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# Severe Space Weather and the National Response Framework

Or: National  
Leadership and  
Decision Making  
Before and After an  
Epic Solar Storm

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# Acknowledgements

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- The organizers for inviting me
- Analytic Services Inc, who sponsored this briefing and my travel to the workshop
- **Susan Murray**, Catie Borklund, and Bob Morgan, ANSER, who provided the details on many of the slides in this presentation

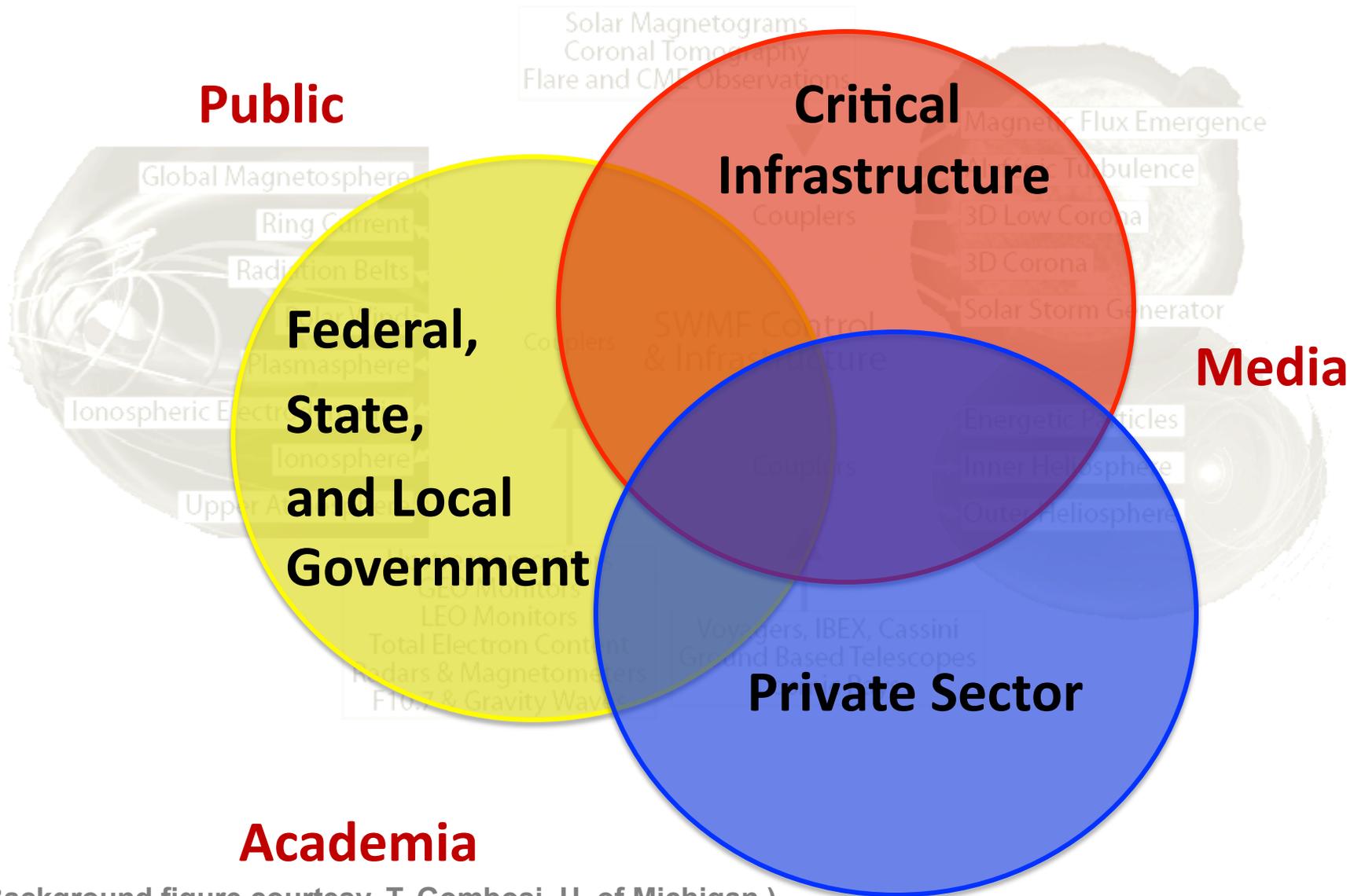
- **However:**

- The final slides are my own, so any errors are mine and do not represent the official position of NASA, DOE, or any other US Government agency

# Summary

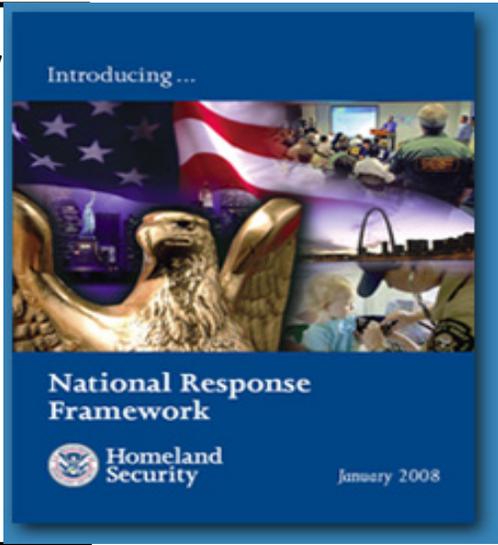
- **In the event of a space weather event of national scope and impact, there is a structure responsible for coordinating the response among local, state, and federal government agencies, as well as working closely with the impacted private industry**
- **The main role of the Space Weather community will be to provide alerts, watches, warnings, and general space situation awareness to the decision makers**

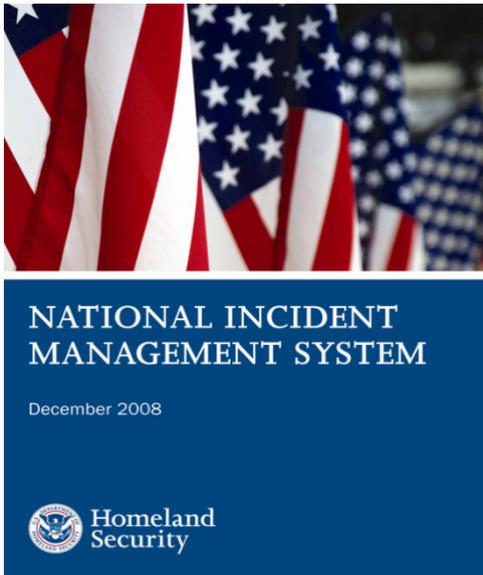
# The Environment is Complex



(Background figure courtesy, T. Gombosi, U. of Michigan.)

# Key Federal Guidance Documents (1 of 3)

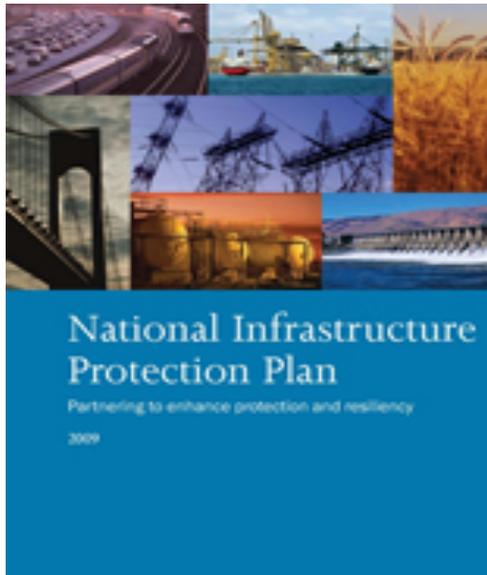
<p><b>Homeland Security Presidential Directive 5</b> Management of Domestic Incidents</p>	<p><b>Homeland Security Presidential Directive 7</b> Critical Infrastructure Identification, Prioritization, and Protection</p>	<p><b>Presidential Policy Directive 8</b> National Preparedness</p>	 <p>Introducing ...</p> <p><b>National Response Framework</b></p> <p>Homeland Security</p> <p>January 2008</p>
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**NATIONAL INCIDENT MANAGEMENT SYSTEM**

December 2008

Homeland Security



**National Infrastructure Protection Plan**

Partnering to enhance protection and resiliency

2009



**17 Sector-Specific Plans**

**Ban** Critical Inf Sector-Sp National Ir May 2007

**Wat Sect Energy** An Anne 2010 Critical Infrastructure and Key Resources Sector-Specific Plan as input to the National Infrastructure Protection Plan May 2007

Homeland Security Department of Energy

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# Key Federal Guidance Documents (2 of 3)

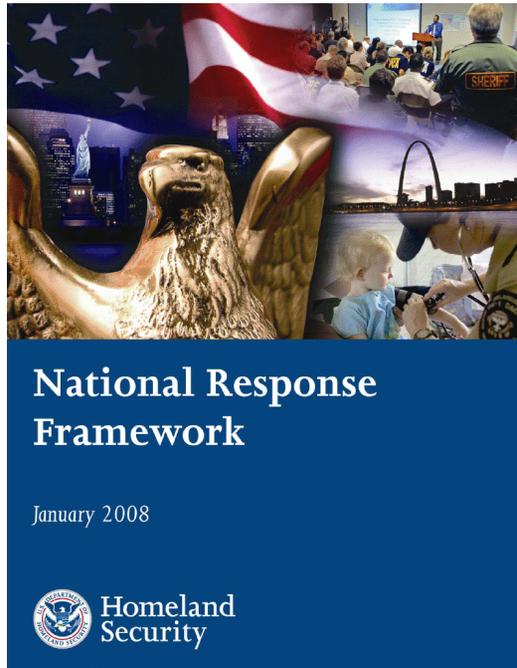
## Presidential Directives

- **HSPD-5:** To enhance the ability of the United States to manage domestic incidents by establishing a single, **comprehensive national incident management system** (NIMS).
- **HSPD-7:** Establishes a national policy for Federal departments and agencies to **identify and prioritize critical infrastructure** and to protect them from terrorist attacks.
- **PPD-8:** This directive is aimed at strengthening the security and resilience of the United States through **systematic preparation for the threats** that pose the greatest risk to the security of the Nation, including acts of terrorism, cyber attacks, pandemics, and catastrophic natural disasters
  - The **National Preparedness Goal** was published September 2011 and the **National Preparedness System** is scheduled to be published on or about November 2011 (an integrated set of guidance, programs and processes that will enable the nation to meet the National Preparedness Goal)
  - Note: PPD 8 replaces HSPD 8 “National Preparedness”

# Key Federal Guidance Documents (3 of 3)

- **National Response Framework:** Provides the structure and mechanisms for national-level policy for incident management. Guiding principles that enable all response partners to prepare for and provide a unified national response to disasters and emergencies - from the smallest incident to the largest catastrophe.
  - Catastrophic Incident Annex
  - Catastrophic Incident Supplement; guides each Federal stakeholder in responding to and acting on direction from the National Command Authority
- **National Incident Management System:** Systematic, proactive approach to guide departments and agencies at all levels of government, nongovernmental organizations, and the private sector to work seamlessly to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, in order to reduce the loss of life and property and harm to the environment.
- **National Infrastructure Protection Plan:** Provides the unifying structure for the integration of a wide range of efforts for the enhanced protection and resiliency of the nation's critical infrastructure and key resources (CIKR) into a single national program.

# National Response Framework



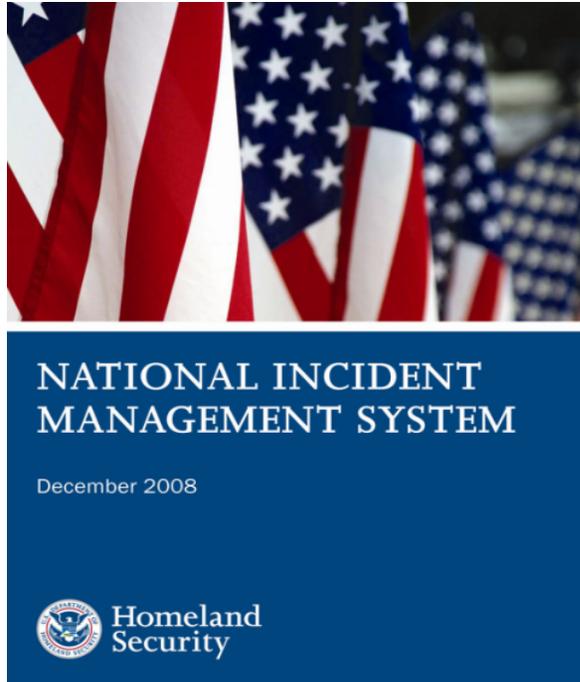
The **Catastrophic Incident Annex** to the **National Response Framework (NRF-CIA)** establishes the context and overarching strategy for implementing and coordinating an accelerated, proactive national response to a catastrophic incident.

A more detailed and operationally specific **National Response Framework Catastrophic Incident Supplement (NRF-CIS)** is published independently of the NRF and annexes.

The NRF-CIA is primarily designed **to address no-notice or short-notice incidents of catastrophic magnitude**, where the need for Federal assistance is obvious and immediate, where anticipatory planning and resource pre-positioning were precluded, and where the exact nature of needed resources and assets is not known.

A catastrophic incident will likely trigger a **Presidential major disaster declaration** and result in the Secretary of Homeland Security or a designee implementing the NRF-CIA/CIS.

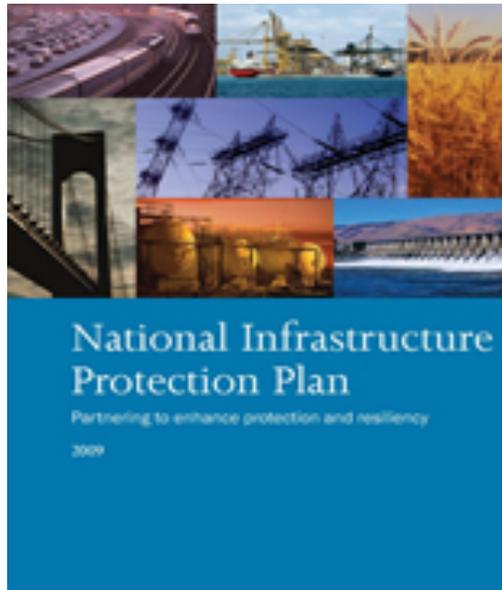
# National Incident Management System



**National Incident Management System (NIMS):** systematic, proactive approach to guide departments and agencies at all levels of government, nongovernmental organizations, and the private sector to work seamlessly to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, in order to reduce the loss of life and property and harm to the environment.

NIMS provides the template for the *management of incidents*, while the NRF provides the structure and mechanisms for *national-level policy* for incident management

# National Infrastructure Protection Plan



## National Infrastructure Protection Plan (NIPP)

provides the unifying structure for the integration of a wide range of efforts for the enhanced protection and resiliency of the nation's critical infrastructure and key resources (CIKR) into a single national program.

The **Sector-Specific Plans** (SSP) detail the application of the NIPP's overall risk management framework to Individual Sectors.

The SSPs describe a collaborative process between the private sector, state, local, and tribal governments, nongovernmental organizations, and the Federal Government. This collaboration is intended to help in the prioritization of its protection and preparedness initiatives and investments within and across sectors.

[http://www.dhs.gov/files/programs/gc\\_1179866197607.shtm#content](http://www.dhs.gov/files/programs/gc_1179866197607.shtm#content)



# Decision Makers and Advisors

## Who Sits at the Table?

### Emergency Support Functions (ESFs)

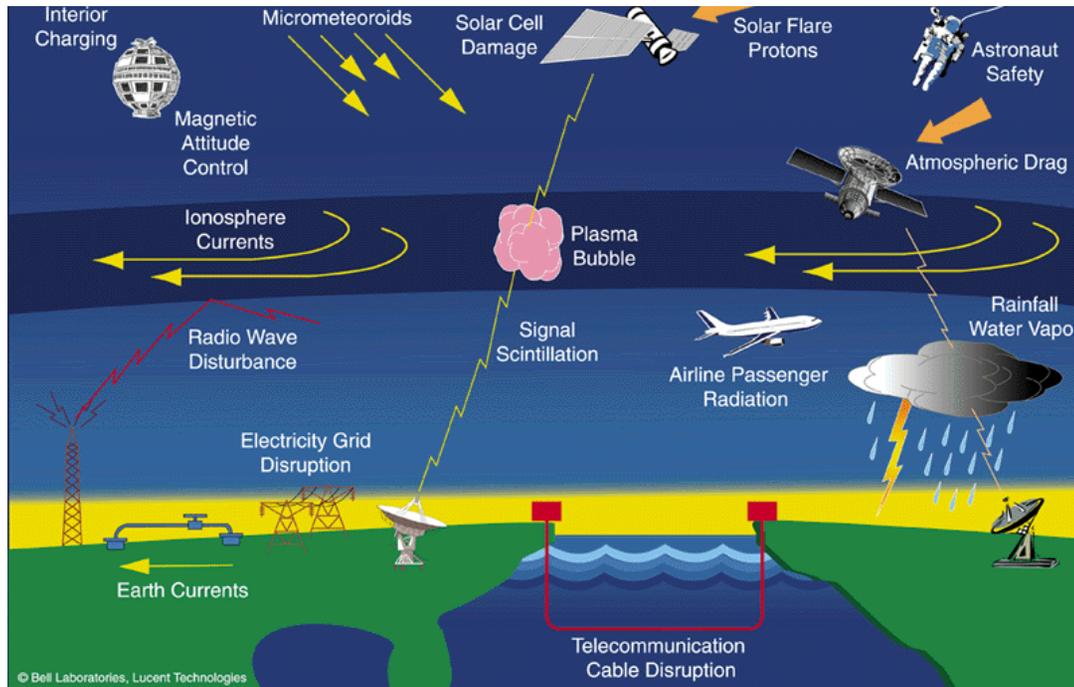
1. Transportation
2. Communications
3. Public Works
4. Firefighting
5. Emergency Management
6. Mass Care, Emergency Assistance, Housing & Human Services
7. Logistics and Resource Support
8. Public Health and Medical Services
9. Search and Rescue
10. Oil and Hazardous Materials Response
11. Agriculture and Natural Resources
12. Energy
13. Public Safety and Security
14. Long Term Community Recovery
15. External Affairs



- The President
- Vice President
- National Security Staff (NSC and HSC)
- Congressional Select committee representatives

**The President will lead the response**  
**The FEMA administrator is the principal advisor to the President**

# Who Briefs the Decision Makers?



**Alerts  
Watches  
Warnings  
Situation  
Awareness**

## Space Weather

- NOAA
- USAF
- NASA

## Critical Infrastructure and Key Resources

- Sector Specific SME's

# Preparation vs. Implementation

## PREPARATION

**National Consensus on Impacts of a Severe Space Weather Event**  
(Gov't, Private Sector, Academia)

**Develop Response Plans And Triggers to Implement Them**

- Federal, State, Local
- Across all impacted Sectors

**Advise Governors' Council**

- Prepare Action Plans
- Coordinate Plans

## IMPLEMENTATION

**National Response Framework and National Incident Management System**  
Provide a structure and the authority to implement the Federal response

**National Operations Center (NOC)**  
Responsible for monitoring the security of the United States on a daily basis and coordinating activities.

**National Response Coordination Center** is FEMA's primary operations management center, as well as the focal point for national resource coordination.

**National Incident Command Center**  
Is the information and coordination hub of a national network dedicated to protecting critical infrastructure

**State, Local, and Private Sector**  
Will begin execution of prepared action plans

# Communication Will be a Critical Component of the Response

## Phase One: The Pending Storm

A *Severe Space Weather Event* will be preceded by a growing substantial Active Region and perhaps some significant precursor events

- The Space Weather Community will announce the development of a growing threat
- NOAA SWPC will issue progressively more urgent alerts
- NOAA, NASA, and the Private Sector will be besieged by the press for comments and opinions
- **Federal response network will be alerted, but not implemented**



Image: K. Turnbull/J. Wild/ESA

# Communication Will be a Critical Component of the Response

## Phase Two: The Storm Erupts

The “*Epic Solar Tsunami*” begins, heralded by a historic solar flare, launch of a massive CME, and the onset of an intense solar particle event

- NOAA SWPC will issue alerts, R 4-5 warnings, S 4-5 warnings, and a G 4-5 watch
- NASA will confirm concerns
- Media and Public interest will skyrocket
- **Government response will commence**
  - White House will convene NSC, and will prepare a consistent message from the President to communicate a statement of concern
  - Crisis management teams will be initiated
  - Federal, State and Local governments will broadcast progressively more aggressive public service announcements
  - Private Sector will prepare to implement action plans

# Communication Will be a Critical Component of the Response

## Phase Three: The Impact is Imminent

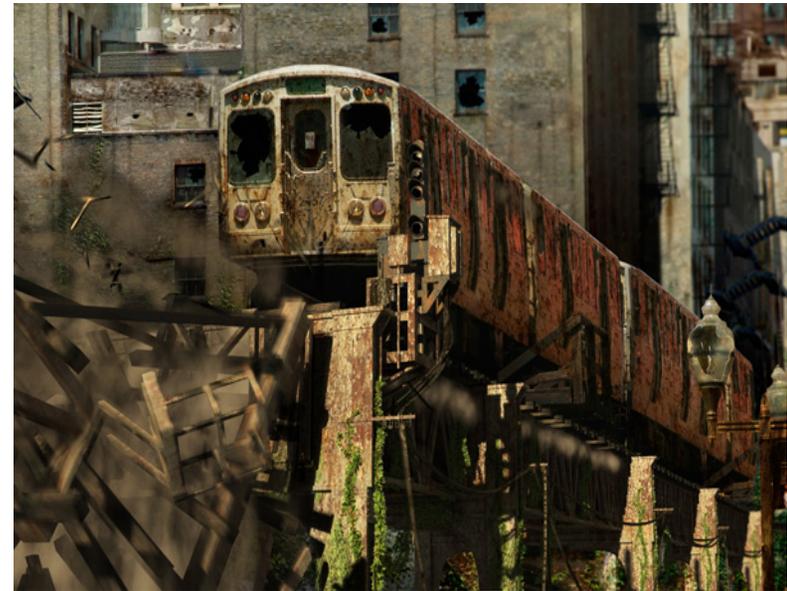
The CME arrives: ACE detects CME passage, confirms intensity and worst case IMF orientation

- NOAA SWPC issues G5 warning
- Next Steps TBD...



<http://world-vists.blogspot.com/2011/04/new-york-at-night.html>

**THIS?**



<http://www.history.com/shows/life-after-people/photos/>

**Or...**

**THIS?**

# How Does the Space Weather Community Contribute?

## **During periods of low to moderate space weather**

- **Improve our understanding of severe space weather (impacts and probabilities)**
- **Improve our models and infrastructure to forecast space weather with high confidence**
- **Develop consistent, measured, and appropriate messages to be used prior to and during low, modest, and severe space weather**
- **Work with Federal/State/Local Governments, Private Sector, and via expanded Public Outreach to communicate the risks of severe space weather**

## **During periods of enhanced or severe space weather**

- **Deliver a coordinated and consistent message using all available public media to appropriately communicate the risk**