

AIRS/AMSU/HSB

Data Assimilation Workshop

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H. H. Aumann
AIRS Project Scientist

AIRS/AMSU/HSB

AIRS Data Assimilation Workshop

Data source

supporting data and software
simulated data for software validation
Planned in-orbit data validation

Data Assimilation

Forecast Impact Assessment

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Initial Verification and Validation Phase

Verification uses internal indicators that the instrument performance is consistent with the pre-launch calibration and the calibration (level 1b) software

Validation uses external indicators to verify that the radiance produced by the level 1b software agree with geophysical observables:

- T(p), q(p) from colocated radiosondes

- T(p), q(p) from aviation forecast

- SST from Reynolds weekly forecast

- SST from the global marine report

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Verification and Validation Phase

Instrument operation start	Launch + 0.5 - 1 month
Initial Verification	Launch + 2 months
Initial Validation using SST and selected ground validation $T(p), q(p)$	Launch + 3 months
Internal update of level 1b software	
Instrument and level 1b software stable	Launch + 4 months
Validation using radiosondes and aviation forecast starts	
Update of level 1b at the DAAC	Launch + 7 months
ARM/CART radiosonde campaign	
Global bias assessment	
Level 2 ($T(p), q(p)$) software validation demonstration of 1K/1km	
Update of level 2 at the DAAC	
Routine production/distribution from the DAAC	Launch + 12 month

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Level 1b Validation before Level 2 Validation

Level 1b validation using geophysical parameters

Statistical analysis of global data or spot (ARM/CART) data

AIRS (calculated.TOA - observed) under “cloud-free” conditions

Result is channel dependent bias and standard deviation.

Bias may show more or less obvious spectral dependence

scan angle asymmetry

sun angle, latitude, surface type, etc. dependence

NASA/JPL focus: Spot evaluation. Understand the source of any bias and minimizing bias at the source (level 1b or spectroscopy), if possible.

NOAA/NCEP, DAO, ECMWF focus: Global bias stability evaluation and bias elimination

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Level 2 Validation and Assimilation after Level 1b Validation

NASA/JPL and AIRS Science team

Level 2 (geophysical product) Validation (T(p), q(p), T_surface, cloud_amount, cloud_height, Ozone, surface emissivity, ...
statistics of (T(p)_observed - T(p)_retrieved)
research product development: CO2 retrieval, etc.

NOAA/NCEP, DAO, ECMWF

level 1b assimilation
statistics of (T(p)_observed - T(p)_predicted)
Impact assessment

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Level 2 Validation and Assimilation after Level 1b Validation

Level 1b and level 2 validation, AIRS data assimilation and forecast impact assessment schedule can be expedited by

pre-launch data simulation to practice and reconcile methodologies

post-launch coordination of results regarding

calculated_TOA flux

data pre-screening and “cloud-free” selection

bias evaluation

effective noise evaluation

plus

We have 7 months until launch + AIRS/AMSU/HSB on the EOS Aqua.

AIRS Science Team Meeting Agenda

Aumann	Overview
Lord	NCEP Assimilation and Impact Assessment Plan
Atlas	DOA Assimilation and Impact Assessment Plan
McNally	ECMWF Assimilation and Impact Assessment Plan
Saunders	UKMeto Assimilation and Impact Assessment Plan
Goldberg	Thinned data from NOAA (simulated and real)
Strow	SRF's and validation schedule
Strow	Forward Algorithm
VanDelst	Forward and Inverse Tangent Algorithm
McMillin	Forward Algorithm NOAA vers. NASA
McMillin	Bias Evaluation and tuning
Susskind	Bias and noise evaluation
Goldberg	Cloud free identification: Why and how
Rizzi	Cloud identification
Kalnay	Cloudy field comparison: AIRS vers. Forecast
Plans/Action Items	