# Biospheric Sciences Branch Highlights for September – October 2005

- **Research or Project activities/accomplishments**

** Dr. Elissa Levine was selected as the Principal Investigator for funding in the 2006 Director's Discretionary Fund Program for a proposal entitled "A New Partnership for Effective Science Education". This project seeks to structure a new partnership between NASA Goddard and the Smithsonian Environmental Research Center (SERC), located in Edgewater, Maryland, in the development and trial implementation of interdisciplinary, experiential science education pedagogy at the middle and high school levels. The approach will include a combination of field data acquisition, satellite data, and modeling of the Chesapeake Bay watershed to create an engaging methodology for science delivery that matches national and state education standards. Dr. Levine will be working with Co-Investigators Mark Haddon, Education Director at SERC, and David Herring, Code 613.2.

** Dr. Elissa Levine presented a lesson on Earth Science and soils to 12 blind middle school students and their teachers as part of the National Federation of the Blind (NFB) "Circle of Life" Summer Academy. This was the second year the Circle of Life academy has been offered and blind students from schools across the US participate in this academy for 1 week in the summer. This year, the students made daily measurements of max/min temperature of the soil and air, and precipitation according to LOBE protocols at the NFB headquarters in Baltimore. They also participated in numerous activities during the week, including a camp out on an organic farm, culminating with a visit to Goddard. The students toured Goddard facilities, had a luncheon with other blind scientists and engineers at Goddard, and took part in Dr. Levine's Earth science activities in the afternoon. These activities included a discussion of the importance of studying Earth Science, reviewing climate patterns across the country and the world, understanding the climate measurements they had made, and hands-on experiences with soil structure and texture in the lab. The students appeared to enjoy these activities and were able to grasp the concepts and ask meaningful questions.

** Ross Nelson returned from a two week trip to Matsuyama, Japan where, in conjunction with professors from Ehime University, he collected ~1600 km of airborne laser profiling data. We'll use these data to estimate aboveground forest biomass in 2005. They'll fly the same flight lines in 2007, develop biomass estimates, and compare the 2005-2007 figures to determine if Ehime Prefecture (an area about the size of Delaware) gained or lost above ground carbon

** Tom Brakke prepared weekly site acquisition schedule for EO-1, including hurricane-damaged areas and woodpecker habitat in Arkansas (for Woody Turner, NASA HQ). Revised EO-1 schedule after orbit-lowering burn on Sept. 27 led to unexpected post-burn orbit changes. Reviewed schedule with USGS/EROS.

Ross Nelson (Code 614.4) reviewed a final version of a RaDAR/LiDAR synergy report with first author Peter Hyde (SSAI) and colleagues Dan Kimes and Elissa Levine (both 614.4). The Arizona study looked at VHF (FOPEN), UHF - X and P band (GeoSAR) SAR, and LiDAR scanning data. No synergistic effects were noted between the 3 instruments with respect to predicting biomass in a predominantly ponderosa pine forest. LiDAR explained over 80% of the variation in ponderosa pine biomass, GeoSAR 10-25%, and FOPEN <10%. The report has been submitted to Remote Sensing of Environment, and a copy of the report has been sent to Diane Wickland in partial fulfillment of her 2-year contract to look at RaDAR-LiDAR synergy.

Jeff Privette hosted Shunlin Liang, UMD to discuss MODIS land surface temperature validation.

- **Refereed Publications**

** Paper accepted by IEEE GEOSCIENCE AND REMOTE SENSING LETTERS:
Inversion of a Lidar Waveform Model for Forest Biophysical Parameter Estimation, B. Koetz, F. Morsdorf, G. Sun, K. J. Ranson, K. Itten, and B. Allgöwer (in press )

** Jeff Masek had a paper accepted by Journal of Geophysical Research - Biogeosciences entitled "Estimating Forest Carbon Fluxes in a Disturbed Southeastern Landscape: Integration of Remote Sensing, Forest Inventory, and Biogeochemical Modeling", co-authored with G.J. Collatz (also 614.4). The paper combines a Landsat-based analysis of harvest history in Virginia with CASA biogeochemical modeling to estimate forest net carbon fluxes. They also examined the relative roles of disturbance variability and climate variability in controlling interannual carbon flux variability.

- **Other Publications**

** Two conference papers were completed and submitted to the upcoming SPIE Optics East (Oct. 23-26) for publication in the Proceedings:

Middleton, E.M., L.A. Corp, C.S.T Daughtry, P.K.E.Campbell, and L.M. Butcher (2005). Deriving chlorophyll fluorescence emissions of vegetation canopies from high resolution field reflectance spectra, Conference SA104, Optical Sensors and Sensing Systems for Natural Resources and Food Quality, Proceedings, Optics East SPIE Conference, 10 pp., Boston, MA, Oct. 23-27, 2005.

Huemmrich, K.F., E.M. Middleton, Guillaume Drolet, Forrest G. Hall, Hank Margolis, Robert G. Knox (2005). Determining ecosystem light use efficiency for carbon exchange by satellite, Conference SA104, Optical Sensors and Sensing Systems for Natural Resources and Food Quality, Proceedings, Optics East SPIE Conference, Boston, 8 pp., MA, Oct. 23-27, 2005.

** Jim Collatz attended the 7th international carbon dioxide conference in Boulder and presented a poster on "Partitioning Terrestrial Carbon Fluxes Into Net Primary Production, Heterotrophic Respiration, and Biomass burning components for the 1997-2004 period"

- **Proposals and Activities contributing to future business**

** Jeff Masek's proposal to NASA's Advancing Collaborative Connections for Earth-Sun System Science (ACCESS) was accepted for funding ("Building a Community Land Cover Change Processing System").

** Bob Knox presented Flora ESSP Briefing to Dolly Perkins, Mike Ryschkewitch, Bonnie Norris, George Morrow, Tom Magner, et al. on September 29, 2005

** Lahouari Bounoua arranged for a meeting with Co-I's to start planning to work on a NASA-funded proposal on urbanization

** Jon Ranson attended the Hydrospheric and Biospheric Science Lab Retreat Sept 25-27, 2005

** Jim Collatz submitted 3 notice of intent letters to NASA's ROSES call:
North American Carbon Program Impacts of disturbance history and climate on carbon fluxes in North America:

-- Application of satellite, inventory and climate data within the framework of biogeochemical modeling. PI: J. Collatz/Code 614.4

-- Analysis and understanding of seasonal, interannual to interdecadal variability in carbon sources and sinks in support of the North American Carbon Program PI: Ning Zeng University of Maryland, CoPI: J. Collatz

-- A NACP thematic data center for modeling and synthesis. PI: Jon Ranson, CoPI: Jim Collatz, Code 614.4

** Jeff Privette was invited to join the GOES-R Algorithm Working Group by Dr. Mitch Goldberg, Chief of the NOAA/NESDIS/ORA Satellite Meteorology and Climatology Division.

- **Science policy meetings, Science team meetings, Workshops**

** Jim Collatz presented a poster on the carbon cycle to Administrator Michael Griffin during his visit on September 26

** Ross Nelson presented at the SilviScan International Forestry Laser Symposium on Sept 29-Oct 1 in Blacksburg VA as co-chairman, along with Randy Wynne of Virginia Tech.

** Ross Nelson had a meeting with the statistical arm of the Quebec LiDAR project to discuss variance simulations.

** Jeff Privette and E. Brown De Colstoun participated in the NPOESS OAT meetings in Wisconsin

** Lahouari Bounoua produced some outputs from multiple runs of the LIS system using four land surface models for presentation at the Land Modeling meeting held at GSFC on October17, 2005.

** Jeff Privette participated in inaugural NPOESS Land Telecon and in NPOESS land surface temperature product TIM.

** Dr. Eric Brown de Colstoun and Ms. Jessica Robin (Code 614.4) recently organized an educational workshop on October 7 held at the Pocono Environmental Education Center (PEEC) in Dingmans Ferry, PA, on the grounds of the Delaware Water Gap National Recreation Area (DEWA). The workshop was organized to kick-off a research/educational partnership in the Upper Delaware River Basin which includes NASA, the National Park Service, through the DEWA and Upper Delaware Scenic and Recreational River (UPDE) park units, the GLOBE program, the Landsat Education and Outreach Program, and educators/students from local schools surrounding the parks. The goals of the research project, funding Dr. Brown de Colstoun through NASA's New Investigator Program, are to develop new methods to measure and monitor land cover/use changes in and around the two parks over the past 20 to 30 years using the Landsat satellite, and to model the consequences of such changes on the water and energy cycles of the parks. Educators at this workshop were introduced to various protocols established through the GLOBE program that will provide the data needed for product validation and model parameterization and which will be acquired in the field with the assistance of their students. This partnership between the Principal Investigator, the NPS, and area students and educators is one that clearly benefits the development and validation of the proposed research but also provides the compelling story line for a wide variety of educational activities, all within the spectacular setting of our National Parks. Attendees to the workshop (total 23) included the park superintendent of UPDE, GIS coordinators for both parks, nine educators from five local middle and high schools, the GLOBE country coordinator from Bahrain and one of her students, and two GLOBE master trainers.

** Jeff Privette (Code 614.4) gave a presentation on the various Land algorithms to be used in NPOESS during the Polar Max Conference at NOAA in Silver Spring. Description follows:
The Annual Polar Max conference was held at the NOAA Science Center in Silver Spring, MD on October 25-27, 2005. The conference is a user forum for the environmental monitoring community, bringing together multiple government agencies, academia, industry and stakeholders interested in the current status and future plans of the United States polar-orbiting satellite systems and those of its European partners. Jointly sponsored by the NPOESS Integrated Program Office and the heritage polar program offices, this year's conference focused on advanced sensors under development for the next generation of polar-orbiting satellites, as well as advances in remote sensing science and information extraction from satellite data. Users discussed operational applications of the data and their preparations for NPOESS. NASA speakers included Chief Engineer Chris Scolese (Keynoter Day 3), Ron Birk NASA/HQ SMD, from GSFC: Dr. Franco Einaudi, Dr. Michael King, Dr.Wayne Esaias and Dr. Jeff Privette.

- Seminars given

** Jim Collatz presented at Smithsonian Associates program on October 6. Astronaut Piers Sellers and former Branch member introduced Collatz.

** Jeff Masek presented lecture on "Fire, Disturbance, and Man" as part of Smithsonian Associates lecture series, Oct 20

- Reviewing activities

** Jon Ranson presented to NASA HQ Terra Budget Review Sept. 30, 2005

** Lahouari Bounoua invited to participate in Expert Review of the IPCC (Intergovernmental Panel On Climate Change) Working Group II fourth Assessment: Impact, Adaptation and Vulnerability for Africa and will review a section of the IPCC report dealing with Africa

- Awards, Honors, Memberships, Editorships

** J. Ranson accepted into Council for Excellence in Government's 2005-2006 Fellows Program. Kickoff meeting was in Williamsburg Oct. 17-20

** Jon Ranson, Jeff Privette and Marc Imhoff participated in Leadership Alchemy workshops.

- **Reviewing activities**

** Jeff Privette reviewed two proposals for NASA HQ

** Jeff Privette participated in roundtable discussion with leaders of OHR Training, the New Employee Welcoming Board, and Round The Table. The conversation addressed possibilities for enhancing career planning for new employees at the Center.

** Tom Brakke along with representatives from the Facilities Management Division (Alan Binstock) and the Safety and Environmental Division (Darlene Squibb), attended a meeting of the Baltimore Washington Forest Stewardship Partnership at the Patuxent Research Refuge. The main goal of the partnership is to foster the coordination of land management and research activities on the adjoining properties to achieve common stewardship objectives in a manner consistent with each agency's mission (the 22,000 acres involved contain one of the largest remaining significant tracts of contiguous forested land). Other attendees included Fort Meade, USDA/Beltsville, US Fish and Wildlife Service/Patuxent, and the Maryland Department of Natural Resources. After much discussion, the name of the group was changed to the Baltimore Washington Partners for Forest Stewardship. The attendees were asked to review their project lists, funding strategy (the intent is to find a funding mechanism that does not negatively impact NASA's budget or that of any other participating agency), and the Memorandum of Understanding. It is hoped to have the signing ceremony for the MOU by the end of November.