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宇宙環境シンポジウム
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宇宙天気予報に関する最近の国際動向

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“Global Space Weather Warning System”…

ISEE NICT

How do we avoid/mitigate space weather disasters?

- Space/ground based Observations
- Prediction with Simulation/Artificial Intelligence
- Useful and appropriate Alert

Current and Future SWx Observation

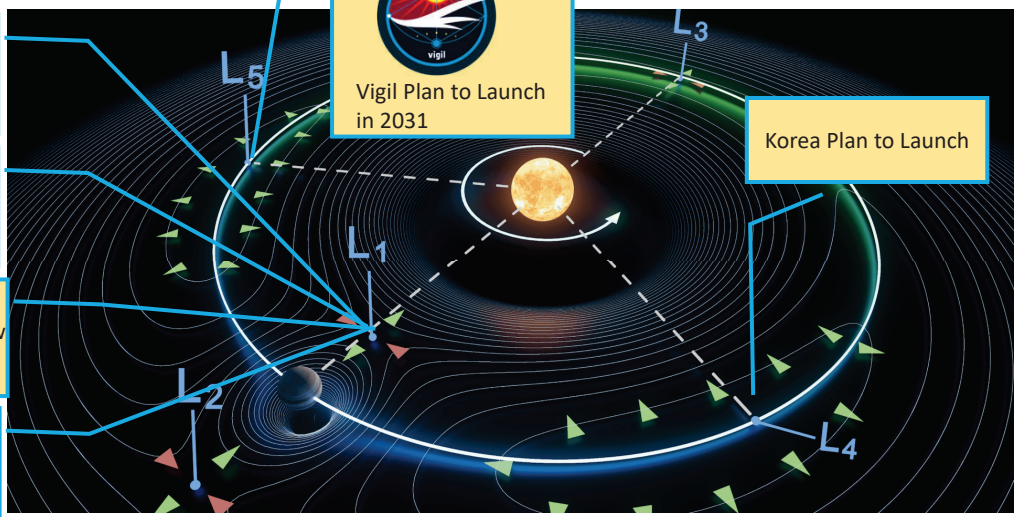
Space-based Observation

SOHO
1995-now

ACE
1997-now

DSCOVR
2015-now

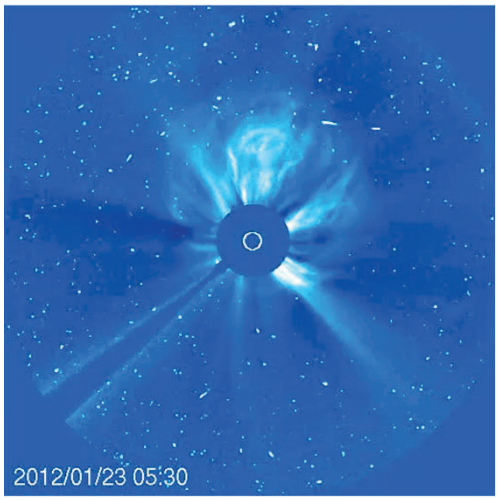
SWFO-L1 plan to launch in 2025



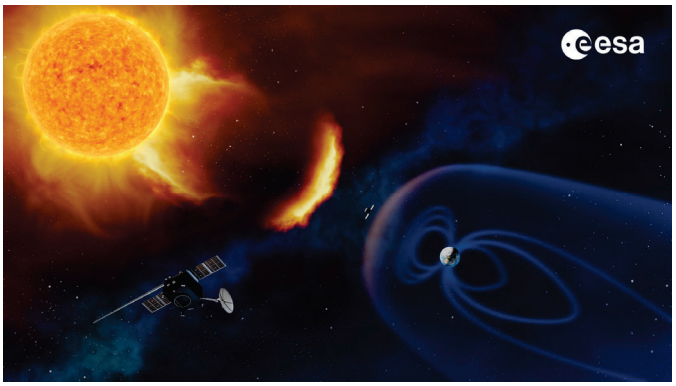
Vigil Plan to Launch in 2031

Korea Plan to Launch

Importance of CME measurement from L4/5



SOHO CME image observed on Jan. 23, 2012

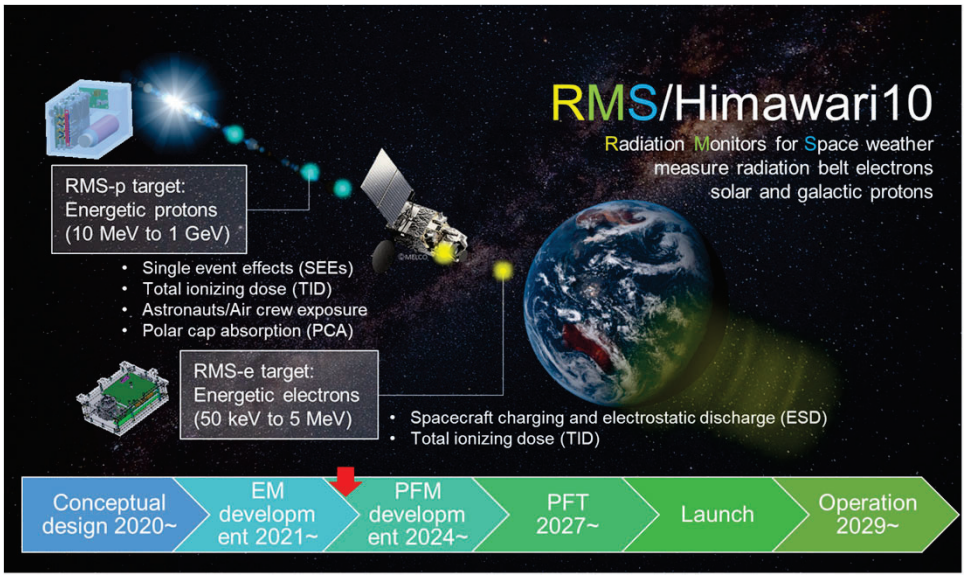


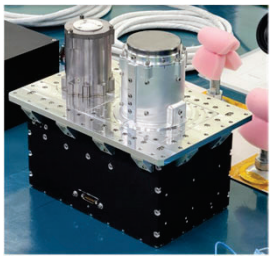
The precision of arrival time estimation will be improved significantly.

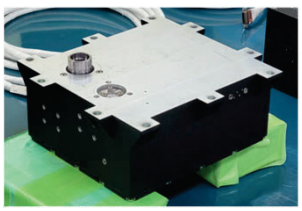
Satellite observation near the Earth (Operational)

- Many recent meteorological satellites has space environment sensors for monitoring space weather.
- However, the sensor on board recent HIMAWARI is for house keeping which means the performance is not enough, so Pacific region has been vacant area for monitoring space weather.

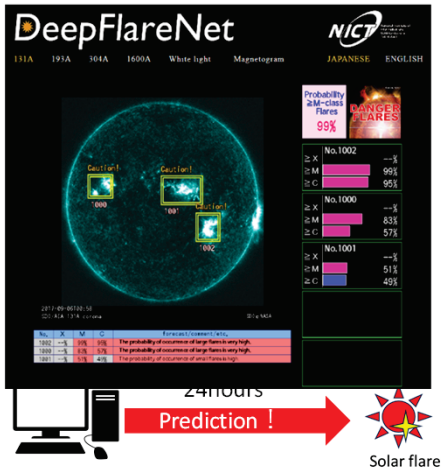
Satellite observation near the Earth (Operational)

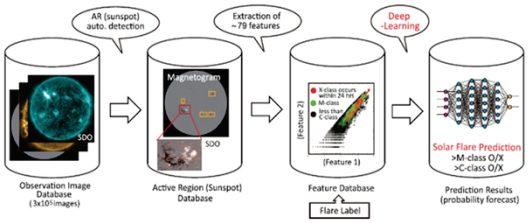




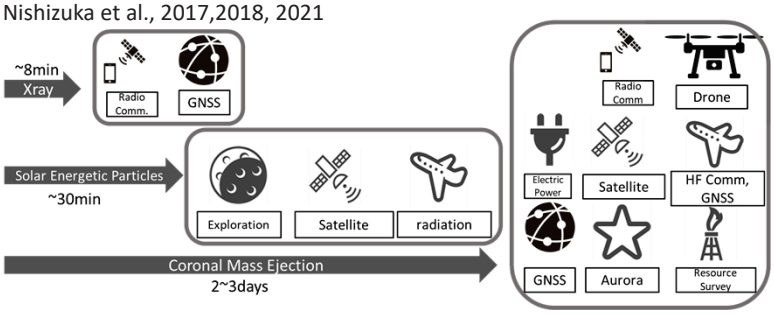


Numerical simulation and AI for extending lead time for prepardness





Nishizuka et al., 2017,2018, 2021



Monitoring SWx phenomena with ground-based observation

Ground based observation has the longest history for monitoring space weather, but global coordination is still not enough mainly due to;

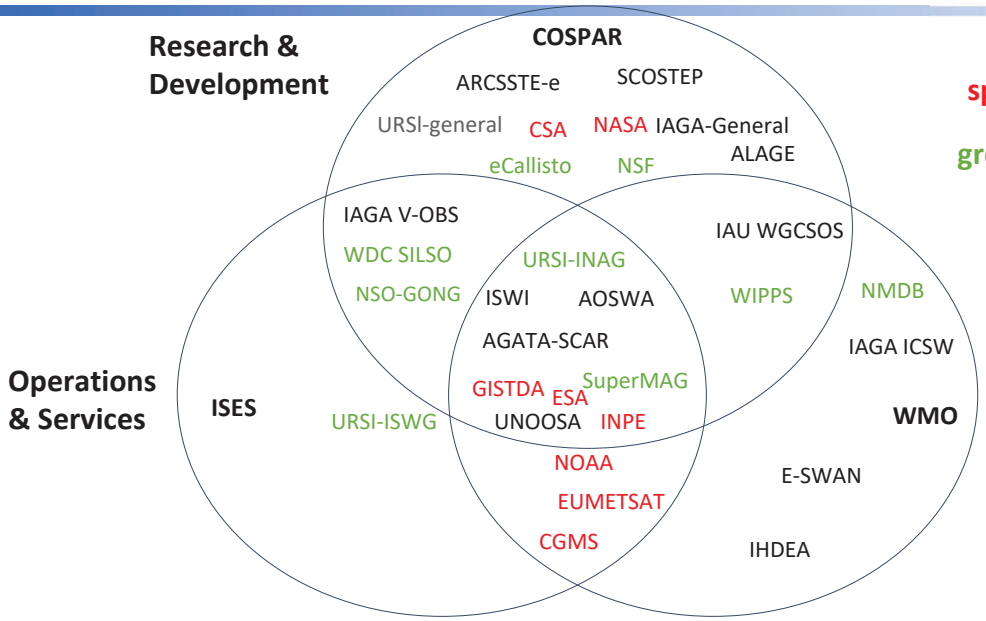
- Diverse Agencies and Priorities
- Lack of Unified Data Systems
- Heterogeneous Instruments and Data Formats
- Geographic Distribution and Coverage Gaps
- Operational vs. Research focus
- Data sharing and Open Access
- Funding and Resource Allocation

POOR COORDINATION IN GROUND-BASED SPACE WEATHER OBSERWATION

Drawed by Gemini

It is necessary to coordinate by international organizations, but…

Primary area of organisations' expertise



WMO-ISES-COSPAR Coordination

- Letter from UN Office of Outer Space Affairs (**UNOOSA)** dated on **July 1, 2022** by request of the Committee on the Peaceful Uses of Outer Space (**UNCOPUOS**) and its Scientific and Technical Subcommittee (STSC).

- COSPAR, ISES and WMO are invited to lead efforts to improve the global coordination of space weather activities in consultation and collaboration with other relevant actors and international organizations.

Space Weather International Coordination Forum (Nov 17 2023, Geneva)

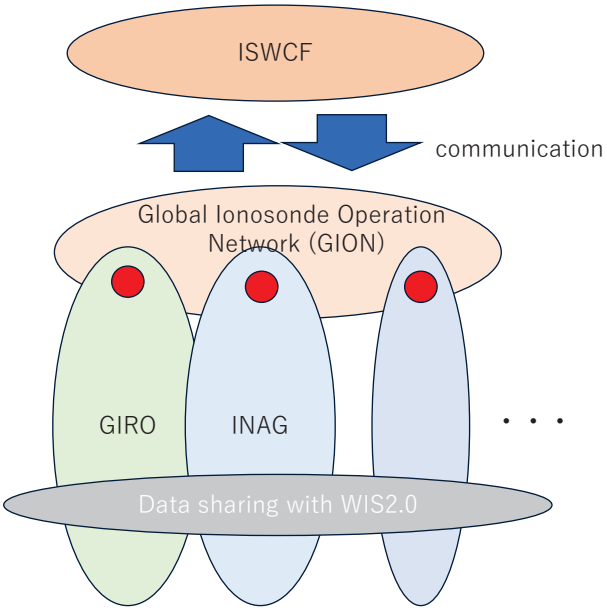
Anticipated outcomes include:

- An outline of the international space weather landscape identifying **primary expertise of each organization** represented in the Forum
- Initial Discussion about the coordination in;
  - Space Based Observation
  - Ground Based Observation
  - User Engagements
- Plans for interfacing with organizations representing major user groups
- Approach to alignments with national strategic planning activities and funding programs
- Plans for join projects to demonstrate the value of collaboration and coordination

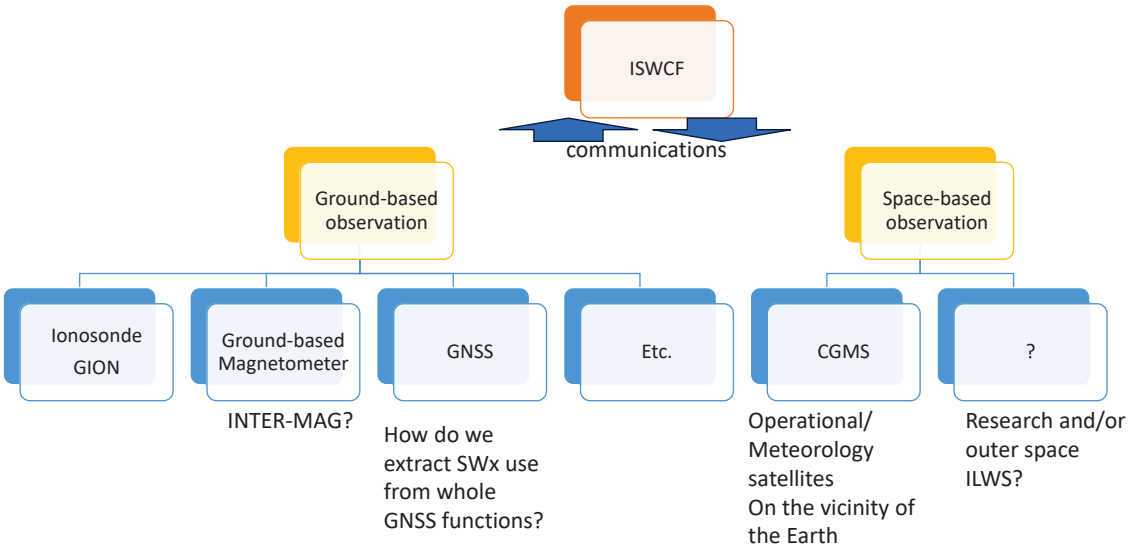
Establishment Plan of "Global Ionosonde Operation Network (GION)

Aim: establish the international comprehensive organization who work for Ionosonde observation/operation as a member of ISWCF.
Structure: group of the representatives and liaisons of existing organizations
Function:

- Work as the representative of Ionosonde observation in ICFWS: input opinions as ionosonde community and spread the information discussed in ISWCF in ionosonde community
- Discuss coordination of ionosonde network
  - Data sharing with WIS2.0
  - Registration of Observation: New digisonde and registration of the URSI station code



Current and Future structure of SWx observations



International Agency Space Weather Coordination Group (IASWCG) led by J. Spann

- Analogous to the International Agency Coordination Group (IACG) from >30 years ago, that gave birth to the original ISTP – IASWCG is a space weather version of IACG.
- IASWCG is a forum where agencies that fund space weather missions and research can come together to share their plans and coordinate missions/research relevant to space weather
- Agencies use community efforts as part of their decision-making process (e.g. ISTP-NEXT, COSPAR ISWAT, Decadal Surveys, existing roadmaps, strategies, and gap analysis).
- IASWCG enables minimization of duplication and identification of observation-mission-research gaps, and it promotes global collaboration where each agency participating to the extent they are able.
- IASWCG complements the existing operational space weather coordination efforts of the World Meteorological Organization (WMO) and the Coordination Group of Meteorological Satellites (CGMS).
- The IASWCG concept is consistent with the COSPAR ISWAT Coimbra Declaration and the UN COPUOS Space Weather Expert Team recommendation document, and is part of NASA's space weather strategy and implementation.

Summaries

- International framework for Space Weather Research, Development and Operation is now changing significantly.
- The comprehensive ionosonde observation/operation network group in the world was established in March 2025. Following this action, (probably) similar group for GNSS and ground-based magnetometer is to be discussed.
- Coordination for Research-based and/or outer space observation is now one of the hottest issues. Two candidates, ILWS and IASWCG.
- We need to discuss and decide the attitude to this action.