nature of astrobiology; by building and leading their team's work, they become ideal candidates for communicating the broad topics of astrobiology to students of all levels. Each NAI PI identifies unique E/PO and training opportunities and includes their team members in these efforts. The result is an amalgamated program reaching the full spectrum of K-Postdoctoral students receiving information and opportunities in astrobiology. Research is embedded throughout the NAI's E/PO program with the ultimate goal of seeding future researchers and their discoveries of life in the universe.

URL: http://nai.arc.nasa.gov

ED41A-07 0930h

Field/Lab Training Workshops in Planetary Geology and Astrobiology for Secondary School Teachers

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Thematic field-lab-classroom workshops can be successful in training secondary teachers in planetary geology and astrobiology, from the LPI's 4 years experience. A typical workshop includes ∼4 days of field study and ∼3 days of related classroom/lab lectures and exercises. Up to 30 teachers have participated at once, and the staff averages 5 researchers and educators. The 2003 workshop, The Great Desert, focused on geology and life in the Colorado Plateau as analogs for Mars. Specific emphases were on geologic processes exemplified in the Grand Canyon, Sunset Crater and Meteor Crater, and on biotic communities in desert soils and hot springs. The classroom portion, hosted by UNM, included lectures, lab work, and teaching exercises keyed to the field experience and its extensions to Mars. Formal followups: non-directive exit questionnaires; email list-serves for participants; websites with images, presentations, and exercises from the workshop, and links to related materials (e.g., http://www.lpi.usra.edu/education/EPO/yellowstone 2002/index.html); and interviews for six-month retrospective. Graduate and continuing education credit are available. Past workshops, all relevant to Mars, have targeted: geology and extremophiles of Yellowstone NP, geology of the Cascade volcanos; and giant floods and lava flows of central Washington. The greatest benefit of this workshop format is the teachers' intense, deep experience, emphasizing scientific content. They learn from field, classroom, and laboratory perspectives, and work with PhD level researchers who contribute their excitement, demonstrate and teach critical thought processes, and provide authoritative background and answers. The small group size permits personal interactions (among teachers and presenters) that complement each other's understanding and appreciation of the subject. They log ∼65 contact hours with the staff, in small groups or one-on-one. Teachers return to the classroom with personal experiences, with heightened appreciation, excited, and energetic. The teachers are asked to share their knowledge in their districts (in one case, saving the district thousands of dollars). For the presenters, the workshop format allows personal interactions with the teachers, leading to enhanced appreciation of their perspectives and needs. This year, teacher input assisted with an NSF-sponsored National Park education initiative. And in one case, a meaningful research collaboration has come from these workshops. Logistics is the greatest challenge of this workshop format. Hosts and teaching/lab venues need to be arranged early in sites dictated by science content, not convenience. Travel and lodging must be arranged for teachers and presenters at several sites, usually all distant from the organizing institution. Logistics also dictates that each workshop cannot serve more than about 30 teachers. The depth of knowledge imparted and its long-term effects on the teachers and their districts offsets the small number of teachers reached per year. Authors here are the 2003 organizers and presenters. Many others have organized and presented at past workshops - especially Dr. A.J. Irving of U. Wash. We are grateful for past support from NASA Broker/Facilitator, and now from Sandia National Laboratory and NASA OSS/EPO.

URL: http://www.lpi.usra.edu/education/EPO/yellowstone2002/index.html

ED41B MCC: Level 2 Thursday 0830h

Undergraduate Research in Geoscience Posters *(joint with OS, P, C, PA)*

Presiding: **I Doxas,** University of Colorado**; G White,** American Institute of Physics**; K McCall,** University of Nevada, Reno

ED41B-1159 0830h POSTER

A Preliminary Geophysical Study Involving Remote Sensing at the Archaeological Site Trinchera Cave, Colorado

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Resistivity, magnetic, seismic, and geodetic surveys were performed at Trinchera cave, an archaeological site ∼50 km east of Trinidad, Colorado, in order to locate the foundation walls of an ancient jacal structure. This structure, a shelter built during the Apishapa phase (earlier than 750 years before present), was reported - and backfilled - during a 1974 excavation; recent excavations have failed to again find it. The cave is a ∼8 m high overhang, the bottom of which marks the contact between the Dakota formation (yellowish-brown, fine-grained sandstone) and the underlying Purgatoire formation (bedded, organic-rich shale). The foundation was reported to be made of blocks of sandstone surrounded by cave fill/soil that is estimated to be 1.5 m thick in the cave. A total station survey mapped the topography beneath the overhang (the cave, ∼30 by 8 m) and within the adjacent creek. This part of the study should be useful to tie together future archaeological and geophysical work. Our magnetic map of the area is inconclusive due to the presence of metallic pipes left at the site by previous excavations and because of the overhang. Seismic refraction tests yielded varying thicknesses of the cave fill (0.7-2.3 m); however we experienced problems with the equipment in the field and realized that a 1-D model is insufficient to explain the data. A future reflection experiment might produce more useful seismic data. Our most reliable results were obtained by resistivity profiling. They show a more resistive structure in the SW part of the cave, about 1 m from the overhang and at a model depth of 2 m. We interpret this as the 'lost' foundation.

ED41B-1160 0830h POSTER

Preliminary Geophysical Investigations of the Ship Rock Diatreme, Navajo Nation, New Mexico

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Magnetic and gravity data were collected at the Ship Rock minette neck and dikes, part of the Navajo volcanic field in the central Colorado Plateau, to investigate their subsurface structure. The deep root system of Ship Rock, an exhumed Oligocene maar-diatreme complex, has not been resolved. The diatreme is largely composed of minette tuff-breccia with a large wallrock fraction, whereas the dikes are composed of hypabyssal minette. The country rock is the Upper Cretaceous Mancos Shale. Density and magnetic contrasts between the igneous rock and surrounding shale suggest that the buried structure of Ship Rock can be imaged. Preliminary geophysical investigations were carried out in order to test this hypothesis. We collected magnetic and gravitational data along four lines selected to transect the major south and northeast dikes and to partly encircle the diatreme. Modeling differently sized, oriented and shaped intrusions, we created theoretical Free Air anomaly curves to try to match the two clearest anomalies. Modeling necessitates (i) that the major north-south dike dips west and (ii) the presence of a high-density, deep body near the diatreme. The Free Air anomaly curves show that smaller dikes might not be detected from gravity data; however, they are necessary to determine the presence of large, dense bodies. Although not modeled, the magnetics curves show that smaller dikes can easily be detected. Our study results are promising, and we plan a more thorough investigation in the future which will produce a magnetic map to determine if further buried dikes exist in the vicinity, and measure gravity along additional profiles to better constrain the location of the dense body at depth.

ED41B-1161 0830h POSTER

A COARSE Receiver Function Survey of the Southern Arizona Lithosphere

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Project COARSE (COnsortium for Arizona Reconnaissance Seismic Experiment) operates a temporary network of broadband seismic stations in southern Arizona. The goal of the project is to investigate the crustal and deep structure across the transition from the Southern Basin and Range to the southern Colorado Plateau. Southern Arizona is a region of notable undersampling in tomographic and receiver function studies of the lithospheric-scale structure of the western United States. In addition, these data will provide unique first-order constraints on crust and upper mantle structure beneath the region in preparation for more focused efforts as EarthScope and USarray pass through the region. We are currently operating eight broadband seismographs recording continuously at 25 samples/sec in an approximate SW-NE swath across southeastern Arizona. When combined with the two permanent broadband stations in the state (TUC and WUAZ), the array will provide the requisite data to delineate the first-order structure of the lithosphere and sublithospheric mantle, as well as improve imaging capabilities for deep Earth structure in adjacent regions. One key question we are addressing is the nature of extension in the Southern Basin and Range, and how this extension is accommodated at greater depths. The current study therefore focuses on data collected at stations located at astronomical observatories on mountain summits associated with metamorphic core complexes. From SW to NE the seismic stations are located at 1) Kitt Peak (KITT), 2) Mt. Lemmon (LEMN) and the nearby GSN station TUC, and 3) Mt. Graham (SQRL). Analyses of receiver functions from teleseismic events at each station indicate a gradual SW to NE increase in crustal thickness from 29 km at KITT, to 30 km at LEMN, and 32 km at SQRL. This crustal thickness increase correlates with the increase in summit elevations from 2100m at KITT, to 2800m at LEMN, and 3050m at SQRL. Among these stations, only the TUC station has a clear Moho multiple from which we can estimate the bulk crustal Vp/Vs value of 1.74. The receiver functions from stations KITT and SQRL have prominent arrivals from the top of a crustal low-velocity zone at depths of 17 km and 14 km, respectively. Inter-crustal arrivals in this region possibly mark shallowly dipping shear zones that have played a role in accommodating extension during core complex formation. We hope to characterize how crustal thickness, anisotropy, extension, and shear within the crust are related in southern Arizona.

ED41B-1162 0830h POSTER

Modeling of Geodetic Crustal Motion Velocities in Southern California: Undergraduate Research

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With funding from the National Science Foundation's Opportunities for Enhancing Diversity in the Geosciences, we have undertaken a project with two primary goals: (1) to introduce undergraduate students and K-14 educators to research in geology/geophysics, and (2) to use GPS to monitor deformation across the boundary between the Pacific and North American plates in southern California, and to model the slip on specific faults that could be responsible for that deformation. Starting in July 2002, we collected campaign-style GPS data twice a year from 13 sites along a line across the San Andreas and San Jacinto faults from Norco through San Bernardino to Lucerne Valley. We are also modeling data from the SCEC Crustal Deformation Velocity Map 2.0 [http://www.scecdc.scec.org/group_e/release.v2/]. Our initial approach has been to use a one-dimensional model of dislocations in an elastic half-space. We are studying the portion of the plate boundary from San Bernardino southward to the U.S.-Mexico border. We have divided this region into seven transects that are perpendicular to the plate boundary. We used a spreadsheet macro to systematically model a range of slip rates and locking depths for each fault. Out of hundreds or thousands of possible combinations for each transect, we sorted the models according to their goodness of fit, using the sum of the squares of the residuals as a criterion. We are also beginning to use the program Simplex (G. Lyzenga. J. Parker) to model the velocity data from all transects simultaneously. This will allow us to take into account the complex fault geometry of the region. Our preliminary results from the one-dimensional modeling suggest that the best-fitting slip rate of the San Andreas fault is 26 mm/yr for the section from Indio to Durmid. However, slip rates in the range of 20-30 mm/yr also fit the geodetic data relatively well. Slip rates of 15 or 35 mm/yr do not fit well. For the San Jacinto fault, the best-fitting slip rate is 13 mm/yr for the section from Anza to Borrego Mountain and 15 mm/yr for the section farther south, which ruptured in 1968. However, slip rates within the range 10-20 mm/yr also fit these data relatively well. The best-fitting rate for the Superstition Hills fault is 15 mm/yr, with rates of 10-15 mm/yr fitting reasonably well, whereas a rate of 20 mm/yr does not fit well. The best-fitting slip rate for the Elsinore fault was 5 mm/yr for the section near Julian, but rates ranging from 2-8 mm/yr also fit relatively well. For the southernmost section of the Elsinore fault, from Agua Caliente Springs to the Coyote Mountains, the best-fitting slip rate was 2 mm/yr, but rates from 2-4 mm/yr fit relatively well. The best-fitting rate for the Laguna Salada fault was 4 mm/yr, with rates from 2-6 mm/yr also fitting fairly well. These results generally agree with geologic estimates of the Holocene slip rates for these faults. There has been considerable debate as to whether the San Andreas and San Jacinto faults contribute approximately equally to the plate boundary deformation in southern California or whether the San Andreas fault contributes substantially more than the San Jacinto fault. Our preliminary results suggest that the San Andreas fault most likely is contributing more to the plate boundary deformation than is the San Jacinto fault, but we cannot rule out the possibility that they are equal contributors.

ED41B-1163 0830h POSTER

Determination of Crustal Thickness in Alaska Using Receiver Functions

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Receiver function analysis of teleseismic P-waveforms was used to determine the crustal thickness beneath 31 broadband seismic stations in and around Alaska. The receiver functions were produced from teleseismic earthquakes of magnitude 6.3 and greater that occurred between January 1999 and June 2003. At each station, receiver functions from similar back azimuths were stacked based on visual comparison. A grid-search program was then used to produce synthetic receiver functions for assumed ranges of crustal thickness and crustal velocity, which were then compared to the observed receiver function or stack. Receiver functions for stations in northern Alaska were interpreted using a single layer crustal model and resulted in crustal thicknesses ranging from 29.5 to 42.0 km, typical of continental crust. The same model was used to interpret the results for stations in southeastern Alaska, producing crustal thicknesses between 20 and 42 km. The complicated subduction tectonics of southern Alaska called for the use of a double layer model for stations in the Aleutians and south central Alaska, which lie above the subducting Pacific plate. The model successfully determined the depth to the Moho of the overriding North American plate, as well as the depth to the Moho of the subducting Pacific plate. For stations closer to the Aleutian trench, a single layer model was applied, but results were interpreted to be depth to the Moho of the Pacific plate rather than the North American plate. This project was completed as an NSF-sponsored REU internship at the Geophysical Institute, University of Alaska Fairbanks during the summer of 2003.

ED41B-1164 0830h POSTER

Lost in Loess: Paleomagnetic investigation into loess and tephra deposits in interior Alaska

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As a part of a NSF-funded Research Experience for Undergraduates (REU) program at the University of Alaska Fairbanks, loess and tephra samples were collected at a road cut near Tok, Alaska, to determine if the site was suitable for paleoclimate reconstruction of the Pleistocene. Oriented cubes and cores were obtained from a section of loess just below the Sheep Creek tephra dated at 190 ± 20 ka, through the Tetlin tephra (1.2 meters below the Sheep Creek tephra) dated at 630 ± 50 ka to two meters below the Tetlin tephra. The accumulated amount of loess between dated tephra layers suggests a span of more than one million years for the whole section assuming a constant sedimentation rate for the loess. The samples were measured for natural remanent magnetization (NRM) and magnetic susceptibility before magnetic cleaning techniques (Alternating Field Demagnetization and Thermal Demagnetization) were employed. Samples were analyzed using a cryogenic magnetometer. The demagnetizations show stable magnetic vectors and demonstrate that loess is a reliable paleomagnetic recorder. At Tok, we found that the entire section is of normal polarity and shows no sign of the 780 ka Brunhes-Matuyama polarity reversal, which was expected to be 42 cm below the Tetlin tephra. Absence of the reversal may be due to discontinuities or other changes in the sedimentation rate in the loess, a problem with the sampling methods, or incorrect ages of the tephras. Based on our studies, we feel that changing rates of loess deposition or other unseen discontinuities are the reason the reversal was not found. Because of the uncertainty of the depositional history of the Tok loess, this section is not useful for obtaining a continuous record of ancient climate.

ED41B-1165 0830h POSTER

Analysis of Compressional Pc 5 Magnetic Field Oscillations and Associated Energetic Ion Modulations Occurring on December 20, 2002 in the Dusk Sector Outer Magnetosphere

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An intense compressional Pc 5 wave event was observed by Polar during a minor magnetic storm on 20-Dec-2002 as it crossed the geomagnetic equator near dusk (17:30 MLT) at L ~ 9.6. The local magnetic field varied by a factor of two while fluxes of ~10 keV energetic protons varied in anti-phase by a factor of three. The Dst index revealed a sudden commencement beginning at 08:00 UT on Dec. 19, and decreased to a minimum of -56 at 19:00 UT. Waves were observed from 01:00 to 03:00 UT on Dec. 20 as the Dst index showed an initial recovery from the storm. The region of proton flux and magnetic field oscillations was sharply bounded in magnetic latitude from -0.6° to 4.1°. Proton fluxes with energy per charge from 1.0 to 21.5 keV/e showed a sharp anti-correlation with the total magnetic field, while proton fluxes with higher and lower energy were much weaker and showed little variation. Protons with pitch angles between 30° and 150° were essentially isotropic in azimuth and varied in anti-phase with the total magnetic field, while the much smaller fluxes with pitch angles below 30° and above 150° showed fluctuations with less obvious correlations to the magnetic field. The observed predominantly compressional wave can be attributed to a ballooning-mirror instability of observed energetic protons, excited when ion pressure gradients and pressure anisotropy are large, and are hence closely associated with magnetic storms. The localization of the waves near the geomagnetic equator in the outer dusk magnetosphere is consistent with such source mechanisms.

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ED41B-1166 0830h POSTER

Satellite Observations and Model Predictions of Rayleigh Scattered UV Radiance

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The Student Nitric Oxide Explorer satellite (SNOE) is a spinning satellite which uses a limb directed Ultraviolet Spectrometer (UVS) perpendicular to the satellite's axis of rotation. The instrument has two detectors which are positioned to observe at 215 nm and 237 nm. The purpose of the UVS is to measure NO densities in the Thermosphere. Although NO dominates the signal in the altitude region near its average peak at 106 km, at lower altitudes the signal is dominated by Rayleigh scattered solar radiance from N2 and O2. We have developed a model of the Rayleigh scattered emissions observed by the UVS. In addition to answering many interesting geophysical questions, the model accomplishes two important tasks. Our determination of the tangent altitude of the UVS line of sight is subject to large uncertainties due to the spinning of the satellite. By aligning consistent identifiable features in the modeled Rayleigh scattering altitude profile with the corresponding features in the UVS data we are able to significantly reduce these uncertainties. Also, we use the model to study the instrument calibration as its sensitivity degrades. The model takes into account all of the important factors contributing to the observed signal. The most important factors are the single scattered volume emission rates along the instrument's line of sight and the radiation's extinction on its path to the detector. Ozone is the dominant contributor to absorption of the light and the model shows a significant sensitivity to its presence. The model also takes into account the polarization of the scattered radiation and the sensitivity of the UVS to polarization. The model predictions are in excellent agreement with the UVS data. This agreement adds confidence to our understanding of the physical processes involved and allows us to utilize the model for the tasks described above. This presentation will cover the model development and how it is used to accomplish the altitude registration of the UVS and the sensitivity studies. We will also discuss the comparison of the model results to the UVS observations.

ED41B-1167 0830h POSTER

Student Dust Counter I : Science Objectives

C. Mitchell[1] (Colin.Mitchell@lasp.colorado.edu); C. Bryant[1] (Chelsey.Bryant@lasp.colorado.edu); N. Bunch[1] (Nicholas.Bunch@lasp.colorado.edu); T. Chanthawanich[1] (Tim.Chanthaw@lasp.colorado.edu); M. Colgan[1] (Matt.Colgan@lasp.colorado.ed); A. Fernandez[1] (Anselm.Fernandez@lasp.colorado.edu); B. Grogan[1] (Beth.grogan@lasp.colorado.edu); G. Holland[1] (Gene.Holland@lasp.colorado.edu); C. Krauss[1] (Corinne.Krauss@lasp.colorado.edu); E. Krauss[1] (Ervin.Krauss@lasp.colorado.edu); O. Krauss[1] (Otto.Krauss@lasp.colorado.edu); M. Neeland[1] (Michael.Neeland@lasp.colorado.edu); M. Horanyi[1] (303 492 6903; horanyi@colorado.edu)

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The New Horizons mission to Pluto and the Kuiper Belt is scheduled for launch in January 2006. As part of the Education and Public Outreach activity of the mission, undergraduate and graduate students at the Laboratory for Atmospheric and Space Physics, University of Colorado, are building a space experiment: the Student Dust Counter (SDC). This talk will summarize the scientific goals of this experiment. An accompanying poster describes the technical details of SDC. The primary goal of SDC is to map the dust distribution in the Solar System from 1 to 50 AU. It will greatly enhance our knowledge of dust production and transport in the outer Solar System by providing more sensitive observations than earlier experiments past Saturn, and the first in situ dust observations beyond 18 AU.

ED41B-1168 0830h POSTER

Student Dust Counter II: Building the Instrument

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The New Horizons mission to Pluto and the Kuiper Belt is scheduled for launch in January 2006. As part of the Education and Public Outreach activity of the mission, undergraduate and graduate students at the Laboratory for Atmospheric and Space Physics, University of Colorado, are building a space experiment: the Student Dust Counter (SDC). This talk will summarize the technical details of this experiment. An accompanying poster describes the science goals of SDC. SDC has a high degree of heritage from dust detectors of this type built by the University of Chicago for several missions, including Vega 1 and 2 to comet P/Halley, Cassini and Stardust. Dust detection is based on signals generated by impacts into a thin polyvinylidene-fluoride (PVDF) film.

ED41B-1169 0830h POSTER

Creating A Virtual Fault Database Using Ontologies

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SCEC's Fault Information System (FIS) consists of several databases including SCEC's Fault Activity Database (FAD) and SCEC's Community Fault Model database (CFM). The purpose of the FIS is to provide an interface for obtaining fault data contained in multiple, distributed databases using a single point of access. Constructing such an interface requires the existence of a mapping that links terms used in the databases to their semantic meaning. In this way, terms appearing in different databases, but representing the same data, can be treated as equals from the point of view of the query interface. In this project we explore a system which uses ontologies to provide the necessary database semantics. The system uses two ontologies: one to represent semantics in the domain of fault geology and one to represent relational databases. Using these ontologies a mapping can be created that links entities in the fault database ontologies to their equivalent semantic meanings in the fault domain ontology. An interface can then be constructed using the ontologies to mediate between FIS users and the databases contained within the FIS.

ED41B-1170 0830h POSTER

Using Java 3D for Magnetospheric Visualization

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The paper will discuss the design characteristics of CALCHAS, a 3D visualization package that integrates models and data and is used in data assimilation schemes in Space Weather forecasting. The package is written in Java 3D, and has a modular design, so that different models and datasets, both real-time and historical, can be seamlessly compared using a variety of goodness-of-fit measures. The package is used both in research and education at the undergraduate as well as secondary level. It was developed in Spring 2003 on a Research Experience for Undergraduates (REU) supplement for NSF grant # 1R01HD-44276.01, "Scaling up Reading Tutors".

ED41B-1171 0830h POSTER

Undergraduate Research - Analyzing Data Sets: Global Positioning System (GPS) and Modeling the 1994 Northridge Earthquake

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Our undergraduate research program (2000-2003), funded by NASA, consisted of four short courses on the analysis of selected data sets from GPS, solar physics, orbital mechanics, and proteomics. During the program, approximately 80 students were recruited from science, math, engineering, and technology disciplines. This short course introduced students to GPS and earthquake data analysis with additional presentations by scientists from JPL. Additional lectures involved discussions of the wave equation, Fourier analysis, statistical techniques, and computer applications of Excel and Matlab. Each student modeled the observed GPS displacements produced by the 1994 Northridge earthquake and presented an oral report. An additional component of the program involved students as research assistants engaged in a variety of projects at CSUN and JPL. Each short course continued the following semester with weekly research lectures.

ED41B-1172 0830h POSTER

Earth in Space: A CD-ROM Version for Pre-College Teachers

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Earth in Space, a magazine about the Earth and space sciences for pre-college science teachers, was published by AGU between 1987 and 2001 (9 issues each year). The goal of *Earth in Space* was to make research at the frontiers of the geosciences accessible to teachers and students and engage them in thinking about scientific careers. Each issue contained two or three recent research articles, rewritten for a high school level audience from the original version published in peer-reviewed AGU journals, which were supplemented with short news items and biographic information about the authors. As part of a 2003 summer internship with AGU, sponsored by the AGU Committee on Education and Human Resources (CEHR) and the American Institute of Physics, this collection of *Earth in Space* magazines was converted into an easily accessible electronic resource for K-12 teachers and students. Every issue was scanned into a PDF file. The entire collection of articles was cataloged in a database indexed to key topic terms (e.g., volcanoes, global climate change, space weather). A front-page was designed in order to facilitate rapid access to articles concerning specific topics within the Earth and space sciences of particular interest to high school students. A compact CD-ROM version of this resource will be distributed to science teachers at future meetings of the National Science Teachers Association and will be made available through AGU's Outreach and Research Support program.

ED41B-1173 0830h POSTER

Multi-kilohertz Microlaser Altimeter(MMLA)Real-time Scan Footprint Mapping Software

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It is expected that this near Real-time Scan Footprint Mapping Software (R-T Scan) display will alert us to any missed areas that we can re-fly to obtain more complete coverage. The value-added custom software is the Visual Basic Data conversion package. This software captures the GPS NEMA string(s) from the 2nd serial port, reads the attitude data form (the shared file of "most recent" attitude data), and performs a geometric projection of 10 (user adjustable) hypothetical laser scan angles to ground based latitude and longitude coordinates. The Lat/Long data are then converted back into the NEMA string format used by Street Atlas. The Multi-kilohertz Micro Laser Altimeter (MMLA) acquires high spatial resolution digital topographic databases and can observe geographical terrains such as hydrological runoff, measure ice sheet thickness, and the changes in lakes and reservoirs. The MMLA is ideal for making topographical (digital) maps of forest settings and cities. (NASA/GSFC 920.3) In order to maximize flight time efficiency and to avoid the potential disastrous situation of missing a target of prime importance, we have developed the MMLA R-T Scan.

ED41C MCC: Level 2 Thursday 0830h

Teaching Petrology in the 21st Century I Posters *(joint with V)*

Presiding: **C A Manduca,** Science Education Resource Center, Carleton College**; C Davidson,** Carleton College**; D Mogk,** Montana State University

ED41C-1174 0830h POSTER

The Barrovian Metapelitic Rocks In Northern Idaho: An Outstanding Suite For Teaching Undergraduate Metamorphic Petrology

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The Barrovian metapelitic rocks in the St. Joe-Clearwater region in northern Idaho provide an outstanding suite for the study of many aspects of regional metamorphism in an undergraduate petrology class. Metamorphosed Belt Supergroup and associate rocks, located along the northwest border zone of the Idaho batholith, record the effects of three phases of recrystallization. The first phase of metamorphism (M1) is recognized by the presence of (M2) muscovite pseudomorphs after staurolite. The second phase of metamorphism, M2, was Barrovian and ranges in grade from biotite zone through K-feldspar + sillimanite zone. M2 porphyroblasts are commonly quite large and easily recognizable in hand sample as well as petrographically. Four and five AFM phase assemblages present in these