

The View from SWPC: Utilizing the Diversity of the Commercial Space Weather Industry

Space Weather Workshop

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Boulder, CO

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Evolving Needs for Space Weather Services

Evolving technologies:

- Precision Global Navigation Satellite Systems
 - Power Grids
- Satellites (private and government)
 - UAVs

Evolving customers and industries

- Arctic economic development
- Airspace management needs
 - Emergency Management
- Commercial space enterprise
 - Precision farming



The Dawn of a New Era – Commercial Human Space Flight

NEWS



10.01.14
VIRGIN GALACTIC REACHES NEW HEIGHTS IN THIRD SUPERSONIC TEST FLIGHT



Commercial Space Transportation Sub-orbital, then orbital, flights need space weather



FIRST PRIVATE SPACECRAFT TO THE SPACE STATION

DRAGON

BJ GELOW
AEROSPACE sm



NEXT GENERATION COMMERCIAL SPACE STATIONS

Air Transport of the Future

Improving the International Airspace System

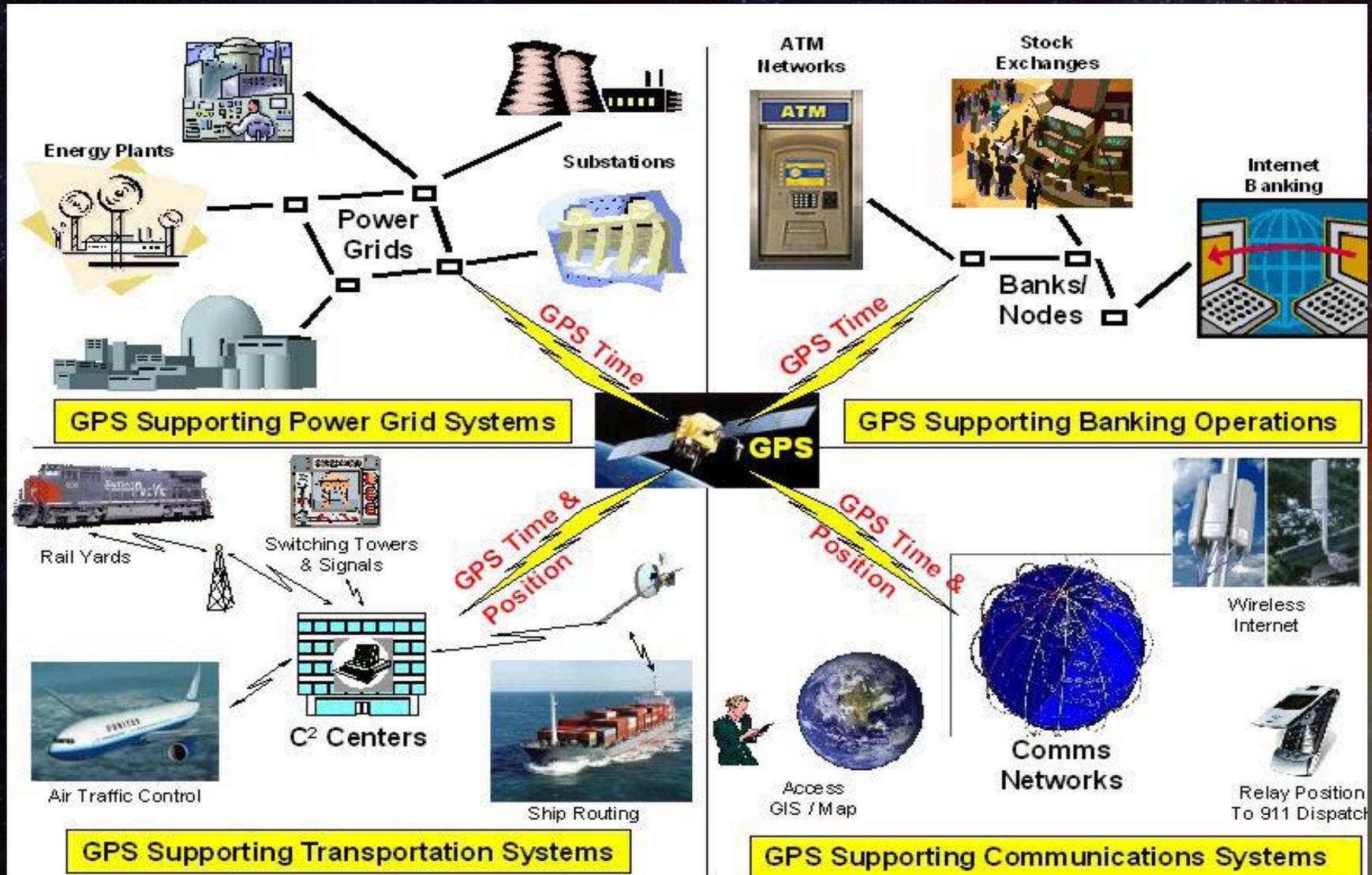
- More Efficiency
- More Capacity
- More Profitable



Changing air traffic control system from a ground-based system to a satellite-based system

GPS-based systems in place OR in the process of deployment globally – USA (WAAS), Japan (MSAS), Europe (EGNOS India (GAGAN), and elsewhere.

Civilian GPS Applications Potentially Impacted



Space Weather Forecasts – Space & Ground Observations – Research – Modeling

Evolving Needs Mounting gaps Growing opportunities

What Will the Future Demand of Us?

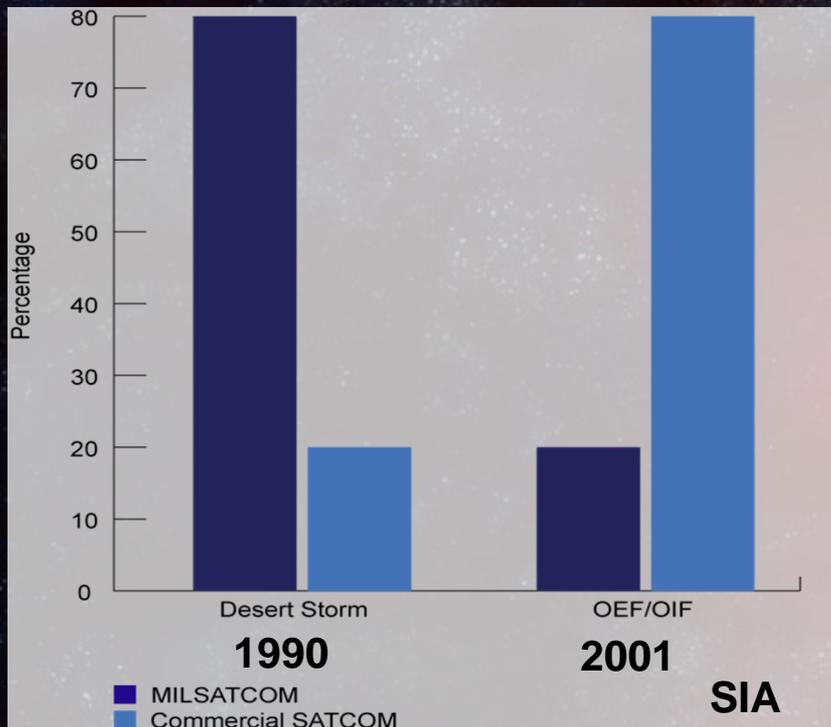


CREDIT: NASA

Commercial Space Activities

The screenshot shows the top navigation bar of the NASA website with the following categories: NEWS (News, features & press releases), MISSIONS (Current, future, past missions & launch dates), MULTIMEDIA (Images, videos, NASA TV & more), and CONNE (Social media, NASA apps). Below the navigation bar, there are two news snippets: 'International Space Station Commercial Space Transportation' and 'NASA Hails Success of Commercial Space Program' with a sub-headline 'Private Space Station Resupply Underway, Plans Readied for Astronauts'.

NASA ISS Support



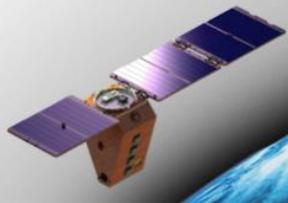
“We are concerned about mission failure,” Antonio Elias, Orbital Sciences chief technical officer



Request for Information on Commercial Sources for Solar Wind Data and Hosted Payloads

Solicitation Number: RFI SolarWind
Agency: Department of Commerce
Office: National Oceanic and Atmospheric Administration
Location: Acquisition and Grants Office

Feb 2014



GPS satellite

LEO satellite

Turning to Commercial Sector - Satellite Services

SUNJAMMER

Solar Sail Opportunity Overview



Cubesats

Multiple research and demonstration missions underway in academia and commercial sector

- One unit being 10 x 10 x 10 cm
- Uniform design so international collaboration easier
- Air Force evaluating feasibility for ops
- Great challenge – how small can we make these things - electrical systems solar cells getting the data down

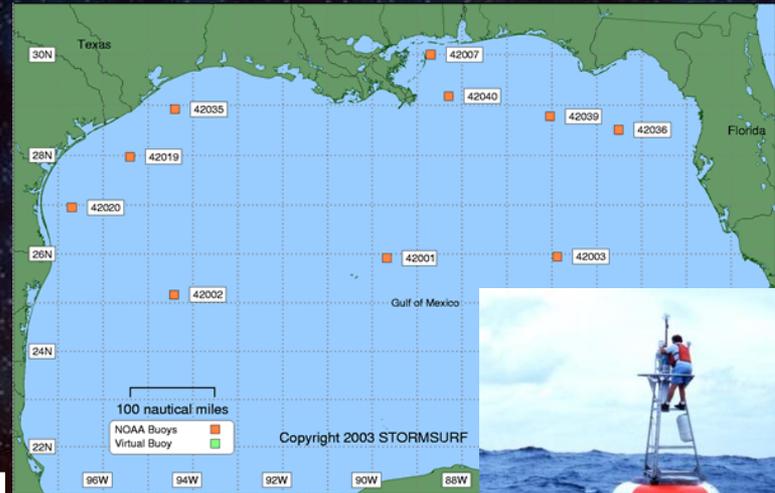


Cubesat being developed by small companies and universities around the world

Ground-based observations

Remote-area sensing

Buoy-based GPS sensing could provide TEC data for global ionospheric modeling



Airborne energetic particle/radiation dose monitoring

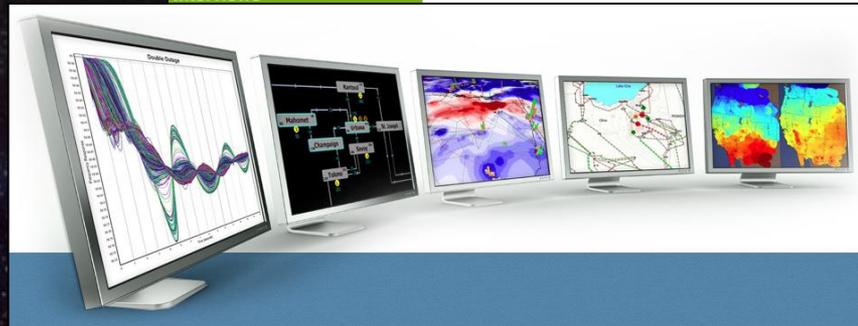


In-situ measurements at aviation altitudes



Power Grid Modeling

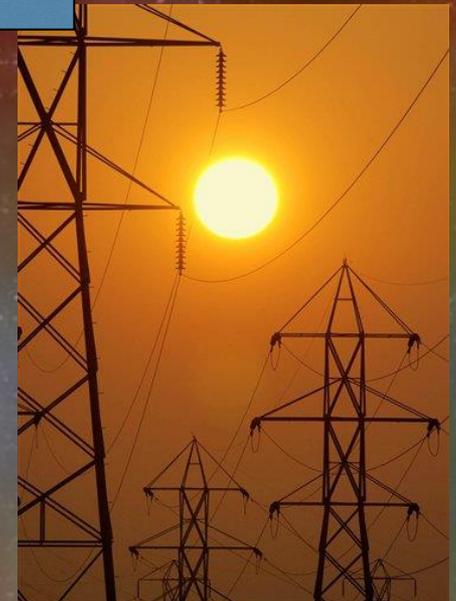
FERC ruling driving innovative solutions by commercial sector



Innovative tools for analyzing the potential impact of geomagnetic disturbances

- Power grid engineers to readily assess GMD risk posed to their systems.

Tailored support for industry



Commercial Sector...

Observations - commercial or government; space-based, ground/ocean-based or airplane-based, all contribute to the evolving needs for products and services. Commercial services can be utilized for:

- Data processing,
- Data analyses,
- Tailored Space Weather nowcasts,
- Tailored Space Weather forecasts
- Modeling

Scientists recognizing gaps, and understanding and seeing opportunities, providing critical value-added to technology breakthroughs

'We didn't invent it...we made it better'

Public – Private Partnerships

Better products and services will:

- Emerge in the science community
- Transition to Operations
- Reach fruition in the Operations Centers
- Serve national and global needs

Questions