AMSR ATBD Algorithms

- Level 1C -- Peter Ashcroft and Frank Wentz
- Ocean Parameters -- Frank Wentz
- Sea Ice -- Don Cavalieri and Joey Comiso
- Snow Water Equivalent -- Al Chang and Al Rango
- Rainfall -- Tom Wilheit, Chris Kummerow, and Ralph Ferraro
- Land Surface Parameters -- Eni Njoku

AMSR Level 1C Algorithm

- Obtains spatially consistent data sets corrected for antenna spillover and cross-polarization effects
- Footprint sizes of 58, 37, 21, 11, and 5 km for the 6.9, 10.7, 18.7/23.8, 36.5, and 89 GHz observations, respectively
- For each Level 1C observation, a set of coefficients describes the relative weights of the neighboring observations that are combined to produce the Level 1C value; the weighting coefficients are determined by the Backus-Gilbert method

AMSR Ocean Parameters

- Sea surface temperature

  (58 km resolution; hope for 0.5 K accuracy)

- Near-surface wind speed

  (38 km resolution; expect better than 1.0 m/s accuracy)

- Vertically integrated water vapor

  (24 km resolution; expect better than 1.0 mm accuracy)

- Vertically integrated cloud liquid water

  (13 km resolution; expect better than 0.02 mm accuracy)

AMSR Sea Ice Parameters

- Standard products
  - Sea ice concentration

    (25 km resolution; better than 7% accuracy)
  - Sea ice temperature

    (50 km resolution; 2.5 K estimated accuracy)
  - Snow depth on sea ice

    (25 km resolution; 10 cm estimated accuracy)
- Special products
  - Sea ice motion, Arctic sea ice types, Sea ice surface classes

AMSR Snow Water Equivalent Parameter

- Five-day snow water equivalent maps, gridded on a 25-km equal-area grid
- Valid only under dry conditions (wet conditions will be screened out)
- Estimated accuracies of 25% as long as the snow cover is at least 15 cm thick

AMSR Rainfall Parameters

- Instantaneous ocean rainfall
  - based on Bayesian inversion
- Instantaneous land rainfall
  - based on empirical relationships using ground-based radar observations
- Monthly rainfall gridded into 5º latitude x 5º longitude boxes

AMSR Land Surface Parameters

- Surface soil moisture
  (0.06 g/cm^3 accuracy, 76 km resolution)
- Land surface temperature
  (2.5 K accuracy, 76 km resolution)
- Vegetation water content
- Higher-level, derived products:
  - vertical moisture gradients in the soil
  - vertical temperature gradients in the soil
  - energy fluxes at the land surface

Major Divisions of the AIRS Standard-Product Algorithm

- Microwave-Only First-Guess Algorithm
  -- Phil Rosenkranz, Dave Staelin, et al.
- First-Product Algorithm
  -- Mitch Goldberg, Larry McMillin, et al.
- Final-Product Algorithm
  -- Joel Susskind et al.

AIRS Microwave-Only Algorithm

- Uses AMSU and HSB to obtain estimates of:
  - surface skin temperature
  - spectral surface emissivity
  - water vapor profile
  - cloud liquid water profile
  - (eventually, cloud ice)

AIRS First-Product Algorithm

- Enables a rapid derivation of the following parameters:
  - spectral surface emissivity
  - surface skin temperature
  - temperature and moisture profiles
- Makes products available within two hours, usable operationally
- Provides initial conditions for the Final-Product Algorithm

AIRS Final-Product Algorithm

- Gets refined products, more accurate than those from the Microwave-Product and First-Product Algorithms
- Uses liquid water and spectral surface emissivity from the Microwave-Product Algorithm and surface skin temperature and temperature moisture profiles from the First-Product Algorithm

AIRS Final Products

- Atmospheric temperature profiles
  - 1 K accuracy in 1 km thick layers in the troposphere
  - 1 K accuracy in 4 km thick layers in the stratosphere
- Atmospheric humidity profiles
- Total precipitable water vapor
- Sea surface temperatures
- Land surface temperatures
- Spectral surface emissivity
- Fractional cloud cover, cloud spectral infrared emissivity, and cloud-top pressure and temperature
- Total ozone column density and density in three layers of atmospheric ozone