

Leveraging Partnerships for the Future of Space Business

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NOAA Assistant Administrator For Weather Services and
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MD Space Business Roundtable
April 17, 2007



T-43



MH-53J



C-20



C-21



C-130



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Presentation Overview

- Growing Space Business Opportunities:

- ✦ *Increased Polar Aviation Routes*

- ✦ *New Commercial Space Industry*

- Finding Solutions:

- ✦ *NOAA's Research to Operations*

- The Future:

- ✦ *Integration of Space Weather Into NWS Services*

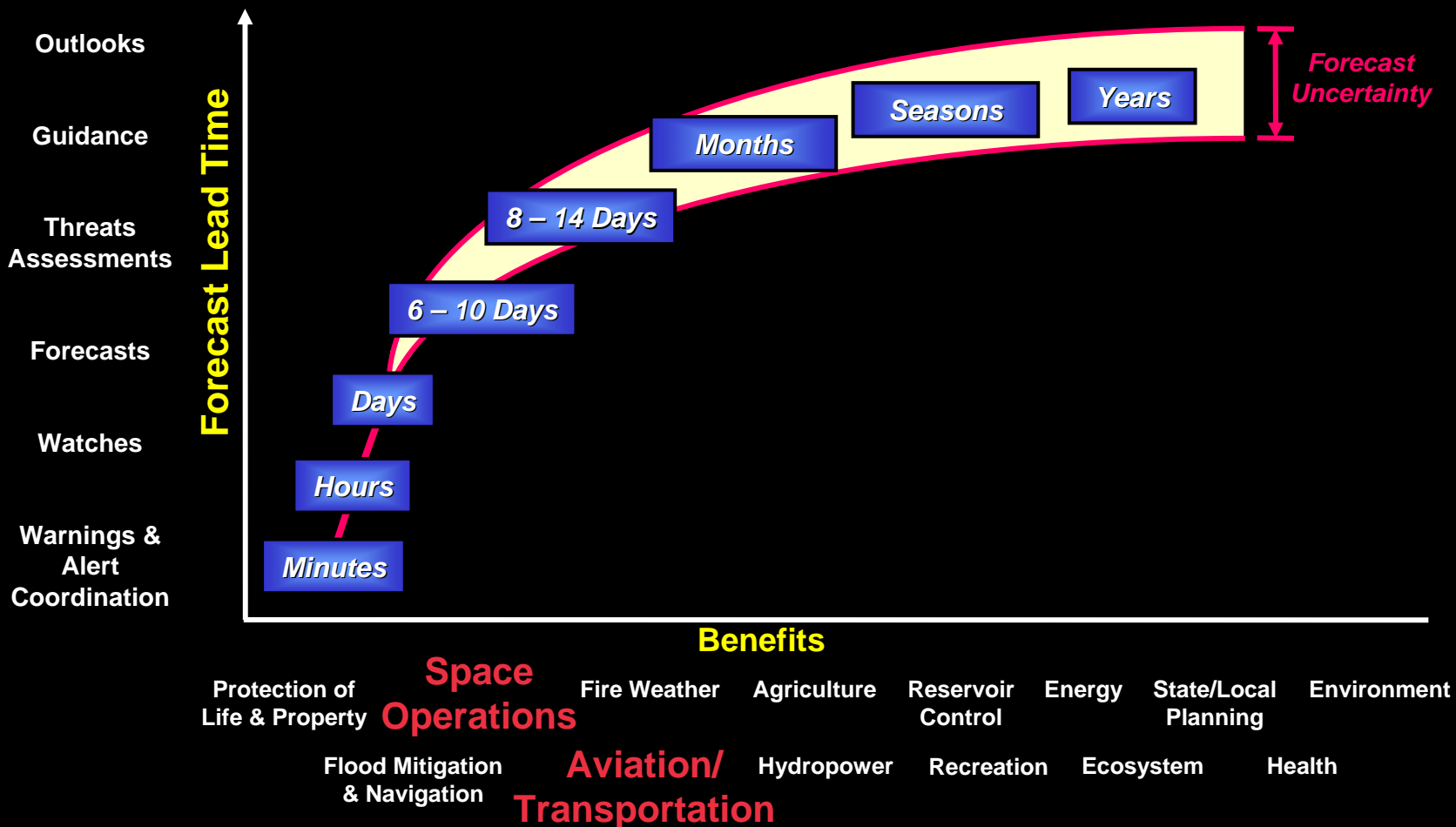
- ✦ *Satellite Continuity and Growth*

- ✦ *Integration of Space Weather Into NGATS*

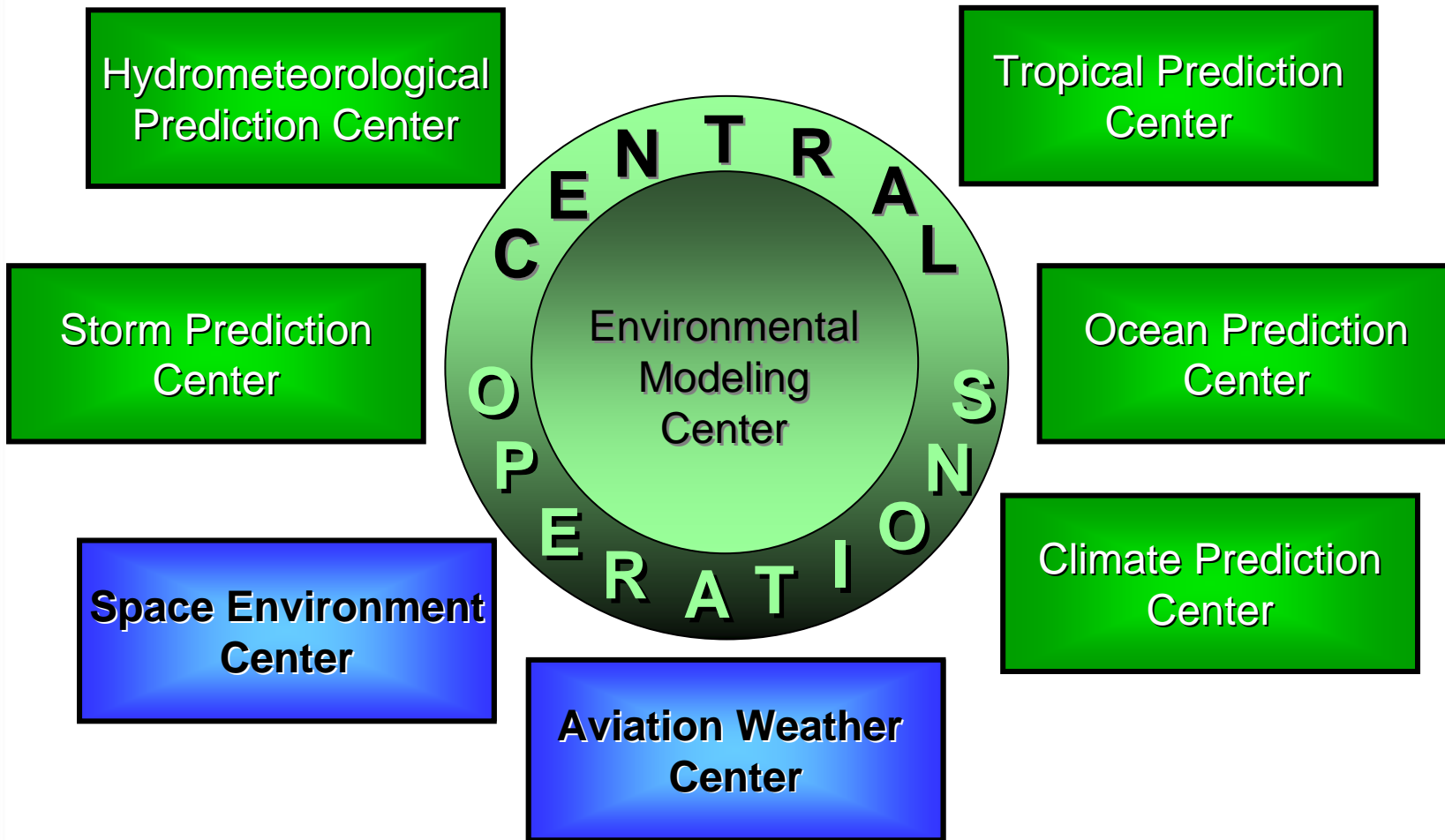


NWS Overview

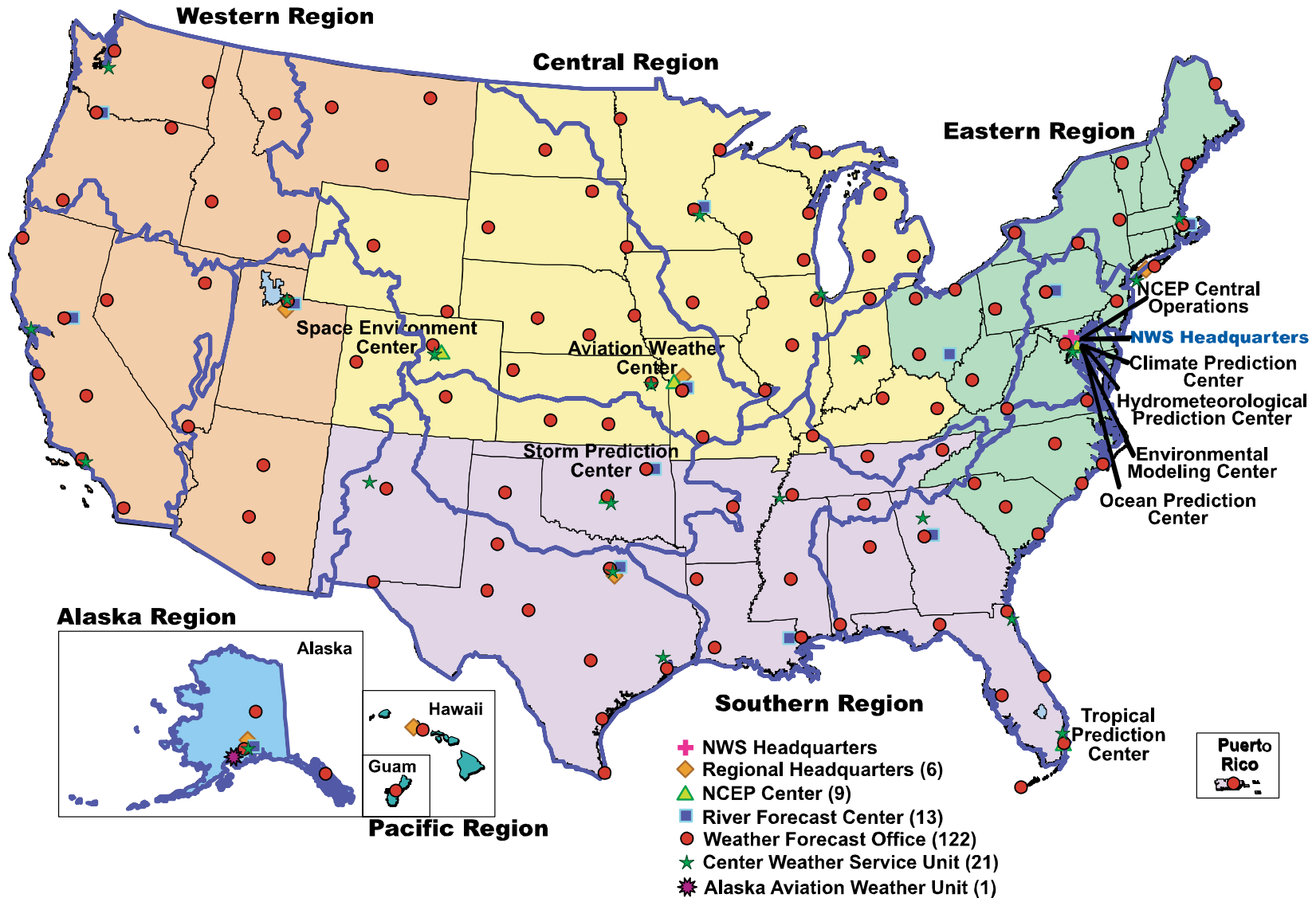
Seamless Suite of Products



NWS National Centers



NWS Facilities



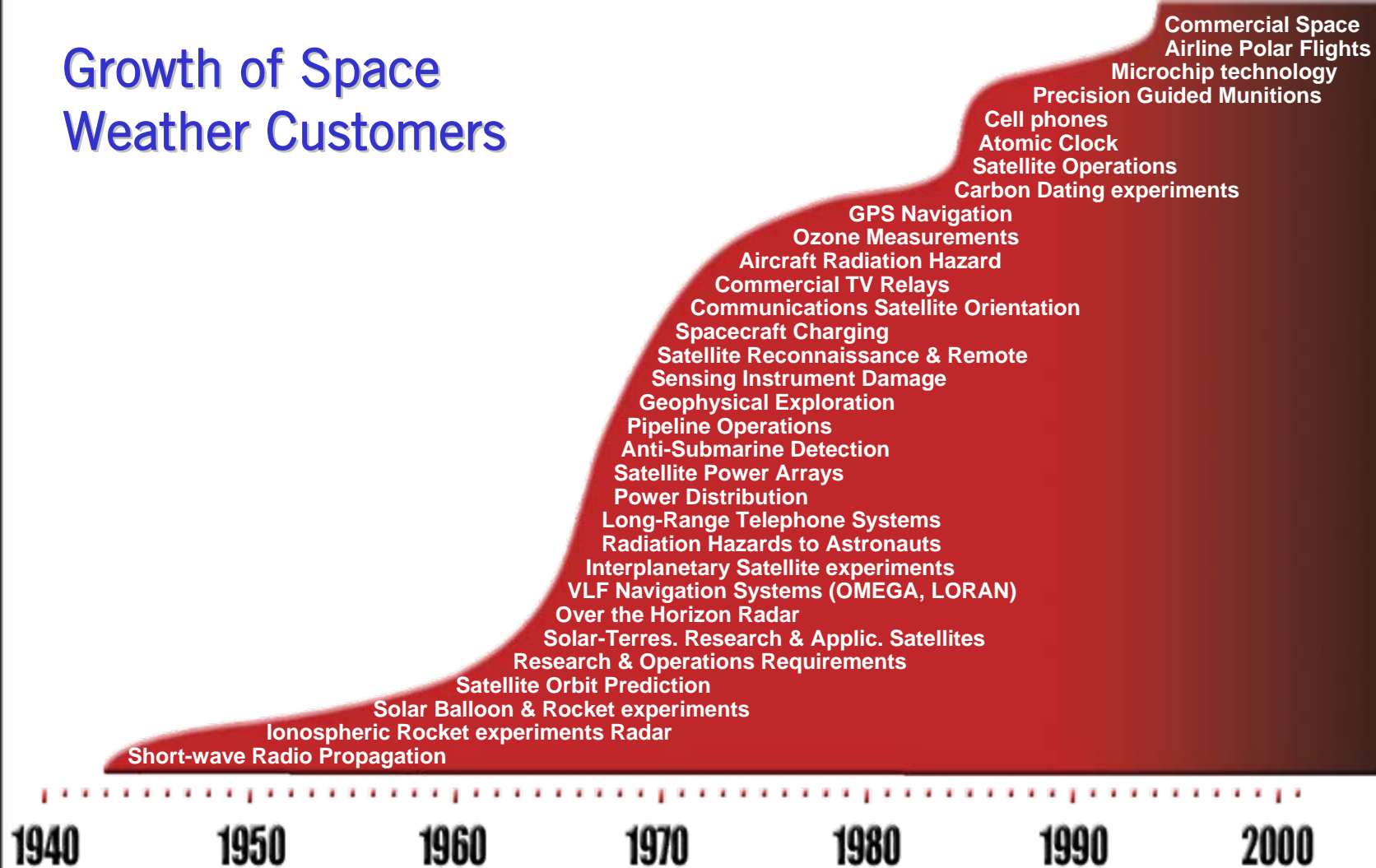
Growing Space Weather Needs

- A Flare and/or CME erupts from the Sun
- 8 minutes later: First blast of EUV, X-rays, and radio waves
 - ✦ *Radio (HF) communications are lost*
 - ✦ *GPS Receivers fail*
 - ✦ *Radar systems lose ability to detect and/or track objects*
- 30 to 1000 minutes later: Energetic Particles arrive
 - ✦ *Astronauts are impacted*
 - ✦ *Satellites are impacted*
 - ✦ *Polar flights are impacted*
- 1 to 4 days later: CME passes and energizes the magnetosphere and ionosphere
 - ✦ *Electric Power is affected*
 - ✦ *Navigation Systems are affected*
 - ✦ *Radio Communications are affected*



Growing Space Weather Needs

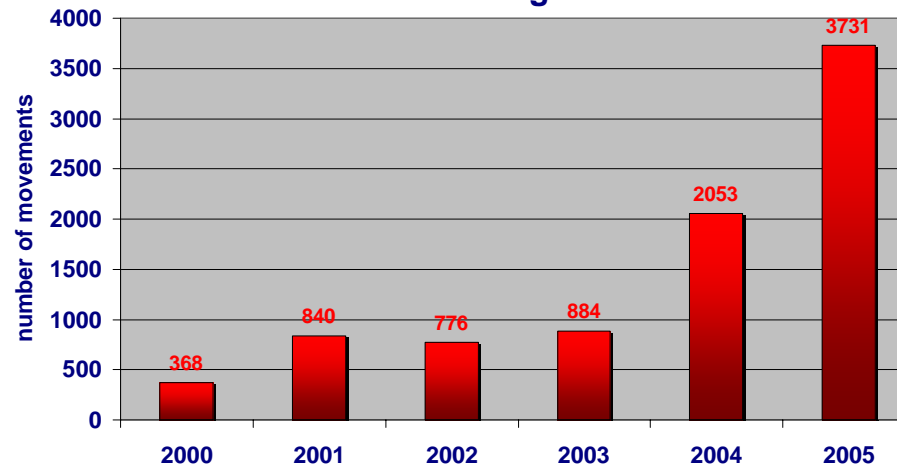
Growth of Space Weather Customers



Growing Space Weather Needs

Aviation Growth

Crosspolar Traffic Levels
from 2000 through 2005



Predicted Polar Route Passenger Movement

	2004	2009	2014	2019
Capacity	228,000	384,000	972,000	1,768,000
AAGR		13.9%	20.4%	12.7%

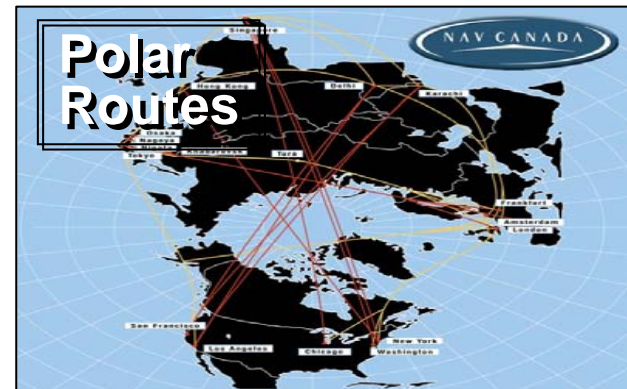
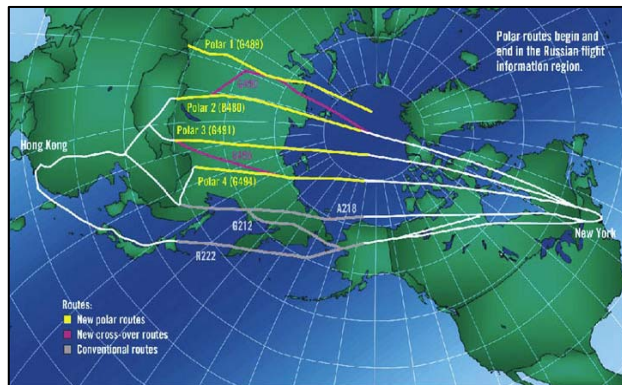


Growing Space Weather Needs

Why Polar Routes?

Time savings in minutes and dollars per flight

- ✈ Atlanta - Seoul 124 minutes \$44,000
- ✈ Boston - Hong Kong 138 minutes \$33,000
- ✈ Los Angeles - Bangkok 142 minutes \$33,000
- ✈ New York - Singapore 209 minutes \$44,000
- ✈ Vancouver - Beijing 108 minutes \$33,000
- ✈ Vancouver - Hong Kong 125 minutes \$33,000



NOTE: Above figures are estimates for the year 2000.

Growing Space Weather Needs

SEC Aviation Group Customers

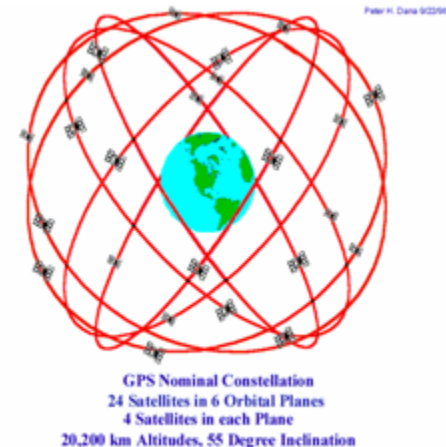
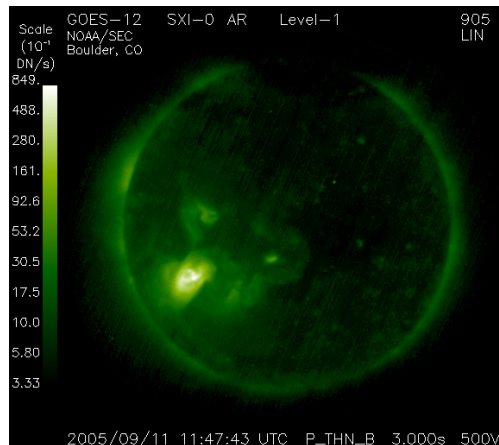
Aer Lingus	Boeing / Flight Test	Northwest Airlines
AFA	British Airways	Oslo Lufthavn AS
Air Canada	Bushmail	PrivateSky
Air China	Cathay Pacific Airway	Qantas Airways
Air Europa	CBAir, LLC	Ravenware Aviation
Air Line Crew Delta	Colegio de Pilotos de Aviacion	Raytheon Aircraft Co.
Air Line Pilots Association	Continental Airlines	SkyWest Airlines
Air New Zealand	Delta Airines	Sun Country airlines
Air Routing Intl	Emirates	Sundt air (Norway)
AirMed Inc.	FedEx	Swales Aerospace
Airservices Australia	German ALPA	United Airlines
Alaska airlines	Icelandic ALPA	US Airways
Allied Pilots Association	Irish Aviation Authority	APLA, Argentina
ALPA Japan	Jet Aviation Business Jets	ARINC
American Airlines	Korean air	ATA Airlines
American Eagle airlines	Lufthansa	NetJets
American Trans Air	Lufthansa Cargo	North American Airlines



Growing Space Weather Needs

Space Commercial Transportation...

- **15,000 passengers and Revenues in excess of \$1 billion per year by 2021** (*Futron's Space Tourism Market Study*)
- **Space transportation scenario by 2030 suggests 5 million passengers into space per year** (*CNN Science & Space, September 24, 2004*)



Growing Space Weather Needs

The Dawn of a New Era – Commercial Human Space Flight



American space tourist Dennis Tito gives a thumbs-up prior to boarding the Soyuz TM-32 rocket at the Baikonur cosmodrome in Kazakstan in this April 28, 2001 file photo.

Space for the Rest of Us!

Burt Rutan
LBJ Auditorium
October 29th
10 a.m.

President of Scaled Composites
Competing for the \$10 Million
Ansari X-Prize

<http://www.me.utexas.edu/rutan>

Free and Open to the Public

Designer of 1st Private Flight to Space

Sponsored by:
The University of Texas at Austin
Mechanical Engineering, Byron Short Lectureship
Chair of Free Enterprise
Acrospace Engineering & Engineering Mechanics
Experimental Aircraft Association, Austin Chapter

The poster features a blue sky background with white clouds and several white and red aircraft in flight. At the bottom, a white and red aircraft is shown on a runway.



Growing Space Weather Needs

- Use of GPS is exploding – vehicle navigation systems, railway control, highway traffic management, emergency response, aviation, marine and land surveying, and much more...
- GPS Global Production Value – expected growth:

- ✦ *2003 - \$13 billion*
- ✦ *2008 - \$21.5 billion*
- ✦ *2017 - \$757 billion*







Finding Solutions

Research to Operations

“Research underpins NOAA’s science-based mission...understanding and predicting changes in the Earth’s environment involves a continually evolving process of discovery, observation, and analysis...”

—*NOAA’s 5 Year Research Plan*

-  *Balancing near-term and long-term research*
-  *Informing policy debates*
-  *Developing Earth System Model*
-  *Integrated Observing System*



Finding Solutions

Research to Operations

Fully Operational!



Space Environment Center



The Future

Integration of Space Weather Into NWS Services

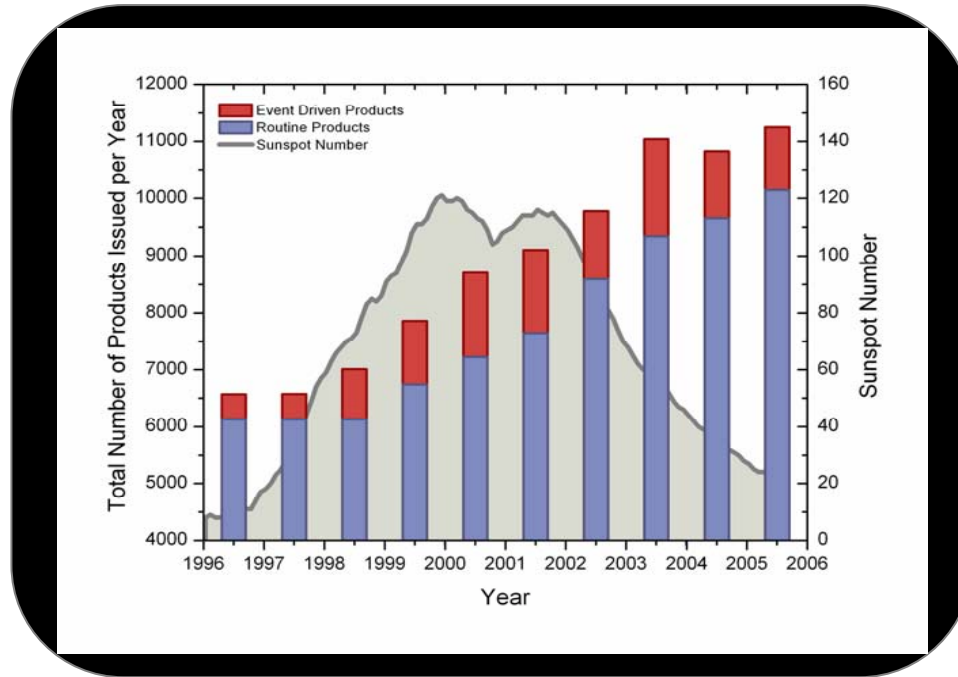
- NWS Aviation Center is working with the Space Environment Center (SEC) to provide aviators with space weather information
- SEC is working with WFOs on a new aurora forecast product
- Space weather is now an important part of the NWS suite of products



The Future

Integration of Space Weather Into NWS Services

NWS to Continue Development of Space Weather Products



- The demand for space weather products is increasing regardless of stage of solar cycle.
- Strong solar storms impacting critical technology infrastructure occur every year of the solar cycle.



The Future

Integration of Space Weather Into NGATS

Space Weather Integrated in NGATS

- More Efficiency
- More Capacity
- More Profitable

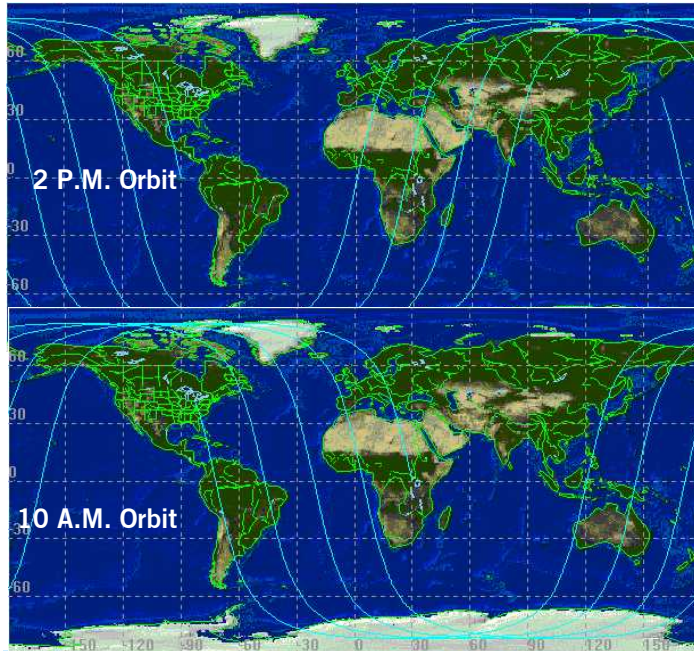
Next Generation Air Transportation System

Joint Planning & Development Office

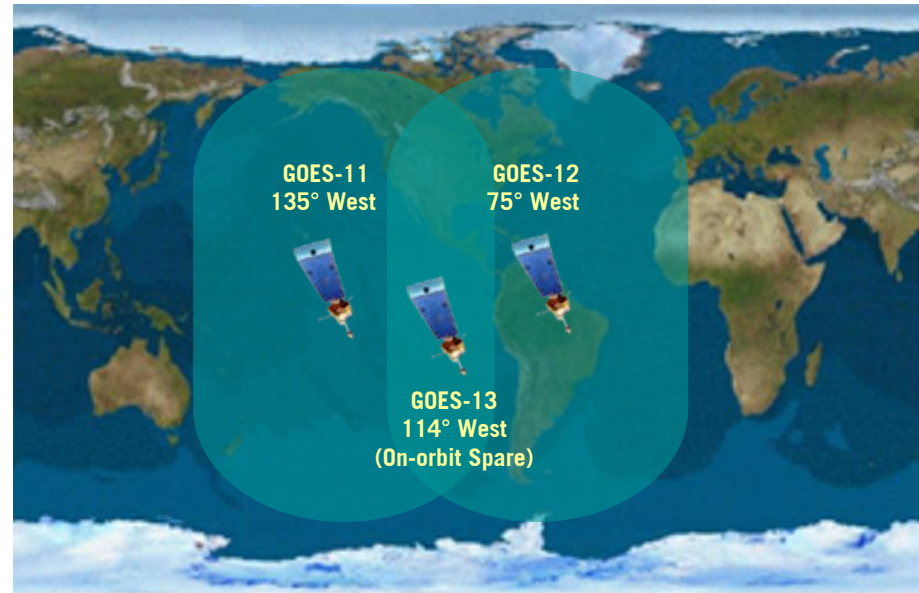


The Future

Satellite Continuity and Growth



- Two operational polar satellites; one in morning and one in afternoon orbit, yielding 6-hour global sampling
- Continuity of operations since early 1960s
- NOAA/EUMETSAT partnership for mid morning orbit with recent launch of Metop A



- Two operational geostationary satellites
- On-orbit spare
- Continuity of operations since 1974 (borrowed satellite from Europe, 1991-1994, to maintain two satellite continuity)
- Retired GOES-10 being moved to 60° West to improve South American environmental satellite coverage.



The Future

Satellite Continuity and Growth

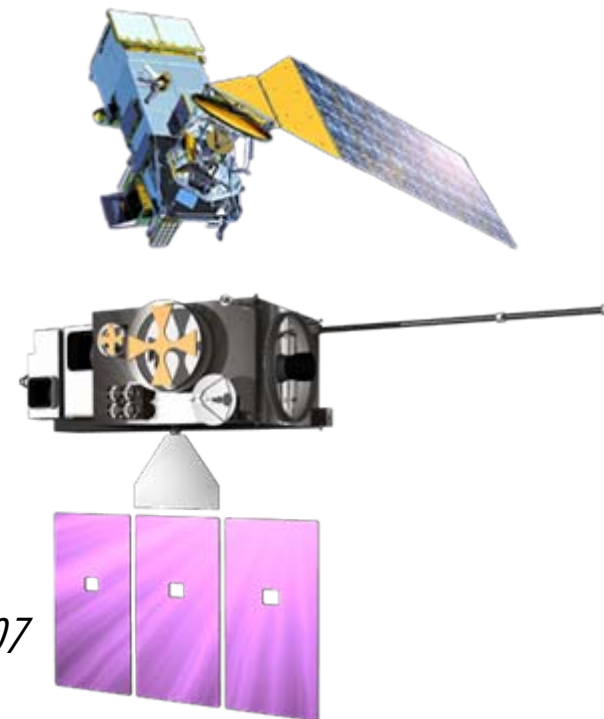
GOES-R and NPOESS will provide continuity to existing satellite constellation

- GOES-R

- ✦ *Program Definition and Risk Reduction activities on-going— RFP release summer 2007*
- ✦ *Instruments progressing*
- ✦ *Lessons learned being incorporated*

- NPOESS (Tri-Agency Program)

- ✦ *Certification through the Nunn-McCurdy process completed*
- ✦ *Interim program on track*
- ✦ *Restructure ongoing – contract mod by end of 2007*

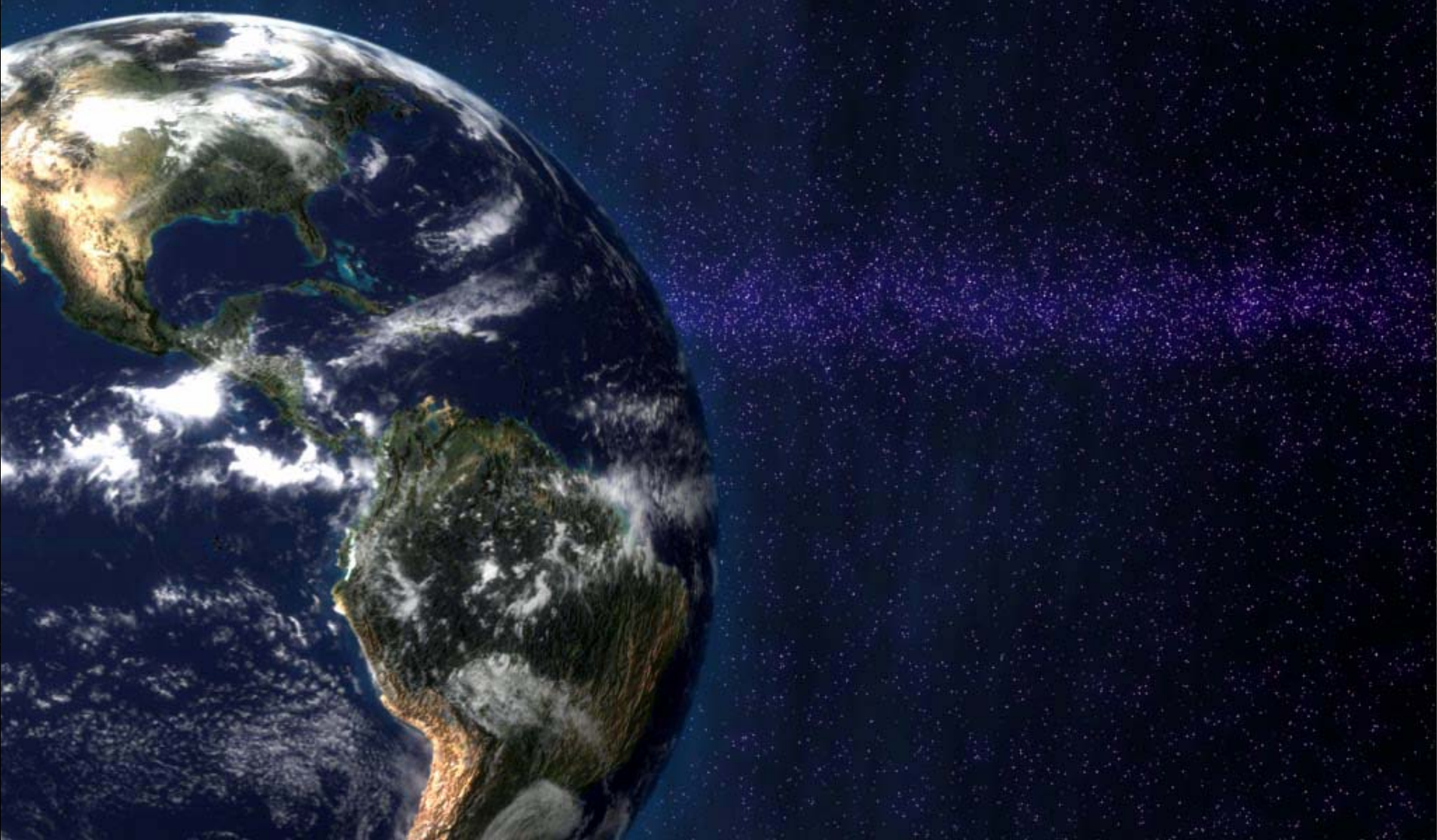




**Provide the right information, in the right format,
at the right time, to the right people,
to make the right decisions.**



What Will The Future Demand of Us?



Email us at: NWS.Communications.Office@noaa.gov