Global Earth Observation System Will Revolutionize Our Understanding Of How Earth Works

Over the next decade, a global Earth Observation System will revolutionize our understanding of the Earth and how it works. With benefits as broad as the planet itself, this U.S.-led initiative promises to make people and economies around the globe healthier, safer and better equipped to manage basic daily needs. The aim is to make 21st century technology as interrelated as the planet it observes, predicts and protects, providing the science on which sound policy and decision-making must be built.

Building an integrated, comprehensive and sustained global Earth Observation System opens a world of possibilities. Imagine a world in which we could:

- Forecast next winter's weather months in advance
- Predict where and when malaria, West Nile virus, SARS and other diseases are likely to strike
- Reduce U.S. energy costs by a potential $1 billion yearly
- More effectively monitor forest fires and predict the effect of air quality on sensitive populations in near real-time
- Provide farmers with immediate forecasts essential to maximizing crops yields
- Predict the pattern of the North American monsoon -- Arizona derives two-thirds of its water from the monsoon weather pattern

Global architecture that reflects how our world actually works is key to making such visions operational.

Challenge Is To Connect The Scientific Dots

Right now many thousands of individual pieces of technology are gathering earth observations around the globe. They are demonstrating their value in estimating crop yields, monitoring water and air quality, and improving airline safety. U.S. farmers gain about $15 of value for each $1 spent on weather forecasting. Benefits to U.S. agriculture from altering planting decisions are estimated at over $250 million. The annual economic return to the U.S. of NOAA's El Nino ocean observing and forecast system is between 13% and 26%.

But while there are thousands of moored and free floating data buoys in the world's oceans, thousands of land-based environmental stations, and over 50 environmental satellites orbiting the globe, all providing millions of data sets, most of these technologies do not yet talk to each other. Until they do – and all of the individual technology is connected as one comprehensive system of systems -- there will always be blind spots and scientific uncertainty. Just as a doctor can't diagnose health by taking just one measurement, neither can scientists really know what's happening on our planet without taking earth's pulse everywhere it beats -- which is all over the globe.

The challenge is to connect the scientific dots – to build a system of systems that will yield the science on which sound policy must be built.

U.S. and Global Plans

The U.S. is spearheading such a system, in our country and around the world. As a collaborative effort, 15 federal agencies and three White House offices developed a *Strategic Plan for the U.S. Integrated Earth Observation System*. The draft plan was released on September 8 and, after public review, the final plan was released on April 18, 2005 by the White House Office of Scientific and Technology Policy Director, Dr. John Marburger.

On a parallel track, the U.S. was instrumental in the development of an implementation plan for the Global Earth Observation System of Systems (GEOSS), of which the U.S. plan is a key contribution. Launched at the first-ever global Earth Observation Summit, held on July 31, 2003 in Washington, D.C., development of the pioneering system is now supported by nearly 60 countries, the European Commission, and close to 40 international organizations. The framework of a 10-year implementation plan for GEOSS was agreed to at the second global Earth Observation Summit, held on April 25, 2004 in Tokyo. Ministers adopted the plan at the third global Earth Observation Summit held on February 16, 2005 in Brussels.

With the adoption of the 10-year implementation plan for the Global Earth Observations System of Systems, ministers replaced the *ad hoc* Group on Earth Observations (GEO) with a new, more formally established GEO. The inaugural meeting of this new, intergovernmental GEO was held on May 3-5, 2005 in Geneva.

With four international co-chairs, the Group on Earth Observations (GEO) is now helping to advance the development of the global system. The co-chairs are: Vice Admiral USN (Ret.) Conrad C. Lautenbacher, Jr., Under Secretary of Commerce for Oceans and Atmosphere and Administrator of the National Oceanic and Atmospheric Administration (NOAA); Mr. Achilleas Mitsos, Director General for Research, European Commission; China (not yet announced); and Dr. Rob Adam, Director-General of Science and Technology, South Africa. South Africa and China co-chair on behalf of the developing world, reflecting the vital importance of developing nations to the success of the global system.

Nine Societal Benefits

In the U.S. and globally, the emerging system will focus on nine societal benefit areas:

- Improve Weather Forecasting
- Reduce Loss of Life and Property from Disasters
- Protect and Monitor Our Ocean Resource
- Understand, Assess, Predict, Mitigate and Adapt to Climate Variability and Change
- Support Sustainable Agriculture and Forestry and Combat Land Degradation
- Understand the Effect of Environmental Factors on Human Health and Well-Being
- Develop the Capacity to Make Ecological Forecasts
- Protect and Monitor Water Resources
- Monitor and Manage Energy Resources

The benefits of building global observing architecture are enormous.

Substantial Socio-Economic Payoffs

- We could more accurately know how severe next winter's weather, with strong implications for emergency managers, transportation, energy and medically personnel, farmers, families, manufacturers, storeowners, etc., etc. Weather and climate sensitive industries account for one-third of the nation's GDP, or $3 trillion.

- We could forecast weather with just one degree F more accuracy, saving at least $1 billion annually in U.S. electricity costs.

- With coastal storms reflecting 71 percent, or $7 billion, of U.S. disaster losses every year, improved forecasting will have a major favorable impact on preparedness.

- In the U.S., at a cost of $4 billion annually, weather is responsible for about two-thirds of aviation delays -- $1.7 billion of which would be avoidable with better observations and forecasts.

- Benefits from more effective air quality monitoring could provide real-time information as well as accurate forecasts that, days in advance, could enable us to mitigate the effects of poor quality through proper transportation and energy use.

- Benefits from ocean instrumentation that, combined with improved satellite Earth observing coverage, could provide revolutionary decadal worldwide and regional climate forecasts, enabling us, for example, to predict years of drought.

- Benefits from real-time monitoring and forecasting of the water quality in every watershed and accompanying coastal areas could provide agricultural interests with immediate feedback and forecasts of the correct amount of fertilizers and pesticides to apply to maximize crop generation at minimum cost, helping to support both healthy eco-systems and greatly increased U.S. fishery output and value from coastal tourism.

- Globally, an estimated 300-500 million people worldwide are infected with malaria each year and about one million die from this largely preventable disease -- with a linked international system, we could pinpoint where the next outbreak of SARS or West Nile virus, or malaria is likely to hit

http://earthobservations.org Global Earth Observation System

http://iwgeo.ssc.nasa.gov U.S. Integrated Earth Observation System

http://www.epa.gov/geoss/whereyoulive.html benefits cited for 50 states, D.C., tribal nations

www.economics.noaa.gov national economic statistics