

Public/Private Partnerships and Growth of Space Weather Commerce

Space Weather Workshop
Boulder, CO

Space Environment and Commercial
Business Roundtable

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Agenda

- Partnerships
- Industry Growth
 - Space Weather
 - Meteorology
- Benefits of Space Weather Commerce
- Lessons Learned
 - Size and Growth Rate
 - Meteorology
- The Future
 - The Ideal Public/Private Partnership

Partnerships

All Kinds with Many Different Purposes

- Informal Handshake
- Formal Joint Venture, Associations
- Comprehensive Total Business Integration
- Limited Purpose Single Business Objective
- Public – Public NOAA – DOE HS Computing
- Private – Private Prime – Sub(s)
- Public – Private Joint Institute, NWS – AMS
- R & D Grants, Joint Institutes
- Operational Data Buys, Service Contracts

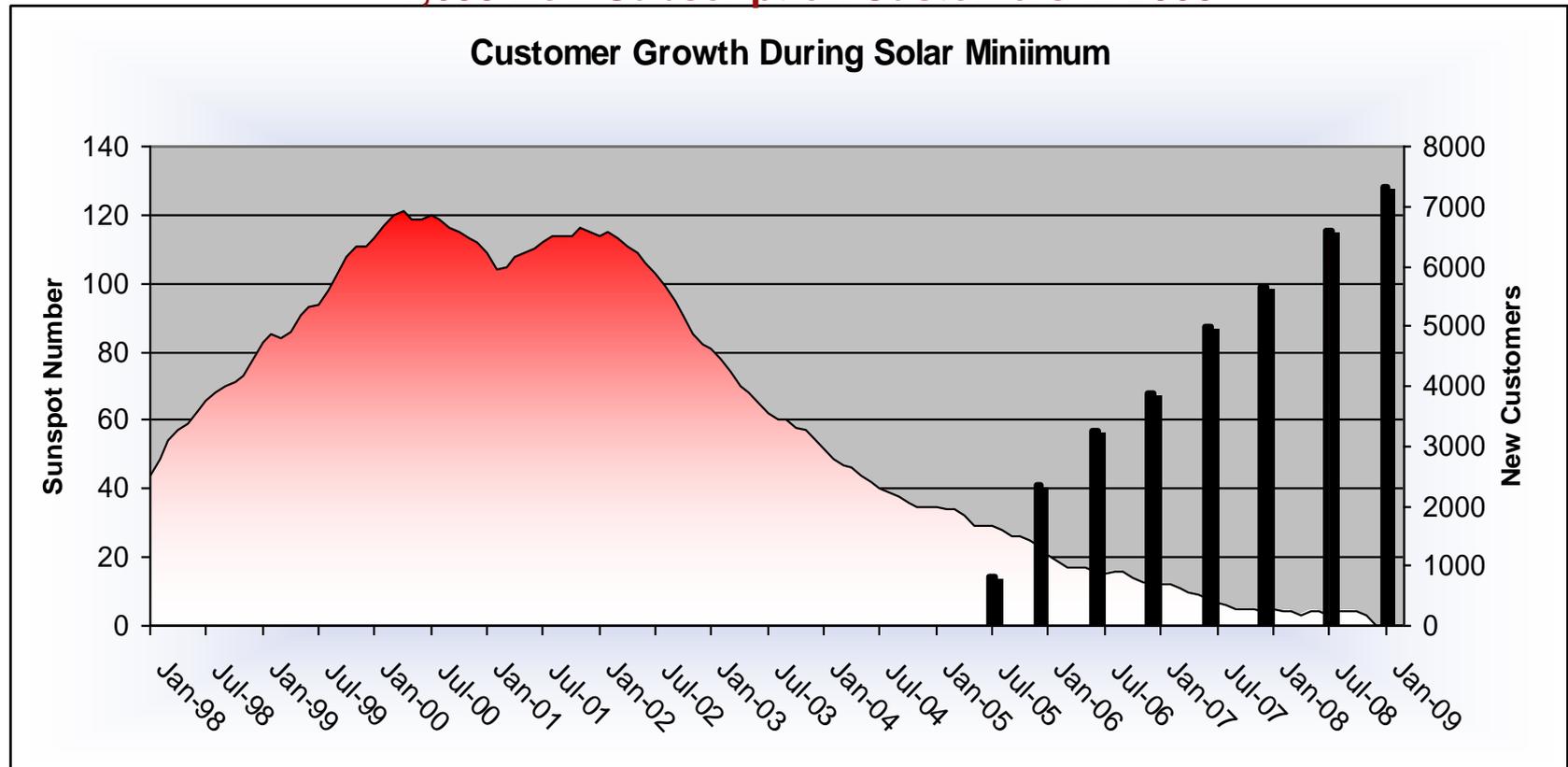
Understand and Define your Partnership!

Relationship and Objectives

Space Weather Growth

SWPC Product Subscription Service

1,695 New Subscription Customers in 2008



USSTRATCOM	Inmarsat	FEMA	Boeing	FAA
White House Communications Agency	L-3 Communications	Florida Division of Emergency Mgnt.	British Petroleum America	Bonneville Power Administration
Washington St. Dept of Transportation	Caterpillar, Inc.	Alaskan Airlines	United Launch Alliance	Salem and Hope Creek Nuclear Stations

Space Weather Growth

Average Monthly SEC Internet Traffic Summary

Web Site: More than 30 million files transferred each month.

- ~500,000 files created monthly with near-real-time data for 176 products
- more than 250,000 unique customers per month
- customers from 150 countries

**GOES - Eight million file transfers per month
- 140,000 unique users monthly**

**POES - Five Million file transfers per month
- 185,000 unique users**

**ACE - One million file transfers per month
- 25,000 unique customers**

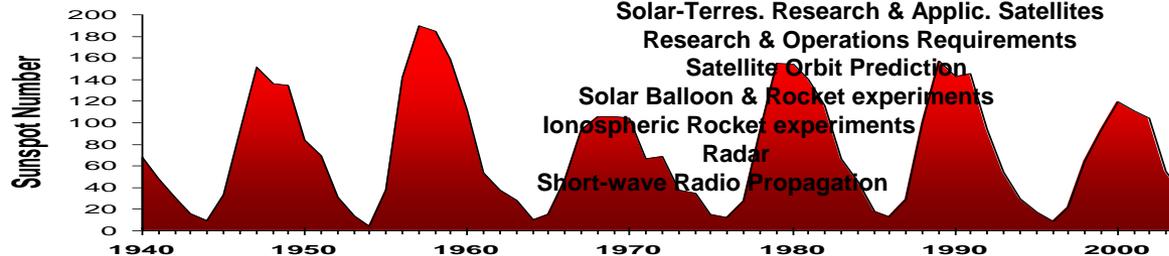
All the above numbers reflect monthly usage near solar minimum!

Space Weather Growth

Growth of Space Weather Customers

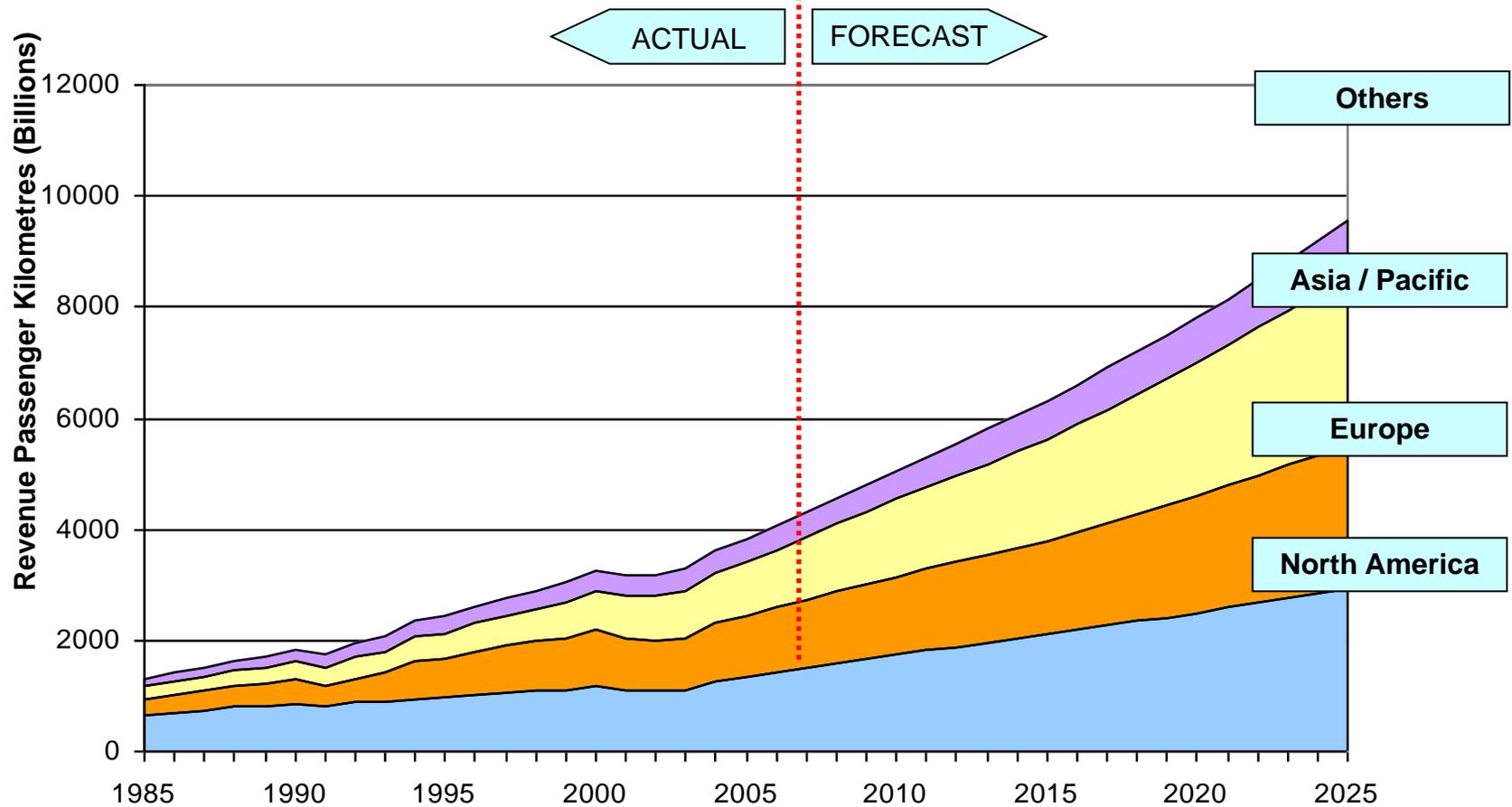


- Commercial Space Transportation
- Airline Polar Flights
- Microchip technology
- Precision Guided Munitions
- Cell phones
- Atomic Clock
- Satellite Operations
- Carbon Dating experiments
- GPS Navigation
- Ozone Measurements
- Aircraft Radiation Hazard
- Commercial TV Relays
- Communications Satellite Orientation
- Spacecraft Charging
- Satellite Reconnaissance & Remote Sensing
- Instrument Damage
- Geophysical Exploration.
- Pipeline Operations
- Anti-Submarine Detection
- Satellite Power Arrays
- Power Distribution
- Long-Range Telephone Systems
- Radiation Hazards to Astronauts
- Interplanetary Satellite experiments
- VLF Navigation Systems (OMEGA, LORAN)
- Over the Horizon Radar
- Solar-Terres. Research & Applic. Satellites
- Research & Operations Requirements
- Satellite Orbit Prediction
- Solar Balloon & Rocket experiments
- Ionospheric Rocket experiments
- Radar
- Short-wave Radio Propagation



Space Weather Growth

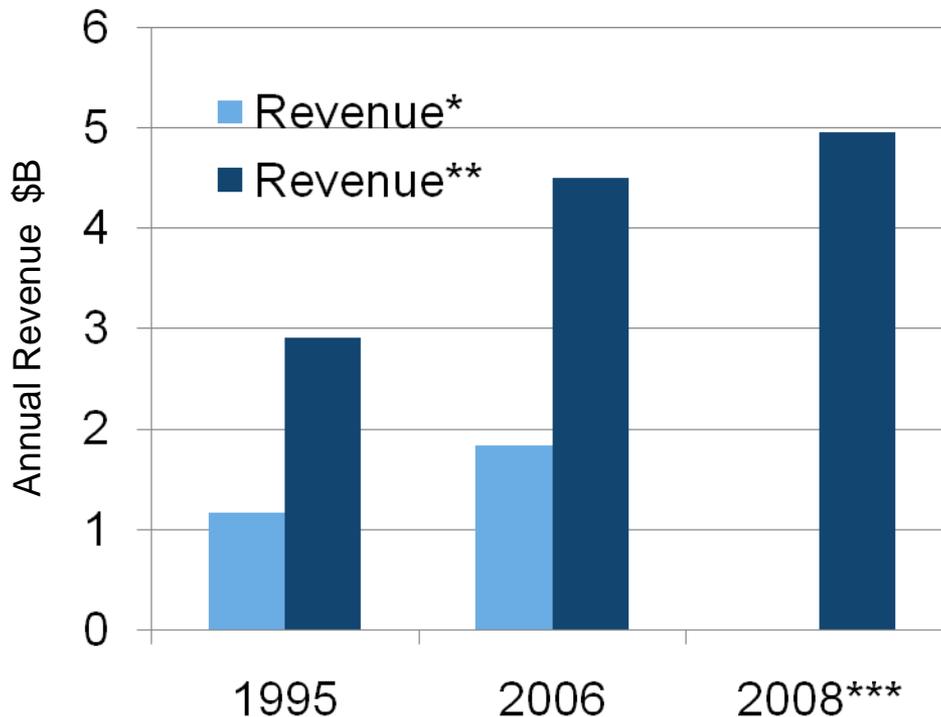
GROWTH OF AIR TRAFFIC



Ref: Worldwide Market Forecast for Commercial Air Transport, JADC

Private Sector Meteorology Growth

~4.5 Annual Growth



- Difficult to determine
 - Inconsistent data
- Multi-dimensional
 - People
 - Programs
 - Dollars
- Diversity of products & services
- Rapid Technological Change

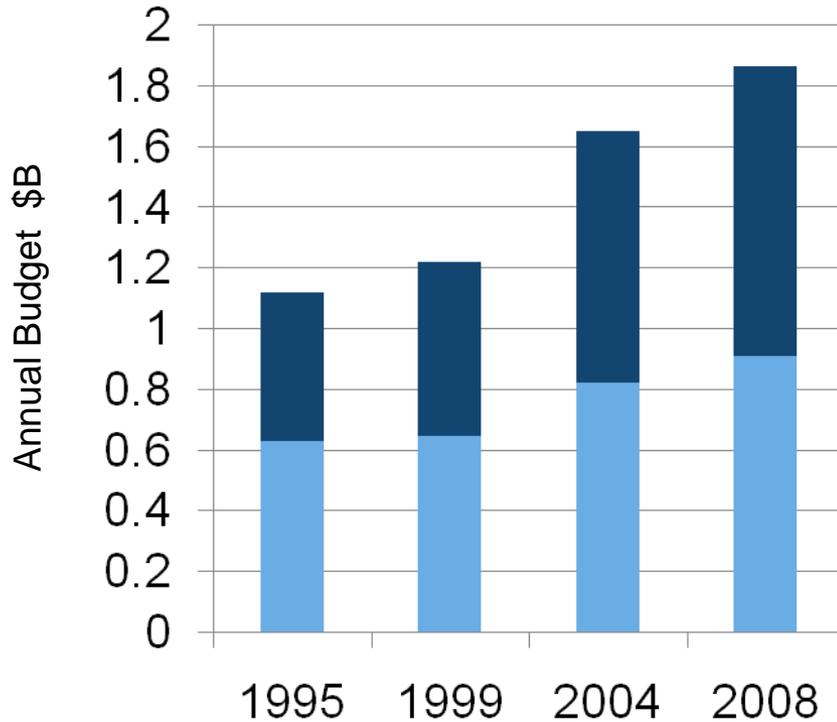
*Spiegler Reports 1995, 2006

**AccuWeather adjustments to include Instrumentation, weather related, and company staff

*** projected from 2006

Public Sector Meteorology Growth

~4.0% Annual Growth



■ NESDIS
■ NWS

- Not as Difficult
 - Data public record
- Multi-dimensional
 - Agencies
 - Federal/State/Local
 - Dollars
- Diversity of products & services
- Rapid Technological Change

Private Sector Meteorology Growth

Segments of Private Sector*

- 1. Weather Instrumentation – Remote Sensing
- 2. Weather Forecasting Services
- 3. Weather Data/Graphics providers
- 4. Staff Meteorologists in Industrial Companies
- 5. Meteorological Consulting Services & Weather
- 6. Forensic Meteorology
- 7. Specialty Companies (e.g. weather modification, lightning detection, wind profilers, biometeorology, etc.)
- 8. Environmental Consulting and Engineering – air quality monitoring
- 9. Weather System Developers, providers, integrators
- 10. Media Meteorology

* Spiegler 1995

Private Sector Meteorology Growth

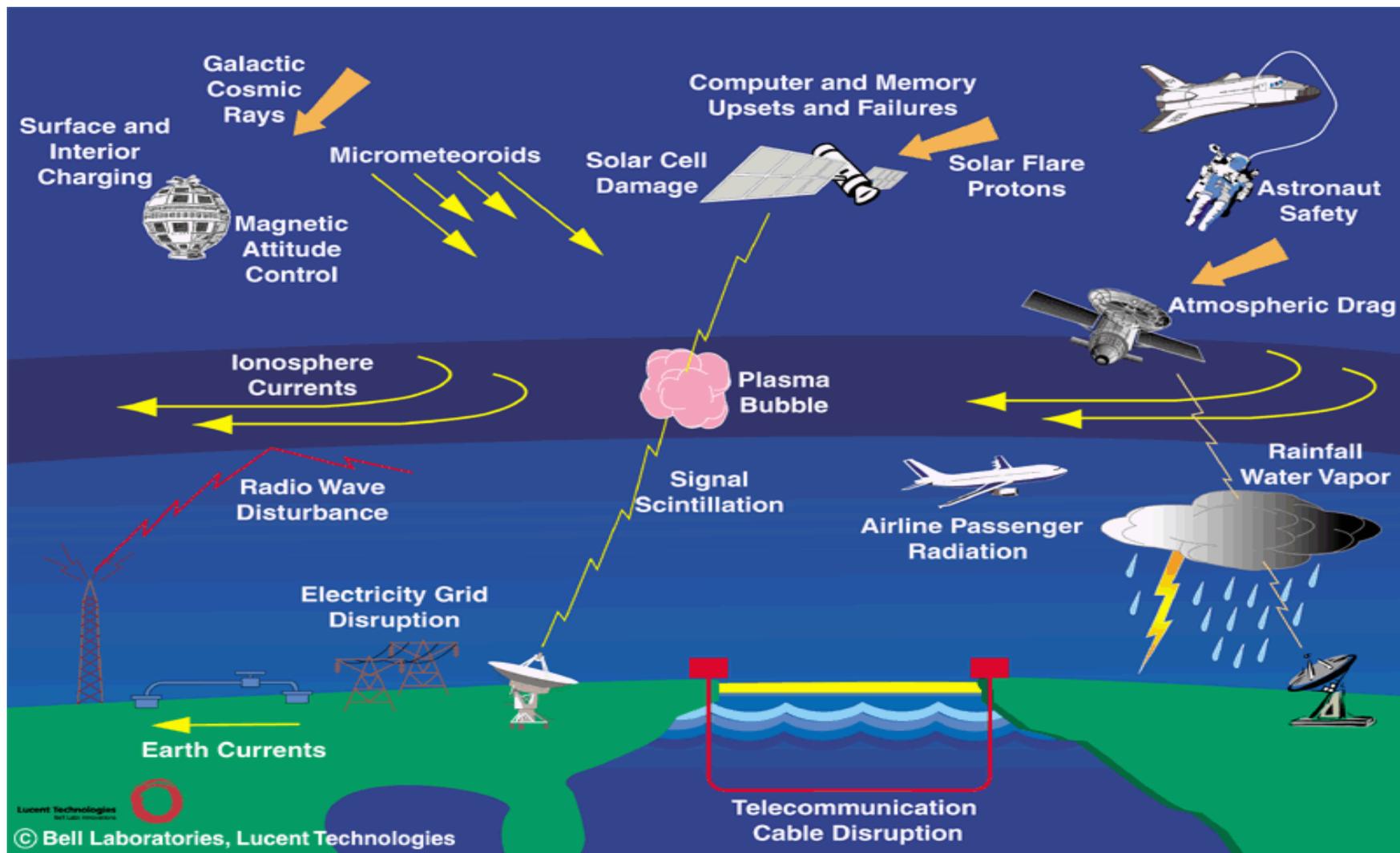
Segments of Private Sector*

- 1. Weather Instrumentation – Remote Sensing
- 2. Weather Forecasting Services
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- 4. Staff Meteorologists in Industrial Companies
- 5. Meteorological Consulting Services & Weather and **Climate Research/Studies**
- 6. Forensic Meteorology
- 7. Specialty Companies (e.g. weather modification, lightning detection, wind profilers, biometeorology, etc.)
- 8. Environmental Consulting and Engineering – air quality monitoring
- 9. Weather System Developers, providers, integrators
- 10. Media Meteorology
- 11. **Weather Risk Management**
- 12. **Weather Education**

* Spiegler 2006

Benefits of Space Weather Commerce

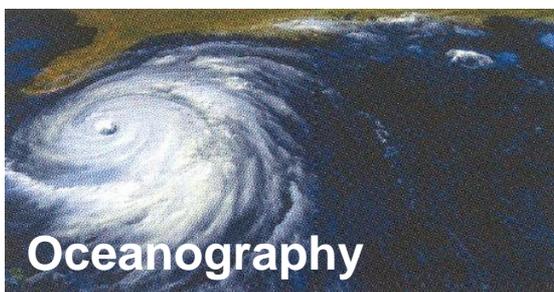
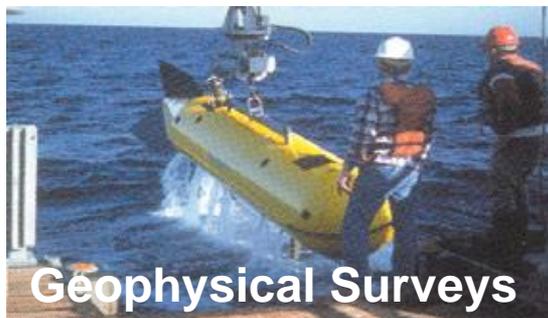
Space Weather Impacts



Benefits of Space Weather Commerce

Severe Space Weather Events

Understanding Societal and Economic Impacts Workshop Report (2008)



Diverse range of geo-location users are susceptible to space weather effects.

Benefits of Space Weather Commerce

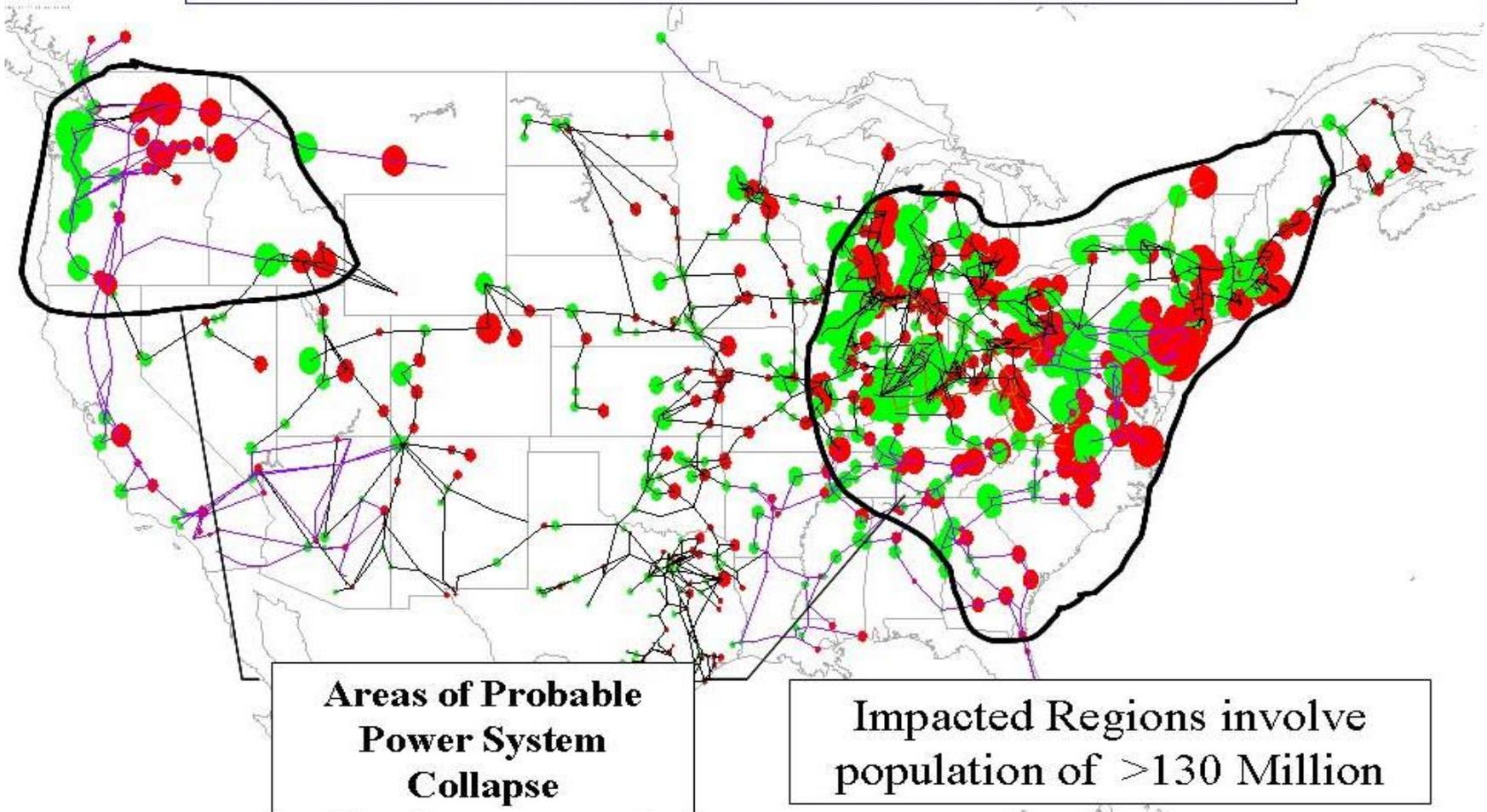
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Benefits of Space Weather Commerce

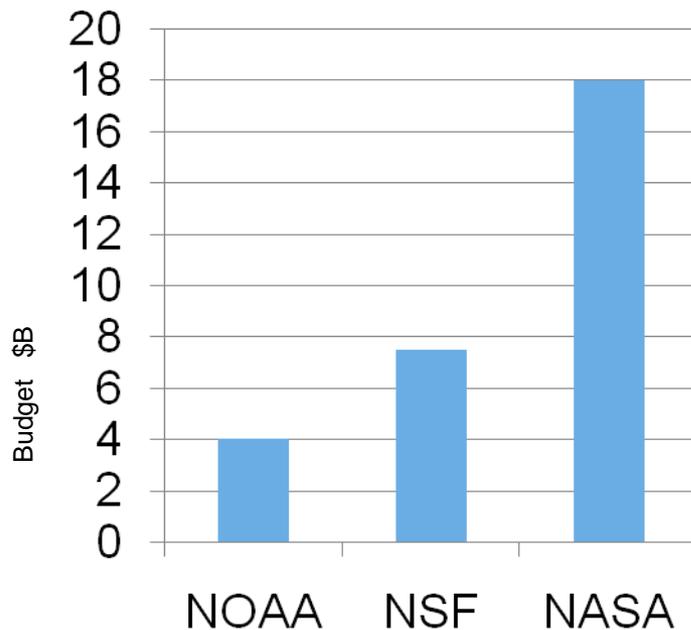
Severe Electrojet Disturbance Scenario

Power System Disturbance and Outage Scenario of Unprecedented Scale



Lessons Learned

Size Counts



Size means:

- More FTE's
- More Programs
- More Vendors
- More Interested Hill Members
- More Lobbies
- More Press
- More Public Interest

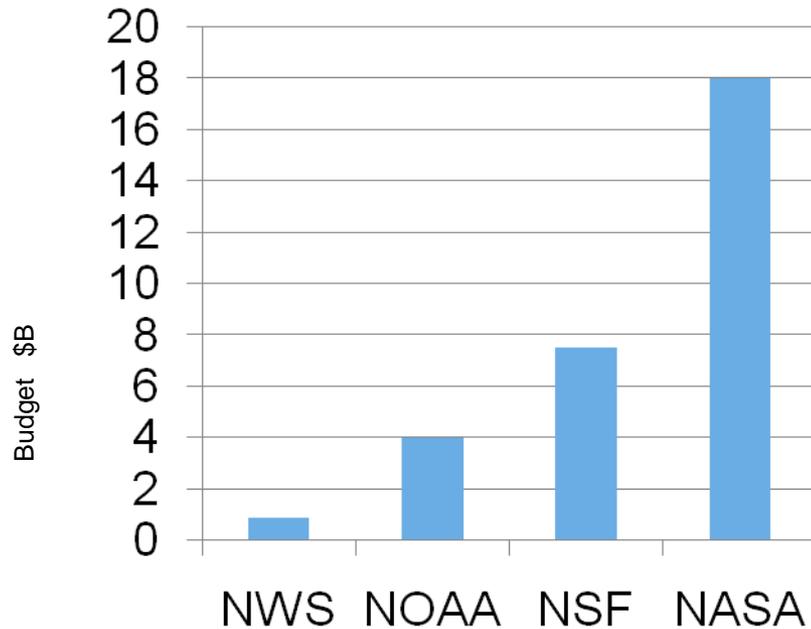
Potential for Growth!*



* Diminishes beyond a certain point!

Lessons Learned

Size Counts



Growth Rate Counts

< Inflation



Programs Shrink



= Inflation



Programs Static



> Inflation

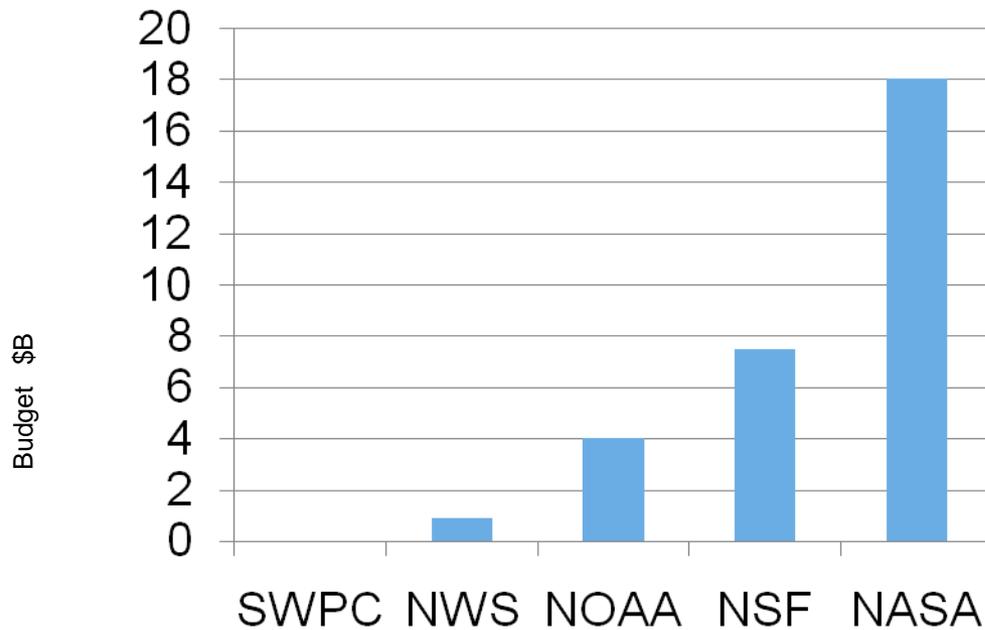


Programs Grow



Lessons Learned

Size Counts

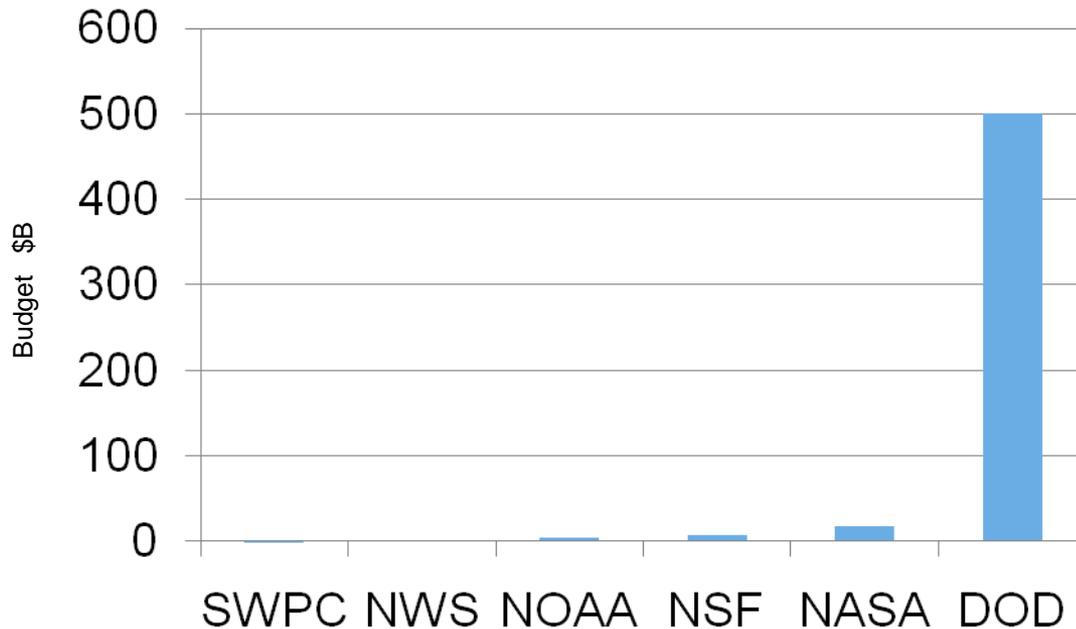


Notice the addition
of Space Weather!

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Hard to detect!

Lessons Learned

Size Counts



Not an entirely fair comparison;

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But when you are number 2 or "n", you need to try harder!

Lessons Learned

Meteorology

- Development over many years
- Technology Growth
- Economic Sensitivity to Weather Grew
- Many Encounters/Competitions
- Products and Services Defined
 - Public
 - Private
- Associations/"Partnerships" developed
 - Professional
 - Commercial
 - Public/Private
- A-Ha! Moments
 - Bigger is better (common goals)
 - Growth rate
 - Working together accomplishes more

The Future

The Ideal Public/Private Partnership

- Common Goals
 - Defined Roles
- Defined Products and Services
 - Public
 - Private
- Mutual Support
 - Commercial associations that advocate Budget Growth
 - PACs, Public Education
 - Government programs that incorporate private contributions
 - Judicious Use of FACA's, Advisory Committees
- Inclusion of R & D and Operations
- Variety of Partnership Mechanisms
 - Public/Private
- Collaborative Policy Development Mechanisms
- Frequent Communication
 - Planning to execution
- **Mutual Trust**