



National Aeronautics and
Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

Project Science Report

V6 Status

V7 Vision

George Aumann
AIRS Project Scientist

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V6 Status Summary

Feature	October 2008	May 2009	April 2011
Level 1B			
Improve Spectral Calibration	Nearly Complete	Algorithm Understood Currently prototyping, testing	Factor 10 better than FRD
Channel Properties Enhancement (Dynamic)	Conceptual design completed	No change Deferred	Minimal Impact V7
New Radiometric Calibration Coefficients	(Undiscovered)	Evaluating impact	Minimal Impact V7

V6 Status Summary

Feature

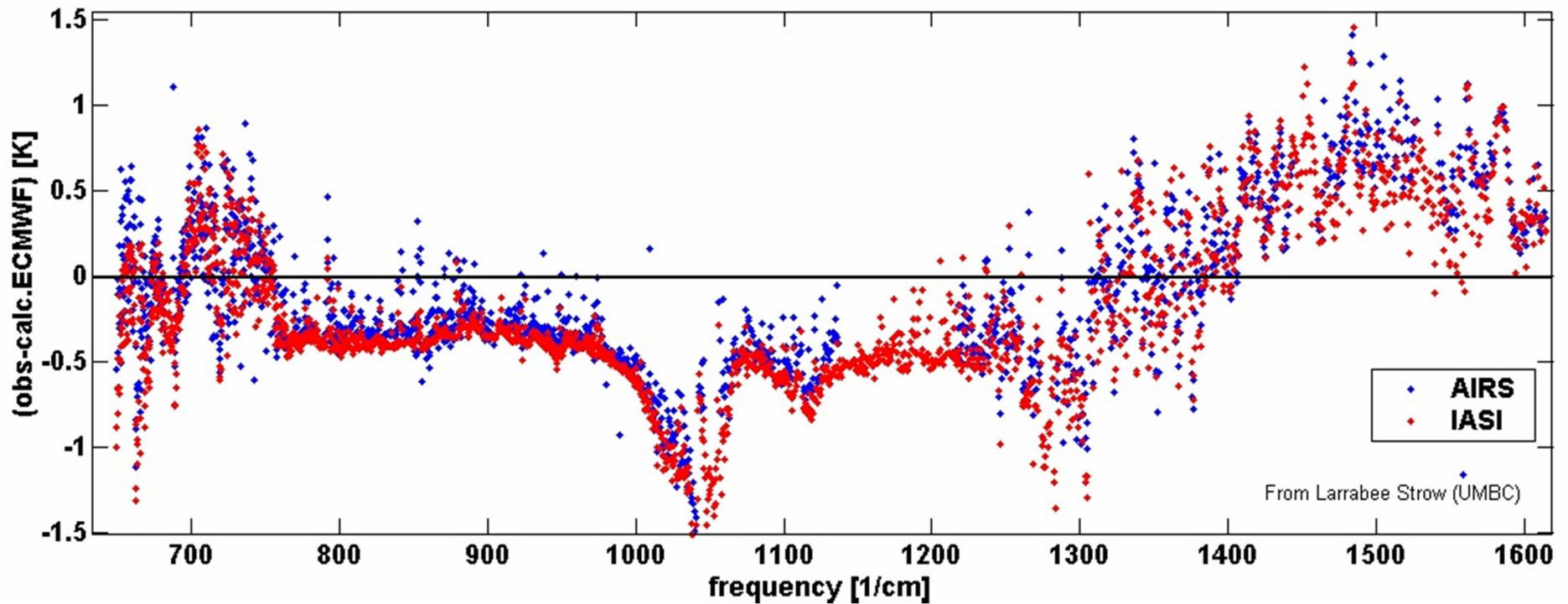
October 2008

May 2009

April 2011

Level 1B

clear night trop ocean 200707-200902



AIRS and IASI fit the ECMWF analysis at the fraction of 1 K level

V6 Status Summary

Feature	October 2008	May 2009	April 2011
Level 1C			
Enable spectral shifting.	In process	Prototyping concepts completed	Done
		Cleaning alg. being converted to C	Done
		Spectral shifting algorithm delivered	Done

V6 Status Summary

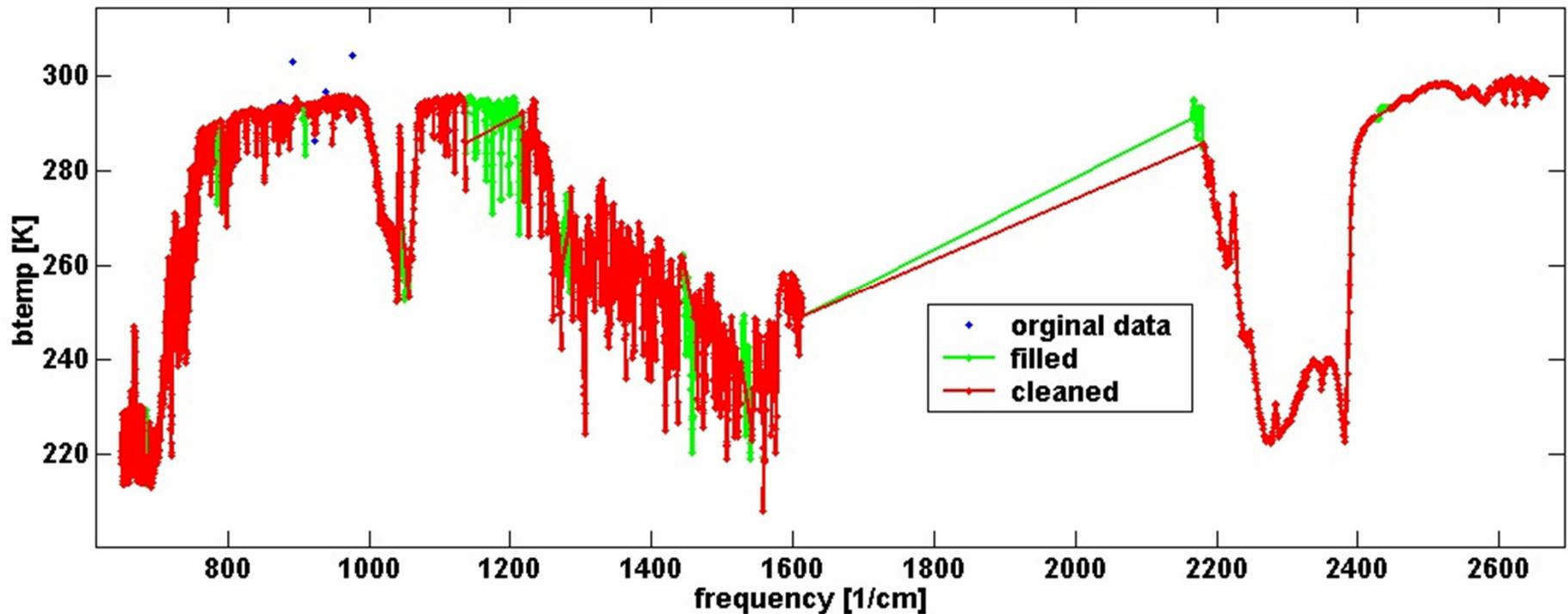
Feature

October 2008

May 2009

April 2011

20050828.75.clear.spectrum



This is a sample spectrum from the AIRS Climate Subset

V6 Status Summary

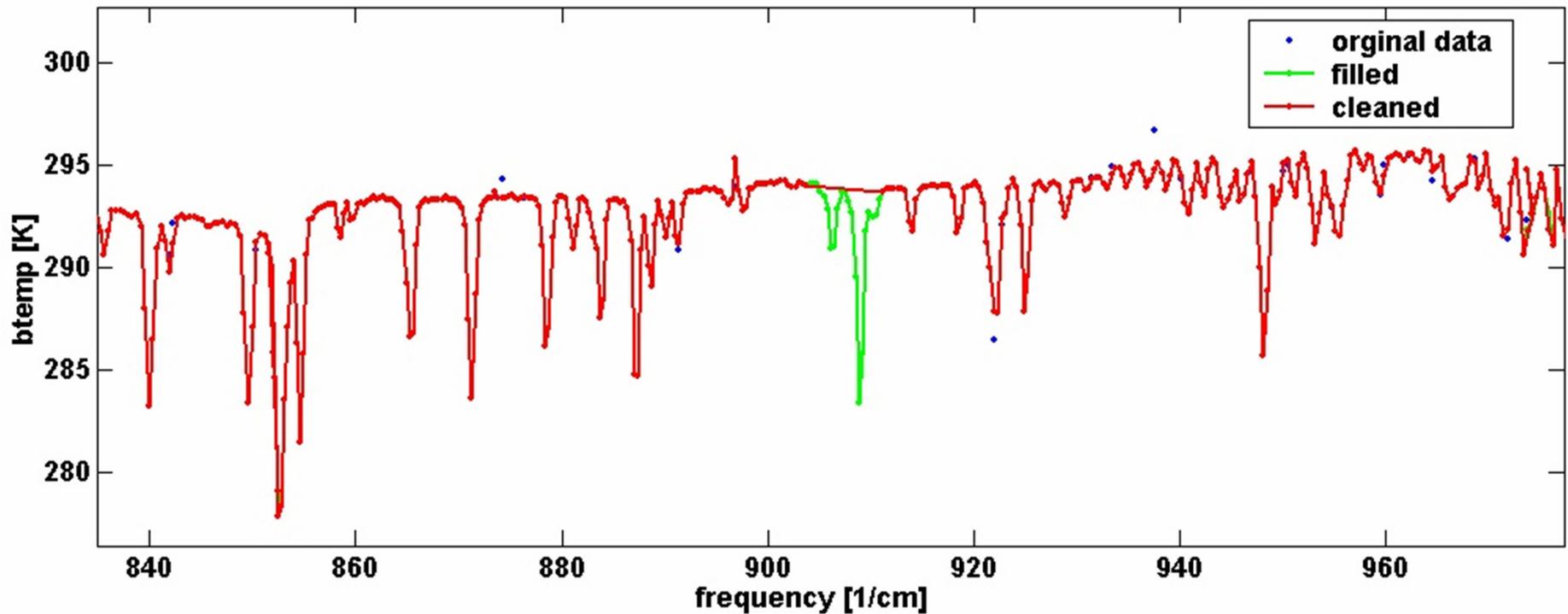
Feature

October 2008

May 2009

April 2011

20050828.75.clear.spectrum



V6 Status Summary

Feature

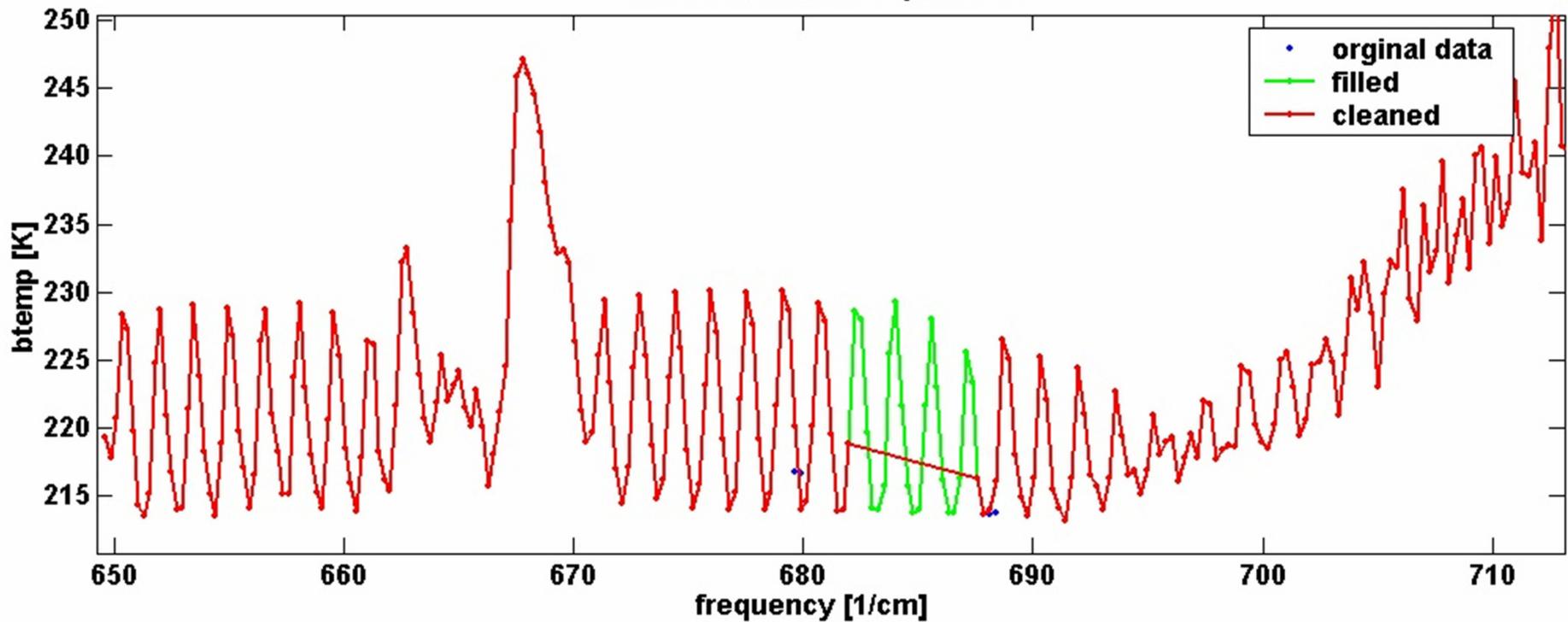
October 2008

May 2009

April 2011

Level 1C

20050828.75.clear.spectrum





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V6 Status Summary

Feature	October 2008	May 2009	April 2011
Level 2 Cloud Clearing			
Noise larger than expected and not Gaussian			

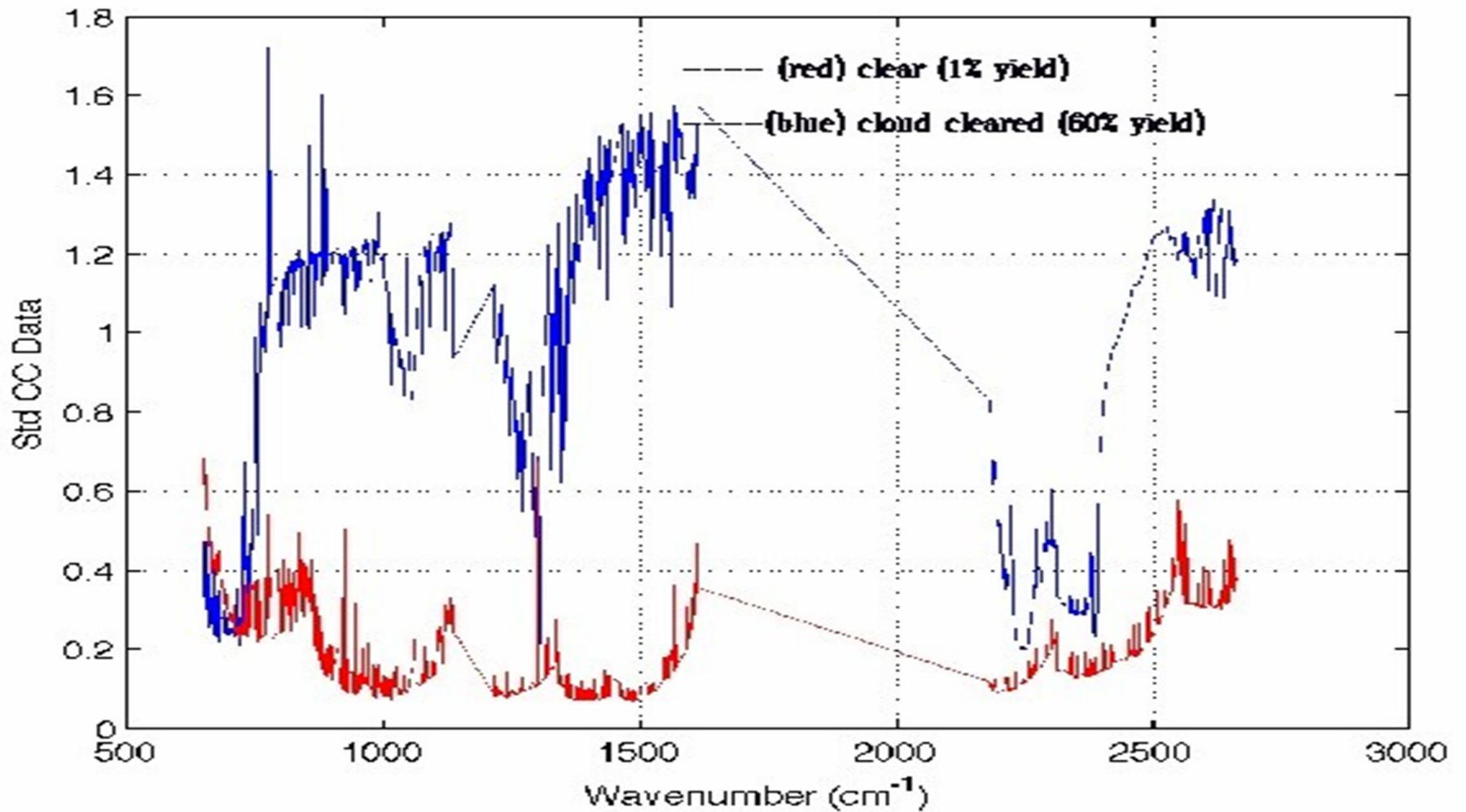
V6 Status Summary

Feature

October 2008

May 2009

April 2011



V6 Status Summary

Feature	October 2008	May 2009	April 2011
Level 2 Cloud Clearing			
Noise larger than expected and not Gaussian	Contributing factors not well understood	Fundamental 3x3 cloud clearing assumptions are not always satisfied Error propagation required	Chris Barnett ROSES proposal funded

V6 Status Summary

Feature	October 2008	May 2009	April 2011
Level 2			
Bias in mid-Trop temp. and water vapor has unrealistic trend.	Contributing factors not well understood	Replacing regression-based first-guess with climatology Try Neural Net first guess Change the CO ₂ covariance	Significantly reduced trend

V6 Status Summary

Feature	October 2008	May 2009	April 2011
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Level 2 (cont'd.)			
Unacceptable downward trend in yield	Some improvement, more work needed. Code not integrated.	Code prototyped at GSFC but not integrated into baseline code at JPL.	Trend eliminated
Improve Error Estimation	No improvement to date	Issue remains open	V7
RTA Improvement - variable frequency, trace gases	Algorithmic work completed	RTA code complete, but not integrated into L2.	Integrated and tested

V6 Status Summary

Feature	October 2008	May 2009	April 2011
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Level 2 (cont'd.)			
Improve Boundary Layer Sensitivity	Added new CC channels	No significant improvement	No significant improvement
Retrieve Surface Emissivity	Work completed, but not integrated	Code delivered and integrated into L2. Ready for testing.	Use MODIS emissivity climatology

V6 Status Summary

Feature	October 2008	May 2009	April 2011
Level 2 (cont'd.)			
Retrieve Mid-Tropospheric CO ₂	Prototype post-L2 CO ₂ retrieval demonstrated	CO ₂ in V5 as Post-L2 PGE.	Planned post-V6 delivery
Potential Loss of AMSU-A	Work not begun on IR-Only Retrieval	IR-Only retrieval with minor degradation without AMSU	Delivered

V6 Status Summary

Feature	October 2008	May 2009	April 2011
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Level 3

Reduce Sampling Bias Effects	Concepts under development	Concepts still under development	Significant progress
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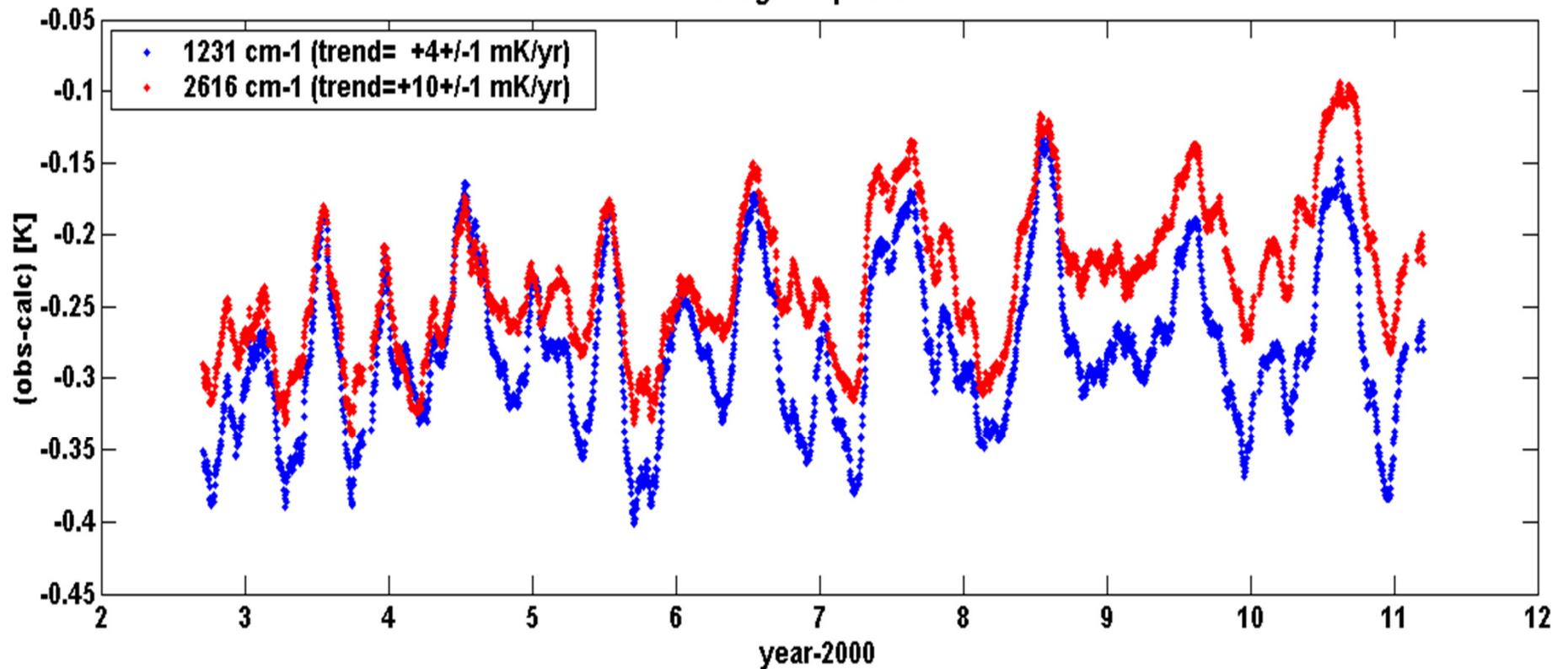
V7 Vision

Feature	April 2011		
Position AIRS L1b as premier climate record	(obs-calc) bias and trend AIRS Climate Subset		
Optimize L2 for climate processes	Add external data and uncertainty propagation Focus on what ECMWF does not do well: Inversions, supersaturation, clouds, deep convection, minor gases		
Single footprint retrievals	Use MODIS subpixel data		

V7 Vision

Position AIRS L1b as premier climate record

clear night tropical ocean



From AIRS Calibration Data Subset (ACDS) available from the GSFC DAAC



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V7 Vision

Single FOV Cloud Clearing using subpixel information



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V7 Vision

Single FOV Cloud Clearing using subpixel information

**Can MODIS 1 km sounding and surface channels be used
for Cloud Clearing in the boundary layer?**



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V7 Vision

Single FOV Cloud Clearing using subpixel information

Infrared multidetector spectrometer for remote sensing of temperature profiles in the presence of clouds

H. H. Aumann and M. T. Chahine

Applied Optics, Vol. 15, Issue 9, pp. 2091-2094 (1976) doi:10.1364/AO.15.002091

Abstract

An infrared multidetector spectrometer with channels in the 4.3- μm and 15- μm CO₂ bands for the remote sensing of temperature profiles in the presence of clouds is described. Results obtained from aircraft flights in July 1975 over ocean sites under various conditions of cloudiness demonstrate the capability of the dual frequency technique to recover surface temperatures to an accuracy of ± 0.5 K in the presence of up to 90% cloud cover.

Citation

H. H. Aumann and M. T. Chahine, "Infrared multidetector spectrometer for remote sensing of temperature profiles in the presence of clouds," Appl. Opt. **15**, 2091-2094 (1976)