of western Oregon and parts of SW Washington about a nearby pole. Superimposed on this rotational signal is roughly E-directed uniaxial contraction arising from temporal stress increases across the Cascadia subduction thrust. We model the velocity field with a series of rotating blocks whose boundaries are subject to strain due to drag against adjacent blocks. We invert the GPS results to solve for poles of rotation, spatial distribution of coupling on the 3-dimensional subduction thrust fault, and sections of the block boundaries. Modeling results, that do not include the 2001 data, show that the GPS vectors are fit best when a NW Washington block also rotates clockwise relative to North America but more slowly than Oregon does. These results suggest that the rate of permanent shortening, the type that causes upper plate earthquakes, across the Puget Sound region is approximately 2.1 $\pm 1.2 mm/a$.

### G21A-12 1145h

## Plate kinematics of East Asia From GPS Observations

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The velocities of 16 stations extending from Svalbard Island in the north Atlantic to eastern Siberia define the Eurasian plate with a root-mean-square (rms) less than 1 mm/yr. Using these stations as a frame of reference, we have estimated velocities for 58 stations in east Asia from the Arctic to southern China and combined these with the results of other investigators to infer the first-order kinematics of East Asia. The boundary between the Eurasian and North American plates in eastern Siberia is marked by a zone of mild, $< 2$ mm/yr, compression across the Cherskiy Range but is unclear farther south. Our single permanent station in northern Chukotka (BILI) does not move relative to North America by more than 1 $\pm$1 mm/yr. Stations in Siberia at the northern margin of the Sea of Okhotsk, at Sakhalin Island, and at western Hokkaido move relative to North America by 2-5 mm/yr and may indicate the existence of microplates encompassing one or more of the Sea of Okhotsk, Bering Sea, and Arctic Ocean. Our estimates of the velocities of stations in southeastern Russia (VLAD), Korea, and China are sensitive at the level of 2-6 mm/yr to the realization of the Eurasian frame and render problematic the characterization of the motion of South China and a possible Amurian plate to the north.

# G22A MC: Hall D Tuesday 1330h

## Operational Altimetry: Data Sources, Systems, and Applications II *(joint with OS)*

***Presiding:*** **G Jacobs,** NRL**; J Lillibridge,** NOAA

### G22A-0202 1330h POSTER

## Operational and Precise Orbit Determination for GEOSAT Follow-On Altimetry

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The GEOSAT Follow-On spacecraft (GFO-1), launched in early 1998, began continuous radar altimeter coverage of the oceans in 2000. After an extensive series of calibration campaigns in 1999 and 2000, the satellite was accepted by the U.S. Navy on November 29, 2000. GFO supplements the altimetry data from TOPEX/POSEIDON and ERS-2 (and their successors JASON-1 and ENVISAT), by providing a different synoptic sampling of the oceans with its 17-day ground track repeat cycle.

Altimeter crossover analysis suggests that GFO is capable of "cm-class" altimetry, with orbit error as the largest contributor to the sea surface height error budget. Satellite laser ranging (SLR), especially in combination with altimeter crossover data, offers the only means of precise orbit determination, due to the failure of the GPS tracking system on board GFO. SLR tracking is augmented by the operational Doppler tracking system. These data have been used to tune the gravity field and satellite macro-model (a 3-D representation of the spacecraft geometry and surface properties) used in the orbit determination software.

Near real-time medium precision orbits (MOEs) are generated at GSFC within 72 hours, with radial orbit errors of 10 cm or less. These preliminary orbits are suitable for mesoscale studies where short-arc orbit error removal doesn't severely impact the sea surface height signals. Beginning in August, 2001 GSFC began releasing Precision Orbit Ephemeris (POE) data for use in the NOAA GDR and NASA Pathfinder Project. The POE orbits are more accurate than the MOEs, with orbit errors of 5 cm or less. To characterize the errors, these orbits are evaluated using tracking data residual analysis, GFO crossover and collinear analyses, dual-satellite crossovers, and direct orbit comparisons. Geophysical validation of the final sea surface heights is performed by comparisons with in situ tide gauge data as well as height fields from contemporaneous altimetry missions.

### G22A-0203 1330h POSTER

## Towards 1-cm Orbits

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TOPEX/POSEIDON (T/P) has demonstrated that using radar altimetry, the time variation of ocean topography can be determined with an accuracy of a few centimeters, and has also established the new capability for monitoring global sea level change with a precision of about 1 mm/year. This has become possible due to the high radial accuracy (2-3 cm) achieved for the T/P orbits, whereas in previous missions orbit error dominated the altimeter error budget. Jason, the T/P follow-on, will continue measurement of the ocean surface using radar altimetry with the same, if not better accuracy. Reaching the Jason centimeter accuracy goal would greatly benefit the knowledge of ocean circulation. For example this would reduce the present errors in estimates of time rates of change in oceanic heat flux divergence to values close to those anticipated for greenhouse gas increase, as well as obtain clearly submillimeter accuracy in determining global sea level rise, currently estimated to be 1-2 mm/year. What is required for achieving 1-cm radial orbit accuracy? Orbit accuracy depends on the fidelity of the force and measurement models, and quality of tracking data. Simulated SLR, GPS, and "perfect" tracking of the T/P and Jason satellites were studied using GEODYN, applying dynamic and reduced-dynamic strategies , current and anticipated error budgets, to evaluate error sensitivity and Precision Orbit Determination (POD) capability. Simulation studies indicate that achieving the 1-cm goal poses a major challenge, but is possible with sufficiently precise and dense tracking. Combination solutions such as GPS/SLR offer more promise than using GPS alone. Altimeter crossover data, although not evaluated in the simulations, also offer a very strong data type for POD. Possibly significant improvements to current T/P POD with the inclusion of altimeter crossover data are evaluated using actual data, and also presented.

### G22A-0204 1330h POSTER

## High Resolution SSH Anomaly Fields from Coincident T/P, ERS-2, and GFO Altimeter Observations

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It is recommended, both for mesoscale and large-scale [ocean circulation] studies, that multiple altimetric satellites be flown contemporaneously. (Koblinsky, et al., 1992). After many years of development this unique situation exists today. TOPEX/POSEIDON, ERS-2, and GFO missions at 10, 35, and 17-day repeat periods, respectively, are providing a dense spatial sampling of the global ocean. In order to accurately map the ocean mesoscale field from the combined missions, a homogeneous, inter-calibrated data set has been generated. This is achieved through the adjustment of GFO and ERS-2 altimetry into the more precise TOPEX/POSEIDON reference frame to minimize inter-mission biases and radial orbit errors. In this presentation we provide a time series of global high resolution sea surface height and surface geostrophic current anomaly fields from the blended multi-satellite data set. The height fields are validated against the WOCE global tide gauge network, and their eddy resolving capability is examined through inter-comparison with regional images provided by Sea Wifs and MODIS. The current fields are intercompared with surface drifter observations in regions where geostrophy dominates the flow to assess how well we can observe the eddy kinetic energy spectrum.

URL: http://nemo.gsfc.nasa.gov/ocean.html

### G22A-0205 1330h POSTER

## Towards a Global Operational Altimeter Service: RADS

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DEOS' anticipation of the need for global altimeter services started the Radar Altimeter Database System (RADS) project. Embedded in the Netherlands Earth Observation NETwork (NEONET), this project is supported by the Dutch government. After defining the database content, collecting altimeter and ancillary data from all available altimeter missions and combining them with the latest (correction) models, we have arrived at an (inter)nationally appreciated validated, calibrated and consistent altimeter data set, comprising over 15 years of valuable sea level, wave height and wind data. Whenever new data or knowledge arrives the database is updated. Major assets of RADS are the upgraded ERS orbits and the flexible data organization.

This paper presents an overview of the work involved in establishing RADS: the I/O, enhancements, screening, formatting, harmonization, and CAL/VAL. The aim is to improve the algorithms for converting satellite data to the final geophysical products. Global altimeter data from various satellites are intercompared or compared to external data, like tide gauges, wind speed measurements, etc. This has been used to establish the data's quality and to enhance algorithms for deriving the geophysical parameters. Also: ironing out inconsistencies in significant wave height, sea state, inverse barometer, wet troposphere corrections, orbits, biases, drifts, and time tagging. Access to the database at level 1 level is provided for by a web portal (`http://www.deos.tudelft.nl/altim/rads`). Here also status, higher level products, software, and literature can be obtained. Finally, examples are given of putting in RADS in research and education. We fully automated the Gulf Stream and El Niño web pages: Hovmuller diagrams and eddy kinetic energy plots are refreshed regularly. Furthermore, RADS has been successfully used at Delft Hydraulics in a data assimilation scheme for improving tides and storm surge predictions, showing the importance of near real-time observations, and at the Dutch Meteorological Office KNMI for ENSO studies.

## G22A-0206 1330h POSTER

### An altimeter/GTS Web-interface at NOAA/AOML

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Altimeter data are of great interest for studying ocean dynamics. Sea surface height measurements aid scientists in many ways, such as improving model results, tracking eddies, and estimating upper layer depths. In an operative environment, altimeter-derived sea surface height anomalies (SHA) are available through NOAA/NESDIS in a near-real-time basis, with a 2-day average delay. A Web-interface has been developed to graphically display these data. Coverage is worldwide and the region of interest can be interactively selected. As an additional product, geostrophic currents are also estimated using the SHA values, and a 1x1 degree climatological mean dynamic-height field relative to the 1000-m depth level. These currents can be displayed as vectors overlayed on the dynamic height field, or as a scalar field showing the most active areas. Processing is done on the fly using the parameters sent by the client (time, geographic area, overlaying points and/or contours, mask depths, ).

Besides the altimeter products, data from the Global Telecommunications System (GTS) can also be visualized and retrieved. These data are ingested into the database four times per day and they comprise data from a large number of floating platforms (drifters, VOS, ) around the world.

GTS and altimeter-derived products can be displayed together (e.g., geostrophic altimeter-derived currents can be compared with drifter trajectories using the same interface).

URL: http://www.aoml.noaa.gov/phod/trinanes/java.html

## G22A-0207 1330h POSTER

### Accuracies of Altimetric Methods to Estimate Surface Velocity

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The ocean flow field is one of the fundamental variables in physical oceanography and in disciplines such as marine biology and marine geochemistry. Satellite altimetry is the only currently available technique that comes close to providing adequate continuous monitoring of this variable through its measurement of sea surface height. In light of the launch of several new missions in the near future we consider three different approaches to routinely estimate ocean surface currents from altimetric data and study resulting uncertainties. This is done by simulating satellite measurements of sea surface height using the output of the 1/10 deg North Atlantic simulation of the Los Alamos National Laboratory and by subsequently adding realistic observation errors. These measurements are then analyzed using parallel-track, cross-over, and optimal interpolation methods. We find that final velocity accuracies are limited in all three cases by the different kinds of observation error in combination with the characteristics of the spatial and temporal sampling and of the ocean variability. We show that average velocity uncertainties as obtained from conventional altimeter missions are around 5 cm/s for most of the ocean basin, and may increase to 20 cm/s or more near strong boundary currents, near the equator and towards the turning latitude. Uncertainties are similiar to signal magnitudes over large parts of the ocean.

## G22A-0208 1330h POSTER

### TOPEX/Poseidon and Jason-1 Formation Flying; Applications of the Tandem Mission Data

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Jason-1 will join a suite of oceanographic satellites in Earth orbit following its planned December 2001 launch from Vandenburg Air Force Base in California. Jason-1 will be positioned along the same groundtrack that TOPEX/Poseidon has faithfully flown for over nine years. After a brief period of Jason-1 measurement calibration and validation, TOPEX/Poseidon will be maneuvered to an interleaved groundtrack, half-way between the tracks of its former path. TOPEX/Poseidon will continue collecting its valuable data in this new orbital position, thereby increasing the altimetry dataset by a factor of two. Jason-1 will remain on the original TOPEX/Poseidon groundtrack and assume its role as the primary source for many researchers and operational entities utilizing this valued oceanographic data.

Jason-1 has a primary mission phase of three years, with a projected five year extended life. As long as TOPEX/Poseidon remains operational, this enhanced dual dataset can provide an unprecedented opportunity for improved resolution in ocean surface topography measurement that may never again be possible.

The Tandem Mission phase, as this formation-flying period is described, will be a unique and valuable opportunity for many potentially new scientific discoveries and practical applications. These include, but may not be limited to, ocean eddy velocity and interaction with mean currents, Rossby wave dynamics, coastal currents and tides, oceanic internal tides, fisheries management, ship routing, ocean debris tracking, and offshore operations.

URL: http://sealevel.jpl.nasa.gov

## G22A-0209 1330h POSTER

### The Impact of Assimilation of Altimeter Data on ENSO Hindcasts

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The El Nino/Southern Oscillation phenomenon (ENSO) is the strongest interannual climate fluctuation. Its impact is felt worldwide. Prediction of this phenomenon is not only of scientific but also of public interest. ENSO prediction depends strongly on the accuracy of the ocean initial conditions. To improve the accuracy and investigate the impact on ENSO forecasts Topex/Poseidon altimeter data were assimilated into an Ocean General Circulation Model. For comparison, ocean model runs assimilating temperature data of the TAO/TRITON buoy array and ocean model runs assimilating Topex/Poseidon altimeter data together with SST data were performed as well.

Ocean analysis were obtained with and without assimilation, and these ocean analysis were used as initial conditions for ENSO hindcast experiments with a hybrid coupled model (HCM). Differences between the ocean analysis and their impact on the ENSO hindcast skill are discussed.

## G22A-0210 1330h POSTER

### On the Resolving Power of a Single Exact-Repeat Altimetric Satellite or a Coordinated Constellation of Satellites

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It is proved that the mid-point grid, which is composed of samples obtained at ground track locations midway between crossover points (thus a subset of the full sampling), has the same resolving power as the full set; i.e., they resolve the same three-dimensional spectral space. The resolving power of the mid-point grid as derived previously by Tai (1995, 1998) is characterized by the Nyquist frequency $\omega_c=\pi/T$ (where T is the repeat period of the exact-repeat satellite), and by (in local Cartesian coordinates) the zonal and meridional Nyquist wavenumber $k_c=2\pi/X$ and $l_c=2\pi/Y$ respectively (where X and Y are the east-west and north-south separation between adjacent parallel ground tracks). Here we re-derive this result in simplified terms. First, it is shown through the sampling theorem as demonstrated previously by Tai (1999) that even though samples of the real mid-point grid are not taken simultaneously, they resolve the same frequency range as that of a hypothetical mid-point grid, wherein samples are taken simultaneously at time t=nT (where n is an integer), hence sharing the same Nyquist frequency as cited above. This also reduces the three-dimensional problem to a two-dimensional one. The spatial part of the mid-point grid is a textbook regular grid with zonal and meridional sampling interval of X/2 and Y/2 respectively. As such, the Nyquist wavenumbers are exactly as those stated above. Now with the resolving power of the mid-point grid clearly understood, we are ready to prove that the mid-point grid provides the maximum resolving power. Putting the origin of the xy coordinate system on one of the crossover points, the proof comes in the demonstration that $\cos(2\pi x/X)$ is indistinguishable from $\cos(2\pi y/Y)$ along track; i.e., along-track samples are unable to distinguish the cosine part of the spectral component $k=\pm k_c$, $l=0$ from that of the spectral component $k=0$, $l=\pm l_c$. Thus any spatial spectral range containing both of these spectral components will be unresolved. In other words, the mid-point grid already has the maximum spatial resolution that can be attained by the complete along-track samples. Moreover, it is shown that there is a corresponding mid-point grid for a coordinated constellation of satellites, extending the theory for a single satellite to multiple ones. In addition, the proof implies that not all along-track samples are needed for three-dimensional analysis. Tremendous saving can be achieved through data compression. We discuss the best ways to achieve this while still retaining the aliasing-reduction benefits offered by the extra observations.

## G22A-0211 1330h POSTER

### Interannual Sea Level Changes and Associated Mass Transports in the Tropical Pacific From Topex-Poseidon Data and Model Results (1964-1999)

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The main modes of interannual climate variability in the tropical Pacific are identified using satellite-derived wind (ERS) and sea level (Topex-Poseidon) data from 1993 to 1999, and output from a linear model forced by observed FSU wind from 1964 to 1999. During the 1993-1999 period, the dominant ENSO signal consists on a zonal seesaw pattern in sea level around the date-line, associated with an equatorial patch of zonal wind centered on the date-line. This oscillation is described in terms of equatorial waves. A second mode of variability, mainly linked to the strong 1997-1998 El Niño event, depicts a meridional seesaw pattern in sea level around 5°N, associated with opposite zonal wind anomalies in the north-western and south-eastern tropical Pacific. Both modes are well reproduced in the linear model forced by either the ERS (1993-1999) or the FSU (1964-1999) wind. The second mode, particularly active during the very strong 1982-1983 and 1997-1998 El Niño events, is reminiscent of the recharge oscillator theory. However, it shows no equatorial symmetry and its temporal function seems to include a decadal component. Sensitivity studies showed simple wind patterns are responsible for the sea level zonal and meridional seesaw patterns. The role of horizontal mass advection on the sea level variations is then quantified in the 15°S-5°S, 156°E-80°W southern box, the 5°S-5°N, 136°E-80°W equatorial box and the 5°N-15°N, 136°E-80°W northern box. For both modes of variability, there is little mass advection across 15°N and 15°S. At the ENSO time-scale, the equatorial box fills (El Niño) and empties (La Niña) mainly through zonal geostrophic transport across its western boundary, and counteracting meridional transport mitigates this mass budget. The second mode of variability contributes to the buildup and depletion of the equatorial band mainly through changes in the 5°N meridional geostrophic transport. Its modulation at decadal time scale could explain the shift from prevailing La Niña conditions before the 1982-1983 major El Niño event to prevailing El Niño conditions after. Complementary results based on 1948-1999 outputs from an OGCM are discussed.

## G22A-0212 1330h POSTER

### An Operational Eddy Resolving Global Ocean Nowcast/Forecast System

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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° 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 × 2304 × 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 time-scales 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

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## 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.