

# NASA Space Weather Working Group

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# 2006 PA&E Radiation Study Team Report

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- **“The study team identified the following five broad issue themes that the Agency should address in order to enhance the effectiveness of its radiation-related activities.**
  - Knowledge of the Radiation Environment
  - Radiation Standards
  - Radiation Testing Strategies
  - Developing Strategic and Mission Requirements
  - Radiation Health and Safety Compliance

**“The most salient overarching issue identified regarding the Agency’s radiation-related efforts is the need to ensure appropriate communication, coordination, and exchange of information between the various diverse and distributed radiation functions within the Agency. All of the subsequent issue themes identified are an outgrowth of this situation. It is recommended that an Agencywide Radiation Advisory Group, reporting to an appropriate NASA senior official, be formed to coordinate radiation-related activities and to facilitate communication and information exchange.”**

# OCE Radiation/Space Weather Study

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- **OCE conducted a stakeholder inventory at HQ beginning March 2008**
    - It was motivated by the Radiation Study Team report conducted by PA&E (2006)
    - Stakeholders included:
      - Policy [HQ]
      - Research
      - Operations
      - Engineering
- } Centers
- **March 2010: Technical Investment Steering Committee (TISC) approved SWxWG**
    - The NASA Space Weather Working Group (SWxWG) is established jointly by the Office of the Chief Engineer (OCE) and the Office of the Chief Health and Medical Officer (OCHMO), as a direct response to the NASA PA&E study conducted in 2006 (item 2.2.1). The purpose of the SWxWG is to
      - Act directly on recommendations developed by the 2006 PA&E study group
      - Continuously assess and update agency space weather needs and status
      - Promote cross-directorate communication on space weather issues in order to facilitate maximum leverage of agency resources
  - **April 2010: OCE/OCHMO letter to Center Directors with ToR for WG and soliciting names**
    - ~50 names received from HQ, ARC, GSFC, JPL, LaRC, KSC, JSC, MSFC, DFRC

# Background [2007-2010]

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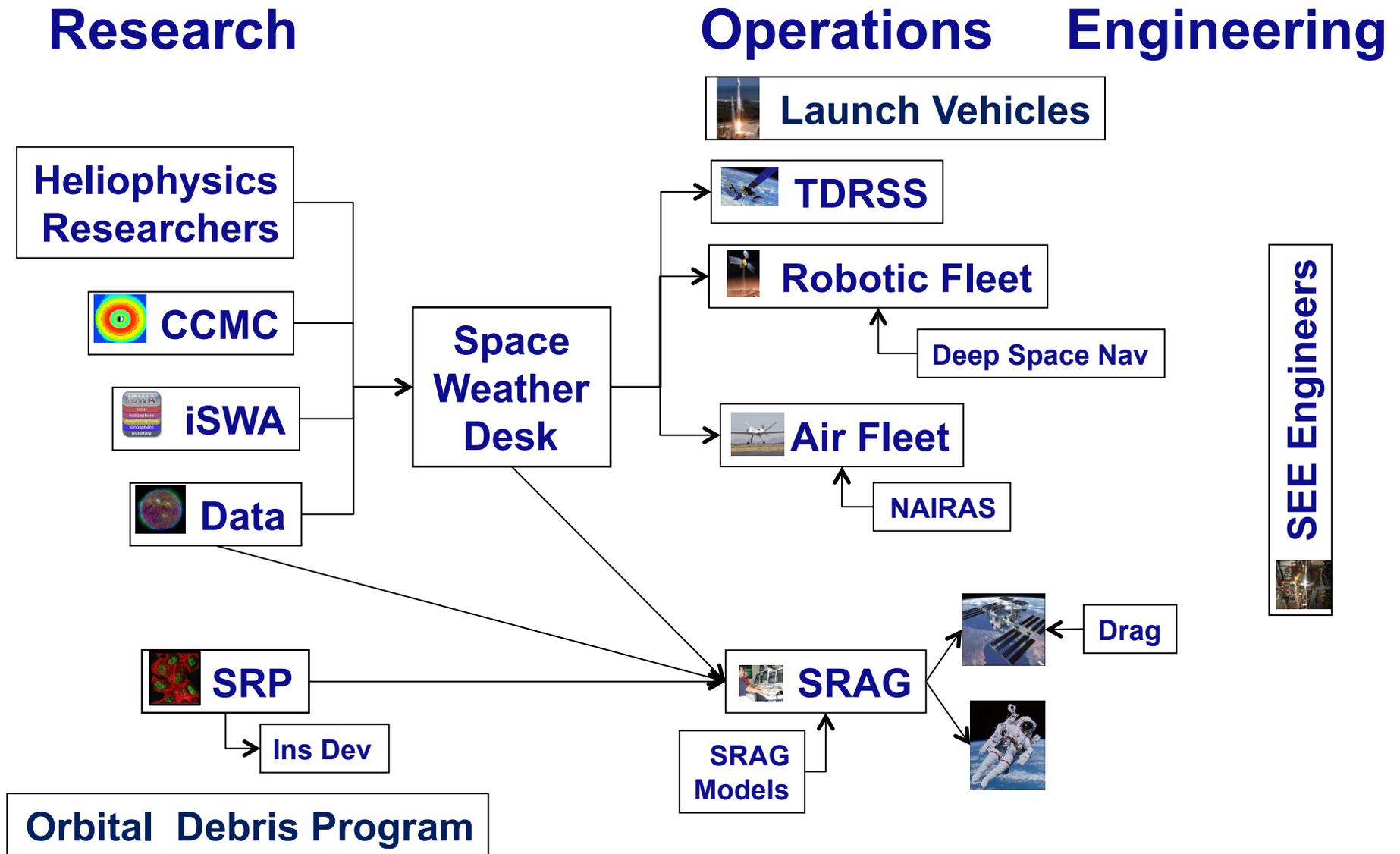
- **2007 NASA HQ SMD/HPS requested development of a “space weather desk” at GSFC**
  - support anomaly resolution with the robotic fleet
  - Initiate collaboration with Space Radiation Analysis Group (SRAG) at JSC
  - begin development of system of displays and tools
- **2008 NASA HQ OCE requested expanded support for information dissemination for the robotic fleet**
  - Led to the development of iSWA
- **2009 a workshop was convened at GSFC to focus on space weather requirements for NASA’s Robotic Fleet operators (SMD and TDRSS)**
  - Third workshop was held at GSFC in September 2011
- **2009 NASA SMD/HPS (LWS) sponsored first “All Clear Workshop” led by HEOMD/SRAG**
- **March 2010, Space Weather Desk began issuing alerts/warnings and weekly reports to the robotic fleet operators**

# Recent Activities of SWxWG

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- **June 2010: Introductory telecon (St. Cyr, GSFC for OCE)**
  - **July 2010: SRAG (Zapp, JSC)**
  - **Sep 2010: CCMC & SWx Desk (Hesse, GSFC)**
  - **Oct 2010: SRP (Cucinotta, JSC)**
  - **Nov 2010: Dosimetry (Straum, ARC) & ASE (Spann, MSFC)**
  - **Jan 2011: JPL activities (Garrett, JPL) & LWS SET (Xapsos, GSFC)**
  - **Feb 2011: ISS drag (Koontz, JSC) & Solar Cycle 24 (Pesnell, GSFC)**
  - **Mar 2011: NAIRAS (Mertens, LaRC)**
  - **Apr 2011: Deep Space Navigation (Mannucci, JPL)**
  - **May 2011: Environmental Effects Facilities (La Bel, GSFC)**
  - **Jul 2011: Environmental Effects Facilities (Burns, MSFC)**
- Average 15-20 participants/telecon

# Space Weather Working Group



# Near Term Activities for

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## SWxWG

- Continue WG telecons

# Near Term Activities for SWxWG

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- **Continue WG telecons**
- **Inventory requirements across the Agency**
  - **Requirements documents exist for:**
    - Human space flight -- Space Radiation Analysis Group (SRAG) [JSC]
    - Spacecraft design – Environmental Effects Branches [GSFC/MSFC/JPL/ARC/JSC]
    - Launch operations – USAF Weather Squadron [Patrick AFB and Vandenberg AFB]
    - ISS operations (drag, charging, and avionics) – Environmental Effects Group [JSC]
  - **Goals/Desires have been documented for:**
    - Robotic fleet operations – Space Weather Desk [GSFC]
    - TDRSS fleet operations – Space Weather Desk [GSFC]
  - **Goals/Desires to be documented**
    - UAV Fleet Operations
    - High-Flier Fleet Operations
    - Interplanetary Navigation and Communication – Tracking Systems & Applications Section [JPL]
    - SOFIA Operations
    - Non-space systems (GICs, aviation, etc.)
      - Solar Shield [GSFC]
      - NAIRAS for aviation [LaRC]

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***Questions?***

# *ad hoc* SWx Leadership

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## Committee

- **Headquarters**

- John Allen (HEOMD/OCHMO), Mike Wargo (HEOMD)
- Lika Guhathakurta, Arik Posner (SMD)
- Hal Bell (OCE)

- **Centers**

- Chris St. Cyr, Michael Hesse (GSFC)
- Neal Zapp, Dan Fry (JSC)

# *ad hoc* SWx Leadership

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## Committee

- **Current spacecraft used in SWx forecasting are predominantly SMD assets and are, at best, viable for about 10 more years (e.g., ACE, SOHO, STEREO, SDO)**
- **SWx data requirements beyond low earth orbit will almost exclusively be of use to NASA**
- **Precedents and opportunities exist for SWx synergies between SMD and HEOMD**
- **New systems will require time for planning, production, and launch**

# Space Weather Working Group

## Top Level Areas & Stakeholders (Part 1)

Topic	HQ	Centers
<b>Radiation (Human)</b>	Williams (OCHMO)	
Research	Liskowsky (OCHMO)	Cucinotta (JSC)
Forecasting	J. Allen (HEO/OCHMO)	Zapp (JSC-SRAG)
Standards	OCHMO/OCE/OSMA	Cucinotta (JSC) <i>et al.</i>
<b>Radiation (Space Weather)</b>	Giles (SMD)	Hesse (GSFC)
Missions in Development	PE's (SMD)	GSFC, APL
Modeling Infrastructure	Hayes (SMD)	CCMC (GSFC)
Model Development	Guhathakurta (SMD) LWS TR&T	All Centers (+NSF and other Agencies)
Data/Model Dissemination (iSWA)	OCE	Maddox (GSFC)
Robotic Fleet	Hayes (SMD)	GSFC, APL, <i>et al.</i>
Forecasting (Robotic Fleet, TDRSS, Air Fleet)	Giles (SMD)	Zheng (GSFC)
LWS SET	Brewer (SMD)	Xapsos (GSFC)

# Space Weather Working Group

## Top Level Areas & Stakeholders (Part 2)

Topic	HQ	Centers
<b>Other Operations</b>		
Deep Space Navigation	Green (SMD)	Mannucci (JPL)
ISS Drag	PE? (HEO)	Hartmann (JSC) + MSFC
Radiation Susceptibility (SOFIA, high fliers, & UAV fleet)	Walker (SMD)	Teets (DFRC)
LV Forecasting	Jim Norman (LS)	Wood (KSC)
<b>Engineering</b>		
Radiation Shielding/Materials Research	??	MSFC (MAPTS), LaRC
Facilities	Whitlow	GSFC, MSFC, ARC, GRC, <i>et al.</i>
Parts & Packaging (NEPP)	Hughitt (OSMA)	LaBel (GSFC) & MSFC, JPL, ARC
Standards	OCE, OSMA, OCHMO	
Air Crew & Avionics Forecasting	?	Mertens (LaRC) [NAIRAS]
Orbital Debris Research	SMD/OSMA	Johnson (JSC)
MicroMeteorite Research	OSMA	Cooke (MSFC)

# Space Radiation Inter-Agency Policy

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- **Inter-Agency Committee on Space Weather (OFCM)**
- **Space Partnership Council (NASA, DoD, NOAA)**
- **Space Technology Alliance (Multiple organizations)**
- **National Science and Technology Council, Subcommittee on Disaster Reduction**
- **Radiation Hardened Council**
  
- **UN and other International efforts**