Advanced Spaceborne Thermal Emission & Reflection Radiometer

ALGORITHM STATUS

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Algorithm Overview for VNIR & SWIR

- Look-up table approach
  - LUT based upon output from a radiative transfer code
  - Code is used to generate at-satellite radiances for assumed atmospheric conditions and surface reflectance
  - Output is the basis for the look-up table
- Atmospheric parameters obtained from outside sources
- Same algorithm used for surface radiance and surface reflectance

Algorithm Status

Look-up Table Format

- The original plan was to have a look-up table based on the following parameters:
  - Solar zenith angle
  - Satellite view zenith angle
  - Satellite-sun relative azimuth angle
  - Molecular and aerosol scattering optical depths
  - Junge aerosol size distribution parameter
  - Aerosol single scatter albedo
  - Surface reflectance

- This plan has been modified based on comments made at the ATBD review and subsequent discussions
  - The LUT will be changed to better use the inputs from the MISR and MODIS aerosol products
  - The goal is to maintain consistency with the aerosol parameters used to retrieve the inputs to the correction
  - Strong emphasis will be placed on developing an ASTER-only atmospheric correction and adjacency effect correction

Algorithm Status

Look-up Table Format, Cont.

- The main portion of the LUT will now be developed using the MISR Aerosol Physical and Optical Properties Product (APOPP)
  - This "product" is the basis of the MISR aerosol retrieval
  - The MISR aerosol retrieval is used as input to the ASTER atmospheric correction

- This ensures that the ASTER atmospheric correction makes consistent use of the MISR aerosol retrieval

- APOPP will also be the basis of the climatology used for the atmospheric correction in the absence of outside data sources

Algorithm Status

Implementation Plan for VNIR & SWIR

- We will still generate a portion of the table based on the Junge assumption
  - This is because the software already exists to both generate and use the LUT in this form
  - Ensures that a product will be available at launch

- While we are generating Junge-based results, we will investigate how best to approach using the aerosol parameterizations from MISR
  - Cannot use all of the cases used by MISR because the table would become too large
  - Code to generate and use the new table needs to be developed

- Hope to begin generating the APOPP-portion of the table by the beginning of August
  - This should allow us to generate the full LUT (Junge- and APOPP-based) for delivery of the at-launch code

Algorithm Status

ASTER-only Correction for VNIR & SWIR

- The current plan for cases when there are no outside aerosol data sources is to use climatological assumptions

- It should be possible to use an approach similar to that developed by MODIS to determine the aerosol properties within the scene by using ASTER data alone
  - Use a dark-object approach with the SWIR bands used to determine the dark objects in the scene
  - Multiple SWIR bands and high-spatial resolution are advantages that ASTER has for this type of approach
  - Small swath width and lack of a "blue" band are disadvantages

- An ASTER-only correction that does not assume climatology should be available for the second software delivery after launch

Algorithm Status

Adjacency Effect for VNIR & SWIR

- The adjacency effect correction will be available for the first delivery after launch
  - The approach will use a post-processing philosophy to make it easier to implement in the production code
  - The correction may be available sooner depending on how well work goes on redeveloping the LUT

Algorithm Status

Thermal Infrared Atmospheric Correction

- Version 0
  - Basic implementation of algorithm
- Version 1.1
  - Incorporation of default atmospheric models (climatology) and
  - Assimilation model interface and
  - Data quality indicators (pixel by pixel)
- Version 2.0
  - Incorporation of interfaces to instrument profile data from (e.g. MODIS, MISR etc.) and
  - Topographic data bases (100m, 1 km, 10 km postings)

Algorithm Status

Temperature/Emissivity Separation Algorithm

- Basic code development is complete and tested
- Additions are in progress to accommodate potential failures in ASTER data
  - "bad" bands
  - unanticipated errors in atmospheric corrections
- QA requirements are still being met
  - propagating errors from atmospheric correction to emissivity
  - recalculating errors for the "bad" line situation
- Validation efforts are underway
  - running TES on existing data
  - collecting new data over test areas
- Cloud alarm for QA data plane is still being tested

Algorithm Status

ASTER DEM Standard Product Status

- ATBD-AST-09 Revised 16 August 1996
- COTS Software approach for Product Production at Launch
- Software Acquisition on Schedule

20 Feb 97	RFP Release by U.S.G.S.
31 Mar 97	Proposals Due
18 Apr 97	Test Datasets to Responsive Proposers
2 May 97	Evaluation Products Due
30 May 97	System Selection
15 Jul 97	System Installed at Land DAAC (EDC)
1 Jun 98	System Operational

Algorithm Status

Polar Cloud Mask

- Prototype of the daytime cloud mask is now available for JPL product integration
- The cloud mask runs with PGS (Product Generation System) Toolkit on LANDSAT TM data
- The algorithm combines
  - Adaptive Thresholding as the first classification step, and
  - A set of Neural Networks trained on specific collections of classes
- The daytime mask achieves ~95% overall accuracy in clear/ cloudy distinction
- Effort is now concentrated on the development of the nighttime cloud mask using MAS and TIMS data
- The development of nighttime cloud mask is hindered by the lack of polar nighttime data with adequate thermal spectral information

Science Software

Status

- Version 1
  - Completed on 1/97
  - Delivered to ESDIS and Japan on 2/97
- Version 1.1
  - This version will be integrated in the ECS testbed
  - It is in final development
  - Integration into the ECS system at EDC will begin -- 6/97
- Version 2
  - Launch version
  - Will be integrated into ECS B0
  - Development will begin - 6/97
  - Will be delivered to EDC for integration into the ECS B0 system -- 2/98

Science Software

Status, Cont.

- DEM COTS software
  - The revised RFP was sent out 2/97
  - Deadline for responses 3/97
  - Vendor selected 7/97
  - Software operational at EDC 5/98