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A real-time eddy-resolving global ocean nowcast/forecast system has been running at the Naval Oceanographic Office (NAVOCEANO) since 18 October 2000. The system, which was developed at the Naval Research Laboratory (NRL), uses a NRL Layered Ocean Model (NLOM) with $1/16^{\circ}$ resolution and 7 layers in the vertical. Real-time satellite altimeter sea surface height (SSH) from Topex/Poseidon, ERS-2 and Geosat-Follow-On provided by NAVOCEANO's Altimeter Data Fusion Center (ADFC), are assimilated into the model. The large size of the model grid ($4096 \times 2304 \times 7$) and operational requirements makes it necessary to use a computationally efficient ocean model and assimilation scheme. The assimilation consists of an optimum interpolation (OI) deviation analysis of SSH with the model as a first guess, a statistical inference technique for vertical mass field updates, geostrophic balance for the velocity updates outside of the equatorial region and an incremental updating of the model fields to further reduce gravity wave generation. A spatially varying mesoscale covariance function determined from Topex/Poseidon and ERS-2 data is used in the OI analysis. The sea surface temperature (SST) assimilation consists of relaxing the NLOM SST to the Modular Ocean Data Assimilation System (MODAS) SST analysis which is performed daily at NAVOCEANO. Real-time and archived results from the model can be viewed at the NRL web site http : //www7320.nrlssc.navy.mil/global_nlom. This includes many zoom regions, nowcasts and forecasts of SSH, upper ocean currents and SST, forecast verification statistics, subsurface temperature cross-sections, the amount of altimeter data used for each nowcast from each satellite and nowcast comparisons with unassimilated data. The results show that the model has predictive skill of the mesoscale variability for at least one month.

URL: http://www7320.nrlssc.navy.mil/global_nlom

G22A-0213 1330h POSTER

Sea Level Rise and Quasi-Periodicity in Storminess Along the West Coast

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Error-corrected hourly tide gauge data from 1858 to 1999 at San Francisco (SFO) suggests a trend for greater coastal impacts during winter months as a result of a combination of both an increased rate in sea level rise and recently increased storminess. Changes in storminess are determined from non-tide residuals, while sea level rise impacts are estimated from tide gauge anomalies. Assuming that non-tidal forcing varies smoothly across the tide gauge spectrum, non-tide water level estimates are obtained by linearly interpolating Fourier spectral estimates across the tidal bands, with the variance of the interpolated estimates determined from spectral level variation on both sides of the band. Tide gauge anomalies are determined from the difference between the raw tide gauge data and mean of the monthly means. Thus, tide gauge anomalies can include significant contributions resulting from El Niño related thermal expansion along the West Coast as well as long term sea level rise, while non-tide residuals exclude water level variation at timescales greater than 90 days and are more closely associated with storminess. Tide gauge anomalies show an increasing trend in both the number of hours and occurrence of extreme water levels (above the 98^{th} percentile) beginning about 1930, inferred to be primarily the result of an increase in the rate of sea level rise. Five-year moving variance analyses show quasi-periodic decadal-scale variability from 1858 onward for both non-tide residuals and tide gauge anomalies, with variance peaks generally centered near extreme ENSO episodes. The range in non-tide variation suggests that storminess during ENSO episodes has not increased substantially since 1858 (except for perhaps the last 10 yrs). Measures of non-tide variability indicate that storminess comparable to or exceeding the great El Niño's of 1982-83 and 1997-98 occurred during decadal-scale periods centered near 1878 and 1916, suggesting that any climate change that may have occurred has not caused significant changes in storm trends during the last 140 years that are visible in the sea level record at SFO. The California Department of Boating and Waterways supported this research.

G22B MC: Hall D Tuesday 1330h

SRTM: Mission Status and Early Applications *(joint with IP, P, T, V)*

Presiding: **T G Farr,** Jet Propulsion Laboratory**; P Rosen,** Jet Propulsion Laboratory

G22B-0214 1330h INVITED POSTER

The Shuttle Radar Topography Mission

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The Shuttle Radar Topography Mission (SRTM), which flew successfully aboard Endeavour in February 2000, is a cooperative project between NASA, the National Imagery and Mapping Agency, and the German and Italian Space Agencies. The mission was designed to use a single-pass radar interferometer to produce a digital elevation model of the Earth's land surface between about 60 degrees north and 56 degrees south latitude. The DEM will have 30 m horizontal resolution and better than 15 m vertical errors. Two orthorectified C-band image mosaics are also planned. Data processing will be completed by the end of 2002.

SRTM used a modification of the radar instrument that comprised the Spaceborne Radar Laboratory that flew twice on the Shuttle Endeavour in 1994. To collect the interferometric data, a 60 m mast, additional C-band antenna, and improved tracking and navigation devices were added. A second X-band antenna was also added by the German Space Agency, and produced higher resolution topographic measurements in strips nested within the full, C-band coverage.

First results indicate that the radars and ancillary instruments worked very well. Data played back to the ground during the flight were processed to DEMs and products released hours after acquisition. An extensive program for calibration and verification of the SRTM data is now underway. When complete later this year, systematic processing of the data will begin, with final products emerging a continent at a time. Products will be transferred to the US Geological Surveys EROS Data Center for civilian archive and distribution. NIMA will handle Department of Defense distribution.

* Work performed under contract to NASA.

URL: http://www.jpl.nasa.gov/srtm/

G22B-0215 1330h POSTER

NIMA's SRTM Data Processing Plans and Preliminary Data Assessments

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In February 2000, the National Imagery and Mapping Agency (NIMA) and NASA successfully acquired IFSAR data over 80 percent of the Earth's landmass using a C-band radar system on the Space Shuttle Endeavor. The Jet Propulsion Laboratory (JPL) is processing the raw radar data into terrain heights, accompanying error statistics and orthorectified image mosaics. NIMA's goal is to obtain a uniform, self-consistent, global set of digital terrain elevations referenced to WGS 84 and with absolute accuracies of 16 m vertically and 20 m horizontally (90 percent confidence). NIMA will take the data products generated by JPL and perform a series of quality control checks. Then, with the help of highly automated processing systems developed by NIMA contractors, water bodies will be identified and delineated in each of the approximately 14,400 one degree by one degree cells for which there are data. Landsat data will be used to aid in the identification and validation of water bodies. NIMA is evaluating sample data products from JPL, including comparing the SRTM terrain heights with independent sources of height data. This paper discusses NIMA's plans and some of the issues related to finishing the SRTM data processing, and provides some early assessments of the data quality.

G22B-0216 1330h INVITED POSTER

Expected Applications of the SRTM Data Within the Amazon Basin

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Using the SRTM data combined with additional SAR, optical, and ground based observations throughout the entire Amazon basin, we plan to (1) determine long-term landscape evolution using a stream channel incision and local uplift model, (2) apply a mass-flux model to estimate the Andean sediment supply, (3) characterize channel migration, (4) model topographically driven runoff and groundwater recharge to assess the rate of delivery of flood runoff to channels, and (5) quantify areas of basic vegetation types and their methane production. Presently, we have been using a high-resolution mosaic of JERS-1 SAR data until the Basin wide SRTM DEM is available. Stream networks automatically extracted from the mosaic have already been combined with interferometric SAR measurements of water level changes to yield a floodplain storage estimate. Furthermore, the mosaic has now been used to characterize regions of expected topographic ruggedness. The advent of the DEM will allow relationships to be developed between topographic slopes and measured concentrations and fluxes of dissolved inorganic material. Most significantly for SRTM DEM studies and as based on our SIR-C research, the C-band radar is backscattered from within the uppermost canopy. Thus to convert the DEM from canopy-top to expected ground heights we plan to use our classification methods to produce a map showing vegetation types and average heights which can be subtracted from the SRTM DEM.

URL: http://www.icess.ucsb.edu

G22B-0217 1330h INVITED POSTER

Topographic Dynamics of Kerguelen Island : A Preliminary SRTM Analysis

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Oceanic islands have served as natural laboratories for investigating the interplay between geological processes that construct landscapes and those that hasten their destruction. Thanks to the emergence of new perspectives for monitoring the landscapes of isolated oceanic islands, it is now possible to assess how global-change forcings have impacted these sensitive natural laboratories. As part of an investigation of how the topographic expression of oceanic island landscapes is related to natural forcings, we have analyzed recently acquired high resolution digital elevation model (DEM) data provided by the NASA JPL Shuttle Radar Topography Mission (SRTM). SRTM acquired 30m horizontal resolution DEM format data for many of the most isolated oceanic islands of the Earth, and in particular provided a unique dataset for the Iles Kerguelen, located near 50 S in the Indian Ocean. Other than Iceland, Kerguelen is the largest ice-covered volcanic island on Earth, and is over 7000 sq. km in area. Kerguelen offers a unique opportunity to assess the development of major glacial outwash plains (sandur), with its areally extensive, low-relief eastern peninsula. In addition, SRTM observations of the 16 sq. km Cook Icefield, one of the most sensitive ice-cap glaciers on Earth, have already provided a critical benchmark against which future changes in volume and area can be measured. The SRTM DEM has permitted the first modern measurements of the apparent ice volume of the Cook icefield, as well as the state of key outlet glaciers, including the well-monitored Ampere. The SRTM DEM of Kerguelen is being used to interpret new Landsat 7, IKONOS, and RADARSAT time series observations as well.

G22B-0218 1330h INVITED POSTER

Comparison of SRTM Topography to USGS and High Resolution Laser Altimetry Topography: Case Studies From the Oregon Coast Range

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The Shuttle Radar Topography mission (SRTM) acquired topographic data for the non-polar regions of earth at a nominal 30-m resolution. This horizontal resolution is dramatically higher than previous 1 km data, and is likely to be used by a broad cross-section of the earth sciences community for detailed modeling of surface and coupled surface-atmospheric models. These users will need to know how SRTM topography compares with field-scale (e.g., 1-2 m) topography. We compare SRTM 30-m data to 3 sites in the forested steeplands of the Oregon Coast Range where we have acquired 2-3 m spaced topography using laser altimetry and total station surveys over areas from 2-6 km^2. At each site, we have field-checked the laser altimetry with ground reconnaissance and measurements, and have identified vegetation cover. In addition, we compare the SRTM data to the existing public access data from the USGS 10- and 30-m data. We compare the coarser resolution data to high resolution data, and to re-gridded versions of the high resolution data for the following landscape metrics: 1) mean slope, 2) local slope distribution, 3) drainage density at a given area threshold, 4) relief as a function of area, 5) link magnitude distribution, and 6) slope versus area for the valley network. We also compare individual hillslope and river profiles by comparing rms error of the coarser data to fine resolution topography, and evaluate the planform errors in the coarser valley network. Our comparisons should guide user's interpretation of SRTM data where ground-truthing data are absent.

G22B-0219 1330h INVITED POSTER

Topographic Change at Mt. Pinatubo, Philippines, from SRTM and TOPSAR Observations

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Data from the Shuttle Radar Topographic Mission (SRTM) will permit extensive analysis of volcanoes and volcanic processes in many parts of the world that are infrequently studied by field volcanologists. In preparation for the release of the SRTM data, we have been studying Mt. Pinatubo volcano in the Philippines, using digital elevation data collected from the TOPSAR airborne interferometric radar. We report here on our results from these preparatory studies, and suggest how SRTM observations may enhance future work on Mt. Pinatubo and other volcanoes.

The 1991 eruption of Mt. Pinatubo, Philippines, provides a unique opportunity to study the effects of a large eruption in part because it took place after the advent of satellite-based observations. Using five SPOT multispectral satellite images (obtained 4/88, 12/91, 12/94, 2/96 and 12/98), we have documented the drainage evolution on the "Western Fan", which is a large (>100 km^2) ignimbrite deposit extending from ODonnell Valley in the north to Marella Valley in the SW. Detailed knowledge of topography and slopes is important for documenting these changes, and are relevant for the study of the evolving "sediment budget" (near-summit sediments eroded during storms and deposited at lower elevations) which controls lahar production. These lahars can result in extensive damage downstream even years after the eruption. Our topographic studies have so far relied on the morphologic analysis of TOPSAR data of the western fan collected during the 1996 and 2000 PacRim deployments. Coregistering the TOPSAR and SPOT data enables the degree of erosion to be assessed over the 5 year 4 month period between the eruption and TOPSAR data collection. A maximum of >50 m of erosion has been identified in areas buried by the eruption. Numerous small (10 - 15 m deep) new canyons have also been measured. Because they were obtained in the same year as PacRim 2 data, the SRTM observations promise to provide the regional context for these TOPSAR topographic studies of volcanoes in the Philippines and other volcanic areas of the world.

G22B-0220 1330h POSTER

Comparison of the SRTM DEM for the Olympic Mountains to Existing DEMs of Varying Resolutions: Results and General Implications for Application of SRTM data to Models of Hillslope and Fluvial Processes in Mountainous Regions

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Predicting the spatial patterns and rates of many geomorphic processes such as hillslope erosion and down-valley sediment transport requires an accurate representation of the land surface at a scale appropriate to the particular process model. Until now, Digital Elevation Models (DEMs) throughout much of the world were of very coarse resolution (1 km) and inconsistent quality (a number of elevation sources were often quilted together to form starkly heterogeneous products). A much-anticipated solution to this problem, SRTM provides a high-resolution global DEM derived using a single instrument and standardized techniques. To explore the quality and significance of SRTM for geomorphic process models of mountainous regions, we compare the SRTM DEM to an existing suite of DEMs of varying resolutions (10 1,000 m) for the Olympic Mountains, Washington State. As an accessible and familiar region with prior geomorphic analysis of a wide range of DEMs of known quality, the Olympics provide an ideal locality for early application and comparison of SRTM to existing geomorphic models. We first present the similarities and differences between the three-arc-second and one-arc-second SRTM and the 100-meter and 30-meter USGS DEMs for a variety of important geomorphic parameters, including: elevation and relief, hillslope gradients, curvature, valley slope, ridge and valley volumes, and drainage area per unit contour length. We also discuss the implications of the greater SRTM resolution for modeling geomorphic processes in areas previously covered by only lower-resolution DEMs. We motivate this discussion by comparing geomorphic models for hillslope stability and wetness, as calculated with the SRTM and conventional DEMs at varying resolutions. We conclude with a summary of the benefits of SRTM and enhanced DEM resolution for modeling geomorphic processes in the Olympics, and, by extension, in other mountainous regions throughout the world.

G22B-0221 1330h POSTER

Topography and Surface Change at the Shallow Subduction Zone Near Kodiak Island, Alaska

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In our SRTM study we focus on a class of subduction zones that are responsible for the largest earthquakes as well as dramatic topography; i.e., ones in which the initial dip of the downgoing oceanic plate is shallow ($\leq 15^{\circ}$ to depths of 30-40 km) and the strain regime in the forearc region of the continental overriding plate is compressional. Here we report initial results from the Kodiak Islands, Alaska portion of the study. Specifically, we are using moderate and high resolution topographic data, along with SRTM and Landsat-7 image data, to characterize the rugged topography, to identify fold and thrust faults and to delineate the location and extent of Late Pleistocene and Holocene marine terraces across the Kodiak Islands of the Alaska-Aleutian subduction zone. Additionally, kinematic GPS observations were made along several of the roads of northeastern Kodiak and across 3 sets of marine terraces. These elevation profiles will be compared with the SRTM derived digital elevation model (DEM) to evaluate the resolution of the preliminary product. The existing DEM's of the complete Kodiak Island region are of DTED Level 1 resolution. We have used these data to create a preliminary three-dimensional perspective view with a Landsat-7 image overlay. From these data we identified a number of faults and we made field observations that indicate Holocene offsets on several within a fold and thrust belt near the northeast coast of the Kodiak Islands. Our overall results of this study will be used to examine the relationship between attributes of the subduction zone (such as dip and age of downgoing slab, width of main thrust zone and known features within downgoing plate) and geophysical and geological observations and derived parameters. These include: (1) short-term deformation rates estimated from geodetic measurements (1993-2001) that are associated with the seismic cycle, (2) uplift rates that can be estimated from dating of the high-resolution elevation profiles of late-Holocene marine terraces and (3) topographic features.

G22B-0222 1330h POSTER

SRTM and Laser Altimeter Views of Western Washington State Topography

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Interferometric Synthetic Aperture Radar (InSAR) and laser altimeter measurements of topography provide complimentary approaches to characterize landforms. Results from the Shuttle Radar Topography Mission (SRTM) will provide an unprecedented, near-global, public-domain topography data set at 90 m resolution using a single pass C-band (5.6 cm wavelength) radar interferometer. In vegetated terrains, the C-band radar energy will penetrate part way into vegetation cover. The elevation of the resulting radar phase center, somewhere between the canopy top and underlying ground, will depend on the vegetation density, structure, and presence or absence of foliage. The high vertical accuracy and spatial resolution achieved by laser altimeters, and their capability to directly measure vegetation height and ground topography beneath vegetation cover, provides a method to evaluate InSAR representations of topography.

Here a preliminary C-band SRTM digital elevation model (DEM) for a portion of western Washington State is evaluated using laser altimeter data to assess its elevation accuracy and the extent of vegetation penetration. The SRTM DEM extends from the Cascades Range westward to the Olympic Peninsula. The laser altimeter data includes two profiles acquired by the second flight of the Shuttle Laser Altimeter (SLA-02) in August, 1997, numerous transects acquired by the airborne Scanning Lidar Imager of Canopies by Echo Recovery (SLICER) in September, 1995, and comprehensive mapping in the Puget Lowland region acquired by Terrapoint, LLC for the Puget Sound Lidar Consortium in the winters of 2000 and 2001. SLA-02 and SLICER acquired waveforms that record the height distribution of illuminated surfaces within 120 m and 10 m diameter footprints, respectively. The Terrapoint elevations consist of up to four discrete returns from 1 m footprints spaced 1.5 apart, with all areas mapped twice. Methods for comparing laser altimeter and SRTM topography developed here will be applied on a global basis as Ice, Cloud and land Elevation Satellite and Vegetation Canopy Lidar laser altimeter waveform data and final SRTM products become available.

G22B-0223 1330h POSTER

Phase Unwrapping for Large InSAR Data Sets Through Statistical-Cost Tiling

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Two-dimensional phase unwrapping is a key step in the analysis of InSAR data, and many algorithms for this task have been proposed in recent years. Some

of these algorithms have shown promise in handling the problem's intrinsic difficulties, but new difficulties arise when the dimensions of the interferometric input data exceed the limits imposed by computer memory constraints. Similarly, new phase unwrapping strategies may be required when sheer data volumes necessitate greater computational throughput. These issues are especially important in the contexts of large-scale topographic mapping projects such as SRTM and the Alaska DEM Project. We propose a technique for applying the statistical-cost, network-flow phase unwrapping algorithm (SNAPHU) of Chen and Zebker (2001) to large data sets. That is, we introduce a methodology whereby a large interferogram is unwrapped as a set of several smaller tiles. The tiles are unwrapped individually and then further divided into independent, irregularly shaped reliable regions. The phase offsets of these reliable regions are then computed in a secondary optimization problem that seeks to maximize the probability of the full unwrapped solution, using the same statistical models as employed in the primary phase unwrapping stage. The technique therefore approximates a maximum *a posteriori* probability (MAP) unwrapped solution over the *full-sized* interferogram. The secondary optimization problem is solved through the use of a nonlinear network-flow solver. We examine the performance of this technique on a real interferometric data set, and we find that the technique is less prone to unwrapping artifacts than more simple tiling approaches.

G22C MC: Hall D Tuesday 1330h

General Geodesy

Presiding: **J B Blair,** NASA Goddard Space Flight Center**; I M Vigo,** University of Alicante

G22C-0224 1330h POSTER

Airborne Laser Swath Mapping: Results of Field Tests Conducted to Quantify the Effects of Different Ground Covers

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Most scientific and engineering applications of Airborne Laser Swath Mapping (ALSM) require precisions and/or repeatabilities (relative accuracies) of several decimeters in the horizontal coordinates and a few to several centimeters in the vertical coordinates of the point measurements, or ultimately of surface features derived from the point measurements. Manufacturers generally use components consistent with this level of performance and laboratory calibration and testing results indicate that instrumental errors are within these bounds. However, field observations include additional sources of error that can vary significantly from project to project. Comparisons of results from an ALSM system operated by the University of Florida (Optech Model 1210) and ground survey values, on a point-by-point basis, and as profiles cut from Digital Elevation Models, consistently yield RMS differences of 30 to 50 cm in horizontal coordinates, and 4 to 8 cm in the vertical coordinates, for points on smooth bare surfaces such as pavements, roofs, and sand beaches. These numbers increase in steep or rugged terrain, and in areas covered with vegetation. Results from recent projects will be presented that illustrate the effects of different ground covers, including grass, row crops, marsh grasses, coastal mangroves, open pine and dense mixed forests. Examples illustrating the use of laser intensity values, multiple stops per pulse, and filtering algorithms, to minimize the degradation caused by ground cover, will also be presented.

G22C-0225 1330h POSTER

Topographic Change Detection using Full-waveform Imaging Lidar

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The capability of wide-footprint (i.e. 10 m or greater), full-waveform laser altimeters to penetrate beneath dense vegetation to directly measure the sub-canopy topography provides us with a unique capability for sensing topographic change in the presence of vegetation. We evaluate the feasibility of using a geolocated laser altimeter return waveform instead of individual elevation measurements to measure vertical elevation change within a laser footprint. The method, dubbed the return pulse correlation method, maximizes the shape similarity of near-coincident, vertically-geolocated laser return waveforms from two observation epochs as they are vertically-shifted relative to each other. First, we evaluate the inherent accuracy of the pulse correlation method using models and simulations under "bare-Earth" conditions. We then analyze the effects of vegetation and vegetation growth on the change detection capability. The use of this method, combined with order of magnitude improvements to laser altimeter swath widths (from 1 km to 10 km) and the potential for a future spaceborne imaging lidar, may provide sub-centimeter level relative change detection beneath vegetation to complement IFSAR's ability to make similar measurements in low or vegetation-free conditions.

G22C-0226 1330h POSTER

Estimating Surface Slope and Roughness over the Greenland Ice Sheet Through Deconvolution of Laser Altimeter Waveforms

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The Airborne Topography Laser Altimetry System (ATLAS) was flown at high altitude over the Greenland Ice Sheet in June 1993 in order to simulate the large footprint (65 m) of the Geoscience Laser Altimeter System (GLAS), providing the first laser altimeter waveforms ever collected over ice. Waveforms are of critical importance in laser altimetry since they contain information about surface roughness, surface slope (or equivalently instrument pointing direction) and atmospheric effects. These effects all act to broaden the laser return pulse, making it difficult to separate them. In principle, knowledge of two of the three effects permits determination of the last one.

Previous studies to separate roughness and slope have been limited by the assumption of Gaussian return pulses and inaccurate knowledge of the outgoing pulse. We present a more general method which neither places restrictions on the temporal shape of the return pulse, nor requires knowledge of the outgoing pulse. We use the waveforms themselves to determine the impulse waveform of the instrument (which includes atmospheric broadening and instrument response), using simultaneous time domain deconvolution. For this purpose, we use several flight sections where the aircraft banked steeply over relatively smooth terrain, so that the contribution to broadening due to apparent slope dominates that due to surface roughness. With knowledge of the roll and pitch angles, we are able to extract the impulse function from the return waveforms. If the impulse function is accurately known when slope is known, roughness can be extracted by deconvolution, and we test this over parts of the ice sheet. In addition, this opens the possibility of extracting the waveform disto rtions due to forward scattering along the atmospheric path. This has important applications for processing GLAS waveforms whose output pulses will be recorded.

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Validation of Large-Footprint Lidar Sub-Canopy Topography Measurements Beneath a Dense Tropical Forest

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Large footprint (greater than 10 m wide) laser altimetry is a useful technique for mapping topography (including sub-canopy), canopy height and vertical structure in densely vegetated areas. In March 1998, the Laser Vegetation Imaging Sensor (LVIS), an airborne laser altimeter, mapped a $\sim$800 km^2 area of Costa Rica including the La Selva Biological Station using 25 m-diameter footprints as part of the pre-launch activities of the Vegetation Canopy Lidar (VCL) Mission. To investigate the utility of the lidar technique for making sub-canopy topography measurements, the precision and accuracy of the LVIS elevation measurements from this mission are assessed. Crossover analysis using laser shots, whose recorded waveforms contain high amplitude reflections from the lowest reflecting surface, show a vertical precision of better than 1 m. Comparison of the LVIS elevations with coincident *in situ* ground elevation data reveals that the measurements are within $\sim$1.5 m of each other on less than 3 degree slopes. Even on slopes of up to 30 degrees measurements are within $\sim$5 m of each other. These are very encouraging results given that the forests of this region are some of the densest, most complex on Earth, and that mapping its sub-canopy topography is near-impossible using any other remote sensing technique. Given the similarity of the measurement processes of the LVIS and VCL systems, these results suggest that the topographic measurements made by the VCL will meet stated accuracy goals under the majority of measurement conditions.

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International DORIS Service on web.

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The International DORIS Service is on the way to be established. The dedicated web site (http://ids.cls.fr) is developed with two priorities : the DORIS system and its daily operation, the elements needed to initiate DORIS products generation and distribution.

General and technical DORIS information was initially available on the "about DORIS" topic. This topic is to be completed and moved to AVISO, the web site for ocean altimetry, DORIS being a main contributor to the Topex-Poseidon and Jason missions. In addition two FAQ on both DORIS and IDS schemes have been added. Information related to the system operation is obtained with a short delay thanks to a connection to SSALTO, the multi-mission orbitography and altimetry center. That way, information about system events such as satellite orbit maneuvers, changes in the instrument mode due to an incident - a single upset for example -, data gaps is available on line and regularly updated. Station history plots can be selected for each satellite, related to the whole network or to a given station. Performances of the preliminary orbits and the operational 2 days station network positioning are also shown.

Regarding DORIS data and products, the formats working group has discussed and proposed formats for preprocessed data, satellite ephemeris, station coordinates and associated times series. For each IDS Analysis Center, the web site gives its identification and its process strategy description in a standard form. As an experiment, present available products are satellite orbits and station network coordinates.

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A Fuzzy Logic Study of Weighting Scheme for Satellite-Laser-Ranging Global Tracking Network

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