospheric correction across the country is unsuitable

• Local At. Cor. particularly important in the months Aug-Oct

• Model needs to accommodate aerosols particularly from BB, and at least from this previous year less so for coarse fraction aerosols

• Need to link further with climate data that link with wind movement