

## 8.6 GOES R Algorithm Working Group: Aerosols – Steve Ackerman

### Proposed Work

- Develop and begin testing an appropriate strategy for the AWG Aerosol algorithm, with focus on dust, smoke and volcanic aerosols.
- Collaborate with Cloud and Aviation AWG groups.

### Summary of Accomplishments and Findings.

Figure 8.6.1 shows the development strategy for AWG aerosol detection algorithm. We have applied this strategy for dust detection via ABI, using MODIS data as a proxy and are continuing development using MODIS and SERVI observations. Candidate Algorithms exist for AVHRR, GOES (imager and sounder), MODIS and SERVI that make use of visible, near-infrared, and infrared channels, with some emphasis on the IR channels so that daytime and nighttime approaches are similar. Improvements are being made to make detection thresholds a function of several parameters (e.g. viewing and illumination geometry, surface type, and atmospheric profile). The approaches require ancillary data, such as surface type (e.g. water, land, desert). The overall strategy is:

- Start with current AVHRR, MODIS and aerosol (e.g. volcanic ash, dust and heavy smoke) detection algorithm and modify accordingly to ABI characteristics.
- Identify optimum method for aerosol properties and height estimation (likely 1-D variational approach)
- Identify test data sets (MODIS/AIRS/SEVERI/) and apply algorithm to test data. Coordinate algorithm with cloud and aviation AWG groups.

Figure 8.6.2 is a MODIS 0.86 micron reflectance and an IR window channel image of a dust storm over off the coast of Africa on March 8, 2006 at approach 12UTZ. Figure 8.6.3 shows the results of the dust algorithm as well as the MODIS cloud mask applied to the scene. This approach has been applied to several MODIS scenes and will soon be applied to SERVI data. We are trying to coordinate efforts as best we can with the AWG cloud group and the Aviation working group on volcanic aerosol detection. In that regard, we are exploring approaches to retrieving dust optical properties using a 1-DVAR approach developed by a visiting scientist in collaboration with CIMSS scientists.

# Algorithm Development Strategy

Algorithm Selection Procedure:

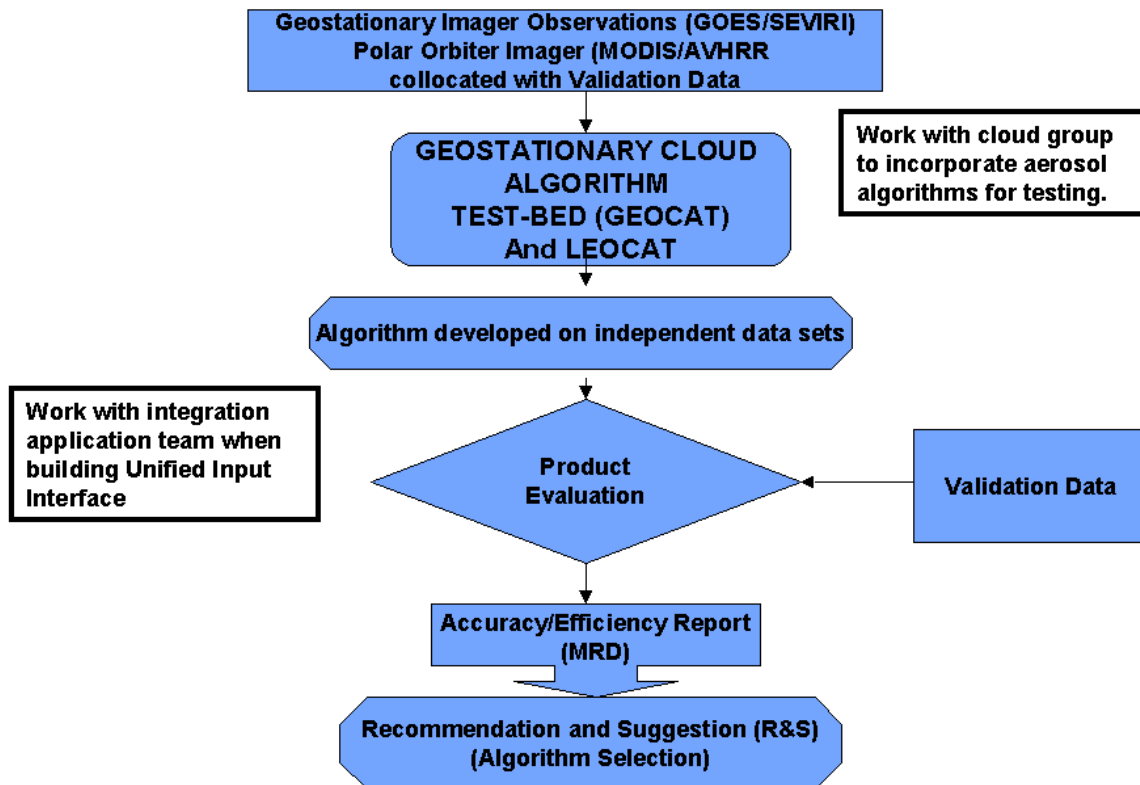
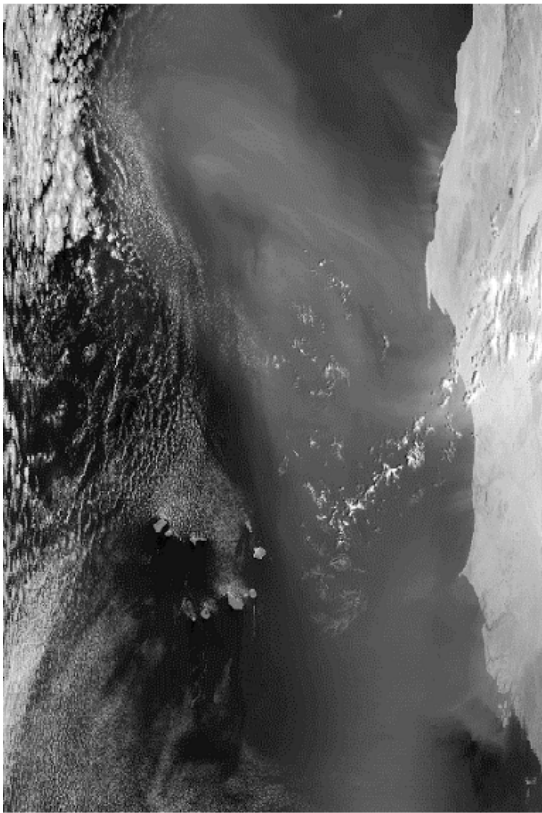
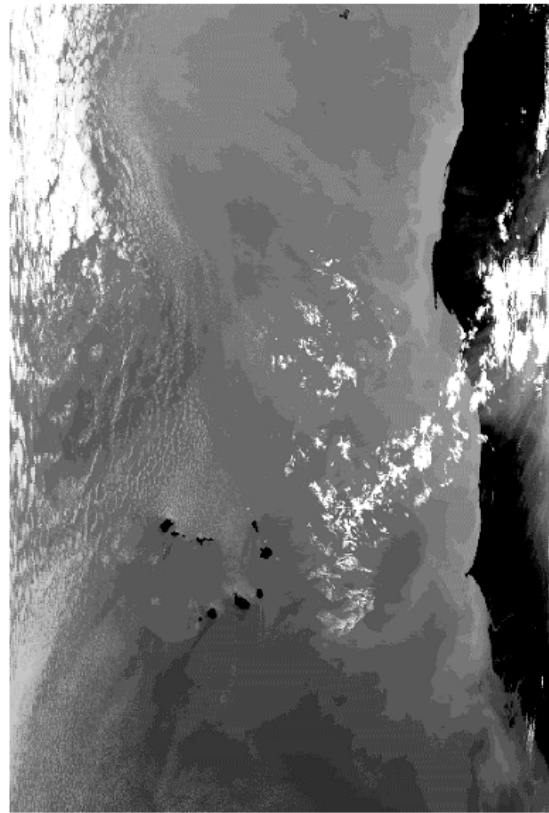


Figure 8.6.1: Development strategy for the AWG aerosol detection algorithm

Daytime Ocean Example #2 (Terra)  
March 8, 2006 12:05 UTC



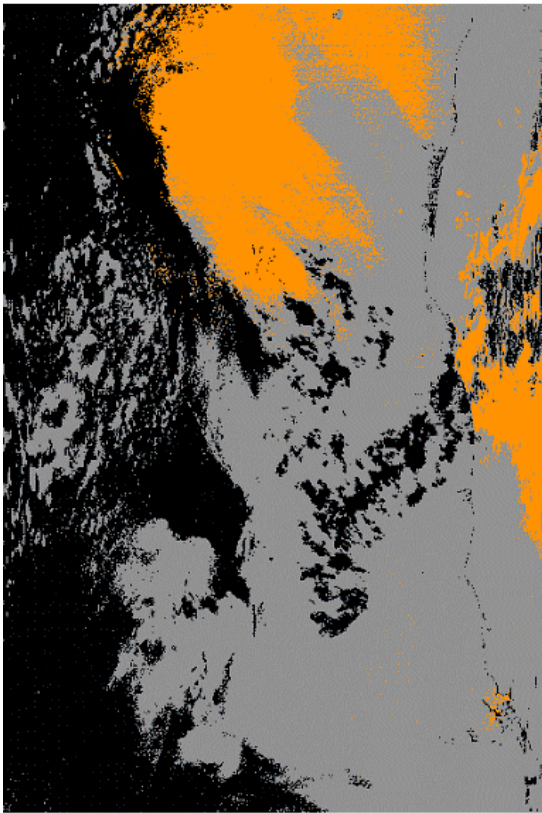
MODIS 0.86 um reflectance



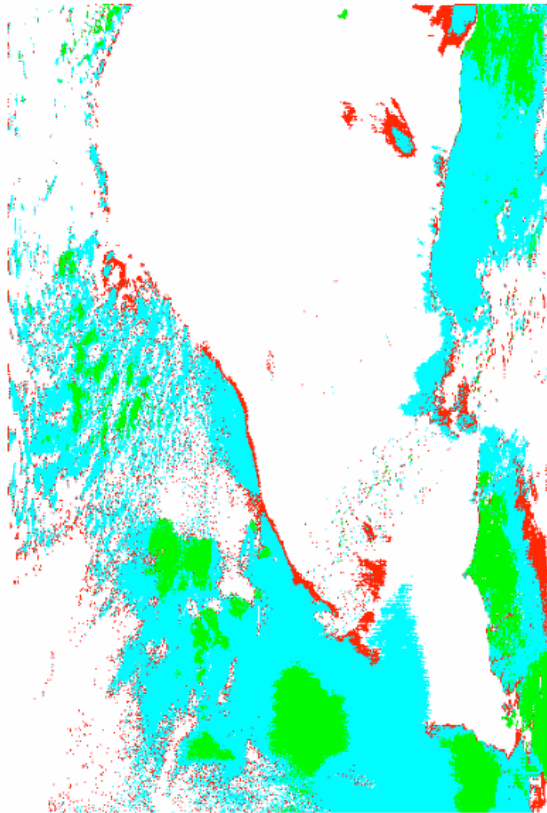
MODIS 11 um BT

**Figure 8.6.2:** MODIS 0.86 micron reflectance (left) and an IR window channel (right) image of a dust storm over off the coast of Africa on March 8, 2006 at approach 12UTZ.

Daytime Ocean Example #2 (Terra)  
March 8, 2006 12:05 UTC



Dust Indicated



MODIS Cloud Mask (MOD35)

**Figure 8.6.3:** Preliminary results of the dust algorithm (left) as well as the MODIS cloud mask (right) applied to the scene of Figure 8.6.2.