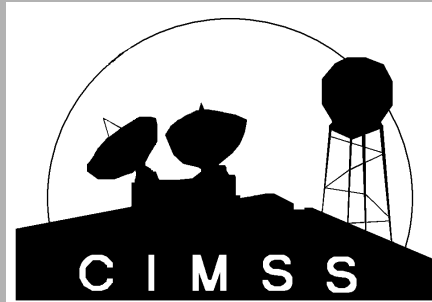


# Remote Sensing Seminar

## Lectures in Maratea 22 – 31 May 2003

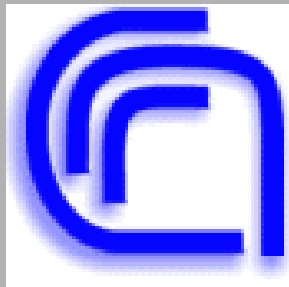


**Hank Revercomb**  
**Paolo Antonelli**  
*UW/CIMSS*

**Vincenzo Cuomo**  
**Carmine Serio**  
**Filomena Romana**  
*IMAA/Italy*

**Christophe Accadia**  
*Roma, Italy*  
**Tiziana Cherubini**  
*Hawaii, USA*

**Paul Menzel**  
*NOAA/NESDIS/ORA*





**Bologna Students  
September 2001**







Roma Students

June 2002

# Maratea Remote Sensing Seminar

22 – 31 May 2003

Supported by CNR-IMAA (Potenza) and EUMETSAT (Darmstadt)

<b>R pm</b>	<i>Welcome</i> –	<b>Discussion of Agenda [Menzel, Cuomo]</b>
	<i>Lecture 1</i> –	<b>Radiation and the Radiative Transfer Equation [Menzel]</b>
	<i>Lab</i> –	<b>Introduction to the Labs and MATLAB [Antonelli]</b>
<b>F am</b>	<i>Lecture 2</i> –	<b>Spectral signatures from Earth's sfc &amp; atm [Menzel]</b>
<b>F pm</b>	<i>Lecture 2</i> –	<b>Remote Sensing Advances with MODIS including cloud and aerosol detection [Menzel]</b>
	<i>Homework 1</i>	
<b>Sa am</b>	<i>Lab 1</i> –	<b>Multi-spectral Data [Antonelli, Menzel] Staging, Viewing, Interrogating MODIS Data Multi-spectral Cloud Mask Properties</b>
<b>Sa pm</b>	<i>free</i>	
<b>Su am</b>	<i>free</i>	
<b>Su pm</b>	<i>Group Dinner</i>	
<b>M am</b>	<i>Quiz 1</i>	
	<i>Lecture 3</i> –	<b>Introducing IR Hyperspectral Data [Revercomb] Detecting moisture, cloud, and aerosol with High Spectral Resolution Sounders [Revercomb]</b>
<b>M pm</b>	<i>Lab 2a</i> –	<b>High Spectral Resolution IR data [Antonelli, Revercomb] Staging, Viewing, Interrogating AIRS and SHIS Data</b>

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<b>T am</b>	<i>Lecture 4-6 –</i>	<b>Instrument Considerations and Cal/Val [Revercomb, Menzel]</b>
<b>T pm</b>	<i>Lab 2b –</i>	<b>High Spectral Resolution IR data [Antonelli, Revercomb] Mapping Surface, Cloud, and Aerosol Properties</b>
<b>W am</b>	<i>Lecture 7&amp;8 –</i>	<b>Introducing MSG and Investigating AIRS [Menzel]</b>
<b>W pm</b>	<i>Lab 2c –</i>	<b>High Spectral Resolution IR data [Antonelli, Revercomb] Mapping Surface, Cloud, and Aerosol Properties</b>
<b>R am</b>	<i>Lab 3a</i>	<b>Group Projects (Cal/Val, Noise, N*, Eco Syst, Cld &amp; Aerosol) [Antonelli, Revercomb, Cherubini, Accadia, Bernardini]</b>
<b>R pm</b>	<i>Lab 3b –</i>	<b>Finish Group Lab Projects</b>
<b>F am</b>	<i>Lab 3c –</i>	<b>Presentation by Lab Groups [Students, Antonelli]</b>
<b>F pm</b>	<i>Quiz 2</i>	
	<i>Review Homework and Quizzes</i>	
	<i>Discussion–</i>	<b>Summary of Remote Sensing Lessons [Menzel, Revercomb, Antonelli]</b>
	<i>Evening Get-Together</i>	
<b>Sa am</b>	<i>Lecture 9</i>	<b>Evolving to the Future Global Observing System [Menzel] Discussion of Longer Term Projects Concluding Ceremony</b>

*AM sessions: 10:00 am – 12:30 pm – PM sessions: 2:30 pm – 5:00 pm*

*<http://barrage.ssec.wisc.edu/~paoloa/teaching/Maratea2003/html/index.html> posting updates*



# WMO TD 1078 "Applications with Meteorological Satellites"

## CHAPTER 2 - NATURE OF RADIATION

2.1	Remote Sensing of Radiation	2-1
2.2	Basic Units	2-1
2.3	Definitions of Radiation	2-2
2.5	Related Derivations	2-5

## CHAPTER 3 - ABSORPTION, EMISSION, REFLECTION, AND SCATTERING

3.1	Absorption and Emission	3-1
3.2	Conservation of Energy	3-1
3.3	Planetary Albedo	3-2
3.4	Selective Absorption and Emission	3-2
3.7	Summary of Interactions between Radiation and Matter	3-6
3.8	Beer's Law and Schwarzschild's Equation	3-7
3.9	Atmospheric Scattering	3-9
3.10	The Solar Spectrum	3-11
3.11	Composition of the Earth's Atmosphere	3-11
3.12	Atmospheric Absorption and Emission of Solar Radiation	3-11
3.13	Atmospheric Absorption and Emission of Thermal Radiation	3-12
3.14	Atmospheric Absorption Bands in the IR Spectrum	3-13
3.15	Atmospheric Absorption Bands in the Microwave Spectrum	3-14
3.16	Remote Sensing Regions	3-14

## CHAPTER 5 - THE RADIATIVE TRANSFER EQUATION (RTE)

5.1	Derivation of RTE	5-1
5.10	Microwave Form of RTE	5-28

## CHAPTER 12 - RADIOMETER DESIGN CONSIDERATIONS

12.3	Design Considerations	12-1
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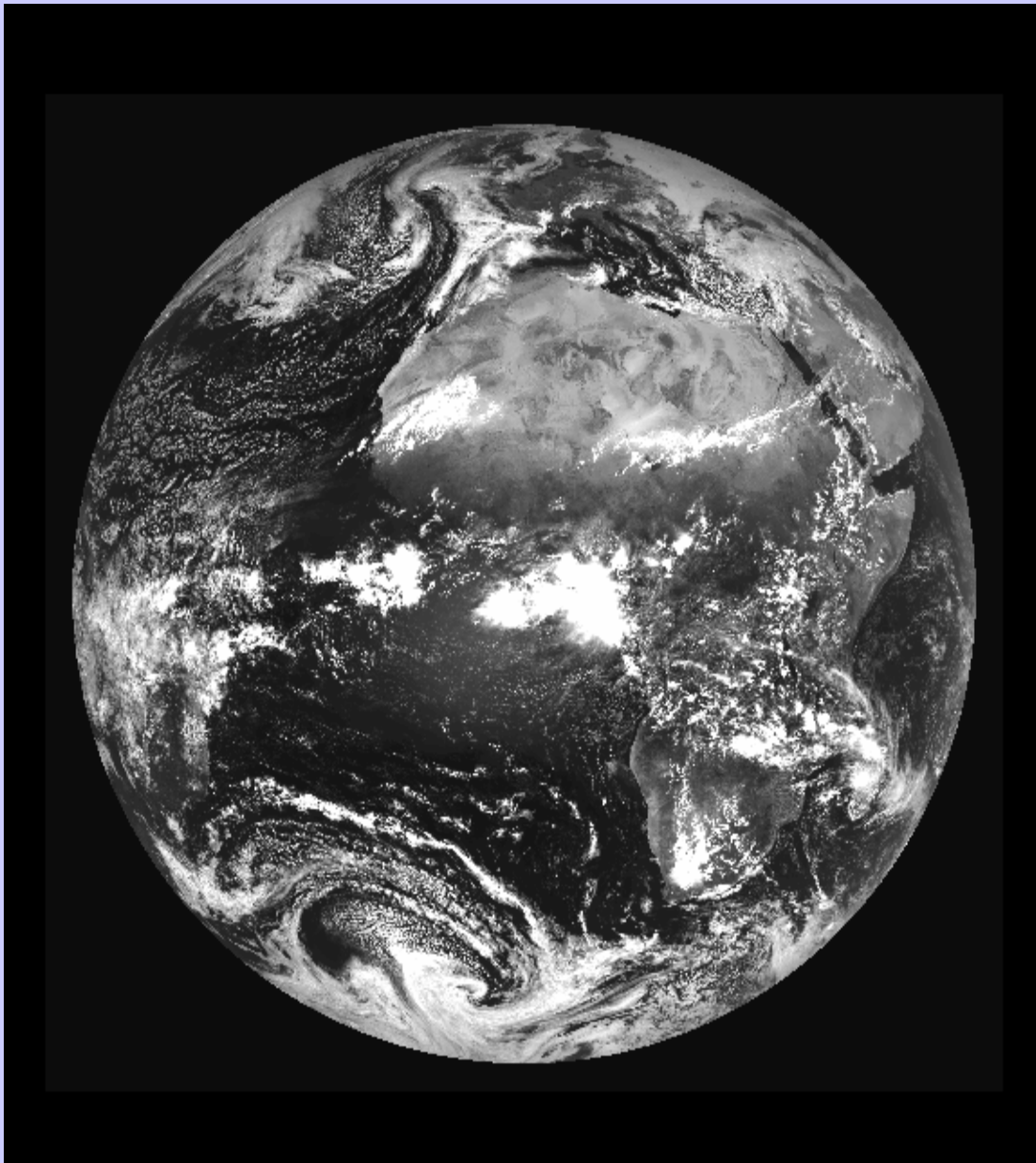


**MODIS**



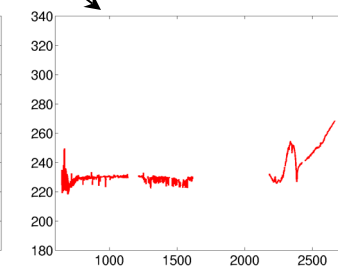
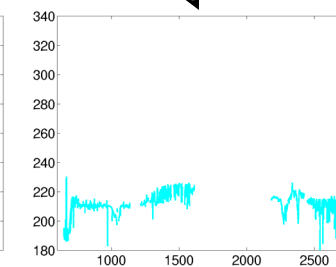
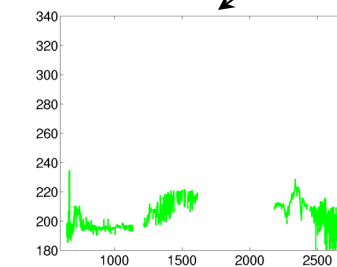
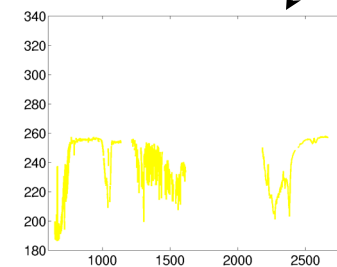
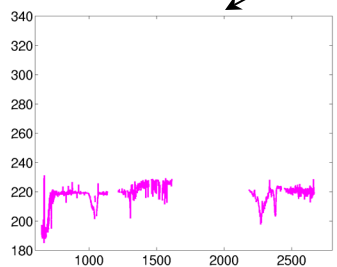
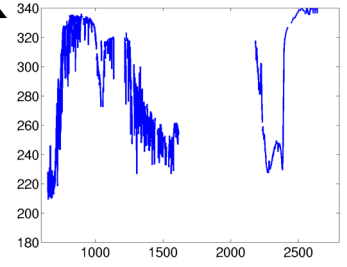
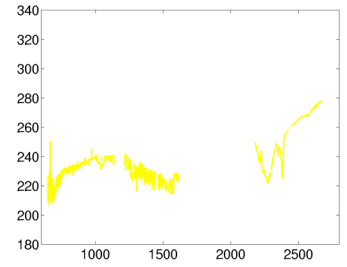
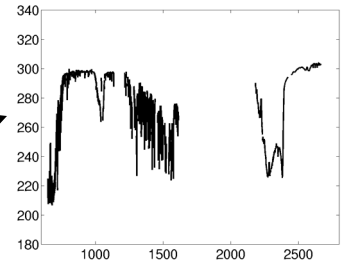
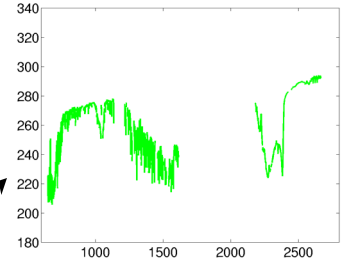
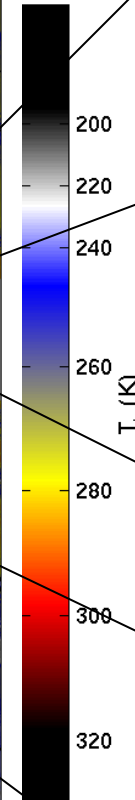
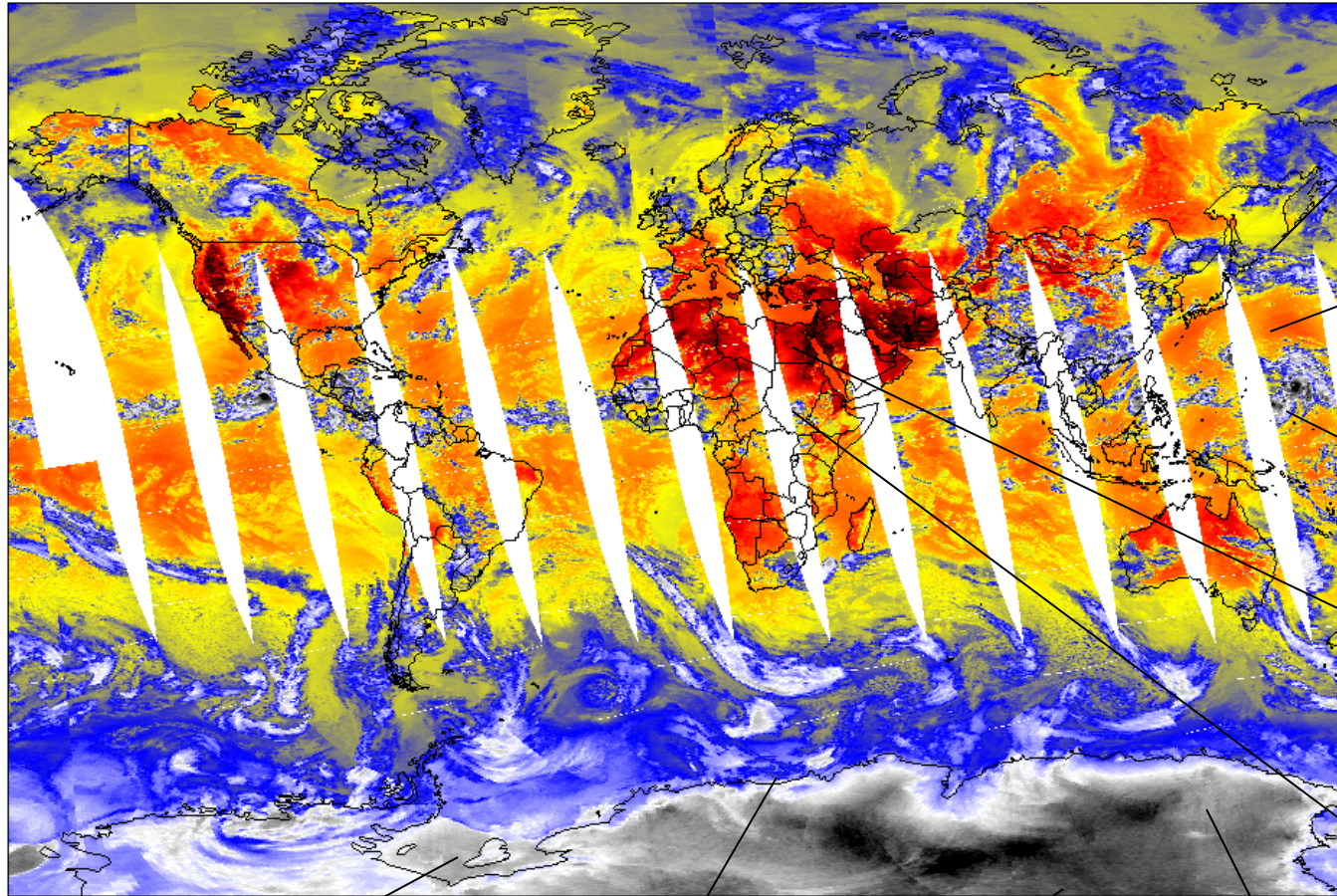
# MSG

HRV	Broadband
VIS0.6	0.635
VIS0.8	0.81
NIR1.6	1.64
IR3.9	3.90
WV6.2	6.25
WV7.3	7.35
IR8.7	8.70
IR9.7	9.66
IR10.8	10.80
IR12.0	12.00
IR13.4	13.40



# AIRS

20-July-2002 Ascending LW\_Window





WMO TD "Applications with Meteorological Satellites"  
can be obtained from [Hinsman\\_D@gateway.wmo.ch](mailto:Hinsman_D@gateway.wmo.ch)

Homework, Lab Exercises, Lecture ppt presentations  
are or will be available on CD & the seminar web page  
[http://barrage.ssec.wisc.edu/~paoloa/teaching  
/Maratea2003/html/index.html](http://barrage.ssec.wisc.edu/~paoloa/teaching/Maratea2003/html/index.html)

*REMOTE SENSING SEMINAR*  
*Maratea, ITALY*  
*22-31 May 2003*

