REPORT TO THE BOARD OF DIRECTORS
COOPERATIVE INSTITUTE FOR METEOROLOGICAL
SATELLITE STUDIES (CIMSS)
17 DECEMBER 1999

A REPORT from the

COOPERATIVE
INSTITUTE FOR
METEOROLOGICAL
SATELLITE
STUDIES
REPORT TO THE BOARD OF DIRECTORS
COOPERATIVE INSTITUTE FOR METEOROLOGICAL
SATELLITE STUDIES (CIMSS)
17 DECEMBER 1999

prepared by
Thomas Achtor
Leanne Avila
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CIMSS BOARD OF DIRECTORS
December 1999

Virginia S. Hinshaw, Chair
Dean, UW Graduate School

Steven A. Ackerman
Director, CIMSS

Henry E. Revercomb
Director, Space Science and Engineering Center, UW

Matthew Hitchman
Chair, Department of Atmospheric and Oceanic Sciences, UW

Greg Withee
Assistant Administrator for Satellite and Information Services, NOAA/NESDIS

James Purdom
Director, Office of Research and Applications, NOAA/NESDIS

Elaine Prins
Leader, Advanced Satellite Products Team, NOAA/NESDIS

Ghassem Asrar
Associate Administrator for Earth Science, NASA

Vincent Salomonson
Director, Earth Sciences Directorate, NASA Goddard Space Flight Center

Jerry Newsom
Director, Earth and Space Sciences Program Office, NASA Langley Research Center

Invited Representatives:
Terry Millar
Associate Dean for Physical Sciences, UW Graduate School

Mary Glackin
Deputy Assistant Administrator for Satellite and Information Services, NOAA/NESDIS

Franco Enaudi
Chief, Laboratory for Atmospheres, NASA Goddard Space Flight Center

Leonard McMaster
Director, Atmospheric Sciences Competency, NASA Langley Research Center
CIMSS SCIENTIFIC ADVISORY COUNCIL
June 1997

P. K. Rao, NOAA/NESDIS

Jerry Newsom, NASA Langley Research Center

Robert Fox, UW/SSEC

John Anderson, UW Department of Atmospheric and Oceanic Sciences

Steven Ackerman, UW Department of Atmospheric and Oceanic Sciences

Henry Revercomb, UW/SSEC/CIMSS
An Overview of the
Cooperative Institute for Meteorological Satellite Studies (CIMSS)
at the University of Wisconsin-Madison

CIMSS was established in 1980 to formalize and support cooperative research between the National Oceanic and Atmospheric Administration's (NOAA) National Environmental Satellite, Data, and Information Service (NESDIS) and the University of Wisconsin-Madison's Space Science and Engineering Center. Sponsorship and membership of the Institute was expanded to include the National Aeronautics and Space Administration (NASA) in 1989.

During the 1980s, a need emerged for joint federal - university research centers to support the NOAA weather research program. The CIMSS was established to focus on the development and testing of the operational utility of new weather satellite observing systems to improve weather analysis and forecasts. Federally sponsored university institutes such as CIMSS have proved to be very cost effective organizations for conducting research and development programs.

CIMSS develops and successfully implements techniques and products for using geostationary and polar orbiting weather satellite visible, thermal and microwave radiation observations to improve forecasts of severe storms, including tornadoes and hurricanes. CIMSS plays a major role in the transfer of new technology into operational practice.

CIMSS plays a major role in instrument design and testing, and related software development, for improved space-based measurements of the earth's atmosphere. CIMSS is very active in national and international field programs, testing new instrumentation, data processing systems and assessing the geophysical utility of measurements.

Current research also focuses on the development and testing of computer-based analysis and forecast techniques that use observations from existing and planned spacecraft and ground-based weather observing systems as part of a national program to greatly improve weather forecast capabilities for the next decade. The optimal use of satellite data in climate and global change studies has become another essential part of the CIMSS mission.

CIMSS serves as an international center for research on the interpretation and uses of operational and experimental satellite observations and remote sensing data acquired from aircraft and the ground. These data are applied to a wide variety of atmospheric and oceanographic studies and evaluated for their potential operational utility. The CIMSS international role is further strengthened through its visiting scientist program that hosts sabbaticals for several foreign scholars each year.
CIMSS' relationship with the UW-Madison Department of Atmospheric and Oceanic Sciences provides graduate student research support to more than ten students per year. The education/research center link provides an excellent path for young scientists entering geophysical fields.

Visit the CIMSS WWW Home Page at  http://cimss.ssec.wisc.edu

Organizational Structure within the University of Wisconsin System

Research institutions with the University of Wisconsin system are administered through the Graduate School. The Space Science and Engineering Center (SSEC) is a research institution employing roughly 200 scientists, engineers, programmers and support staff. The SSEC program includes development of the Man-computer Interactive Data Access System (McIDAS), development and construction of spacecraft instrumentation and scientific investigations of earth and other planetary environmental systems. Within the SSEC, the Cooperative Institute for Meteorological Satellite Systems (CIMSS) is a research arm conducting scientific investigation from passive remote sensing systems for meteorological and surface-based applications.
<table>
<thead>
<tr>
<th>CIMSS PERSONNEL SUMMARY: (72 Associates)</th>
<th>December 1999</th>
</tr>
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<tbody>
<tr>
<td><strong>CIMSS ADMINISTRATION: (4)</strong></td>
<td></td>
</tr>
<tr>
<td>Steve Ackerman</td>
<td>Director</td>
</tr>
<tr>
<td>Tom Achor</td>
<td>Senior Research Program Manager</td>
</tr>
<tr>
<td>Leanne Avila</td>
<td>Project Assistant II</td>
</tr>
<tr>
<td>Rosalyn Pertzborn</td>
<td>Associate Outreach Specialist</td>
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<tr>
<td><strong>UNIVERSITY PRINCIPAL INVESTIGATORS: (7)</strong></td>
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<tr>
<td>George Diak</td>
<td>Senior Scientist</td>
</tr>
<tr>
<td>Allen Huang</td>
<td>Associate Scientist</td>
</tr>
<tr>
<td>Bob Knuteson</td>
<td>Assistant Scientist</td>
</tr>
<tr>
<td>Robert Pincus</td>
<td>Visiting Professor</td>
</tr>
<tr>
<td>Bill Raymond</td>
<td>Senior Scientist</td>
</tr>
<tr>
<td>Henry Revercomb</td>
<td>Senior Scientist</td>
</tr>
<tr>
<td>Chris Velden</td>
<td>Assistant Scientist</td>
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<tr>
<td><strong>NOAA/NESDIS ASPT PERSONNEL: (7)</strong></td>
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<tr>
<td>Paul Menzel (PI)</td>
<td>Senior Scientist</td>
</tr>
<tr>
<td>Elaine Prins (PI)</td>
<td>Team Leader</td>
</tr>
<tr>
<td>Robert Aune</td>
<td></td>
</tr>
<tr>
<td>Geary Callan</td>
<td></td>
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<tr>
<td>Jeff Key (PI)</td>
<td></td>
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<tr>
<td>Tim Schmit</td>
<td></td>
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<tr>
<td>Gary Wade</td>
<td></td>
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<td><strong>NASA PERSONNEL (1)</strong></td>
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<tr>
<td>Bryan Baum (PI)</td>
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<td><strong>UNIVERSITY SCIENTIFIC AND PROGRAMMING STAFF (31)</strong></td>
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<tr>
<td>Scott Bachmeier</td>
<td>Assistant Researcher</td>
</tr>
<tr>
<td>Gail Bayler</td>
<td>Senior Research Specialist</td>
</tr>
<tr>
<td>Ralph Dedecker</td>
<td>Senior Instrument Technician</td>
</tr>
<tr>
<td>Joleen Feltz</td>
<td>Research Specialist</td>
</tr>
<tr>
<td>Wayne Feltz</td>
<td>Assistant Researcher</td>
</tr>
<tr>
<td>Veronica Fisher</td>
<td>Research Intern</td>
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<tr>
<td>Richard Frey</td>
<td>Assistant Researcher</td>
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<tr>
<td>Ray Garcia</td>
<td>Instrument Technician</td>
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<tr>
<td>Liam Gumley</td>
<td>Associate Information Innovator</td>
</tr>
<tr>
<td>Mat Gunshor</td>
<td>Senior Research Specialist</td>
</tr>
<tr>
<td>Ben Howell</td>
<td>Researcher</td>
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<tr>
<td>Dan LaPorte</td>
<td>Associate Researcher</td>
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<tr>
<td>Szu Chia Lee</td>
<td>Research Specialist</td>
</tr>
<tr>
<td>Jun Li</td>
<td>Associate Researcher</td>
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<tr>
<td>John Mecikalski</td>
<td>Assistant Researcher</td>
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<tr>
<td>Chris Moeller</td>
<td>Associate Researcher</td>
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<tr>
<td>Fred Nagle</td>
<td>Researcher</td>
</tr>
<tr>
<td>Shaimi Nasiri</td>
<td>Research Intern</td>
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<tr>
<td>Jim Nelson</td>
<td>Associate Researcher</td>
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<tr>
<td>Tim Olander</td>
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<tr>
<td>Tom Rink</td>
<td>Associate Instrumentation Tech</td>
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<td>Tony Schreiner</td>
<td>Associate Researcher</td>
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<tr>
<td>Chris Sisko</td>
<td>Assistant Instrumentation Innovator</td>
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<td>Dave Stettner</td>
<td>Assistant Researcher</td>
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<tr>
<td>Kathy Strabala</td>
<td>Assistant Researcher</td>
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<tr>
<td>Jonathan Thom</td>
<td>Research Specialist</td>
</tr>
<tr>
<td>Dave Tobin</td>
<td>Assistant Researcher</td>
</tr>
<tr>
<td>Name</td>
<td>Position</td>
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<tr>
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</tr>
<tr>
<td>Tom Whittaker</td>
<td>Senior Information Innovator</td>
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<tr>
<td>Hal Woolf</td>
<td>Researcher</td>
</tr>
<tr>
<td>Xiangqian Wu</td>
<td>Assistant Scientist</td>
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<tr>
<td>Tom Zapotocny</td>
<td>Associate Scientist</td>
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<table>
<thead>
<tr>
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<tr>
<td>VISITING SCIENTISTS: (2)</td>
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<tr>
<td>Youri Plokenko</td>
<td>NCAR Fellow</td>
</tr>
<tr>
<td>Robert Rabin</td>
<td>National Severe Storms Laboratory</td>
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<table>
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<tr>
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<td>POST DOCTORS: (0)</td>
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<table>
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<tr>
<td>STAFF AT OTHER SITES: (6)</td>
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<tr>
<td>Bormin Huang</td>
<td>LaRC/Assistant Researcher</td>
</tr>
<tr>
<td>Dan DeSlover</td>
<td>LaRC/Assistant Researcher</td>
</tr>
<tr>
<td>Jim Jung</td>
<td>NSC/Assistant Researcher</td>
</tr>
<tr>
<td>Paul vanDelst</td>
<td>NSC/Associate Researcher</td>
</tr>
<tr>
<td>Ma Xia Lin</td>
<td>Associate Researcher</td>
</tr>
<tr>
<td>Connie Spinoso</td>
<td>BoM/Research Associate</td>
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<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>GRADUATE STUDENTS: (11)</td>
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<tr>
<td>Paolo Antonelli</td>
<td>pH Smith</td>
</tr>
<tr>
<td>Kurt Brueske</td>
<td>pH Ackerman/Velden</td>
</tr>
<tr>
<td>Nick Nalli</td>
<td>pH Smith</td>
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<tr>
<td>Ed Mierkiewicz</td>
<td>pH Roessler</td>
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<tr>
<td>Xuanji Wang</td>
<td>pH Ackerman/Key</td>
</tr>
<tr>
<td>Howard Berger</td>
<td>MS Ackerman/Velden</td>
</tr>
<tr>
<td>Gregg Gallina</td>
<td>MS Ackerman/Velden</td>
</tr>
<tr>
<td>Monica Harkey</td>
<td>MS Ackerman/Baum</td>
</tr>
<tr>
<td>Erik Olson</td>
<td>MS Ackerman</td>
</tr>
<tr>
<td>Chris Schmidt</td>
<td>MS Menzel</td>
</tr>
<tr>
<td>Hong Zhang</td>
<td>MS Menzel</td>
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<tr>
<td>HOURLY EMPLOYEES (3)</td>
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<tr>
<td>Jason Brunner</td>
<td>Achtor</td>
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<tr>
<td>Steve Dutcher</td>
<td>Dedecker</td>
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<tr>
<td>Robin Tanamachi</td>
<td>Knuteson</td>
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</table>
CIMSS SPENDING HISTORY: 1982-1999
CIMSS FY99 SPENDING
Total: $6.4M
**CIMSS GRANT AND CONTRACT SUMMARY**

*By Agency*

*October 1999*

<table>
<thead>
<tr>
<th>NOAA PROGRAMS</th>
<th>AGENCY</th>
<th>PI/PM</th>
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<tbody>
<tr>
<td>2205 ABS/ABI STUDIES</td>
<td>NOAA</td>
<td>Huang/Schmit</td>
</tr>
<tr>
<td>Studies in support of NOAA next generation Sounder and Imager.</td>
<td></td>
<td></td>
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<tr>
<td>8010 NOAA BASE</td>
<td>NOAA</td>
<td>Ackerman/Achtor</td>
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<tr>
<td>Broad support for CIMSS programs and infrastructure, including program management, education and outreach, students, visiting scientists, and workshops and seminars.</td>
<td></td>
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<tr>
<td>8041 LANDFALLING HURRICANES</td>
<td>NOAA</td>
<td>Velden</td>
</tr>
<tr>
<td>Collaboration with the NCEP/TPC to create an improved low level wind analysis using GOES VIS cloud winds. Includes student working at TPC the past summer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8042 WINDS OSSE</td>
<td>NOAA</td>
<td>Huang / Velden</td>
</tr>
<tr>
<td>Observing System Simulation Experiment using GOES and future weather satellite wind data sets in forecast analysis and prediction system.</td>
<td></td>
<td></td>
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<tr>
<td>8043 HIGH PERFORMANCE COMPUTING</td>
<td>NOAA</td>
<td>Hibbard / Whittaker</td>
</tr>
<tr>
<td>Development of high level protocols for Earth Science information, applicable to a wide variety of NOAA data holdings, encoding all the necessary metadata to allow the data to be fused in distributed, collaborative 3-D visualizations.</td>
<td></td>
<td></td>
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<tr>
<td>8050 GOES PRODUCT ASSURANCE</td>
<td>NOAA</td>
<td>Ackerman/Achtor</td>
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<tr>
<td>Support for the GOES I-M Product Assurance Program (GIMPAP). Includes activities in retrieval, satellite cloud product, derived product imagery, biomass burning, SST, collaboration with NWS, instrument calibration / navigation, GPS, and CIMSS NSC and UCAR support.</td>
<td></td>
<td></td>
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<tr>
<td>8059 VISIT</td>
<td>NOAA</td>
<td>Ackerman/Bachmeier</td>
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<tr>
<td>Virtual classroom project to develop techniques and methods for NWS forecasters training on satellite data interpretation and forecast applications.</td>
<td></td>
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<tr>
<td>8063 USWRP - MODELING</td>
<td>NOAA</td>
<td>Raymond</td>
</tr>
<tr>
<td>Focus is on data assimilation and modeling studies.</td>
<td></td>
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<tr>
<td>8067 SOUNDER OSSE</td>
<td>NOAA</td>
<td>Huang</td>
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<tr>
<td>Observing System Simulation Experiments with current and future sounder instruments on model analysis and forecast impact.</td>
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</tr>
<tr>
<td>Project Number</td>
<td>Program Name</td>
<td>Agency</td>
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<tr>
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<tr>
<td>8068</td>
<td>RADIATIVE TRANSFER MODELING</td>
<td>NOAA</td>
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<tr>
<td>1230</td>
<td>PICASSO-CENA</td>
<td>NASA</td>
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<tr>
<td>1900</td>
<td>SURFACE ENERGY BUDGET – SHEBA</td>
<td>NASA</td>
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<tr>
<td>1910</td>
<td>ANTARCTIC CLOUD PROPERTIES</td>
<td>NASA</td>
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<tr>
<td>1920</td>
<td>POLAR SEA SURFACE EXCHANGE</td>
<td>NASA</td>
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<tr>
<td>3000</td>
<td>CLOUD RETRIEVALS</td>
<td>NASA</td>
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<td>3010</td>
<td>NASA CLOUD MODELS</td>
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<tr>
<td>3170</td>
<td>FIRE – 3 DATA ANALYSIS</td>
<td>NASA</td>
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<tr>
<td>3260</td>
<td>MOPPITT VALIDATION</td>
<td>NASA(UMBC)</td>
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<tr>
<td>3270</td>
<td>CO CLIMATOLOGY</td>
<td>NASA(UMBC)</td>
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<tr>
<td>Project Code</td>
<td>Description</td>
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<td>--------------</td>
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</tr>
<tr>
<td>3410 BIOMASS / AEROSOL</td>
<td>NASA Menzel/Prins</td>
<td>Collaborative effort with NASA-Goddard et al. to characterize aerosol radiative forcing in the Atlantic Basin associated with urban/sulfate, Saharan dust, and biomass burning aerosols.</td>
</tr>
<tr>
<td>3500 MODIS</td>
<td>NASA Menzel/Ackerman</td>
<td>Participation in the EOS/MODIS science team, including MAMS and MAS field programs, calibration issues, and development of meteorological products (e.g., cloud mask, cloud properties, atm. profiles) and visualization software.</td>
</tr>
<tr>
<td>3510 AIRS-ALGORITHM DEV.</td>
<td>NASA Smith/Huang</td>
<td>Participation in the EOS/AIRS instrument program, including HIS, SHIS and NASTI field programs, information content studies, and thermodynamic retrieval algorithm development.</td>
</tr>
<tr>
<td>3513 WALLOPS 99 FIELD PROGRAM</td>
<td>NASA Smith/Huang</td>
<td>Participation in the 1999 Wallops Field Experiment supporting NAST. This is a placeholder until funding comes from IPO/LaRC.</td>
</tr>
<tr>
<td>3520 AIRS-CALIBRATION STUDIES</td>
<td>NASA Revercomb</td>
<td>Participation in the EOS/AIRS program, including HIS, SHIS and NASTI field programs, and calibration and transmittance modeling work.</td>
</tr>
<tr>
<td>3530 ADEOS</td>
<td>NASA Revercomb</td>
<td>Participation on the JMS ADEOS/IMG Science Team.</td>
</tr>
<tr>
<td>3531 SHIS-KWAJALEIN FIELD PROGRAM</td>
<td>NASA Revercomb</td>
<td>Scanning HIS deployment to Kwajalein Is. (Tropical Pacific) for data gathering in support of TRMM.</td>
</tr>
<tr>
<td>4456 CIMSS STAFF AT LARC</td>
<td>NASA Ackerman/Achtor</td>
<td>Financial support for CIMSS staff member Bormin Huang to work as a visiting scientist at NASA Langley on NPOESS retrieval methods.</td>
</tr>
<tr>
<td>4480-82 GIFTS PROPOSAL PREPARATION</td>
<td>NASA Paulos/Huang/Velden</td>
<td>Support to complete studies and Phase II of the NMP EO3 GIFTS proposal.</td>
</tr>
<tr>
<td>5846 SURFACE ENERGY BALANCE</td>
<td>NASA Diak</td>
<td>Technique development and studies examining the surface - atmosphere energy exchange. Using models of soil and vegetation and atmospheric PBL to diagnose land surface fluxes of moisture and heat at 10 km resolution over continental scales.</td>
</tr>
<tr>
<td>5856 AMSU MODEL IMPACT</td>
<td>NASA Diak</td>
<td>Simulation experiments with new data sources, focusing on the development and testing of AMSU-B products and their information contribution. Major products include estimation of microphyscial components such as cloud water, rain water, etc.</td>
</tr>
<tr>
<td>5870</td>
<td>EOS / ASTER VALIDATION</td>
<td>NASA</td>
</tr>
<tr>
<td>------</td>
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</tr>
<tr>
<td></td>
<td>Validation of ASTER data using MODIS.</td>
<td></td>
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<table>
<thead>
<tr>
<th>5880</th>
<th>RESAC</th>
<th>NASA</th>
<th>Diak</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Formation of a Regional Earth Science Applications Center. Program applies science results, technologies and data products to help resolve issues with regional economic and policy significance and to support regional assessments supporting the U.S. Global Change Research Program.</td>
<td></td>
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<table>
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<tr>
<th>NAVY/DOE/NSF PROGRAMS</th>
<th>AGENCY</th>
<th>PI/PM</th>
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<tbody>
<tr>
<td>1220 SUOMI VIRTUAL MUSEUM</td>
<td>NSF</td>
<td>Ackerman</td>
</tr>
<tr>
<td>Develop a Web site to recognize and demonstrate the creative ideas of SSEC founder Verner E. Suomi.</td>
<td></td>
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<table>
<thead>
<tr>
<th>1430</th>
<th>NRL TROPICAL SUPPORT</th>
<th>NRL</th>
<th>Velden</th>
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<tbody>
<tr>
<td>Create real time wind data production software that is platform independent. Work on a new targeting scheme. Develop enhanced Dvorak hurricane/typhoon estimation criteria based on multi-platform satellite imagery. Apply AMSU to TC studies.</td>
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<tr>
<th>1435</th>
<th>NRL TROPICAL CYCLONE</th>
<th>NRL</th>
<th>Velden</th>
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<tbody>
<tr>
<td>Study of Tropical Cyclone Intensity Changes in Response to Environmental Vertical Shear.</td>
<td></td>
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<table>
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<tr>
<th>1600</th>
<th>LONGWAVE RADIATION</th>
<th>NSF</th>
<th>Walden</th>
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<tbody>
<tr>
<td>Support to fabricate and deploy an AERI in the Antarctic to study radiative processes, including ice and water clouds.</td>
<td></td>
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<table>
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<tr>
<th>1610</th>
<th>ANTARCTIC CLOUDS</th>
<th>NSF</th>
<th>Walden</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud studies to support GCM parameterization.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3285</th>
<th>ARM / AERI ALGORITHM</th>
<th>DOE</th>
<th>Knuteson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meteorological software retrieval and product development for AERI radiance measurements to support the DOE ARM program. Temperature / moisture retrieval software for AERI and development of thermodynamic time series display.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4322</th>
<th>AERI MAINTENANCE</th>
<th>DOE</th>
<th>Revercomb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance contract to support AERI deployed for DOE.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4455</th>
<th>NORTH SLOPE AERI</th>
<th>DOE</th>
<th>Revercomb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support for AERI deployed on the North Slope of Alaska.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4666</th>
<th>ARM-CART</th>
<th>DOE</th>
<th>Revercomb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continued participation in the DOE ARM program, water vapor validation studies, including field programs at the CART site.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IPO PROGRAMS</td>
<td>AGENCY</td>
<td>PI/PM</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>---------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>1210 NPOESS VIIRS AEROSOL STUDIES</td>
<td>AER (IPO)</td>
<td>Ackerman</td>
<td></td>
</tr>
<tr>
<td>Aerosol detection with advanced imager on NPOESS platform.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4446 NAST DATA SETS</td>
<td>IPO</td>
<td>Revercomb</td>
<td></td>
</tr>
<tr>
<td>Support for field program data set post processing, meteorological product creation and quality control to produce final product data sets for LaRC and IPO.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4450 IPO S-OAT ACTIVITIES</td>
<td>IPO</td>
<td>Menzel/Revercomb</td>
<td></td>
</tr>
<tr>
<td>Support for activities of the IPO Sounder OAT teams.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INTERNATIONAL/PRIVATE SECTOR</th>
<th>AGENCY</th>
<th>PI/PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1027 ATOVS / IAPP</td>
<td>none</td>
<td>Achtor</td>
</tr>
<tr>
<td>Revenue from licensing of the International TOVS Processing Package (ITPP) and International ATOVS Processing Package (IAPP) to commercial organizations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200 NASDA / ADEOS TEAM</td>
<td>JMA</td>
<td>Ackerman</td>
</tr>
<tr>
<td>Project to transform the MODIS Cloud Mask developed at CIMSS to work with the Japanese Global Imager (GLI) which will be on ADEOS II (and is similar to MODIS).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4407 CWB WINDS</td>
<td>CWB</td>
<td>Huang/Velden</td>
</tr>
<tr>
<td>For Central Weather Bureau, Taiwan, to provide geostationary wind data sets to their numerical prediction center.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5881 CASE INSOLATION PRODUCTS</td>
<td>Private</td>
<td>Diak</td>
</tr>
<tr>
<td>Creation of Solar Insolation products from GOES archived data.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Programs Awaiting Project Numbers:**

<table>
<thead>
<tr>
<th>CERES</th>
<th>NASA</th>
<th>Baum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cirrus cloud parameterization studies for General Circulation Models.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MODIS</td>
<td>NASA</td>
<td>Baum</td>
</tr>
<tr>
<td>Cirrus microphysical and optical property retrieval.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PROPOSALS FUNDED

A Proposal to Construct an EOS Direct Broadcast Facility at SSEC
Fox, Gumley
NASA, $350,750
Submitted in October 1998 (Funded #1042)

A Distributed Object Science Data Protocol for Advanced Collaboration
Menzel, Hibbard
NOAA, $100,000
Submitted in November 1998 (Funded #8043)

High Spectral Resolution FTIR Observations for the ARM Program
Revercomb
DOE, $310,000
Submitted in November 1998 (Funded #4666 w/ mods)

The Collection and Analysis of High Spectral Resolution IR Radiance as Part of FIRE III
Ackerman, Revercomb
NASA, $44,000
Submitted in December 1998 (Funded #3170, continuation)

The Midwest Center for Natural Resource Management
Diak, et. al.
NASA, $1,500,000 (shared)
Revised Budget submitted in December 1998 (Funded #5880)

Participation in NOAA-K Calibration/Validation Activities
vanDelst, Achtor
NOAA, $100,000
Submitted in December 1998 (Funded #8069, continuation)

Field Deployment for Special Emissivity Measurements: Desert Radiance III
Knuteson
NRL, $31,980
Submitted in January 1999 (Funded #3280)

Observational Study of Tropical Cyclone Intensity Changes in Response to Environmental Vertical Shear
Velden
ONR, $150,000
Submitted in January 1999 (Funded #1435)
Agreement on the Pre-Launch Standard Product Algorithm Development for the
Global Imager Aboard the Advanced Earth Observing Satellite II
Ackerman
NASDA (NASA), $10,900 and $60,000
Submitted in January 1999 (Funded #1200, continuation)

Repair of the North Slope of Alaska AERI
Revercomb
DOE, $19,522
Submitted in February 1999 (Funded #4455)

Maintenance and Support of Operational ARM AERI Systems
Revercomb
DOE, $59,656 and $40,707
Submitted in February 1999 and August 1999 (Funded #4322)

Participation in the GOES Product Assurance Plan
Johnson, Achtor
NOAA, $830,000
Submitted in February 1999 (Funded #8040, continuation)

Continuation of the Data Analysis Software Development for the AERI
Knuteson
DOE, $165,000 (shared)
Submitted in February 1999 (Funded #3285, continuation)

Development of Atmospheric Retrievals using Satellite Data from Microwave Sounding
Instruments
Diak
NASA, $50,000
Submitted in January 1999 (Funded #5856, continuation)

Analysis of Combined PICASSO-CENA and MODIS Data
Ackerman
NASA,
Submitted in May 1999 (Funded #1230)

A Proposal for Continued Participation in the NOAA ERL USWRP
Raymond
NOAA, $60,000
Submitted in May 1999 (Funded #8063, continuation)

A Proposal to the USWRP: Improving Forecasts of Landfalling Hurricanes
Velden
NOAA, $85,000
Submitted in May 1999 (Funded #8042, continuation)
NMP GIFTS Proposal Support
Revercomb
NASA, $186,000
Submitted in June 1999 (Funded #4480)

Supplemental Funding to Spectral and Radiometric Calibration of the IMG for ADEOS
Revercomb, Knuteson
NASA, $153,108 (shared)
Submitted in June 1999 (Funded #3530)

Engineering and Scientific Support for the NPOESS Airborne Sounder Testbed (NAST) Instrument
Revercomb
NASA (LaRC), $271,478
Submitted in June 1999 (Funded #4446-4449)

Improved Algorithm Development for Ocean Observations with EOS/MODIS
Revercomb
U. Miami (NASA), $35,024
Submitted in August 1999 (Funded #4350)

Remote Sensing as it Pertains to Agriculture
Diak, $7,500
CASE Corp
Submitted in August 1999 (Funded #5881)

Antarctic Cloud Properties and their Effects on the Surface Energy Budget
Key, $145,084
NSF
Submitted in August 1999 (Funded #1900)

Documenting, Understanding and Predicting the Aggregate Surface Radiation Fluxes for SHEBA
Key, $40,314
NASA
Submitted in August 1999 (Funded #1910)

Continued Support for CIMSS Base Activities
Ackerman, Achtor
NOAA, $265,000
Submitted in June 1999 (Funded #8010)
PROPOSALS REJECTED

The Development of a Conceptual Model for Extra Tropical Transition of Tropical Cyclones
Velden
NSF, $70,000
Submitted in January 1999

Continuous Vertical Profiling of Boundary Layer Temperature and Humidity in Support of the VTMX Research Program
Knuteson, Feltz
DOE, $320,000
Submitted in June 1999

===============================================================================

CURRENTLY PENDING (FUNDING LIKELY)

Application of Remote Sensing to Assess the Impact of Long Term Climate Variability on Coastal Sedimentation
Menzel, Moeller
NASA, $545,537 (shared)
Submitted in February 1999 (We have heard it is funded)

World Deltas: A Baseline of Change
Menzel, Moeller
LSU (NASA), $224,794 (subcontract, shared)
Submitted in February 1999 (We have heard it is funded)

Accounting for Sub-grid Scale Variability of Clouds and Water Vapor in Large Scale Models based on ARM Observations
Pincus
DOE, $229,846
Submitted in June 1999 (We have heard it is funded)

Field Support and Data Analysis for SHIS Participation in the NAPScar Field Program
Revercomb
NOAA, $24,000
Submitted in February 1999 (We have heard it is funded)

Continuation of High Spectral Resolution FTIR Observations for the ARM Program: Clear and Cloudy Sky Applications
Revercomb, Knuteson, et. al.
DOE, $677,934
Submitted in June 1999 (We have heard it is funded at a lower level)

===============================================================================

19
CURRENTLY PENDING

Atmospheric Compensation Study in Support of SEBASS (Desert Radiance Follow-up)
Knuteson, Feltz
NRL, $43,586
Submitted in June 1999

Cooperative Study of Hurricane Variations using CAMEX-3, TRMM, AMSU and other Data Sets
Velden
UMBC (NASA), $25,367
Submitted in June 1999

A Study of High Latitude Polar Highs and Cloud Drift Winds
Raymond
NSF, $412,165
Submitted in June 1999

The Collection and Analysis of High Spectral Resolution IR Radiances as Part of FIRE III
Ackerman, Revercomb
NASA (LaRC), $134,000
Submitted in June 1999

Interactive Visualization of the Global Water Cycle
Ackerman, Santek
NSF, $553,785
Submitted in July 1999

Extra Tropical Transition of Tropical Cyclones
Velden
NSF, $112,846
Submitted in August 1999

A Distributed Object Data Protocol for Advanced Collaboration using JAVA and VIS-AD
Menzel, Hibbard, Whittaker
NOAA, $150,008
Submitted in August 1999

Monitoring and Modeling of Land Surface Energy and Water Fluxes using Enhanced Pathfinder Database
Diak, Norman
NASA, $580,558
Submitted in September 1999

Land Surface Temperature and Emissivity from Combined MODIS and AIRS Data
Knuteson, Revercomb
NASA, $572,525
Submitted in September 1999

Mesoscale Assimilation of Real Time MODIS and AIRS Data
Huang, Menzel, et. al.
NASA, $750,000
Submitted in September 1999

International MODIS and AIRS Processing Package for EOS Direct Broadcast Data
Huang, Gumley
NASA, $749,859
Submitted in September 1999

Application of Polar Pathfinder Datasets for Intercomparison of Arctic Regional Models
Key
U of Colorado (NASA)
Submitted in September 1999

Polar Cloud Properties from Combined Satellite Measurements
Ackerman, Key
NASA, $908,778
Submitted in September 1999

Parameterizing Cumulus Momentum Transport ... for Application in Regional Climate Models
Mecikalski
NASA, $74,353
Submitted in September 1999

Determination of Momentum Transport, Organization and Temporal Intensity of Deep Convection using Remotely Sensed Data from TRMM
Mecikalski
NASA, $116,699
Submitted in October 1999

Analyses of Infrared Validation Data in Support of TRMM
Revercomb, Knuteson, et. al
NASA, $300,010
Submitted in October 1999
1999 REVIEWED LITERATURE


King, M. D., S.-C. Tsay, S. A. Ackerman, and N. F. Larsen, 1999: Discriminating heavy aerosol, clouds, and fires during SCAR-B: Application of airborne multispectral MAS data. Accepted to J. of Geophys. Res.


1999 CONFERENCE PAPERS AND REPORTS


Gunshor, M. M., T. J. Schmit, and W. P. Menzel, 1999: Intercalibration of geostationary (GOES, Meteosat, GMS) and polar orbiting (HIRS and AVHRR) Infrared window Radiances. CGMS XXVII held 13 – 19 October 1999 in Beijing, China. EUMETSAT publication.


Whittaker, Tom and Steve Ackerman, 1999: The making of Web-based, highly-interactive instructional aids. Proceedings of the 4th International Conference on Computer Aided and Distance Learning in Meteorology (CALMet99), Helsinki, Finland, 14 - 18 June 1999.

Whittaker, Tom and Steve Ackerman, 1999: The Development of VISITview. Proceedings of the 4th International Conference on Computer Aided and Distance Learning in Meteorology (CALMet99), Helsinki, Finland, 14 - 18 June 1999.


UPS Aircraft Water Vapor Sensor Statistics Compared to Radiosondes

ACARS ALL MATCHES (Excluding Flight 376) VS VAISALA RADIOSONDES

Matches = 40
Matching Criteria +/- 1.5 Hours

ACARS - Vaisala Mixing Ratio (g/kg)

ACARS - Vaisala Temperature (°C)
AERI, GOES, and RAOB matches for Louisville, KY field experiment
Conclusions of AERI Demo

Ground based AERI provides continuous monitoring of temperature / moisture changes in boundary layer.

Synergistic use with GOES provides continuous tropospheric temperature / moisture profiling.

- Temperature / moisture profiles provided at better than 250 meter vertical resolution in near real-time every ten minutes in the boundary layer.
- With GOES hourly tropospheric soundings within 1 C rms of raob T(p) up to 200 hPa.
- Oklahoma / Kansas AERIs useful for NWP model validation and data assimilation in near real-time over DOE ARM site domain.
- High temporal resolution stability indices to forecast convective destabilization before severe thunderstorm initiation.
- Low cost environmentally hardened robust AERI system possible with commercial partner.
WINTEX
Winter Experiment
March 1999

DATA

- 8 ER-2 Science Flights
- MAS, NAST, S-HIS
- Day/Night, Cloud/Clear

SCIENCE

- MODIS Cloud Mask testing
- Atmospheric Sounding
- IR Calibration
WINTEX yields unique data over cirrus clouds with SHIS and MAS

March 15, 1999
March 18, 1999
March 20, 1999
March 21, 1999
March 25, 1999
March 26, 1999
Instrumentation

- Atmospheric Emitted Radiance Interferometer.
- 0.5 cm\(^{-1}\) resolution over 3.3 – 18 µm.
MAS TIR Bands Suitable for Surface Observation AERI Measurements
Satellite-Derived Winds R&D

- Development of an advanced QC approach
  * Quality Indicators integrated into the auto-editing procedure

- Experimental production of Meteosat 5/7 winds

- Evaluation of winds derived from rapid scans
  * GOES-10 science checkout data sets
  * Tropical cyclones

- Development and evaluation of winds derived from GOES 3.9 micron imagery

- Experimental high-resolution winds from VIS imagery around tropical cyclones distributed to AOML/HRD for inclusion in real time surface analyses used extensively by NHC/TPC in 1999

- Development of vertical wind shear analyses for NHC and JTWC
  * Derived from high-res. 3-D analyses of multispectral sat. winds
  * Found very useful by NHC and JTWC forecasters in 1999
  * Currently being tested in the operational SHIPS intensity prediction model (DeMaria/CIRA)
Construction of ‘Wavetrak’ product

Time-continuous plots/movies of low-level sat. winds to track developing waves in the tropics (avail. over CIMSS web site)
AMSU-A and HIRS/3 Products from International ATOVS Processing Package

NOAA-15 Temperature Retrieval 500 hPa
Year: 1998    Day of Year: 319

Temperature (Kelvin)

215  227  238  249  260  271
CIMSS Cloud Retrieval

- MODIS
- GLI
- AVHRR
- AVHRR/HIRS
- GOES
- MAS/HIS
AVHRR Global Product
CHAPS

Zonal Mean Frequency of High Cloud by Algorithm
July 1994 from CHAPS
Ocean Only

<table>
<thead>
<tr>
<th>8-11 um</th>
<th>CO2-slicing</th>
<th>CO2-slicing and APOLLO</th>
<th>6.7-11 um (right)</th>
</tr>
</thead>
</table>

Frequency (%)

Latitude

Frequency of Deep Convection (% 6.7-11 um > 0)
GOES-8 Fire and Smoke Product Summary for the 1998 Fire Season in South America

GOES-8 ABBA 1745 UTC fire pixel composite for the 1998 fire season in South America. Distinct burning patterns are identified along rivers and in areas of recent road construction in the Amazon basin.

GOES-8 ASADA 1145 UTC smoke composite for the 1998 fire season in South America. The highest occurrence of smoke coverage days are found collocated with or downwind of the most intensive burning regions.
GOES Experimental Multispectral Cloud and Smoke Analyses

UW-Madison/SSEC/CIMSS

NOAA/NESDIS/ORA ASPT

GOES-9 Visible Image  UW-Madison/CIMSS  25-Aug-95 at 1145 UTC

GOES-9 ASADA (Vers. 3.0): Albedos  25-Aug-95 at 1145 UTC

GOES-8 Textural Cloud Analysis  25-Aug-95 at 1145 UTC

GOES-8 Textural/Spectral Smoke Analysis  25-Aug-95 at 1145 UTC
Leo/Geo inter-calibration shows all Geos are within 0.5°C

Feb to Jul 1999 IR window comparison of NOAA-14 HIRS and G-8, G-10, M-5, M-7, GMS-5

<table>
<thead>
<tr>
<th>Delta (geo – leo)</th>
<th>G-8</th>
<th>G-10</th>
<th>M-5</th>
<th>M-7</th>
<th>GMS-5</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Comparisons</td>
<td>9</td>
<td>36</td>
<td>9</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>Abs Mean</td>
<td>0.31</td>
<td>0.23</td>
<td>0.28</td>
<td>0.40</td>
<td>0.40</td>
</tr>
<tr>
<td>Mean</td>
<td>-0.06</td>
<td>-0.13</td>
<td>-0.24</td>
<td>-0.40</td>
<td>0.05</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.36</td>
<td>0.23</td>
<td>0.26</td>
<td>0.19</td>
<td>0.59</td>
</tr>
</tbody>
</table>
OSE showing positive impact of Sat data for T and RH at 00-hr and 24-hr

A. 00-HR RMS Temperature Sensitivity (July 14-23, 1999)

B. 00-HR RMS Rel. Humidity Sensitivity (July 14-23, 1999)

A. 24-HR RMS Temperature Forecast Impact (July 14-23, 1999)

B. 24-HR RMS Rel. Humidity Forecast Impact (July 14-23, 1999)
Comparison of Sat and Non-sat forecast impact

A. 24-HR RMS Temperature Forecast Impact (July 14-23, 1999)

B. 24-HR RMS Rel. Humidity Forecast Impact (July 14-23, 1999)
CIMSS/NWP Collaborations

Satellite-derived Winds Data Assimilation and Model Impact Experiments

* Navy and ECMWF – NORPEX datasets
* NCEP/EMC GDAS and ETA (Su, Derber, Lord)
* GFDL Hurricane Model (Soden, Tuleya)
* Numerous regional and mesoscale studies (PSU, FSU, NCAR, NASA)
* Multi-satellite satwind datasets being distributed to India and Taiwan NWP centers for evaluation
IMPACT OF SATWINDS ON ECMWF FORECASTS DURING NORPEX

[from Holmlund, Velden + Rohn ... Submitted to MWR]
View from space

GOES Sounder DPI in NWS FOs
OK tornado 3 May 99

View from ground

530 CDT (2330 UTC)
AERI DETECTING PRECURSORS OF CONVECTIVE INITIATION FOR MAY 3, 1999 OKLAHOMA CITY TORNADO
UW-Madison Branch:
Products for Agricultural, Environmental, and Forest Managers

Applying NASA Earth Science to key regional issues

RESAC
Upper Midwest
Regional Earth Science Applications Center

http://resac.gis.umn.edu/
Tasks:
Overview & Conceptual Framework

Agriculture

- Soil moisture in top 15 cm - time of planting and trafficability
- Grain drying - farm energy use
- Pest and disease indicators - plant health, pesticide use

Forestry

- Growth and yield models for sustainable harvests
- Scenarios for CO₂ sequestering

Ecosystem Services & Water Resources

- Water resources in the Midwest, climate change effects
- Effects of CO₂ fertilization
Data

Conventional

GOES Vis & Thermal

Aircraft

Topography, soil properties, etc.

NEXRAD

AVHRR

MODIS
Models

Weather and Climate

Distributed Runoff
Evolving the GOES Capabilities

To keep pace with the growing needs for GOES data and products, NOAA must continue to evolve its geostationary remote sensing capabilities.

The Advanced Baseline Imager and Sounder (ABI / ABS) follows this evolutionary path. Current capabilities are enhanced and unmet NWS requirements are addressed.
ABI-12 (top bars) and MSG/SEVIRI (bottom bars) Channels
OSSE indicating capability of Geo-Interferometer for adding info to raob, profiler, ACARS network

Geo Interferometer penetrates Boundary Layer (BL) to provide low level (850 RH) moisture information:

Geo Radiometer only offers information above BL (700 RH)
IMG demonstrates interferometer capability to detect low level inversions: example over Ontario with inversion (absorption line BTs warmer) and Texas without (abs line BTs colder).
Hourly Geo-I soundings and winds vs 6 hourly Leo-I soundings
Conv (sfc obs, raobs, profiler, acars) vs Conv+Leo-I vs Conv+Geo-I vs Conv+Geo-Prfct (best = no noise)

850 RH
Sensor Design

- 8 cm Clear Aperture
- 4-Stage Split-Patch Passive Cooler
  - 81K LWIR patch temperature
  - 98K MWIR/SWIR patch
- High-Performance PV Detectors
- 3 x 3 Arrays (14 km IFOVs)
- 3 Spectral Bands
- All-Reflective Telescope
- Proven Bomem Plane-Mirror Michelson Interferometer With Dynamic Alignment
- Deep-cavity Internal Calibration Target based on MOPITT design
- Two-Axis Scene Selection Module with Image Motion Compensation
- Modular design allows future addition of active cooler and larger than 3x3 arrays

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>61 x 40 x 40 cm</td>
</tr>
<tr>
<td>Mass</td>
<td>&lt; 81 kg</td>
</tr>
<tr>
<td>Power</td>
<td>&lt; 91 W</td>
</tr>
<tr>
<td>Data Rate</td>
<td>&lt; 1.5 Mbps</td>
</tr>
</tbody>
</table>

*15% Margin Included
VISITview
Distance Learning & Collaboration Tool for Teletraining

During a Teletraining Session  Using the Lesson Builder
Summer Workshops
Suomi Web Museum

- Focuses on remote sensing from satellites.
- Museum type structure
- Hands-on

Http://Profhorn.meteor.wisc.edu/wxwise/museum/

Welcome to the Suomi Virtual Museum
Looking to the future

- Theory modeling
- Education knowledge
- Action
- New instruments
- Data
- Algorithms
- Information

Looking to the future...
GIFTS Simulation of Hurricane Bonnie:
Winds from Water Vapor Retrieval Tracking
Interferometric Monitor of greenhouse Gases

Using a procedure developed at CIMSS, data from the IMG instrument, flown aboard the Japanese ADEOS satellite, has been corrected for large radiometric errors.
Simulated retrievals using both AMSU-A and GOES radiances. Large improvement to the temperature retrieval using both GOES+AMSU over GOES only is seen.

The impact on the water vapor is small (using just GOES and AMSU-A).
Cloud Mask

# pixels = 653
# cloudy pixels = 211
# undecided pixels = 83
# probably clear pixels = 15
# confident clear pixels = 344
EOS Direct Broadcast at SSEC

Acquire EOS direct broadcast data to
1. Provide regional users with near real-time products,
2. Assist MODIS validation by supporting field campaigns,
3. Provide outreach to the non-EOS community.

Develop a MODIS direct broadcast processing package to
1. Provide software to transform Level-0 to Level-1B and a selection of geophysical products,
2. Enable the international community to directly participate in MODIS calibration and validation.

SSEC rooftop installation has begun
Direct Broadcast Coverage from SSEC at 10° and 0°