JUL 12

Schwarzenegger Blasts Bush

climate change, global change, policy No Comments »

Governor Schwarzenegger came down hard on the Bush administration's record on global warming in an interview with George Stephanopoulos that is scheduled to air this Sunday on ABC's "This Week."

> "This administration did not believe in global warming, they just didn't believe in it or they didn't believe that they should do anything about it, since China is not doing anything about it and since India is not willing."
>
> "We don't wait for other countries to do the same thing. That's what makes America number one."
>
> "I'm very happy that California is in the forefront," he said. "We are very aggressive. We have made a commitment to roll back our greenhouse gas emissions to the 1990 level … We didn't wait for Washington."

Read more on this ABC blog.

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JUL 11

What is the role of GIS and GPS in renewable energy development?

Perspectives, energy 1 Comment »

This column is sponsored by **ESRI**

Wherever new infrastructure investments take place, there's a strong need for geospatial technologies to plan, construct and monitor new developments. When it comes to renewable energy, the contribution of geospatial technologies is essential. Renewable energies derive power from earth systems, and GIS coupled with GPS is uniquely positioned to analyze and monitor these processes to make certain that renewable power generation sites are optimally sited, and that the power that is generated is delivered efficiently.

There's a movement afoot to turn to renewable energy as the economic and security repercussions of peak oil are realized. The maximum rate of global petroleum extraction has been reached, and there is an accelerating global competition for this finite resource. Renewable energy has the capacity to cushion the economic repercussions of this looming crisis, and can do so with fewer environmental impacts.

The lower cost and more reliable sources of renewable energy are driving investments, but the environmental benefits are also a key consideration. With climate change increasingly impacting populations worldwide, renewable energies have a lighter carbon footprint and are a key element to reversing global warming. Increasingly, governments are turning to taxing businesses for their carbon outputs, as these new taxes take hold there will be a mass move to offset carbon emissions by turning to cleaner energy.

Determining Optimal Sites

GIS technology is the best tool to analyze and communicate optimal renewable energy sites. GIS provides the means to convert long-term weather observations of wind and sun to a map view, returning calibrated maps that show the best sites for renewable power generation investments.

Wind mapping is done on many different scales with different instruments. On a global scale, wind readings are determined from space by NASA's QuikSCAT satellite. In the United States, the U.S. Department of Energy provides wind resource maps at both a national and state level. These maps assist in determining if the wind resources in your location are adequate to support a wind turbine or wind farm. The National Renewable Energy Laboratory provides a document as backup to their maps to illustrate how the maps were created and validated. Be sure to read, "Geographic Information Systems in Support of Wind Energy Activities at NREL (PDF)," in order to gain a broader understanding of the role of GIS in wind observations.

Solar mapping at a global scale was undertaken by NASA for the Group on Earth Observations, but I wasn't able to find an online repository for this work. The National Renewable Energy Laboratory has a wealth of solar mapping tools, including GIS data and analysis tools. There are also localized solar mapping sites, such as the San Francisco Solar Map, which is a partnership between SF Environment and CH2M Hill. Each of these examples illustrates the interest and importance of mapping solar availability, yet since solar panels are still quite expensive, government incentives are proving to be much more of a driver for individual use rather than the potential to generate energy.

While the above maps for wind and solar power are largely aggregate maps to show the best average readings over time, there are dynamic maps that chart and follow these ever-changing variables over time. There are other renewable energies that can be mapped, such as hydro, geothermal and biomass, and they're all cataloged on the this National Atlas page. There are also geographic considerations outside of simply the location for optimal power, such as population proximity to the energy source and the existence of infrastructure to transport the power.

Efficient Delivery and Use

The U.S. power infrastructure is in need of reform and refurbishment in order to increase efficiency and reduce wasted energy in the transmission process. A smart electric transmission grid is one promising technology. With a smart grid, the network is tied to smart meters that allow interactive connectivity for shutting down sections of the grid or individual sites if great demand occurs. In addition, the response of the grid can become automated for faster and more accurate response to changing conditions.

GIS technology play a key role in the smart grid strategy by first analyzing grid use and demand, and then aiding in the automation of grid response. Smart meters also allow for energy pricing based on time of use, which can reduce individual bills and cut peak demand. Smart meters allow utilities to spot outages, read usage, and connect and disconnect customers. In addition, the need for meter readers goes away, saving considerable manpower costs. A move is also underway by manufacturers to create smart appliances (dishwashers, dryers, refrigerators) that communicate with the smart meter to optimize energy savings.

Renewable energy options are abundant, but the performance of the various renewable energy options are variable based on location. This fact, coupled by the fact that populations may not be proximate to the source, means that geospatial analysis is needed to find the best fit for each community. Geospatial technologies are essential to the renewable energy decision making process, and ongoing and increasingly better observations about these energy sources will continue to improve the quality of the analysis and hence the performance

of the power plants.

The move to renewable power is definitely on. One of the more striking examples of this is the massive investment that legendary Texas oil man T. Boone Pickens is making in wind power in the United States. Visit this site for details on the Pickens Plan, and be sure to view the video for discussions on geopolitical ramifications of our dependency on foreign oil.

Read what Jeff Thurston has to say on this subject here.

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JUL 10

The Pickens Plan

energy, green, sustainability 1 Comment »

Legendary Texas oil man T. Boone Pickens is fully embracing renewable energy, and investing a great deal of money in what will be the world's largest wind farm. The wind farm outside Pampa, Texas will place 2,000 turbines on more than 200,000 acres to generate 4,000 megawatts at a cost of $6 billion. Pickens is not only out to capitalize on renewable energy, he's out to change how American's get their energy.

The Pickens Plan involves harnessing renewable energy to replace natural gas as a source of power for electricity transmission. He would then take the natural gas and use it as a fuel for transportation. The impetus for this dramatic move is that the United States now imports 70% of its oil at a cost of $700 Billion a year, which is far too expensive to be sustainable.

While the United States is generally devoid of oil, we have a vast resource of natural gas. Turning to natural gas would exploit a domestic resource, with far less overhead costs than oil transportation today. Natural gas is much less expensive than oil, and it burns much cleaner.

Be sure to watch one of the videos on the Pickens Plan website. I was particularly impressed with the C-SPAN clip from testimony that Pickens gave to congress. In all presentations, Pickens shows maps to illustrate the strategic value of wind power.

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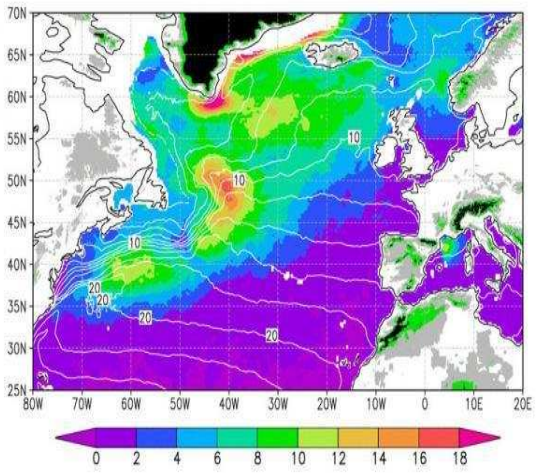
Wind Energy Could Provide 15 Percent of World's Needs

energy, spatial analysis, water 1 Comment »



Wind energy has the potential to provide 10 to 15 percent of future world energy requirements, according to Paul Dimotakis, chief technologist at NASA's Jet Propulsion Lab (JPL). JPL hosts a team of scientists that analyze global wind data generated from NASA's QuikSCAT satellite, and produce global wind power maps.

QuikSCAT, launched in 1999, tracks the speed, direction and power of winds near the ocean surface. Data from QuikSCAT, collected continuously by a specialized microwave radar instrument named SeaWinds, also are used to predict storms and enhance the accuracy of weather forecasts.

If ocean areas with high winds were tapped for wind energy, they could potentially generate 500 to 800 watts of energy per square meter. This is slightly less than solar energy (which generates about one kilowatt of energy per square meter), but wind power can be converted to electricity more efficiently and at a lower cost per watt of electricity produced.

Winds are generally stronger over open ocean than on land, and technologies have been developed to create floating wind farms. Ocean wind farms have less environmental impact, and winds are generally stronger over the ocean due to less friction to slow the wind down.

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JUL 10

Winners Announced for Imagine Cup

education, environmental monitoring No Comments »

Microsoft gathered 120 teams of students from 61 countries in Paris, France this week for the finals of theirImagine Cup, which urged students to use Microsoft technology to come up with environmental solutions.

The Australian Smart Operational Agriculture Toolkit (SOAK) took the top prize in software design. SOAK is a prototype network of solar-powered sensors designed to control water use on a farm by monitoring and regulating soil moisture levels based on temperature readings, including visualization on Virtual Earth.

Such monitoring systems already exist in the marketplace, but are cost prohibitive for most farmers. The team emphasized a dramatic cost reduction for the sensors, and

Hewlett-Packard has expressed interest in helping to manufacture and market the system.

Winners were also announced in other categories, with a Singapore team taking the prize for Embedded Development, a Brazil team won for Game Development, a Russian team won the Programming Battle, and a team from the United States won for Interface Design

Read about the winning projects and other category winners here. The 2009 Imagine Cup is already accepting applications, and is set to culminate in Egypt next year.

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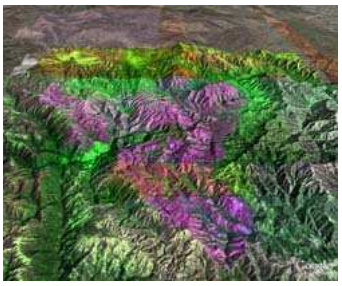
NASA's New Thermal Imaging Sensor Maps California Fires

environmental monitoring, geovisualization, imagery, sensor web No Comments »



The MIT Technology Review has a feature with images taken by NASA's unmanned aerial vehicle Ikhana equipped with a new thermal-imaging sensor. The sensor has a broad thermal range that helps to track the fires and better map the hot spots, slicing through thick smoke to reveal fire intensity. The detailed heat maps let firefighters determine where the fire is heating up or cooling down, aiding the deployment of resources.

The above image is from the Lick Fire of September 2007. The latest images in the Technology Review feature are much more detailed.

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JUL 09

Clemson Builds Digital Watershed Cyber Infrastructure

environmental monitoring, sensor web, sustainability No Comments »

Clemson University was recognized this week as a Center of Excellence for Watershed Management by the U.S. Environmental Protection Agency. The center is part of the university's Restoration Institute, and is "taking a broader approach to managing water resources by looking at watersheds more holistically." A key tool in this effort is a cyber infrastructure-based digital watershed.

The university awarded the center a $1.5 million grant to develop the cyber infrastructure and sensor network and to demonstrate the platform to monitor and report on four different projects.

- Real-time monitoring of 215 miles of the Savannah River watershed
- A low-impact development project in Georgetown County that is part of the Program of Integrated Study for Coastal Environmental Sustainability
- A watershed project at Lake Issaqueena in the Clemson Forest in Pickens County
- A segment of the Saluda River Watershed in Greenville County that is part of the Changing Land Use and the Environment program

"Having real-time data to monitor environmental characteristics — water quality, storm-water runoff, even tree growth — from any Internet access point can improve watershed management," said Gene Eidson, director of Clemson Restoration Institute's ecology program. "This system of remote sensors will provide real-time information to the public, scientists and professional environmental managers. The system will provide hands-on practical information to help promote objective, science-based discussions about economic growth and the environment."

For more information on the Center for Watershed Excellence at Clemson University: www.clemson.edu/restoration/ecology/.

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JUL 09

California Maps Free Lunch for Kids

community, mapmaking No Comments »

The Los Angeles Times details an interactive map that helps families find locations for free lunch. School kids eligible for free food during the school year can also pick up a free lunch at more than 3,200 sites.

I like the idea of communicating the locations via a map, but I question whether the targeted constituents of this program would have access to the Internet in order to find the locations of these sites. The reality of the digital divide really hits home when it comes to this type of outreach.

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JUL 08

Groundshaking Interoperability News Spurred by Move to BIM

GIS/CAD Divide, convergence, infrastructure, spatial data, sustainability, tools 1 Comment »

Autodesk and Bentley held a joint press conference today to announce an agreement that will expand interoperability between their various products. The plan calls for a sharing of software libraries so that each will have the ability to read and write respective DWG and DGN formats. The companies also plan to facilitate better workflows through each other's products with reciprocal use of Application Programming Interfaces (APIs). The aim is for broader reuse of information throughout the design, construction and operation of buildings and infrastructure.

As to the timing of the move, both companies acknowledged that the rapid evolution of the AEC workflow toward globalized project teams has necessitated better interoperability, as has the move toward a BIM design environment. Greg Bentley commented that BIM is not a format, but a process that adds intelligence to the model throughout the design, build and operate cycles and this agreement stands to ensure reliable and consistent data throughout the BIM process.

There was mention of the 2004 study by the U.S. National Institute of Standards and Technology that found that users bear direct costs of almost $16 billion annually from time wasted due to inadequate AEC software interoperability. Greg Bentley pointed out that this report doesn't address the opportunity cost that is even larger.

"At Bentley, our 3,000 colleagues are wholly dedicated to sustaining infrastructure, which we define as everything we build to sustain our planet," said Bentley. "The global requirement for that has never loomed so large–infrastructure safety and security, resource efficient economic development, energy self sufficiency, environmental resilience, and so forth. The stakes are higher than ever and the economic benefits are higher than ever."

There was an acknowledgment of project backlogs due to a reduction in trained personnel and the current software bottlenecks due to a lack of interoperability. Firms are addressing backlogs with increasingly distributed teams, and the aim of these software vendors is to reduce the bottleneck so that the firms can recover time wasted because AEC information hasn't flowed between project teams and processes.

"Autodesk shares a vision for the industry where technology never distracts, but instead facilitates, architects, engineers, builders, owners and government agencies to work seamlessly together, and this announcement facilitates that vision," said Jay Bhatt, senior vice president, Autodesk AEC Solutions. "We recognize that customers work in a mix of Autodesk and Bentley products to meet deliverable and project workflow requirements, and often too much time spent converting and massaging data between DWG and DGN formats. The agreement will help us better support the firms so that they can spend more time on higher value work."

Among the things that will become possible now that weren't available before:

- Native code from both Autodesk and Bentley, each desktop can read and write DGN and DWG.
- Full and trusted comprehension of the formats because each product contains the library of the others format.
- Realtime workflow interoperability between product sets through the use of each others APIs.

The benefits at the project level are reuse of information at various stages of the project, with resources freed up to produce better work. The move to interoperability is seen as an opportunity for both companies to sell more products, with users gaining a wider choice of software tools without having to worry about compatibility with delivery formats.

Bentley has become Autodesk's largest development partner, largely through acquisition, and a portion of this development can be attributed to an increasing need for the companies to work together to support existing products. The broader development community stands to benefit some from this announcement, because the increased interoperability between the products enhances workflows and could lead to more solutions-oriented packaging.

On hand throughout the call were Norbert Young, president of McGraw-Hill Construction and former chairman of the International Alliance for Interoperability in North America and Patrick MacLeamy, CEO of global architectural firm HOK and a founder and current chairman of the International Alliance for Interoperability. Both companies expressed a gratitude to both gentlemen and their organizations for leadership and vision to help spur this interoperability effort.

The move to BIM necessitates an environment and ecosystem of information exchange and collaboration that ultimately will result in real-time workflows for better decision support. Open standards may eventually grow to help address BIM interoperability issues broader than just data exchange between these proprietary formats. With this announcement, it becomes feasible for those that use these two vendor's products to create better workflows and design decisions, and we all stand to benefit.

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JUL 08

Giant Leap for the Metaverse

digital earth, virtual world No Comments »

Linden Labs and IBM have been working for some time on virtual world interoperability and announced today that they successfully teleported avatars from the Second Life Preview Grid into a virtual world running on an OpenSim server. Allowing avatars to move freely through different virtual worlds is a key step to the creation of the metaverse.

Teleporting was made possible by using an open standard for virtual world interoperability based on the Open Grid Protocol. Linden Lab, makers of Second Life, see interoperability between worlds as essential for them to reach their full potential.

The standardization of interoperability protocols for virtual worlds likely has implications for a collaborative Digital Earth environment.

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