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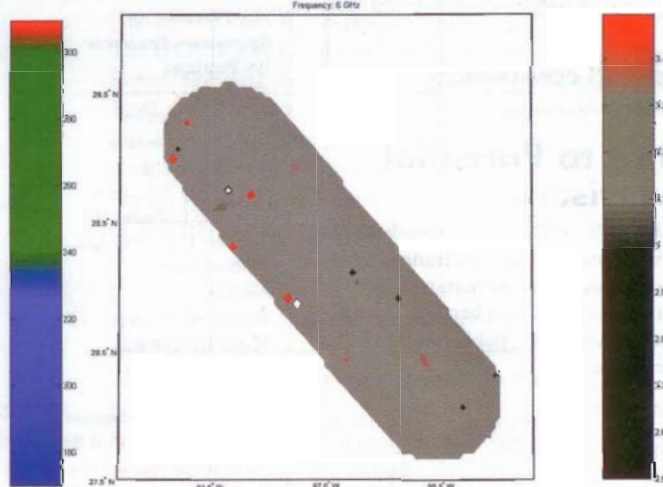
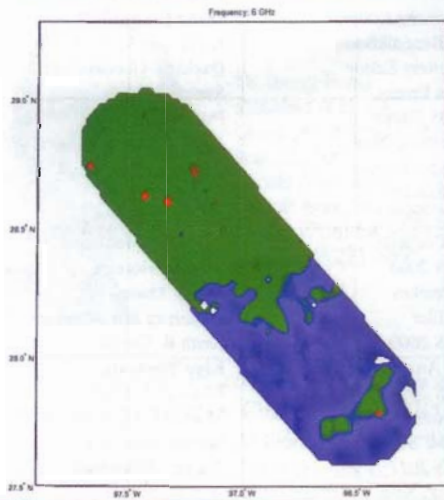
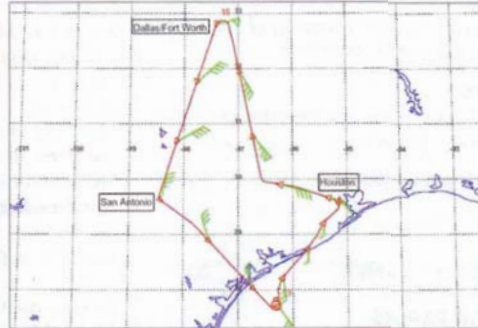
# GEOSCIENCE *and* REMOTE SENSING

Newsletter



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## Editor's Comments



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Welcome to the December 2007 edition of the GRSS Newsletter. This letter features a short article on the fundamentals of multi-spectral thematic imaging of land areas written by David Landgrebe, Prof. Emeritus of Purdue University. This essay focusses on remote sensing of the earth's surface from a multi-spectral, visible - infrared sensor and data perspective. I think you will find the commentary very insightful.

On this month's cover is the first image of microwave kurtosis (4th moment). These data were collected over Texas in a 2005 airborne campaign. These and related measurement techniques show promise for Radio Frequency Interference (RFI) detection and mitigation applications in passive

microwave systems.

One of my favorite experiences as the Newsletter editor has been the many conversations I've had with members about their activities related to the Society. This time I am pleased to have a contribution from Prof. John Kerekes summarizing the founding of the Western New York GRSS Chapter.

You may be interested to know that when you visit the GRSS website you can now purchase items with the GRSS logo on them at Cafépress! See the 'Web Corner' in this Newsletter for the latest about our website (in hardcopy that is). The GRSS website continues to add features, capability and activity. I understand the coffee mugs are going fast...

This Newsletter also offers three excellent contributions related to IGARSS'07. First we have a report from Prof. Corbella providing his perspective of IGARSS'07 in Barcelona as the conference chair. Secondly, there is a report on the 2007 IEEE GRSS publications awards presented at the banquet. And to round out the activities from IGARSS, I believe this issue includes the first full Newsletter report on the IGARSS soccer tournament.

And finally, we note with sadness the passing of Dr. Steven Clifford, formerly of the NOAA Environmental Technology Laboratory. Steve led NOAA ETL from 1986 until his retirement in 2001.

## President's Message



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The 2007 Nobel Peace Prize was awarded to the Intergovernmental Panel on Climate Change (IPCC) and to former US Vice President Mr. Al Gore "for their efforts to build up and disseminate greater knowledge about man-made climate change and to lay the foundations for the measures that are needed to counteract such change". In announcing the award, the Nobel Committee said, "Indications of changes in the earth's future climate must be treated with the utmost seriousness and with the precautionary principle uppermost in our minds". Mr. Al Gore is best known for his documentary film "An Inconvenient Truth" about climate change. The IPCC was estab-

lished in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP). The IPCC has three Working Groups and a Task Force. The IPCC is well known for the Assessment Reports (AR) it publishes. The first three Assessment Reports were completed in 1990, 1995 and 2001 respectively. The fourth assessment report (AR4) will be released shortly in 2007. Working Group 1 deals with the scientific basis of climate change and its focus area is closely related to our Society's research strength. The AR4 report of Working Group 1 discusses atmospheric changes, pattern of climate variability, extreme weather events, changes in the cryosphere, ice sheet dynamics and stability, and changes in the ocean and sea levels. All of these topics are of interest to our Society and we develop and apply instrumentation and algorithms to monitor and analyze these changes. In the U.S., the Decadal Survey was recently completed by the Committee on Earth Science and Applications of the U.S. National Research Council. After the release of the Decadal Report, we have seen renewed activities in satellite remote sensing and many NASA working groups convened to plan new satellite missions. Universities in the U.S. are leading major initiatives in the studies of the earth environment as students, professors and administrators recognize that these are critical needs of humankind. New academic units

*(continued on page 4)*

**Cover Information:** Images of 6.0 GHz horizontally polarized brightness temperature (lower left) and kurtosis (lower right) during an overpass of the Gulf coast near Galveston, TX on 25 August 2005 by the NASA WB-57 research aircraft (upper left). A complete flight plan for this campaign is shown in the upper right panel. *(continued on page 26)*



chair, Xavier Fàbregas; computer support, Josep Maria Haro and the web master, Sebastián Blanch. Without this team, any attempt to organize such a huge symposium would have simply been impossible. The local committee has worked enthusiastically over long periods of time and several hours per day in order to provide the support that has made the success of IGARSS'07 possible.

It should also be mentioned that the team at CIMNE has been in charge of all the details, even the smaller ones. Special mention is given to Cristina, Marta and Angel (Cruchi) who have always been ready to help. Cristina in particular carried upon herself a huge responsibility. The hours she dedicated to IGARSS are simply uncountable.

And last but not least, the continuous support and fantastic help given by the AdCom, and especially from the VP of Meetings and Symposia, Melba Crawford, must be recognized.



*The local organizing team celebrating the success of IGARSS just after the banquet.*

We look forward to seeing you again for IGARSS 2008 in Boston!

## Cover Information *continued from page 3*

The WB-57 was in straight and level flight at 62,000' altitude during the coastal crossing. Measurements were made by a hybrid radiometer consisting of the mechanical-steered antenna and analog receiver electronics of the NOAA/ETL Polarimetric Scanning Radiometer (PSR) [1] and the digital high order moment detector and data system of the U-Michigan Agile Digital Detector (ADD) [2]. PSR was operating in a conically scanning mode at a constant 55° angle of incidence. ADD measures the first four moments of the electric field amplitude associated with the brightness temperature. The second moment is the digital equivalent of a conventional square-law detector. The kurtosis (the fourth central moment divided by the square of the second central moment) is a derived data product. It is sensitive to the presence of non-thermal microwave radiation and, in particular, to manmade radio frequency interference (RFI).

The transition at the coastline from land to water is clearly identifiable in the brightness temperature image because of the large difference in their emissivities. Small coastal islands in the Gulf of Mexico are similarly visible. Discrete "hot spots" in the brightness temperature image are likely a

result of RFI sources on the ground. The strongest ones appear as distinctive red and white points in the image. Weaker RFI may also be present, but its presence is masked by the natural variability of the background brightness temperature. The value of the kurtosis for natural thermal emission is approximately 3 and does not change with brightness temperature [2]. For example, the coastal transition from land to water has no effect whatsoever on the kurtosis image. The kurtosis of non-thermal RFI sources, on the other hand, is markedly different and stands out prominently in the image. This is the first known image of microwave kurtosis. The high sensitivity of the kurtosis to non-thermal signals, combined with its independence from variations in the thermal signals, makes identification of even extremely low level RFI sources much easier and more reliable.

[1] Piepmeier and Gasiewski, IEEE TGRS, 39(3), 606-622, 2001.

[2] Ruf, Gross and Misra, IEEE TGRS, 44(3), 694-706, 2006.

Image credits: WB-57 photo by D. Boprie. WB-57 flight line by AS&M Data Systems. TB and kurtosis images by A. Warnock and C. Ruf.