

NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

Critical Infrastructure Support Panel

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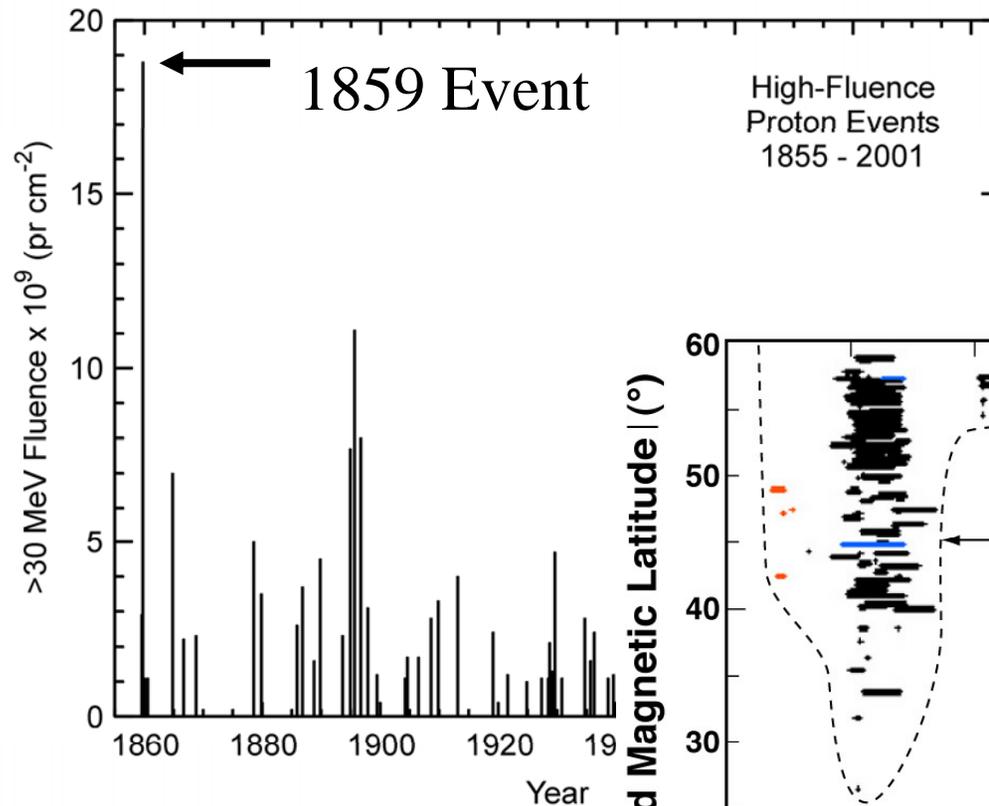
The Societal and Economic Impacts of Severe Space Weather Events: An NRC Report

- Workshop report has had impact
 - Dozens of attendees from academia, industry, government, and industry associations
 - Association reps aggregated data and helped avoid concerns about proprietary or competition-sensitive data
 - Analyses in specific areas; e.g., GPS, power industry, aviation, military systems, human and robotic exploration beyond low-Earth orbit
 - Econometric analysis of value of improved SpaceWx forecasts

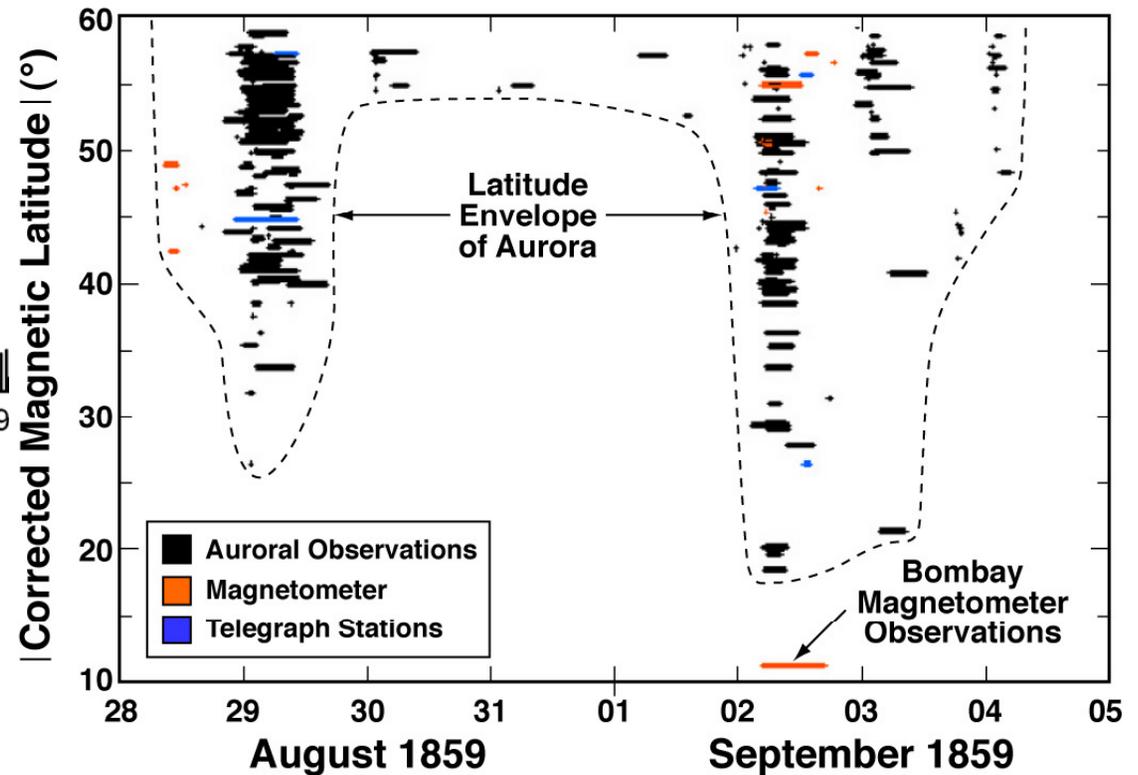
[http://www.nap.edu/catalog.php?record_id=12507]



An Extreme Event: Carrington 1859



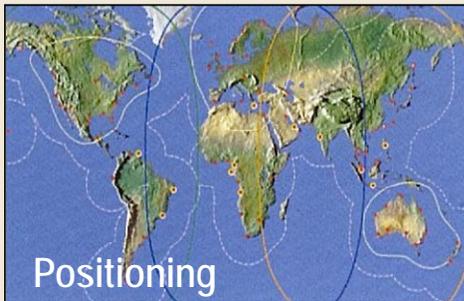
[D.N. Baker and J.L. Green,
In press, *Sky & Telescope*]



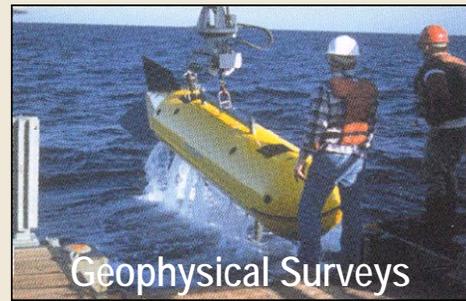
GPS Use Pervades Modern Society



Business Lines



Positioning



Geophysical Surveys



Marine
Construction Support



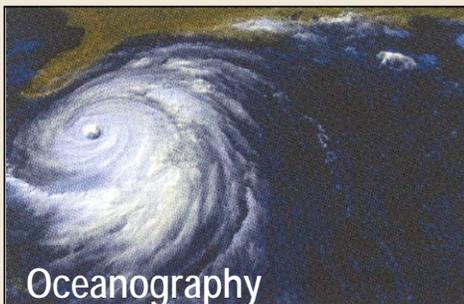
LIDAR Surveys



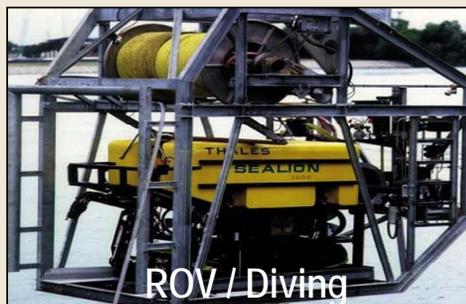
Seismic Data Collection



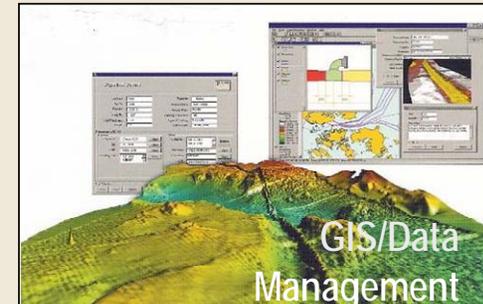
Submarine Cable
Surveys



Oceanography

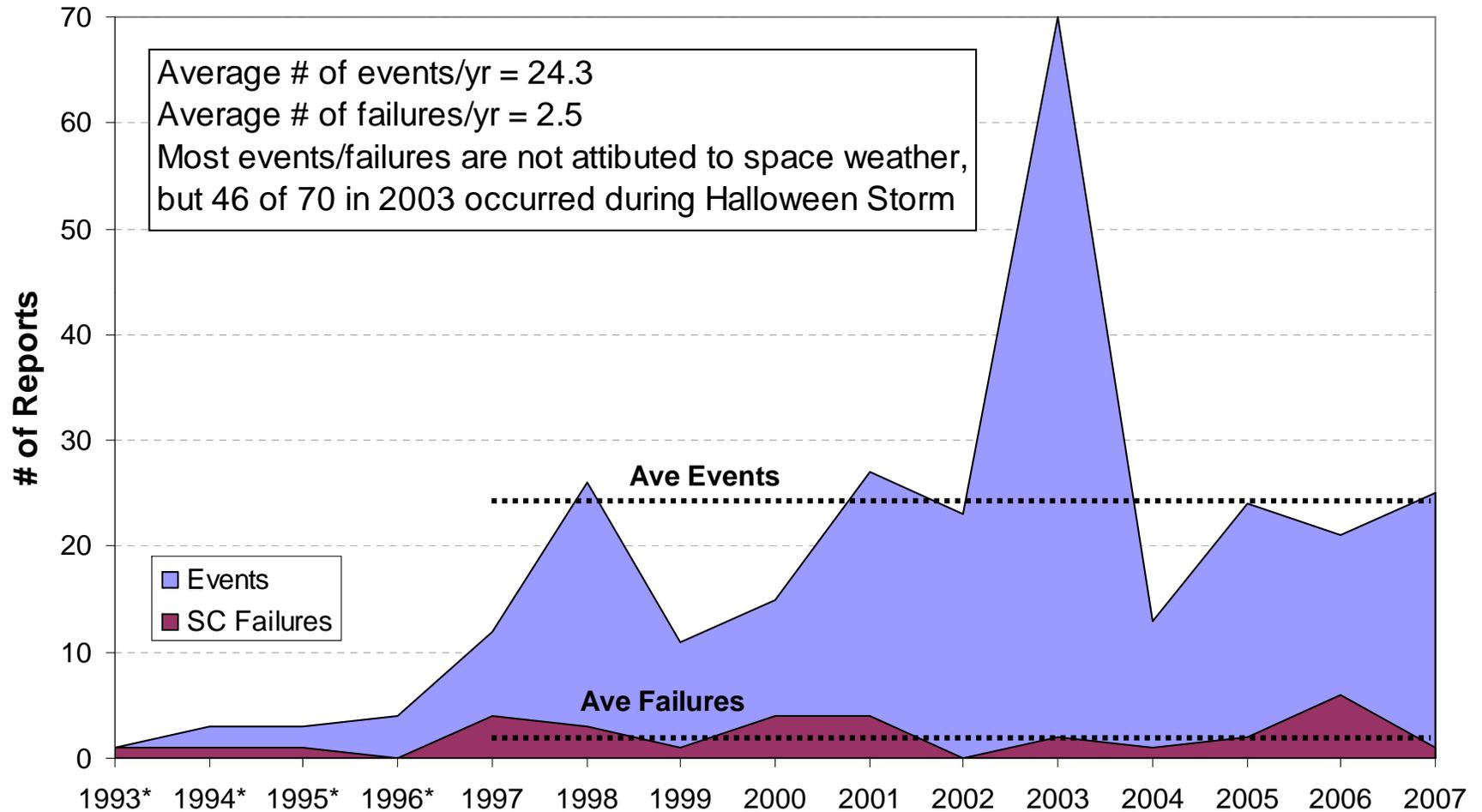


ROV / Diving



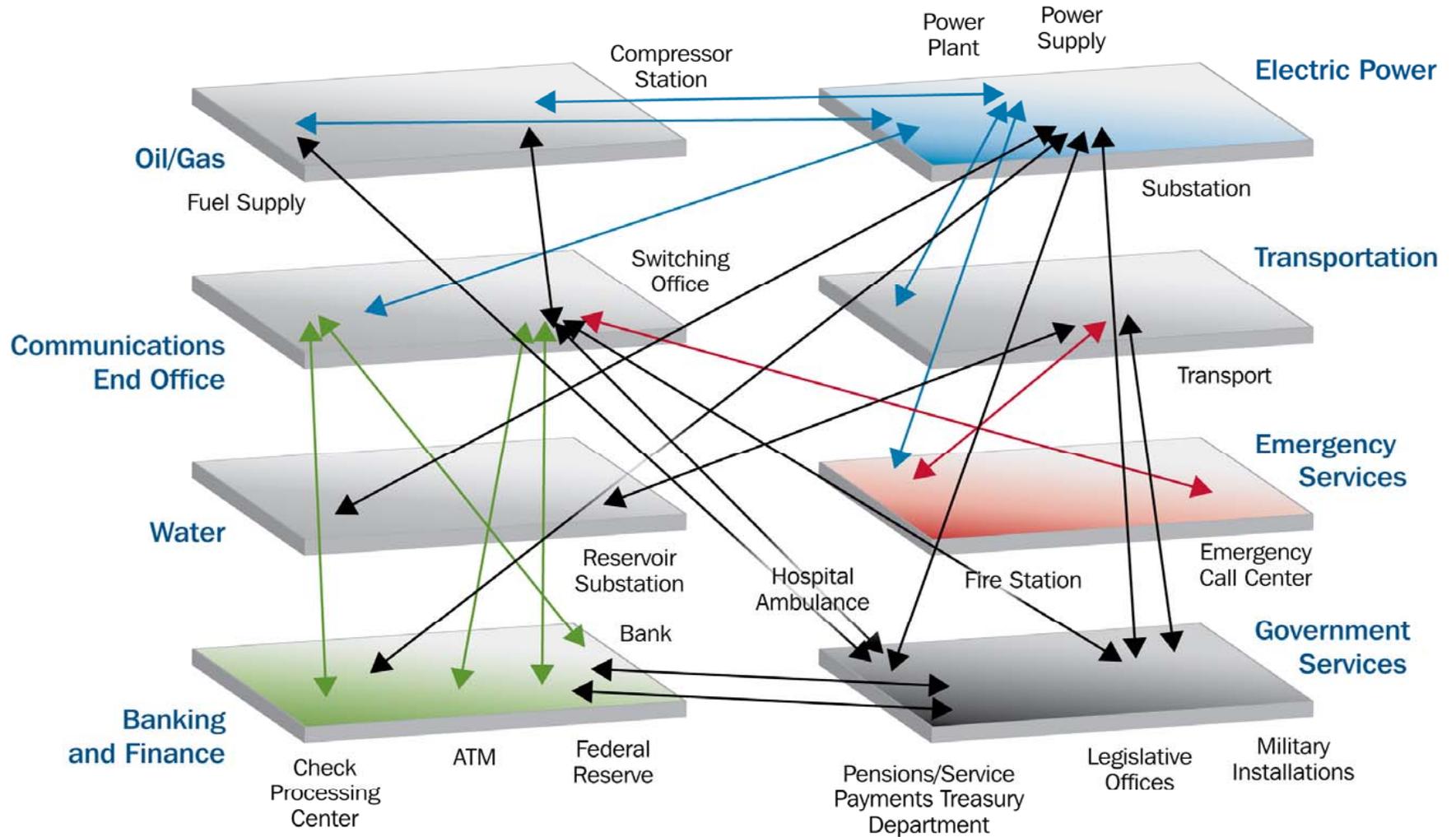
GIS/Data
Management

Spacecraft Anomalies and Failures



A new spacecraft anomaly event [Galaxy 15] that has been in the news

The Interdependencies of Society



Decadal Survey Observations

- U.S. Space Weather program has grown organically (some trial and error)
- New Decadal Survey offers opportunity for:
 - Better alignment of agency roles
 - Clearer reconciliation of research and applications goals
- Gen. D. Eisenhower: “Plans are useless; Planning is essential”
- M. Mead: “A small group of committed people can change the world. Indeed, it’s the only thing that ever has”



Guido Scarabottolo, NY Times

“Much as America’s scientific leadership and policy of open inquiry did wonders for U.S. prestige during the cold war, making most of the [nuclear] detection system data available to the global public would show friends, allies and adversaries alike that the United States is willing to use even its most advanced defense assets for the betterment of humanity.

American taxpayers support a truly remarkable monitoring system whose information could significantly improve our health, security and well-being. We should use this hidden treasure to make the world a better and safer place.”

Opinion Guest Column, *New York Times*

The Earth’s Secrets, Hidden in the Skies

By DANIEL N. BAKER

Published: May 27, 2010

What Constitutes Critical Infrastructure?

- Identify “at risk” elements on which society depends
- Differences with and without space weather forecasts (the expected value of a forecast)
- What are possible mitigation strategies?
- Economic impact of events
 - How do we make society aware?
 - How do we best engage policy makers?
 - Can we promote and implement resiliency?
 - What is the right balance of engineering and science (and social science)?