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The Global Positioning System (GPS) is now widely used to measure ionospheric electron content at both global and regional scales. It is also capable of detecting small-scale high-frequency ionospheric disturbances caused by atmospheric acoustic-gravity waves. We show examples of ionospheric perturbations caused by earthquakes, rocket launches, and large surface explosions. The neutral atmospheric waves triggered by these events couple with the motion of free electrons and ionized plasma at ionospheric heights and induce coherent fluctuations of electron densities and ionization layer boundaries that are detectable with GPS. In all cases, the ionospheric perturbations match fairly well observations made through other techniques as well as numerical models. The development of permanent networks of densely spaced and continuously recording GPS stations open up new opportunities for the study of infrasonic waves in the atmosphere and their coupling with small scale processes in the ionosphere. We show examples of infrasonic waves detected using the 250-station GPS network that covers the Los Angeles area (SCIGN). Although the signal-to-noise ratio of these perturbations is relatively small, we show that it can be considerably improved by multi-station array processing techniques derived from seismic array analysis. These techniques can also be used to determine the perturbation propagation azimuth and velocity and, eventually, to recover information about the sources of these perturbations.

URL: http://www.eas.purdue.edu/~calais/projects/ionosphere.html

U32C-04 1700h

Acoustic-Gravity Waves Induced by Earthquakes: Insights From Observations and Numerical Modeling

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Surface waves emitted after large earthquakes are known to induce, by dynamic coupling, atmospheric infrasonic and gravity waves propagating upward in the atmosphere. Those waves can be detected at ionospheric heights using a variety of techniques, such as Doppler or GPS ionospheric sounding, facilitating systematic monitoring. This opens new perspectives for remote sensing of solid earth events, or the study of solid Earth and atmosphere structure. However, in order to obtain quantitative information from these data, propagation effects due to the atmosphere must be separated from those due to the solid Earth structure. We present a number of modeling approaches to study the relative contribution of source mechanism, solid Earth and atmospheric structure, viscous dissipation and thermal conduction on the propagation of these waves. In order to validate these models, we tested our simulations with some benchmarks cases of simple solid or atmospheric source, as well as with several recent ionospheric observations of earthquakes.

U32C-05 1715h

On the Possible Infrasound Generation by Sprites

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Energetic electrons accelerated by electric fields in thunderstorms are assumed to be responsible for generation of luminous phenomena at altitudes above 30 km, so called sprites. If the generation of light in these phenomena is associated with local heating, it may also be expected that low frequency acoustic waves will be generated. Due to the cylindrical structure of the source the most of the acoustic energy will be radiated close to the horizontal plane along the entire height of the source. The infrasound from these phenomena is therefore unlikely to be detected immediately beneath the source. The search for infrasonic signals from the high altitude luminous phenomena was carried out during the recent years using data from the infrasonic network operated by the Swedish Institute of Space Physics. During the night of May 26-27 1995, when a severe thunderstorm area passed over the Golf of Bothnia, it was possible to identify signals, most probably generated by sprites. The infrasonic observations made during that night are described in the present report. Similar, chirp-like signals were observed during some other occasions at Swedish stations during the recent years.

U32C-06 1730h

Constraining volcano eruption dynamics with infrasound

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Infrasonic airwaves produced by exploding volcanoes provide an indispensable tool for understanding dynamics of diverse eruptions. Unlike the seismicity generated during eruption, which is a complex superposition of internal and surface source and wave propagation processes, the infrasonic pressure field can be unequivocally associated with the flux rate of gas released at the volcanic vent. Because the atmosphere does not support shear waves, and internal scattering, topographic echoes, site, and weather effects are substantially predictable, it is possible to objectively compare the infrasound, and assess degassing from diverse volcanic systems. With its utility for continuously tracking eruptive activity, even when line-of-sight view to the vent is obscured, infrasound greatly enhances the efficacy of volcano monitoring and interpretation of conduit processes / eruption dynamics. We showcase new results from Erebus, Fuego, Villarrica, and Santiaguito volcanoes to demonstrate the utility of infrasound for recovering quantitative parameters, such as eruption duration, source dimensions and mechanism, and explosive gas release. At Erebus, infrasound can constrain the physical dimension of enormous bubbles, with diameters up to 10 m and containing more than 1000 kg gas, that burst individually and infrequently from the lava lake surface. At Villarrica, longer-duration infrasonic transients reveal the eruptive mechanism to be a succession of gas slugs bursting from the free surface, occurring at 60-90 s intervals and representing a stable long-term mode of degassing. At Fuego, the infrasound associated with vigorous explosions is inferred to result from the fragmentation of a bubble foam layer, which continues for tens of seconds until the gas foam is depleted. And at Santiaguito, large eruptions, which generate low intensity infrasound, suggest a diffuse source region with dimensions comparable to the radiated infrasonic wavelength (vent radii > 100 m). The recorded infrasound from these 4 volcanoes complements our infrasound archives for an additional 6 volcanoes, which encompasses a wide range of eruptive behaviors. Infrasound recorded within a few km of a volcanic vent thus provides an ideal tool for objective comparison of associated degassing.

U32C-07 1745h

Hawaiian Infrasound: A Mele of Fire, Wind, and Water

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Some of the more interesting infrasonic signals the can be routinely observed in Hawaii are associated with volcanic activity, severe weather, and ocean processes. Kilauea volcano is one of the most active volcanoes in the world, and infrasonic observations from an expedition in November of 2002 strongly suggest that continuous infrasound in the 1-8 Hz frequency band may be generated from the lava tube system of Puu Oo and may correspond to pressure instabilities in the magma flow. The eruption signal we observed corresponds to low-level effusive activity, and appears to only propagate for a few tens of kilometers. In contrast, signals associated with severe weather in the ocean may propagate for thousands of kilometers. These infrasonic signals, known as microbaroms, are close relatives of microseisms and occupy the 0.1-0.6 Hz frequency band. We believe that these signals are generated by the nonlinear interaction of ocean surface waves generated by storms, and show some observations from hurricanes Daniel and Jimena. When these waves hit the Hawaiian coastline, they can produce world class surf as well as substantial infrasonic energy. We postulate that surf infrasound can be generated by the collapse of the wave upon itself (barreling), impact against a cliff, or slamming against a shallow reef, and show examples from the epic 2002-2003 Hawaiian winter. Our observations in Hawaii demonstrate how infrasound can provide useful information of solid earth-ocean-atmosphere interactions and can be integrated with other technologies to enhance our basic understanding of geophysical processes.

URL: http://www.inframatics.org

U41A MCC: 3001-3003 Thursday 0800h

The Core-Mantle Boundary: Theoretical, Experimental, and Observational Constraints I

Presiding: **J A Van Orman,** Case Western Reserve University**; A D Brandon,** NASA Johnson Space Center

U41A-01 0800h INVITED

Constraints on Chemical Interaction Between Core and Mantle

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Chemical reactions between the core and mantle have been suggested to explain a variety of phenomena including the D" layer (e.g., Knittle and Jeanloz) and Os isotopic signatures observed in some plume derived magmas (e.g., Walker et al.). However, the chemical nature of a core-mantle interaction depends on several poorly constrained factors such as how close the core and mantle are to chemical equilibrium, the composition of the core (i.e., the identity of the light element(s)), and partitioning of elements between the inner and outer core. The state of equilibrium between the core and mantle is dependant on the mode of core formation: Did the core continually re-equilibrate with the mantle as it formed while the Earth grew, or did core metal equilibrate with mantle silicates at pressures significantly lower than those of the present day core-mantle boundary (for example as in the model of Righter et al.)? In addition any subsequent differentiation of the mantle resulting in the formation of D" (if it is not a direct reaction product between core and mantle) could change the state of equilibrium between the core and mantle especially the development of a zone of partial melt as suggested by the ULVZ. However, experimental studies to date of interactions between the core and mantle have assumed that D" is solid and of similar composition to the rest of the mantle (i.e., Knittle and Jeanloz, Goarant et al., Hillgren and Boehler). All that is known about the composition of the core is that it is Fe alloyed with some lighter element. The identity of the light element is unknown (although there is only a limited number of reasonable candidates) and the amount of that element is dependent upon its identity. The identity of the light element is also critical for determining how elements might partition between the inner and outer core. Recent experimental and theoretical work on core-mantle interaction, light element in the core, and partitioning at very high pressures will be reviewed. Ref: Goarant et al. (1992) JGR 97, 4477. Hillgren and Boehler (2000) AIRRAPT 17, 609. Knittle and Jeanloz (1989) GRL 16, 609. Righter et al. (1997) PEPI 100, 115. Walker et al. (1995) Science 269, 819.

U41A-02 0815h

Progress in the Development of Techniques for Detection of Chemical Interactions Between the Core and Mantle

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If some plumes arise from the core-mantle boundary and there is limited chemical interaction between the core and mantle within D", it is possible that these plumes could contain a unique chemical or iso-topic fingerprint that is characteristic of the core. Unequivocal identification of a core component in a plume could potentially settle a major question in geodynamics. The ideal tracers of a core component in a plume are elements that occur in very high abundance in the core relative to the mantle and crust. The most sensitive suite of elements for identifying possible core contributions to plumes that may arise from the core-mantle interface are the highly siderophile elements (HSE = Pt, Re, Os, Ir, Pd, Ru, Rh, Au), and certain moderately siderophile elements such as Ag, W and Mo. Because of the extreme preference of the HSE for metal relative to sili-cates, the formation of the core nearly quantitatively sequestered the Earth's HSE, and also likely dominates the budget of moderately siderophile elements. Mass balance is potentially optimal for detection of core additions to the mantle. Isotopic systems are of greatest interest in prosecuting this task because characteristic isotopic signals may be immune to subsequent processing in the mantle or crust. Pros and cons in applications, and an overview of existing data will be presented, primarily focusing on the Pt-Re-Os coupled system and the short-lived ^{182}Hf -^{182}W system. Although resolution of isotopic differences may currently be insufficient, W isotopes provide the best complement to Os isotopes in the search for a core component.

U41A-03 0830h INVITED

Geochemical Constraints on Core-Mantle Interaction from Fe/Mn Ratios

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The greater density of liquid iron alloy, and its immiscibility with silicate, maintains the physical separation of the core from the mantle. There are no a priori reasons, however, why the Earth's mantle should be chemically isolated from the core. Osmium isotopic variations in mantle plumes have been interpreted in terms of interaction between outer core and the source regions of deep mantle plumes. If chemical transport occurs across the core-mantle boundary its mechanism remains to be established. The Os isotope evidence has also been interpreted as the signatures of subducted Mn-sediments, which are known to have relatively high Pt/Os. In the mantle, Fe occurs mainly as the divalent ferrous ion, and Mn occurs solely as a divalent ion, and both behave in a geochemically coherent manner because of similarity in ionic charge and radius. Thus, the Fe/Mn ratio is a planetary constant insensitive to processes of mantle differentiation by partial melting. Two processes may perturb the ambient mantle Fe/Mn of 60: a) the subduction of Mn-sediments should decrease the Fe/Mn ratio in plume sources, while b) chemical transport from the outer core may increase the Fe/Mn ratio. The differentiation of the liquid outer core to form the solid inner core may increase abundances of the light element constituents (FeS, FeO, etc.) to the point of exsolution from the core at the CMB. The exact rate of this process is determined by the rate of inner core growth. Two end-member models include 1) inner core formation mainly prior to 3.5 Ga with heat release dominated by radioactive sources, or 2) inner core formation occurring mainly in the last 1.5 Ga with heat release dominated by latent heat. This latter model would imply large fluxes of Fe into the sources of modern mantle plumes. Existing Fe/Mn data for Gorgona and Hawaiian samples place limits on both these processes. We describe a new procedure for the precise determination of the Fe/Mn ratio in magmatic rocks by ICP-MS. This high-resolution study of the Fe/Mn of mantle-derived samples offers a new set of chemical constraints on the rates of inner core differentiation and the viability of Os isotope interpretations.

U41A-04 0845h

The Cause and Consequence of Compositional Anomalies at the Core-mantle Boundary

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Waveform modeling and travel time analyses of dense seismic observations reveal a rapidly-varying low-velocity basal layer at the base of the mantle extending from the south Atlantic ocean to the Indian ocean. This basal layer has steeply dipping edges, rapidly varying thicknesses (0-300 km) and geometries, and anomalously low shear wave velocities decreasing from -2% at 300 km above the core-mantle boundary to -9% to -12% at the core-mantle boundary. The maximum P velocity decrease associated with the seismic anomaly is -3%. The structural features and velocity characteristics of the basal layer unambiguously suggest that it is a compositional anomaly. The seismic characteristics associated with this basal layer can be best explained by partial melt driven by a compositional change produced early in the Earth's history. In contrast, the seismic structures beneath the central and western Pacific ocean are dramatically different. The central Pacific exhibits a shear velocity gradient of about -3% over the bottom 300 km of the mantle; and the western Pacific region is characterized by many ultra-low velocity zones with P velocity reductions as large as -10% and vertical length-scales of tens kilometers and horizontal length-scales from tens kilometers to hundreds kilometers. I suggest that the seismic structure beneath the central Pacific may be reasonably explained by pure thermal effects within a thermal boundary layer and the ultra-low velocity zones in the western Pacific may reflect the existence of similar chemical heterogeneities in much smaller length scales and with larger degrees of partial melt or existence of small-scale convection at the base of the mantle. On the Earth's surface, the ocean floor in the south Atlantic ocean and the Indian ocean is noticed to have two distinct characteristics. Its ocean islands have unique isotope signatures and its major hotspots are relatively fixed to each other. The ocean islands in the south Atlantic ocean and the Indian ocean have high ^{87}Sr/^{86}Sr ratios and anomalously high ^{207}Pb/^{204}Pb and Pb^{208}/^{204}Pb ratios for a given ^{206}Pb/^{204}Pb ratio. These unique isotope signatures and its geographical distribution were termed the "DUPAL anomaly". Several studies also indicated that major hotspots in the south Atlantic ocean and the Indian ocean have little motions with respect to each other, while other hotspots in the Pacific ocean have large motions with respect to the "Atlantic-Indian" hotspot group and the mantle. The geographical distribution of the basal compositional anomaly strongly correlate with the geographic extent of the "DUPAL anomaly" and many major hotspots in the south Atlantic and Indian oceans. I suggest that the compositional anomaly near the core-mantle boundary could provide an explanation for the "DUPAL anomaly" observed at the Earth's surface, in terms of its geographical distribution, uniqueness and enrichments, and the fixity of the "Atlantic-Indian" hotspot group, if mantle flow or plume is able to entrain the distinct materials from this bottom compositional layer and carry them to the Earth's surface. In this scenario, this basal compositional anomaly represents an "ancient" enriched chemical anomaly and its presence serves as an anchor to mantle plumes that give rise to the relatively fixed hotspots above.

URL: http://geophysics.geo.sunysb.edu/wen/

U41A-05 0900h

Chemical Reaction Between Silicate Perovskite and Liquid Iron up to 79 GPa

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We investigated chemical reaction between silicate perovskite and liquid iron on the basis of high pressure and temperature experiments up to 79 GPa and 3150 K. A total of 30 runs were made in a Kawai-type apparatus and a laser-heated diamond-anvil cell. Mixtures of iron (99.9 % purity) and gel powder with compositions of Mg0.9Fe0.1SiO3 or Mg0.8Fe0.2SiO3 were used as starting materials (8:92 in weight). Textural observations and chemical analyses on the recovered samples were performed with an analytical transmission electron microscopy (ATEM) equipped with energy dispersive spectroscope (EDS) and electron energy loss spectroscope (EELS). Results demonstrated that dissolution both of oxygen and silicon from silicate perovskite into molten iron was significantly enhanced with increasing pressure and temperature. In contrast, FeO content in perovskite decreased with increasing pressure and temperature. The liquid iron in contact with perovskite quenched from 3100 K at 72 GPa includes 4.3(0.8) wt% oxygen and 3.1(0.7) wt% silicon. It also includes trace amount of magnesium content (0.3 wt%). In all the experiments, no reaction products other than metallic iron and perovskite were observed. This observation together with the fact that Si/O ratios in quenched liquid iron are close to 1/3 suggests that FeSiO3 component in perovskite dissolved into liquid iron without forming any reaction products. The oxygen and silicon contents in molten iron chemically reacted with silicate perovskite at 72 GPa and 3100 K can already account for a 7% density deficit in the outer core, according to Anderson and Isaak (2002, PEPI). It is therefore expected that oxygen and silicon are currently dissolving from the mantle into the core by the consequence of chemical reaction at the core-mantle boundary.

U41A-06 0915h

Shock-induced Melting of $MgSiO_3$ (perovskite): Implications for Density of Ultramafic Liquids above Core-Mantle Boundary

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New shock Hugoniot data for crystal enstatite (En99) at 110 to 170 GPa are concordant with diamond anvil- and Brillouin- based equations of state for perovskite structure. Above 170 GPa transition to a phase 2-3% denser than perovskite occurs. The densities achieved are too high to be explained by transition to any known solid phase, or, via disproportionation, to MgO + SiO_2($CaCl_2$), or, MgO + SiO_2 (melt). We propose on the similar basis of of the shock-induced melting of stishovite, that like SiO_2, shock-induced $MgSiO_3$(perovskite) becomes super-heated (at ~5500-5800 K) and subsequently completely melts at Hugoniot pressures above 170 GPa.From the inferred melting entropy of 1.1 R / (mole-atom), the recent high-pressure x-ray thermal expansion data for $MgSiO_3$(perovskite) indicating a value of ~ $1x10^{-5}$/ K above 100 GPa, and the observation that the bulk sound velocity of crystals are approximately unchanged upon melting. The $MgSiO_3$(perovskite) melting curve peaks at ~ 90 GPa and has a negative slope of -10 to -16 K/GPa at higher pressures. As a result, molten $MgSiO_3$ is negatively buoyant under lower-most mantle conditions and may account for the possible partially molten (silicate) in the ULVZ (indicated by data and analysis of Helmberger, Garnero and Williams).

U41A-07 0930h

Thermal coupling between the convecting mantle and core from the view of thermo-chemical mantle convection

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Our previous studies have investigated the suitability of parameterized convection for describing a compositionally-heterogeneous mantle, and developed a coupled mantle-core thermal evolution model in which the mantle has various complexities but the core heat balance is simple, without the effects of radiogenic heat sources and a magnetic field [Nakagawa and Tackley, 2002 at AGU Fall Meeting; Nakagawa and Tackley, 2003 at IUGG General Assembly]. Recently, several heat balance models for the core that include the effects of radioactive heat sources and the magnetic field have been proposed [Buffett, 2003; Labrosse, 2003]. However, those models use a parameterized mantle convection model to calculate CMB heat flux. Here, we develop a coupled core-mantle model that combines a realistic thermochemical mantle convection model (including the lateral variation of compositional anomalies, phase changes, melting and plate-like behavior) with a core heat balance model that includes inner core growth, the ohmic dissipation and radioactive elements.

The numerical model is the same as that of Nakagawa and Tackley [2003] but thermal evolution of the core is based on Buffett [2002], modified to include variable ohmic dissipation, adiabatic heat flux through the CMB and radioactive heat elements. This coupled model is used to calculate the age and radius of the inner core, and the heat flux through the surface and CMB in order to constain core-mantle thermal evolution by comparing the Earth. The two end-member compositonal assumptions are that heterogeneity comes from intial layering, or that heterogeneity is generated through melting over Earth's history (assumes both constant buoyancy ratio and depth-dependent buoyancy ratio). The core model either: (1) assumes no magnetic field, (2) includes the effect of a magnetic field and (3) includes effects of magnetici field and radioactive heat elements. The final compositional anomalies take the form of isolated piles for both initial conditions. The effect of ohmic dissipation and radioactive elements in the core is expected to be to a smaller inner core compared to the no magnetic field scenario. Detailed findings will be presented.

U41A-08 0945h

Dynamically Causes and Consequences of an Ultralow Viscosity Zone

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The Core-Mantle-Boundary may be viewed in a first order approach as the thermal boundary layer of the convecting lower mantle. Many studies have, however, indicated structures which deviate from those, as expected from a 'simple' thermal boundary layer. Chemically induced density differences have been assumed to explain the various phenomena , ranging from observed topography of the Core-Mantle-Boundary to the existence of a zone characterized by an ultra-low viscosity. Chemically induced contributions to both, density and viscosity can basically arise by either a recharge of the material at the CMB through subducting slabs or through interactions of the mantle and the core leading to a material exchange between both systems. I a series of two- and three-dimensional numerical experiments, possible dynamical causes of an ultra-low viscosity zone were investigated. Especially the case of a chemically dense layer, resulting from interactions with the core, together with viscosity depending on temperature and composition is explored. This configurations leads to the existence of a layer of low viscosity on top of the Core-Mantle-Boundary. Further the influence of radioactive elements, depth dependence of the thermal expansion coefficient and also of pressure dependence of the viscosity, on the stability and on the temporal evolution of this ultra-low viscosity layer has been studied.

U41B MCC: Level 1 Thursday 0830h

New Advances in Data and Service Access for Support of Science Research and Decision Support Posters

Presiding: **R Pfister,** NASA Goddard Space Flight Center**; R Ullman,** NASA Goddard Space Flight Center

U41B-0001 0830h POSTER

Bringing Selected MODIS Vegetation Indices Over to an Open GIS Consortium Web Map Server Environment

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Over the past few years, the Open GIS Consortium, OGC, has been building specifications to enable open data use across platforms and software packages. The OGC specifications have reached a maturity level that enables an alternative means for distributing satellite remotely sensed data acquired by NASA's Earth Observing System, EOS, particularly data products from the Moderate Resolution Imaging Spectroradiometer, MODIS. A spatially-seamless, time-series dataset of the MODIS vegetation normalized difference vegetation index, NDVI, covering the conterminous United States was made accessible through a world-wide-web interface to enable exploratory data visualization. User-specified spatial and/or temporal subsets of these data may be retrieved electronically as map graphics.
The standard NDVI data are a 1 km grid product in the Sinusoidal projection that is organized as a set of non-overlapping tiles, 10° latitude by 10° longitude, consisting of a composite of observations for a 16-day period. To facilitate user-specified map compositions, or data extractions of the standard NDVI products, required several preprocessing steps including data mosaicking, data reprojection and resampling, and metadata compilation. Once the MODIS NDVI were compiled into a seamless mosaicked dataset and hosted on an OGC compliant data server, the data became accessible through web-based mapping services and applications.
By hosting the MODIS NDVI data over on an OGC compliant data server, the accessibility and usability of the data through a wider variety of users' applications became possible. This not only enables the use of all the OGC tool sets, but also enables greater flexibility for data visualizations and map rendering, independent of the end-users' system and software packages. Different data sets from any number of sources are automatically co-registered, independent of the initial map projections of the originating datasets. The net results are faster and more efficient web-based access to data spanning different sources, spatial scales, and time periods.

U41B-0002 0830h POSTER

Integrating NASA Earth Science Enterprise (ESE) Data Into Global Agricultural Decision Support Systems

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Monitoring global agricultural crop conditions during the growing season and estimating potential seasonal production are critically important for market development of U.S. agricultural products and for global food security. Two major operational users of satellite remote sensing for global crop monitoring are the USDA Foreign Agricultural Service (FAS) and the U.N. World Food Programme (WFP). The primary goal of FAS is to improve foreign market access for U.S. agricultural products. The WFP uses food to meet emergency needs and to support economic and social development. Both use global agricultural decision support systems that can integrate and synthesize a variety of data sources to provide accurate and timely information on global crop conditions. The Goddard Space Flight Center Earth Sciences Distributed Active Archive Center (GES DAAC) has begun a project to provide operational solutions to FAS and WFP, by fully leveraging results from previous work, as well as from existing capabilities of the users. The GES DAAC has effectively used its recently developed prototype TRMM Online Visualization and Analysis System (TOVAS) to provide ESE data and information to the WFP for its agricultural drought monitoring efforts. This prototype system will be evolved into an Agricultural Information System (AIS), which will operationally provide ESE and other data products (e.g., rainfall, land productivity) and services, to be integrated into and thus enhance the existing GIS-based, decision support systems of FAS and WFP. Agriculture-oriented, ESE data products (e.g., MODIS-based, crop condition assessment product; TRMM derived, drought index product) will be input to a crop growth model in collaboration with the USDA Agricultural Research Service, to generate crop condition and yield prediction maps. The AIS will have the capability for remotely accessing distributed data, by being compliant with community-based interoperability standards, enabling easy access to agriculture-related products from other data producers. The AIS? system approach will provide a generic mechanism for easily incorporating new products and making them accessible to users.

U41B-0003 0830h POSTER

Merging Air Quality and Public Health Decision Support Systems

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The New Mexico Air Quality Mapper (NMAQM) is a Web-based, open source GIS prototype application that Earth Data Analysis Center is developing under a NASA Cooperative Agreement. NMAQM enhances and extends existing data and imagery delivery systems with an existing Public Health system called the Rapid Syndrome Validation Project (RSVP). RSVP is a decision support system operating in several medical and public health arenas. It is evolving to ingest remote sensing data as input to provide early warning of human health threats, especially those related to anthropogenic atmospheric pollutants and airborne pathogens. The NMAQM project applies measurements of these atmospheric pollutants, derived from both remotely sensed data as well as from in-situ air quality networks, to both forecasting and retrospective analyses that influence human respiratory health. NMAQM provides a user-friendly interface for visualizing and interpreting environmentally-linked epidemiological phenomena. The results, and the systems made to provide the information, will be applicable not only to decision-makers in the public health realm, but also to air quality organizations, demographers, community planners, and other professionals in information technology, and social and engineering sciences. As an accessible and interactive mapping and analysis application, it allows environment and health personnel to study historic data for hypothesis generation and trend analysis, and then, potentially, to predict air quality conditions from daily data acquisitions. Additional spin off benefits to such users include the identification of gaps in the distribution of in-situ monitoring stations, the dissemination of air quality data to the public, and the discrimination of local vs. more regional sources of air pollutants that may bear on decisions relating to public health and public policy.

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Web Service-based Interoperable Geospatial Modeling for Earth Science Research and Decision Supporting

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It is estimated that more than 80 percent of data that human beings have collected so far are the geospatial data. In order for the geospatial data to be useful, information has to be extracted from the data and converted to knowledge. However, currently it is very difficult for users to obtain the geospatial data and to turn them into useful information and knowledge for scientific research and decision support. This paper presents a standard-based web service framework that enables the interactive construction and running of interoperable geospatial models over the web. The models and their components can be reused in construction of other geospatial models and are sharable with peers. The framework is built on the top of the common data environment provided by Open GIS Consortium (OGC) Web Coverage Service (WCS), Web Feature Service (WFS), and Web Registries Service (WRS) Specifications, so that the models can access petabytes of geospatial data without worrying about details of the data formations and data preprocessing. The full implementation of the framework will allow anyone equipped with an Internet-connected PC to conduct large-scale projects on Earth science research and applications with great easiness. This paper also discusses a prototype system that implements the framework.

URL: http://laits.gmu.edu

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NASA's Global Change Master Directory: It's not just data any more.

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NASA's Global Change Master Directory (GCMD) is best known for its offerings of Earth science data set descriptions. However, over the last two years, the GCMD has added descriptions of Earth science tools, resources, and services to the database for users to search and retrieve information. These tools are used in analyzing, processing and evaluating Earth science data sets. Users can search for tools from the following categories: data analysis and visualization, data handling, hazards management, metadata handling, models, Earth science educational resources, environmental advisory services, and information services. Through the GCMD, users are provided a direct link to these tools and services from the data set descriptions, and, where possible, a link to data sets that can be utilized with the tools. The GCMD services database is available from the GCMD homepage, http://gcmd.nasa.gov.

URL: http://gcmd.nasa.gov