NOAA/NESDIS Cooperative Research Program (CoRP)
9th Annual Science Symposium
"Toward a Weather-Ready Nation and Resilient Coastal Communities"

ABSTRACTS

ORAL PRESENTATIONS

Tuesday, 23 July 2013

10:00 AM Patrick Meyers, CICS-MD

Envisioning Future Imagery: Activities at CICS-MD

Authors: Patrick Meyers, Scott Rudlosky, and Ralph Ferraro

Future NOAA/NESDIS products will aim to merge multiple data sources into informative and user-friendly value-added products. The next generation of geostationary (GOES-R series) and polar-orbiting (JPSS) satellites will improve remote sensing capabilities. New products have been developed and demonstrated to prepare users to take full advantage as soon as this new data begins flowing. Unlike the infrared and visible sensors aboard geostationary satellites, passive microwave radiometers are not obscured by clouds and can characterize the precipitation field. Accurate precipitation fields, particularly over the oceans, provide invaluable information to hurricane forecasters characterizing the structure of storms. Additionally, lightning data will improve precipitation algorithms to better identify the regions of convective precipitation in the GOES-R and JPSS era.

This talk illustrates potential methods for combining observations from the GOES-R and JPSS sensors. One example product will combine GOES-R rapid scan imagery with the planned Geostationary Lightning Mapper (GLM) observations to aid operational severe weather forecasting. The Washington D.C. Lightning Mapping Array (DCLMA) continuously monitors electrical activity in the D.C. metropolitan area and acts as a proxy for GLM. Combining special super-rapid scan imagery with DCLMA during a tornado outbreak on 13 June 2013 demonstrated the potential value of a merged product to forecasters, emergency managers, and the general public. A sudden increase in lightning activity, known as a \"jump\", preempted touchdown of two isolated tornadoes by approximately 20 minutes. This near-real time imagery could provide invaluable information for the forecasting severe storms.

10:20 AM Amir Ibrahim, CREST

Polarimetric remote sensing for the retrieval of optical properties of the ocean

Authors: Amir Ibrahim, Alex Gilerson, and Samir Ahmed

Polarized light in the oceans carries intrinsic information that can be utilized to estimate the optical and microphysical properties of the oceanic hydrosols. It is especially sensitive to the scattering coefficient, which cannot be retrieved from the total light reflectance used in current ocean color remote sensing algorithms. Based on extensive simulations using the vectorial radiative transfer program RayXP, the attenuation-to-absorption ratio (c/a), from which b is readily computed, is shown to be closely related to the Degree of Linear Polarization (DoLP). The relationship is investigated for the upwelling polarized light for several wavelengths in the visible part of the spectrum, for a complete set of viewing geometries, and for varying water compositions. A large dataset of Stokes components is collected for various water compositions, measured in the field with a hyper-spectral and multi-angular polarimeter for validation purposes.

10:40 AM Jan Musial, University of Bern/CIMSS

Probabilistic approach to cloud and snow detection on AVHRR imagery

Authors: Jan Pawel Musial, Fabia Huesler, Melanie Suetterlin, Christoph Neuhaus, and Stefan Wunderle

The derivation of probability estimates complementary to geophysical data sets has gained special attention over the last years. The information about a confidence level of provided physical quantities is required to construct an error budget of higher level products and to correctly interpret final results of a particular analysis. Regarding the generation of products based on satellite data the common input consists of a cloud mask which allows discrimination between surface and cloud signals. Further the surface information is divided

between snow and snow-free components. At any step of this discrimination process a misclassification in a cloud/snow mask propagates to higher level products and may alter their usability. Within this scope a novel Probabilistic Cloud Mask (PCM) algorithm suited for the 1x1 km AVHRR data is proposed which provides three types of probability estimates between: cloudy/clear-sky, cloudy/snow and clear-sky/snow conditions. As opposed to the majority of available techniques which are usually based on a decision-tree approach in the PCM algorithm all spectral, angular and ancillary information is used in a single step to retrieve the probability estimates from the pre-computed Look Up Tables (LUTs). Moreover, the issue of derivation of a single threshold value for a spectral test was overcome by the concept of multidimensional information space which is divided into small bins by an extensive set of thresholds. The discrimination between snow and ice clouds and detection of broken, thin clouds was enhanced by means of the Invariant Coordinate System (ICS) transformation. The study area covers a wide range of environmental conditions spanning from Iceland through central Europe to northern parts of Africa which exhibit diverse difficulties for cloud/snow masking algorithms. The retrieved PCM cloud classification was compared to PPSv2012 and MOD35 collection 6 cloud masks, SYNOP weather reports, CALIPSO vertical feature mask version 3 and to MOD10A1 collection 5 snow mask. The outcomes of conducted analyses prove the fine detection skills of the PCM method with comparable or better results than the reference PPS algorithm.

11:00 AM Patrick Meyers, CICS-MD

Updating GPROF2010 for AMSR2/AMSRE

Authors: Patrick Meyers, Nai-Yu Wang, and Ralph Ferraro

The Goddard Profiling Algorithm 2010 (GPROF2010) has been updated and finalized for the family of Advanced Microwave Scanning Radiometers (AMSR). The updates to GPROF2010 are being implemented by the NASA/Marshall Space Flight Center as the final update to the AMSR-E rain product and will reprocess the entire period of record. In addition, GPROF2010 will be the initial precipitation algorithm for the AMSR2 sensor that will be implemented at NOAA/NESDIS. AMSR-2 was deployed in May 2012 by the Japanese Aerospace Exploration Agency (JAXA) aboard the Global Change Observation Mission Water 1 (GCOM-W1) satellite as the first in a series of six climate monitoring satellites as part of the JPSS program.

GPROF2010 was developed for the TRMM Microwave Imager (TMI) to retrieve precipitation over land, ocean, and coast, in addition to total precipitable water, cloud liquid water, and wind speed over ocean. The most noteworthy updates to GPROF2010 for AMSR-E and AMSR2 involve the rain algorithm over land. A correction was calculated from collocated observations to produce AMSR-E brightness temperatures at TMI frequencies. The surface screening procedure has been reexamined to reduce the occurrence of incorrect flagging over land by making use of climatological datasets. A monthly snow and ice climatology developed from Interactive Multisensor Snow and Ice Mapping System (IMS) data eliminates over-flagging in warm-season convective systems and helps to flag ambiguous surfaces in snowy mountainous regions. A static International Geosphere/Biosphere Programme surface-type database is used to flag out desert scenes and initiate select screening procedures over semi-arid surfaces. Retrievals from the updated algorithm are verified globally on monthly time scales using Global Precipitation Climatology Project (GPCP) data and instantaneously over CONUS using collocated National Mosaic & Multi-Sensor QPE (NMQ) data.

Precipitation products generated at NOAA/NESDIS from AMSR2 are set to be publically released in September 2013.

2:30 PM Denny VanCleve, NWS Milwaukee/Sullivan, WI

Weather Ready Nation, What Is It and How Do We Get There?

Authors: Steve Brueske and Denny VanCleve

Weather-Ready Nation is a NOAA initiative to create a society that is ready, responsive and resilient to extreme weather and water events. Changes in climate, technology, demographics and population have dramatically increased our society's vulnerability to extreme weather and water events. Ninety-nine federal disaster declarations set a record in 2011, shattering 2010's previous record 81 disaster declarations. 2012 was the hottest year ever recorded for the contiguous United States and was also the year Hurricane Sandy became the largest hurricane ever observed in the Atlantic. Sandy caused an aggregate $79 billion in estimated losses in New York and New Jersey alone. 2012 also brought a severe and extensive drought to

the U.S. which caused agricultural losses of between $50 billion and $80 billion. Weather-Ready Nation's goal is to reduce or eliminate these disasters.

NOAA's vision of a Weather-Ready Nation is about building community resilience in the face of increasing vulnerability to extreme weather and water events. This vision requires the participation and commitment of a vast network of partners including government agencies and emergency managers, researchers, the media, insurance industry, non-profits, the private sector, the Weather Enterprise and more. Once realized, a Weather-Ready Nation will be one where people are empowered to make life-saving decisions that also prevent devastating economic losses.

3:15 PM Estatio Gutierrez, CREST

Simulations of a Heat Wave Event on New York City Using a WRF Multilayer Urban Parameterization

Authors: Estatio Gutierrez, Jorge Gonzalez, Robert Bornstein, Mark Arend, and Alberto Martilli

The Weather Research and Forecasting (WRF) mesocale model coupled to a multi-layer urban canopy model was used to evaluate the evolution of a 3-day heat wave in New York City (NYC) during the summer of 2010. This urban parameterization considers thermal and mechanical effects of the urban environment including a building scale energy model to account for anthropogenic heat contributions. Comparisons against more simplified urban schemes are made including a case that assumes the complete absence of any urban structures. High resolution urban canopy parameters (UCPs) from the National Urban Database and Access Portal Tool (NUDAPT) were employed to initialize the model. The thermal and drag effects of buildings represented in the multilayer urban canopy model improves simulations over urban regions giving better estimates of the surface temperature and wind speed. The accuracy of the simulation is further assessed against more simplified urban parameterizations models. The nighttime excessive cooling shown by the building energy parameterization (BEP) is compensated for when the building energy model (BEM) is activated. The Tubrulent Kinetic Energy (TKE) is more vertically distributed when using the multilayer scheme with a maximum at the average building height whereas turbulence is confined to few meters above the surface when using the simplified scheme. Evidence for the existence of horizontal roll vortices is presented and the impact that the horizontal resolution and the time step value have on their formation is assessed.

3:35 PM Nathan Hosannah, CREST (CCNY)

Effects of Aerosols on Microphysics and Warm-Season Precipitation in an Urban Enviroment

The research presented here is directed towards determining the effects of aerosol particle size distributions (PSD) on precipitation for the coastal urban environment of New York City (NYC). Urban environments influence precipitation via alteration of dynamic effects and aerosol ingestion. This research aims to improve precipitation forecasts in complex urban environments. The Regional Atmospheric Modeling System (RAMS) was used to simulate July 2007 summer precipitation scenarios for NYC. Aerosol PSD from NASA's Aerosol Robotic Network (AERONET) were processed and ingested directly into RAMS to represent cloud condensation nuclei (CCN) and giant CCN (GCCN). NYC was represented by high resolution land data acquired from the National Land Cover Database (NLCD). An ensemble of numerical simulations were configured. Two runs were month long runs for July 2007, the first with constant PSD values, and the second with observed PSD updates from the Aerosol Robotic Network (AERONET). Four more runs addressed one day precipitation events under various PSD conditions. Model results suggest that PSD variation affects precipitation rates, rainfall amounts, and spatial precipitation patterns via modification of cloud physics. Here, precipitation forecasting is significantly improved with ingestion of observed PSDs.

3:55 PM Jordan Gerth, CIMSS

Sky Cover: Shining Light on a Gloomy Problem

The sky cover problem is more than just splitting the difference between partly cloudy and partly sunny. Of all of the standard meteorological parameters, sky cover is not only one of the most complex, but also most ambiguous in definitions. While the overall impact of the sky cover on the general public is typically minimal, sky cover is important to the aviation sector and energy industry. Determining the sky cover is also a factor is assessing the state of the earth's climate system. And National Weather Service (NWS) forecasters are responsible for delivering a gridded forecast of the quantity.

While human observers record sky cover as part of routine duties, the spatial coverage of such observations in the United States is relatively sparse. There is greater spatial coverage of automated observations, and essentially complete coverage from weather satellites that scan the Americas. A good analysis of sky cover must reconcile differences between manual observations, automated observations, and satellite observations, through an algorithm that accounts for the strengths and weaknesses of each dataset. For example, there has long been a deficiency in ceilometers in high cloud coverage. In contrast, satellites are able to determine the evolution of the highest cloud deck, with clouds in the lower troposphere sometimes obscured. Today's geostationary satellites scan every one-kilometer pixel in the visible band (at nadir) several times per hour, while the surface observer is responsible for the entire celestial dome, which extends to clouds sometimes tens of kilometers from the observation location, no less than once per hour.

This presentation discusses the creation of a blended sky cover analysis, and an optimized sky cover analysis which minimizes absolute error with the one-hour forecast of sky cover from the NWS' National Digital Forecast Database (NDFD). There is additional discussion about how the blended sky cover analysis is compared with the cloud ice, cloud water, rain, snow, and other analysis fields from the High-Resolution Rapid Refresh (HRRR), and then applied to three-, six-, and nine-hour HRRR forecasts. The intent is to suggest a reasonable definition for sky cover and demonstrate a product that can bring consistency to analyses and forecasts of sky cover.

4:15 PM Dugwon Seo, CREST

Assimilation and Incorporation of SMOS Soil Moisture Data to the National Weather Service's Research Distributed Hydrologic Model (HL-RDHM) for Gridded Flash Flood Guidance in Arkansas-Red river basin

Authors: Dugwon Seo, Reza Khanbilvardi, Tarendra Lakhankar, and Brian Cosgrove

After rainfall, soil moisture is the most important factor dictating flash flooding, since rainfall infiltration and runoff are based on the saturation of the soil. It is difficult to conduct ground-based measurements of soil moisture consistently and regionally. As such, soil moisture is often derived from models and agencies such as the National Oceanic and Atmospheric Administration's National Weather Service (NOAA/NWS) use proxy estimates of soil moisture at the surface in order support operational flood forecasting. In particular, a daily national map of Flash Flood Guidance (FFG) is produced that is based on surface soil moisture deficit and threshold runoff estimates. Flash flood warnings are issued by Weather Forecast Offices (WFOs) and are underpinned by information from the Flash Flood Guidance (FFG) system operated by the River Forecast Centers (RFCs). The current FFG system at the ABRFC provides gridded flash flood guidance (GFFG) System using the NWS Hydrology Laboratory-Research Distributed Hydrologic Model (HL-RDHM) to translate the upper zone soil moisture to estimates of Soil Conservation Service Curve Numbers.

The remote sensing observations of soil moisture can provide high resolution soil surface information. This study is to evaluate the contribution of remote sensing technology to quantifiable improvements in flash flood applications as well as adding a satellite based soil moisture component to the NWS FFG Algorithm. Soil Moisture and Ocean Salinity (SMOS) measures the microwave radiation emitted from the Earth's surface operating at L-band (1.20-1.41 GHz). Microwave radiation at this wavelength offers relatively deeper penetration and has lower sensitivity to vegetation impacts, which has been proved to be optimal range to observe surface soil moisture. The challenge of this study is employing the direct soil moisture data from SMOS to replace the model-calculated soil moisture state. This study shows the techniques of SMOS soil moisture incorporation to the NWS operational hydrologic model (HL-RDHM) by spatial, vertical, and temporal data assimilations simultaneously. Corse spatial resolution (40 km) of SMOS data is downscaled to 4 km x 4 km Hydrologic Rainfall Analysis Project (HRAP) grid cells using physical parameters. Soil moisture observation from the surface is assimilated to root zone (50-100 cm depth) soil moisture state. Also, SMOS data coverage in the same area takes every 2-3 days. We assimilated 2-3 days soil moisture information to the 6 hour basis states for the Arkansas Red river basin study area.

Eventually, we will apply incorporated soil moisture in root zone to the FFG algorithm to evaluate accuracy of the system and potential improvement. This study will evaluate the value of remote sensing data in constraining the state of the system for main-steam and flash flood forecasting.

4:35 PM Curtis Seaman, CIRA

RGB Applications of VIIRS Imagery in Support of a Weather-Ready Nation

Authors: Curtis Seaman, Don Hillger, and Steve Miller

The Visible Infrared Imaging Radiometer Suite (VIIRS) aboard the Suomi National Polar-orbiting Partnership (NPP) satellite has been producing high-quality imagery since its launch in October 2011. VIIRS consists of 5 high-resolution imagery channels (~375 m resolution at nadir), 16 moderate resolution channels (~750 m resolution), and the Day/Night Band (~742 m resolution), ranging in wavelength from 0.412 um to 12.01 um. Red-green-blue (RGB) composites of these VIIRS channels are useful for detecting many hazards including: volcanic eruptions, dust storms, smog, fires, and floods. VIIRS RGB composites are also useful for monitoring vegetation health, snow and ice extent, ocean turbidity and other natural phenomena. RGB composites using the Day/Night Band (DNB) alone have proven useful for monitoring power outages over large metropolitan areas. Several RGB composites developed by EUMETSAT have been found to have additional uses when applied to the higher-resolution VIIRS imagery, particularly the \"Natural Color\" composite. VIIRS also has the ability to produce \"True Color\" imagery in the heritage of MODIS. Researchers at the Cooperative Institute for Research in the Atmosphere (CIRA) at Colorado State University (CSU) have been developing additional VIIRS RGB products, including a dust enhancement using visible, near-infrared and thermal infrared wavelengths and two RGB composites for detecting fires: the \"Natural Fire Color\" and \"Fire Temperature\" composites. Examples of these and other RGB composites will be presented, and the numerous applications of these products will be discussed.

Disclaimer: The views, opinions, and findings contained in this article are those of the authors and should not be construed as an official National Oceanic and Atmospheric Administration (NOAA) or U.S. Government position, policy, or decision.

Wednesday, 24 July 2013

9:10:00 AM Soe Hlaing, CREST

Validation of VIIRS Ocean Color primary products in coastal regions

Authors: S. Hlaing, A. Gilerson, A. Weidemann, R. Arnone, M. Wang, S. Ahmed

The quality of the VIIRS Ocean Color (OC) products, namely the normalized water-leaving radiance (nLw) and atmospheric products (i.e., aerosol optical thickness and Angstrom exponent), are analyzed for coastal waters conditions encountered at LISCO and WaveCIS AERONET-OC sites. Through statistical analysis carried out between the VIIRS, MODIS and AERONET-OC data, the impacts of the different processing schemes on the VIIRS's OC data retrievals are assessed in order to aid the scientific community to better interpret the physical or biogeochemical meaning of the VIIRS data in coastal areas. In processing of OC data from VIIRS, NASA Ocean Biology Processing Group (OBPG) is deriving a continuous temporal calibration based on the on-board calibration measurements for the visible bands, and then reprocessing the full mission to produce a continuously calibrated sensor data record (SDR) product. In addition, an additional vicarious calibration during SDR to OC Level-2 processing is applied. In this latest processing, the vicarious calibration is derived from the Marine Optical Buoy (MOBY) data whereas it was derived from a sea surface reflectance model and a climatology of chlorophyll-a concentration in the initial processing. On the other hand, fulfilling the mission of the U.S. National Oceanic and Atmospheric Administration (NOAA), Interface Data Processing Segment (IDPS) developed by Raytheon Intelligence and Information Systems for the processing of the environmental data products from sensor data records has gained beta status for evaluation. Thus, assessments of the VIIRS ocean color product are necessary especially for coastal waters to evaluate the consistency of these processing and calibration schemes. In the investigations carried out over almost a year period dataset of VIIRS based on the data from two coastal AERONET-OC sites, it has been observed that VIIRS sensor can well capture the seasonal and temporal variations in the nLw data exhibiting the significant correlation with in-situ data. For WaveCIS site, VIIRS nLw data retrieval is improved with the latest processing scheme reducing the retrieval biases at every wavelength. Nevertheless, it is not the case for LISCO site revealing more frequent occurrences of the negative water-leaving radiances, and underestimation

in VIIRS nLw data is further exacerbated. This point out the impacts of vicarious calibration procedures are not the same for the coastal areas with different water conditions and probably suggest the need to take into account comparisons between AERONET-OC and satellite data for coastal sites before making decisions on changes of sensor gains. Strong consistency between the time-series nLw data retrieved from the VIIRS and MODIS sensors was also observed. Evaluations of the aerosol optical thickness data exhibits significant correlation but with substantial overestimation in VIIRS data. Impacts of the aerosol model selection over the atmospheric correction procedure will be also discussed.

9:40 AM Natalie Perlin, College of Earth, Ocean, and Atmospheric Sciences/ Oregon State University

Use of Satellite Observations to Measure Air-Sea Coupling and to Validate Its Estimates from Numerical Atmospheric Models

Authors: Natalie Perlin, Dudley Chelton, and Simon de Szoeke

Multi-year scatterometer measurements of near-surface ocean winds from QuikSCAT satellite provide an unique and extensive database with sufficient resolution to reflect the mesoscale effects in the global ocean winds (0.25-deg. gridded product). Satellite-based sea surface temperatures (SST) database on a 0.25-deg. grid is available from NOAA Optimal Interpolation SST analysis. These two observational products allow to quantify statistical atmospheric responses of near-surface wind to mesoscale SST variability, or coupling coefficients (CC). For the given study region in Agulhas Return Current (ARC) for July 2002 that features both mesoscale SST eddies and larger-scale zonal SST gradients, CC yields 0.42 m/s per deg.C.

Month-long simulations over the Southern Ocean ARC region were performed with several different PBL mixing parameterizations with Weather Research and Forecast model (WRF V3.3) and COAMPS atmospheric models. Recently implemented Grenier-Bretherton-McCaa scheme in WRF model agreed best with the satellite-derived CC (0.40 m/s per deg.C).

10:00 AM Lide Jiang, CIRA

Ocean Diurnal Variations in China's East Coast Region Measured by the Korean Geostationary Ocean Color Imager (GOCI)

Authors: Menghua Wang, Lide Jiang, Seunghyun Son, and Wei Shi

The first geostationary ocean color satellite sensor, Geostationary Ocean Color Imager (GOCI) onboard South Korean Communication, Ocean, and Meteorological Satellite (COMS), which was launched in June of 2010 and has eight spectral bands from the blue to the near-infrared (NIR) wavelengths in 412-865 nm, can monitor and measure ocean phenomenon over a local area of the western Pacific region centered at 36N and 130E and covering ~2500 x 2500 km2. Hourly measurements during daytime (i.e., eight images per day from local 9:00 to 16:00) are a unique capability of GOCI to be used for the short- and long-term regional ocean environmental monitoring.

A recent study from a collaboration between NOAA Center for Satellite Applications and Research (STAR) and Korean Institute of Ocean Science and Technology (KIOST) showed that the GOCI ocean color products such as normalized water-leaving radiance spectra, nLw(Î»), for GOCI coverage region derived using an iterative NIR-corrected atmospheric correction algorithm [1] were significantly improved compared with the original GOCI data products and have a comparable data quality as MODIS-Aqua in this region [2]. It is also shown that the GOCI-derived ocean color data can be used to effectively monitor ocean phenomenon in the region such as tide-induced re-suspension of sediments, diurnal variations of ocean optical and biogeochemical properties, and horizontal advection of river discharge.

In this presentation, we show some more results of GOCI-measured ocean diurnal variations in various coastal regions of the Bohai Sea, Yellow Sea, and East China Sea. With possibly eight-time measurements daily, GOCI provides a unique capability to monitor the ocean environments in near real-time, and GOCI data can be used to address the diurnal variability in the ecosystem of the GOCI coverage region. In addition, more in situ data measured around the Korean coastal regions are used to validate the GOCI ocean color data quality, including evaluation of ocean diurnal variations in the region. The GOCI results demonstrate that GOCI can effectively provide real-time monitoring of water optical, biological, and biogeochemical variability of the

ocean ecosystem in the region. Finally, two-year GOCI ocean color data are used to characterize seasonal and interannual variations in water optical, biological, and biogeochemical properties in the western Pacific region.

[1] Wang, M., Shi, W., and Jiang, L. (2012). Atmospheric correction using near-infrared bands for satellite ocean color data processing in the turbid western Pacific region. Opt. Express, 20(2), 741-753.

[2] Wang, M., Ahn, J., Jiang, L., Shi, W., Son, S., Park, Y., and Ryu, J. (2013). Ocean color products from the Korean Geostationary Ocean Color Imager (GOCI). Opt. Express, 21(3), 3835-3849.

1:00 PM Luis Ortiz, CREST

Sensitivity Study of WRF Downscaled Precipitation and Temperature Data for the Northeast Corridor

Authors: Luis Ortiz, Bereket Lebassi-Habtezion, and Jorge Gonzalez

Understanding the effects of low resolution forcings such as Land-cover and topography on climate is an integral part of predicting conditions in the future of the Northeast Corridor (NEC). Specifically of interest is how energy consumption is affected by regional climate trends. Electric demand in the NEC is connected to temperature variability for space heating and cooling of buildings, which can be up to 25% of the total energy consumption in residential buildings. Moreover, the peak demand is driven by extreme climate events such as heat waves, while changes in precipitation might affect the water supply of power plants. This work presents a sensitivity study of high resolution (4km) regional climate modeling (WRF) downscaled in the Northeast Corridor using the NCEP-NCAR Reanalysis Project as input to a set of cumulus parametrization and micro-physics schemes with the aim of validating the model for simulations of future climate (2013-2100).

It is shown that precipitation is very sensitive to cumulus parametrization schemes, with the Kain-Fritsch scheme providing the best representation of the original forcing's precipitation and comparing well with gridded ground observations (PRISM), while few improvements were found by alternating micro-physics parametrization schemes. Moreover, acceptable results for maximum temperature were found, with the model underestimating PRISM temperatures by less than 10% in average for the region.

1:20 PM Dustin Shea, CICS-MD

Demonstrating a Lightning Density Product at the Ocean Prediction Center

Authors: Dustin Shea, Scott Rudlosky, Joe Sienkiewicz, Michael Folmer, and Greg McFadden

A new lightning density product is being demonstrated at the Ocean Prediction Center (OPC) during summer 2013. The National Environmental Satellite, Data, and Information Service (NESDIS) and OPC developed this product as part of the Geostationary Operational Environmental Satellite R-Series (GOES-R) Proving Ground (PG) efforts, using data from Vaisala's Global Lightning Dataset (GLD360). The project aims to introduce forecasters to a continental (ocean basin) scale lightning intensity product to prepare them for the planned GOES-R Geostationary Lightning Mapper (GLM). The project also seeks to improve the OPC's ability to evaluate offshore convection, and to incorporate forecaster feedback to improve the flash density product prior to wider distribution. This presentation focuses on the development of the lightning density product and related training materials, but also briefly describes the forecasters' experiences, potential modifications to the final product, and benefits of the project for the GOES-R PG efforts.

1:40 PM Pei Wang, CIMSS

Improve hurricane Sandy forecasts with hyperspectral infrared sounder data

Authors: Pei Wang, Jun Li, Tim Schmit, Jinlong Li, Zhenglong Li, and Wenguang Bai

The high spectral resolution infrared sounders such as AIRS, IASI and CrIS provide atmospheric temperature and moisture profiles with high vertical resolution and good accuracy. Those advanced IR sounders provide soundings in hurricane environment, which is critical for tropical cyclone (TC) forecasts. In order to demonstrate the application of advanced IR sounder data in tropical cyclone forecasts, both AIRS and CrIMSS temperature soundings in clear and partly cloudy skies are used in regional numerical weather prediction (NWP) model. The advanced research WRF (ARW) modeling system is used as NWP model and the Community Gridpoint Statistical Interpolation (GSI) system is used as data assimilation system in our experiments on hurricane Sandy (2012) forecasts. The assimilation conducted every 6 hours with conventional data, AIRS and CrIMSS

soundings, and followed by the 72 hours forecasts. The operational HWRF and operational global GFS forecasts are compared with our experimental forecasts results. Quality control of AIRS and CrIMSS soundings are conducted before the data assimilation process. To verify the impact of assimilating hyperspectral IR soundings on Sandy forecasts, hurricane track, minimum sea level pressure (SLP) and maximum wind speed observations from national hurricane center (NHC) are used as references for comparisons with forecasts. Comparisons among operational HWF, global GFS and our experimental forecasts show that that for hurricane track, operational GFS forecast are better at the beginning 36 hours, and after 42 hours, our experimental forecasts are comparable with global GFS forecasts, and the RMSE of our experimental forecasts is smaller after 66 hours. For the whole forecast period, the central SLP RMSE of our experimental forecasts is smaller, which indicates the advantage of high resolution regional model on TC intensity forecasting. The GOES-13 Imager brightness temperature measurements are also compared with that of simulated from forecasts, indicating that the mesoscale systems around the TC could be well captured by our experimental assimilation and forecasting system.

2:20 PM Christopher Slocum, CIRA

Satellite Applications to Hurricane Intensity Forecasting

Authors: Christopher J. Slocum - Colorado State University; Kate D. Musgrave, Louie D. Grasso, and Galina Chirokova - CIRA/Colorado State University; and Mark DeMaria and John Knaff - NOAA/NESDIS Center for Satellite Applications and Research

The Cooperative Institute for Research in the Atmosphere has developed several satellite applications to aid in decision support and to understand hurricane intensity as part of the Hurricane Forecast Improvement Project (HFIP). The projects use both geostationary and polar-orbiting platforms.

Observed GOES imagery at 10.7 microns is used as a predictor in the statistical-dynamical model Statistical Prediction of Intensity from a Consensus Ensemble (SPICE). SPICE creates Statistical Hurricane Intensity Prediction Scheme (SHIPS) and Logistic Growth Equation Model (LGEM) ensembles using output from the GFS, HWRF, and GFDL models in addition to observed GOES data and produces a weighted consensus forecast. SPICE shows a 5-10% improvement in skill over SHIPS and LGEM. SPICE has been run as part of the HFIP real-time demonstration over the past two years. In addition to using observed GOES data in real-time hurricane forecasting guidance, observed GOES imagery is also compared with synthetic GOES imagery at 6.48 microns and 10.7 microns generated from HWRF using the CRTM. This comparison allows for verifying HWRF output and diagnosing biases.

Analysis of aircraft reconnaissance flight-level data is used in conjunction with the NESDIS operational rainfall rates from AMSU to provide initial conditions for hurricane intensity change guidance based off of Eliassen's balanced vortex model. The initial vortex structure is derived from the azimuthal average of the aircraft data. The rainfall estimates from AMSU are used to derive the radial profile of diabatic heating. The initial vortex structure and diabatic heating profile are run through the intensity guidance model to provide real-time information related to intensity change and the potential of rapid intensification. Using the Eliassen balanced vortex model-based guidance with satellite data can also be used as a diagnostic tool to compare with statistical-dynamical and NWP models.

Results from these methods to improve hurricane intensity forecasting will be presented. Plans for utilizing new data from S-NPP and GOES-R to improve intensity prediction will also be described.

Disclaimer:

The views, opinions, and findings contained in this article are those of the authors and should not be construed as an official National Oceanic and Atmospheric Administration (NOAA) or U.S. Government position, policy, or decision.

POSTER PRESENTATIONS

Christie Adorno Garcia, UPRM NOAA-CREST

An auto-calibration procedure applied to the surface runoff component of the GOES-PRWEB operational algorithm

Authors: Eric Harmsen and Christie Adorno Garcia

The objective of this research project is calibrate and validate the surface runoff component of the GOES-PRWEB algorithm. It is an algorithm implemented in Matlab, which computes the components of the daily water and energy balance for Puerto Rico. To estimate the surface runoff, the algorithm uses the NRCS-Runoff Curve Number method equation. In this equation the inputs parameters are the curve number (CN) and the rainfall (P). CN is a proportion of rainfall converted to runoff and the rainfall (P) is obtained from NOAA's AHPS website.

The Rio Guanajibo Basin in Puerto Rico, was selected as a prototype watershed for developing the methodology. To evaluate preliminary errors, monthly comparisons were made with data from 2010, 2011 and 2012. Comparisons included: GOES-PRWEB (estimated) runoff vs. direct runoff from stream gauges (observed), estimated recharge vs. observed base flow and estimated runoff plus recharge vs. observed streamflow. Results show, in several cases, an overestimation in the runoff and an underestimation in the aquifer recharge by the algorithm, which tended to cancel out the error in the total runoff result. Nevertheless, there were some significant errors in the total runoff during some months. Error in the runoff may indicate errors in the radar-derived rainfall or possibly in the evapotranspiration or soil moisture.

Future work include application of the methodology to all gauged stations in PR, extrapolation of the results to un-gauged areas, validation of the calibrated algorithm with data from 2009, and application of the radar-rainfall correction procedure in an operational mode.

Barbara Arvani, CIMSS

Implementation of IMAPP/IDEA-I Over the Po Valley Region, Northern Italy, for Air Quality Monitoring and Forecasting

Authors: B. Arvani, R. B. Pierce, S. Teggi, A. Bigi, and G. Ghermandi

Satellite Earth Observations (EO) represents a powerful tool for environmental application such as air quality assessment and forecast. New sensors and image processing methodologies allow the achievement of a better spatial resolution. Air pollution is an important concern in the Po valley, northern Italy, one of the main industrialized and populated areas of the country, so intensely studied. Our work focuses on the applicability of satellite Aerosol Optical Depth (AOD) retrievals in support of air quality monitoring and assessment in urban environments within the Po valley. This has been accomplished by using the implementation of the International MODIS/AIRS Processing Package (IMAPP) Air Quality Applications software, IDEA-I (Infusing satellite Data into Environmental Applications-International) over the Po valley study area. IDEA-I is a globally configurable software package that uses Terra or Aqua MODerate resolution Imaging Spectro-radiometer (MODIS) AOD product retrievals to identify local domains of high values of aerosol. From these points trajectories are initialized and a trajectory model is then run which provides a forecast of the horizontal and vertical movement of the aerosols over the next 48 hours. For our specific analyses, IDEA-I has been used over the large European domain, centred over the Po Valley. One year (2012) of MODIS AOD product (MOD04) retrievals from MODIS on board NASA's Terra satellite has been considered using IDEA-I in a retrospective study. We needed to develop tools to adapt IDEA-I using MODIS AOD data archived at the NASA Level 1 and Atmosphere Archive and Distribution System (LAADS). This was required because IDEA-I is setup for near-real time use of MODIS Direct Broadcast retrievals by default. The Level 2 Aerosol Products collection 5.1 have been used, which returns AOD data at 0.55 um with a spatial resolution of 10X10 km2 retrieved from MODIS. These retrieved data have been compared with PM10 mass concentration measurements from the Italian Agency for Environmental Protection (ARPA) network. Correspondence between AOD and PM10 values suggests that satellite AOD values could be a good substitute for monitoring air quality over the Po valley domain. Moreover, the integration of the use of IDEA-I over the Po valley could give the opportunity to monitor and forecast air pollution and understand particular polluted situations in the past with an its retrospective use.

As ongoing work development, the PM10 and PM2.5 data are been considering compared with the MODIS AOD data normalized by the Planetary Boundary Layer height (ZPBL). The results suggest a much stronger

correlation between PM10/2.5 and MODIS AOD normalized. The ZPBL trend over the Po Valley has a direct impact on the PM - MODIS correlation, with low values during the winter and high values during the summer.

Kaba Bah, CIMSS

Leveraging GOES-R ABI capabilities in partnership with the NWS offices, to significantly improve severe convection weather forecasting and monitoring

Authors: Kaba Bah, Brad Pierce, Tom Greenwald, Todd schaak, Allen Lenzen, Marek Rogal

The May 20th, 2013 Oklahoma tornado outbreak was rated EF-5. It yield a tornado path length of ~17miles and a path width of ~1.3miles. This resulted in at least 25 fatalities, 390 injuries and estimated damages of $2-5 billion. The ABI proxy and imagery team at UW-Madison CIMSS/SSEC has locally been generating real-time ABI proxy data using the WRF-CHEM model which was able to capture onset of the severe WX that led to the May 20th, 2013 Tornado outbreak. These datasets are then used to generate ABI key performance parameter (KPP) products for the cloud and atmospheric moisture profiles. These KPP product suits, which currently includes (CAPE, LI, TPW, TT and RGB-AIRMASS) gets remapped which we plan to package into weather event simulators (WES) cases. This would makes it possible for us to work closely with forecasters to evaluated and improve the products through the join proving ground effort in preparation for GOES-R ABI.

Carlos Carrizo, CREST

Imaging of underwater targets with Full-Stokes polarimetric camera

Authors: Carlos Carrizo, Alberto Tonizzo, Amir Ibrahim, Ahmed El-Habashi, Robert Foster, and Alex Gilerson

Underwater imaging is challenging because of the significant attenuation of light due to absorption and scattering which results in rapid blurring and degradation of an image. Using polarization properties of light is one of the options through which the quality of an image can be significantly improved. The results shown in this presentation correspond to measurements done on a polarized target in open ocean (Curacao) and coastal (NY Bight) waters. The target is in the shape of a square subdivided into smaller squares. Each of these smaller squares is a polarizing film with different polarization orientations or transmission coefficients, which was placed on a highly reflective mirror. The target was imaged under water with green-band full-Stokes polarimetric video camera and measurements of each Stokes vector components was collected as a function of the Sun's azimuth angles. These measurements were then compared with the modeled image of the target using radiative transfer code for the atmosphere-ocean system combined with the simple imaging model.

In the natural world, polarization characteristics combined with intensity imaging can increase the detection range of objects in a scattering medium. These characteristics are of great importance for underwater target detection and understanding marine life behavior (such as that of fish and squids) which exploit these features both to camouflage and to improve the detection of prey. In the context of our results, it is shown that even in the case of clear water the impact of the water body on the polarized underwater image is very significant and retrieval of target polarization characteristics from the image is extremely challenging.

Joan Castro, CREST

GOES Data to Estimate the Evolution of Effective Radius at Cloud Tops

Authors: Joan M. Castro-Sánchez and Nazario D. Ramirez-Beltran

The evolution of the effective radius of convective cloud tops can be estimated by using a sequence of radiative properties of channels 2 (3.9 μm) and 4 (10.7 μm) from GOES. The reflection function represents the albedo of the medium that would be obtained from a directional reflectance measurement. It has been shown that there is a relationship between 3.9 μm reflectance and ice crystal size at cloud top. As the mean diameter of a cloud-top ice crystal distribution decreases, more solar radiation near 3.9 μm is reflected. The Lindsey and Grasso (2008) algorithm was adopted to compute the albedo. This algorithm uses the total radiance of channel 2, the solar irradiance, and the equivalent black body emitted by thermal radiation at 3.9 μm for a cloud at temperature T; and this temperature is estimated with cloud-top brightness temperature of channel 4, T_4. To estimate the albedo for channel 2 requires that T_4<233°K. Lindsey-Grasso's algorithm uses albedo, the solar zenith angle, scattering angle, and look up tables

from radiate transfer to estimate the effective radius of convective cloud tops. A threshold brightness temperature from channel 4 was used to locate the pixels where the convective core can occur. Three stages of rainy pixels were identified: the new, persistent and dissipating rainy pixels. The effective radius was computed at each rainfall stage and the probability distribution was derived to characterize the rainy pixel stages. Rainy pixels were also observed through time to study their evolution.

Lina Cordero, Optical Remote Sensing Lab, City College of New York

Improving PM2.5 estimators using WRF ingested PBL heights

Authors: Barry M. Grossa, Yonghua Wua, and Fred Mosharya

Fine particulate matter measurements (PM2.5) are essential for air quality monitoring and related public health. However, the shortage of ground instruments makes accurate regional sensing very difficult. This motivates the use of both satellite and model based approaches. In this work we focus on the performance of existing satellite algorithms including MODIS AOD regression based approaches as well as performance improvements when the satellite AOD is combined with a low resolution GEOSCHEM model estimate of PM2.5 to AOD (used by IDEA). We find that in all cases, taking into account seasonal and urban / non urban regions that GEOSCHEM shows significant improvement in correlation and RMSE errors. However, we also find in many cases very large overestimation of PM2.5 compared to the in-situ measured fine particulate matter measurements from the New York State Department of Environmental Conservation (NYSDEC). To improve this, we explore the potential of using high resolution WRF meteorological data forecasts together with MODIS AOD to improve performance and reduce overbiases in the GEOSCHEM approach.

To begin, we focus on local ground measurements from a CIMEL, LIDAR and TEOM instruments at City College of New York to explore a neural network approach at one urban location. In particular, we demonstrate the importance of ingesting the planetary boundary layer height into the NN fine particulate matter estimator. In addition, the use of WRF PBL's were assessed in comparing to Calipso PBL heights. Preliminary NN development over the entire NY state region ingesting WRF meteorological information is being tested and performance improvements and reduction of bias in comparison to existing GEOSCHEM product outputs will be discussed.

Robert DeMaria, CIRA

Machine Learning Techniques for Tropical Cyclone Center Fixing using S-NPP

Authors: Robert T. DeMaria and Charles W. Anderson

Locating the surface circulation center is one of the first steps in forecasting tropical cyclones. All of the other forecast parameters depend on the center estimate. Except for the western Atlantic, aircraft reconnaissance data is rarely available for center location so satellite techniques are very important for this estimation. Even in the Atlantic, the aircraft passes are usually only available at 6 h time intervals, so satellite data is also useful there. The center location from satellite data is usually performed subjectively by forecasters using loops of visible and infrared imagery from geostationary satellites and snapshots of microwave imagery from low-earth orbiting (LEO) satellites. The primary objective center finding algorithm is the Automated Rotational Center Hurricane Eye Retrieval (ARCHER) developed by T. Wimmers at the U. of Wisconsin. The ARCHER method fits spiral patterns using gradients in passive microwave imagery from LEO satellites. This method works well when microwave imagery is available, although it has some limitations in storms in high shear environments.

The recently launched Suomi-National Polar-orbiting Partnership Mission (S-NPP) satellite includes the Advanced Technology Microwave Sounder (ATMS) and the Visible Infrared Imaging Radiometer Suite (VIIRS). The ATMS has much lower spatial resolution (~30 km for the highest resolution channel) than the passive microwave imagers used in the ARCHER method (~10 km), but provides more physically based variables, including the horizontal pressure and wind fields, determined from the temperature and moisture retrievals. This allows for a more direct estimate of the center. The first guess center estimate from the ATMS retrievals is then being refined using the much higher spatial resolution VIIRS data using image processing and machine learning techniques. Preliminary results using AMSU and GOES data will be presented.

Michelle Diaz-Laboy, CREST

Land Cover Classification of Caribbean Islands in Support of Climate Change Assessment

Authors: Michelle Diaz-Laboy, Marzieh Azarderakhsh, and Kyle McDonald

Caribbean islands have a unique biodiversity and endemism which has been threatened by humans due to the increase in population and exhaustive use of natural resources. A detailed map of land cover that includes a spatial-temporal characterization of land cover response to environmental drivers is essential to understand how infrastructure, forest and inland open water have changed through the years and may have responded to climate change occurring throughout the Caribbean. In this project, the islands of Puerto Rico and Hispaniola are used as case studies by combining optical and Synthetic Aperture Radar (SAR) data during 2007 and 2010 and in different seasons to classify land cover distribution and its potential response to climate change. Advanced Land Observing Satellite (ALOS) Phased Array L-band SAR (PALSAR) Level 1.1 dual polarization and polarimetric mode data are assembled and analyzed using the Alaska Satellite Facility (ASF) MapReady software. In addition, Landsat 7 Enhanced Thematic Mapper Plus (ETM+) acquired during the same years supplement the SAR data. A polarimetric decomposition was performed on the ALOS PALSAR polarimetric data using ASF MapReady. Supervised and unsupervised classification were performed on the optical and SAR data. Initial results delineate land cover distribution and response to seasonal drivers. Subsequent efforts will include implementation of a decision tree classification scheme using Random Forest to further refine landcover response to climate and climate change.

Simon Kraatz, CREST

High-Resolution Numerical Simulation Of Tidal Energy Distribution Along The New Jersey Coastline and Influence of Sea-Level Rise

Authors: Simon Kraatz and Hansong Tang

Tidal energy is a clean and renewable energy with tremendous amounts stored in oceans, and recently has been attracting more attention worldwide in power generation development. Currently various plans and projects are being made to genera electricity using renewable energy resources, particularly Marine Hydrokinetic (MHK) energy. In order to develop a large scale tidal power industry, it is a prerequisite to survey for tidal energy sites. This research studies the availability and distribution of MHK energy, with a focus on the New Jersey (NJ) coastlines, using a hydrodynamic model.

The numerical survey presented in this work employs the Finite Volume Coastal Ocean model (FVCOM), which solves the geophysical fluid dynamic equations using a finite-volume method on an unstructured triangular grid, spanning a region from Massachusetts to Virginia. The model is run mainly in two dimensions for computational efficacy. Tidal currents are computed on grids as fine as 9 to 20 m along much of the NJ coastline and rivers. The model is calibrated using observed data for water elevation and velocity mainly from NOAA and USGS. Computations are carried out at High Performance Computing Centers (HPC) including those at the City University of New York (CUNY), and the National Energy Research Scientific Computing (NERSC) of the Department of Energy.

This research presents results of a detailed tidal energy survey along NJ coastlines, and it estimates a total tidal MHK energy on the order of 10^12 J along the NJ nearshore water bodies. Model results show that the tidal energy distribution will be affected unevenly along the coastlines under sea-level rise conditions, and that the overall MHK energy in near shore regions will increase.

Margaret Mooney, CIMSS

Advancing Weather and Climate Literacy via Museum Exhibits and Mobile Devices

Authors: Margaret Mooney, Patrick Rowley, Steve Ackerman, Stephanie Uz, and Phil Arkin

This presentation will feature an educational effort to share weather and climate data with the public led by the Cooperative Institute for Meteorological Satellite Studies (CIMSS) in collaboration with the Cooperative Institute for Climate and Satellites (CICS) and NOAA's Environmental Visualization Lab. CIMSS and CICS are working together to create regular visualizations for Science On a Sphere (SOS) exhibits using near real-time data such as the NCDC's monthly climate reports and the CPC's seasonal outlooks. Along with producing large animations for SOS exhibits with background content for museum docents, small videos (with audio) are being created for mobile viewing and made freely available in the digital domain via a blog-style website called EarthNow (http://sphere.ssec.wisc.edu).

Along with discussing and demonstrating products produced by this collaboration, this presentation will elaborate on observed benefits of SOS exhibits and other insights gleaned from docent surveys.

Jonathan Munoz Barreto, CREST

Improvement of Microwave Emission Model using Long Term Field Experiment

Authors: Jonathan Muñoz,Tarendra Lakhankar, Peter Romanov, and Reza Khanbilvardi

Microwave remote sensing has shown great potential in estimating snowpack properties such as: snow depth and Snow Water Equivalent (SWE). However, other snow properties like density, wetness and grain size, which are variable in space and time, largely impact the microwave signal scattering, still need to be investigated and understood. With winters getting shorter and spring arriving 10-15 days earlier than it did 20 years ago, there is a high need to accurately understand the effect of changing snow characteristics (wetness, grain size and density) under various meteorological conditions on the microwave emission of snow. Specifically, information about the volume and temporal distribution of the snow wetness is important for predicting snowmelt run-off and flash floods caused by rapid snowmelt. Simultaneously, for wet snow, microwave retrievals appear to be problematic. However, better characterization of snow physical parameters like wetness can provide deeper insight to improve retrievals of snow cover properties from satellite observations in the microwave spectral range.

This study is focused on the development of a new method to estimate snow wetness (liquid water content) based on snow grain size and temperature; with the objective of assimilating the wetness on microwave emission models. Furthermore, this study concentrates on increasing the accuracy of the models during the melting and refreezing period. This research, will also discuss new instrumentation that will be develop and tested for accurate estimation of snow wetness trough the winter season.

Chowdhury Nazmi, CREST

Assessing High Resolution models to improve PM25 estimates and observe urban heat island signatures

Authors: Chowdhury Nazmi, Barry Gross, andFred Moshary

Retrieving Surface PM2.5 from satellite is very important for Air Quality applications and due to local meteorology and inhomogeneous aerosols, simple satellite AOD is not sufficient. Extra information can be obtained from using air quality models to provide a realistic ratio between satellite AOD and surface PM2.5. Currently, the IDEA product makes use of the GEOS CHEM product retrieval of CHEM PM2.5 / AOD ratios but this global product has 0.5 deg resolutions making it difficult to isolate urban effects. To investigate possible urban effects on this ratio, we use the Community Air Quality Model (CMAQ) to investigate the difference between urban and non urban emission factors. In addition, different seasonal, diurnal and relative humidity conditions are explored. In particular, we find the GEOS CHEM results have much less structure than the CMAQ which accounts better for local emission sources. Significant differences in the magnitude of the PM25/AOD factor are observed. In particular, CMAQ factors are in much better statistical agreement with results between satellites and field measurements. In addition, we also explore differences in PBL height due to urban heat island and demonstrate that in certain conditions, these heat island differences can be seen in Calipso PBL profiles.

Juan Pinales, CREST

Remote Sensing of Land Surface State Variables Controlling Biogeochemistry in Alaska

Authors: Juan Carlos Pinales and Dr. Kyle McDonald

Shifts in global climatic patterns have stronger effects in high-latitude regions, stressing the sensitivity of these regions to anthropogenic climate change. In particular, parameters like the freeze-thaw state of the landscape, the extent of inundated regions, and the distribution of temperature regimes are major constraints on the photoproductivity and land-atmosphere fluxes of energy, water, and carbon. Our approach consists in the analysis and synchronization of remote sensing datasets from microwave and optical sensors with in-situ measurements of surface variables from the Alaska Ecological Transect (ALECTRA) biophysical network and National Climate Data Center meteorological data. These data sets will serve as inputs for testing and validation of algorithmic, process-based models designed to generate classification maps detailing the spatial and temporal distribution of 4 principal

variables: freeze-thaw state, soil moisture, inundation state, and surface temperature. Characterization of these state variables and their linkages to the carbon cycle is a chief scientific imperative of the Carbon in Arctic Reservoirs Vulnerability Experiment (CARVE) and the Soil Moisture Active-Passive (SMAP) mission, two initiatives led by NASA's Jet Propulsion Laboratory. CARVE's campaigns will supply detailed aircraft-based measurements to quantify carbon fluxes and carbon cycle-climate processes of regions in Alaska. SMAP will make global measurements of landscape freeze/thaw state, surface inundation, and surface temperature from an orbiting platform. In order to complement the validation efforts for these missions, these parameters will be derived from several remote sensing data and validated with ground references, in order to test their validity as indicators of biophysical conditions on the ground.

Pedro Sequera,

Spatial and Temporal Analyses of a Global Warming Reverse-Reaction Coastal-Cooling Along the California Coast

Authors: Pedro Sequera, Robert Bornstein, and Jorge E Gonzalez

Previous studies by Lebassi et al. (2009) analyzed summer surface June, July and August mean-monthly maximum air temperature trends between 1950-2005 for two California air basins: San Francisco Bay Area and South Coast Air Basin . The spatial distribution of the observed summer max temperatures showed a complex pattern in which cooling trends were found at low elevation coastal areas open to marine air penetration and warming trends at inland and high elevation coastal areas. The authors suggested that increased sea breeze activity was responsible for the observed coastal cooling. The current research focuses on the extreme monthly-average maximum air temperatures for the all of California to determine both the spatial variability of this effect and the most influential factors on coastal cooling.

Luis Tavarez, CREST

The effects of Boundary Layer changes on AOD variations over Puerto Rico

Authors: Luis Tavarez and Dr. Hamed Parsiani

Recent data from various remote sensing equipment such as AERONET, and two Ceilometers (CL51 at UPRM and CL31 at NWS of San Juan Puerto Rico) were used during the beginning season of Saharan dust over Puerto Rico to evaluate the effects of aerosol boundary level (BL) changes on Aerosol Optical Depth (AOD) variations. The limitations of each equipment were considered, noting that the wavelengths of AERONET do not coincide with the single wavelength of the Ceilometer, as well as the Zenith angle of the Ceilometer. The results show good dependence of AOD on the BL variations for Puerto Rico.