**Next Step Space Weather Benchmarks Workshop**

**April 23-25, 2019, Sheraton Denver West, Lakewood, Colorado USA**

**Workshop Read-Ahead Information**

# Introduction

This workshop represents the next step in an ongoing effort to prepare the Nation for the consequences of an extreme space weather event. In June, 2018 the White House Office of Science and Technology Policy (OSTP) National Science and Technology Council (NSTC) Space Weather Operations, Research, and Mitigation (SWORM) Subcommittee released [***Space Weather* *Phase 1 Benchmarks***](https://www.whitehouse.gov/wp-content/uploads/2018/06/Space-Weather-Phase-1-Benchmarks-Report.pdf)*.* The benchmarks specify the nature and intensity of extreme space-weather events and provide a point of reference from which to improve understanding of their effects. The purpose of developing benchmarks is to provide input for creating engineering standards, conducting vulnerability assessments and risk estimates, establishing decision points and thresholds for action, understanding risk, developing more effective mitigation procedures and practices, and enhancing response and recovery planning.

The Phase 1 benchmarks effort, which was called for by the 2015 *National Space Weather Strategy[[1]](#footnote-1)* and *National Space Weather Action Plan*,[[2]](#footnote-2) was intended to be an initial quick-turnaround analysis based on existing data sets and studies, conducted by teams of subject matter experts across nine Federal departments and agencies. The *Space Weather Phase 1 Benchmarks* document defines benchmarks for five phenomena associated with space weather events: induced geo-electric fields, ionizing radiation, ionospheric disturbances, solar radio bursts, and upper atmospheric expansion. In March 2019, the NSTC released an update to the Strategy and Action Plan[[3]](#footnote-3) that calls for refinement of the Phase 1 benchmarks.

To inform the refinement of the Phase 1 Benchmarks, NSF and NASA have sponsored the **Next-Step Benchmarks (NSB)** task, of which this workshop is an integral part. The goal of the task is to gather input from the space weather research and operations/user communities on how to refine and improve the Phase 1 Benchmarks. This includes: identifying new research or data sets that may be used to improve the benchmark values; identifying gaps in existing data sets and methodologies that hinder the ability to produce high-confidence benchmark values; and suggesting future research activities that may improve the accuracy of and confidence in the benchmark values by closing the gaps. The deliverable of the task is a public report delivered to NSF that will also inform the development of the Phase 2 benchmarks.

The Next Step Space Weather Benchmark activities include:

* Request for Community Input (Due April 12, 2019)
* Next Step Space Weather Benchmark Workshop (April 23-25, 2019)
* Town Hall (Autumn in Washington, DC) and release of draft report for community input
* Public report delivered to NSF

# Workshop Structure

The workshop is centered on a series of breakout sessions designed to produce discussion and analysis of benchmarks for the five space weather phenomena described in Phase 1. During the breakout sessions, each of the five working groups will address a few targeted questions related to their assigned phenomenon. The ‘core participants’ of the working groups have been established as part of the NSB task and are shown in in Table 1. On the first day of the workshop, April 23, the working groups will also include members of the invited public. On all days, the working group chairs will be responsible for leading the discussions, with support from STPI staff.

Table 1. NSB Core Participants

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| Chair |
| Geoff Reeves (LANL) |
| Executive Secretary |
| Tom Colvin (STPI) |
| Working Group Chairs |
| Induced Geo-electric Fields | IonizingRadiation | Ionospheric Disturbances | Solar RadioBursts | Upper Atmosphere Expansion |
| Pete Riley(Predictive Sciences) | Christina Cohen (Caltech) | Susan Skone(U. Calgary) | Dale Gary(NJIT) | David Jackson(UK Met) |
| Working Group Members |
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| Jeff Love |
| Antti Pulkkinen |
| Adam Schultz |
| Emanuel Bernabeu |
| Alan Thomson |

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| Joe Giacalone |
| Therese Moretto Jorgensen |
| Juan Rodriguez |
| Tim Guild |
| Delores Knipp |

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| Anthea Coster |
| Keith Groves |
| Jonathan Makela |
| Ethan Miller |
| Roger Varney |

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| Tim Bastian |
| Gregory Fleishman |
| Stephen White |
| Angelos Vourlidas |
| Jade Morton |
| Jasmina Magdalenic  |

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| Sean Brunsma |
| Yue Deng |
| Eric Sutton |
| Tzu-Wei Fang |
| John Emmert |

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| STPI Support for Workshop |
| Tom Colvin | Jericho Locke | Bebe Caldwell | Evan Linck | Katie Kowal |

# Notes on Participant Input

The workshop will follow the [Chatham House Rule](https://www.chathamhouse.org/chatham-house-rule): participants’ comments will not be attributed in any external-facing documents generated by the workshop to encourage attendees to speak freely. STPI staff will also plan on recording all sessions for notetaking purposes to ensure that the workshop’s conversations are fully captured, including technical terms and finer points of discussion. *STPI will delete these recordings once the workshop input has been synthesized, and the recordings will not be distributed outside of STPI*.

Please note that facilitators from the NSB Steering Committee and STPI will have an understanding of the specific information needed to develop the NSB report, and they will manage the time flow for discussions accordingly.

# Workshop Objectives

**Objective of the Overall Workshop**

To produce a 40% draft of the NSB report to NSF that has:

* An agreed upon structure / table of contents;
* Bullets for most of the major points the final document will likely contain;
* Identified the tasks required to produce a full rough draft of the document; and
* Assigned responsibilities, tasks, and notional due dates for the tasks.

**Objective of Day 1 (Open to the Public) – Gather Information**

We will review Phase 1 to get all participants on the same page. A panel discussion with members of the operations and user communities will help frame subsequent discussions so that benchmarks are useful to them. Breakout sessions will follow for discussion and preliminary analysis of the benchmarks.

At the end of Day 1, we should have non-prioritized bullet lists of:

* Phase 1 issues;
* Space weather operations and user communities’ needs;
* Newly published or previously un-used data and methods that may be used to update benchmarks values;
* Gaps in data and methods needed for improved benchmarks; and
* Suggestions for future research targeting potential solutions for the gaps.

**Objective of Day 2 (Core Participants Only) – Prioritize Information**

The core participants will spend the morning synthesizing and prioritizing the community input. The afternoon sessions will focus on an initial plan for the path forward and preparing for a peer review.

At the end of Day 2, we should have:

* Prioritized lists of gaps and potential solutions;
* An agreed upon structure / table of contents for the NSB report to NSF;
* Post-workshop tasks required to produce a full rough draft of the report; and
* Slides prepared for a peer review session on the morning of Day 3.

**Objective of Day 3 (Core Participants Only) – Peer Review and Implementation Plan**

In the morning, the full group convenes and each working group presents their work and plans for the future. The broader group will provide feedback. In a brief afternoon breakout session, each group digests the feedback they’ve received and update their plans as appropriate.

At the end of Day 3, we should have:

* A 40% draft of the final document as detailed above; and
* Two agreed upon date ranges for the Town Hall to be held in Washington DC in Autumn 2019.

# Preparing for the Workshop

It is expected that all core participants will become familiar with the contents of the [Space Weather Phase 1 Benchmarks](https://www.whitehouse.gov/wp-content/uploads/2018/06/Space-Weather-Phase-1-Benchmarks-Report.pdf) report prior to attending the workshop. Participants are requested to pay particular attention to their focus (working group) topic. They should also consider the following:

* Are the current benchmark quantities (the variable, not its value) well-aligned with the objectives and use cases stated in the Phase 1 Document?
* Are the benchmark values reasonable and up-to-date based on current understanding?
	+ Assessment of Phase 1 benchmark values
	+ Assessment of uncertainties on the benchmark values
	+ Are there other studies that give different values that should be referenced?
* Is the methodology used to derive the benchmark values up-to-date, rigorous, and compelling?
	+ Assessment of the methodology used.
	+ Clarity of the description of the methodology.
	+ Are there updates or alternatives?
* Recommendations for updates that could be done now or in the near term.
* Recommendations for longer-term studies or research that would improve the benchmark values, reduce their uncertainties, or improve their usability.

At the workshop we will discuss responses to these questions, aggregate and document them, and develop an initial draft of our report. Future discussions and writing are expected to take place by telecon or webex.

# Workshop Logistics

This 3-day workshop will be held from 8:30 am Tuesday, April 23, 2019 until 3:30 pm Thursday, April 25, 2019 at the Sheraton Denver West in Lakefield, CO. Participants should have received an email from Robin Dorsey with instructions for completing all travel and lodging reservations.

# Contact Information

For questions concerning travel and lodging, please contact Robin Dorsey at rdorsey@nasaprs.com or (202) 479-9030, Ext. 281

For any questions about the workshop, please contact Tom Colvin (STPI) at tcolvin@ida.org or call / text 571-414-7795.

1. NSTC, *National Space Weather Strategy*, 2015, https://www.sworm.gov/publications/2015/nsws\_final\_20151028.pdf [↑](#footnote-ref-1)
2. NSTC, *National Space Weather Action Plan*, October 2015, https://www.sworm.gov/publications/2015/swap\_final\_\_20151028.pdf [↑](#footnote-ref-2)
3. NSTC, *National Space Weather Strategy and Action Plan*, October March 2019, https://www.whitehouse.gov/wp-content/uploads/2019/03/National-Space-Weather-Strategy-and-Action-Plan-2019.pdf [↑](#footnote-ref-3)