

## AMS ANNUAL MEETING IN 2012: NEW ORLEANS

### *Technology in Research and Operations – How We Got Here and Where We’re Going*

#### Précis

With the 1951 delivery of UNIVAC I, arguably the first government “supercomputer,” and the 1960 launch of TIROS I, the first weather satellite, the stage was set for a revolution in meteorology—later in oceanography, geography, space weather, land-observing, and climate. This technology-driven revolution now encompasses the full spectrum of our professional society’s physical and social sciences, including climate modeling and prediction, atmospheric chemistry, carbon, water, biogeosciences, and even energy management. As a direct consequence of this revolution, the era of extremely limited observational capabilities ended and hand-drawn and analyzed weather charts were replaced by objective numerical analyses and forecasts. We have seen ever-more sophisticated numerical modeling and assimilation, and exponentially increasing computing capacity that can never satisfy an insatiable demand. Increasingly interoperable data and information systems are facilitating national and international collaboration towards a system of systems. And we are using charge-coupled devices to catch photons and acoustic devices to sense sound waves to turn observations into environmental data products to initialize these models. These and countless other technological advances have provided, and continue to provide, powerful tools to geophysical and heliophysical research scientists and operational forecasters. And the pace of this revolution is increasing exponentially. Some key areas of rapid development include:

- Surface, airborne, and space-based platforms and sensors
- Coordinated international formations of Earth-observing satellites
- GPS-tracked radiosondes, buoys, and other devices
- Autonomous airborne and undersea vehicles
- Massive-capacity supercomputing and modeling
- Improved modeling and simulation through computationally intelligent techniques
- Geoinformatics (or Data services), including data access, analysis, visualization (including 4-D) and management
- High speed networks
- Use of artificial intelligence and data mining techniques to understand to understand to understand the increasingly large amount of data available
- Systems of systems and enterprise architectures
- Impact-based socio-economic decision-support systems
- Decision support systems based on open-source service oriented architectures
- Delivery of sophisticated information directly to individuals

The AMS Annual Meeting has provided a showcase for the advances in technology ever since this revolution began 60+ years ago. A walk through the Exhibition Hall of any of our recent meetings would have made this perfectly clear. These exhibits have been paralleled with presented papers, or entire sessions, which reveal the depth and breadth of technology’s impact across the physical sciences and society. Advances in observations, both *in situ* and remotely-sensed; high-capacity computing, modeling, and simulation; information visualization; and the whole spectrum of technology development are providing ever more sophisticated tools. The end result is the delivery of increasingly accurate and timely operational decision support products and services and powerful tools for climate research, all with major benefits to the Nation’s economy security, environmental vitality, and society.

The central theme of the 2012 Annual Meeting will be technology and its profound impact on research, operations, the business of our environmental sciences, and the public. These advancements in environmental awareness and knowledge have greatly lowered the human suffering and loss of life in the

United States and around the world from the deadly and costly effects of extreme weather and ecological disasters. This meeting, appropriately scheduled for the Crescent City of New Orleans which has lived through the traumas of Katrina and Deepwater Horizon's oil spill, isn't intended to be "technology worship." Rather, it will focus on past, current, and future advances which should be of wide interest and value to our AMS members. Also to be considered by our members in discussion of these topics should be the link between the advancing of complex technologies and improving confidence in the end parameters and their linking across scales and processes, such as represented in hurricane prediction. And this is always of great interest for discussion in New Orleans.

While we are only in preliminary planning, the Presidential Forum could take the form of an opening plenary session with three prominent speakers: (1) an historian to provide a retrospective look at the innovations and success stories that have enabled the effectiveness of our community, (2) a technologist to provide a snapshot of what's happening today, and (3) a futurist to challenge our imaginations to conceive of developments (and challenges) that will stun us. The Planning Committee will work with the various themed conference coordinators to find ways to feature the Annual Meeting's theme in creative ways throughout the conference.