



Continuous Advancements in Space Weather Monitoring and Forecasting in Taiwan

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Since 2015, the Space Weather Operational Office (SWOO) of the Central Weather Administration (CWA) has been responsible for providing localized space weather information and forecasts. Due to Taiwan's location near the Equatorial Ionization Anomaly (EIA), rapid plasma variations frequently impact satellite communications and navigation systems. To address these challenges, CWA has expanded its team and established a professional division of labor, separating Research and Development (R&D) from Operations and Forecasting (O&F) to ensure high-quality operational services. Currently, CWA utilizes a data-assimilated ionosphere-thermosphere coupled model for daily operations. This system integrates the TIE-GCM 1.95 model with the Data Assimilation Research Testbed (DART) framework, incorporating ground-based GNSS and FORMOSAT-7/COSMIC-2 observations to provide 6-hour forecasts. Additionally, new products are being developed to support the growing space research and industry, including a Global Ionospheric Specification (GIS) product providing a top-down view of the Northern Hemisphere from the North Pole developed by National Cheng Kung University (NCKU) and customized orbital forecasts for neutral atmospheric density. Finally, the CWA is pleased to announce that it will co-host the Asia Oceania Space Weather Alliance (AOSWA) Workshop with the Taiwan Space Agency (TASA) in Taiwan this November. We sincerely welcome all opportunities for international cooperation and look forward to strengthening global partnerships in space weather research and operation.

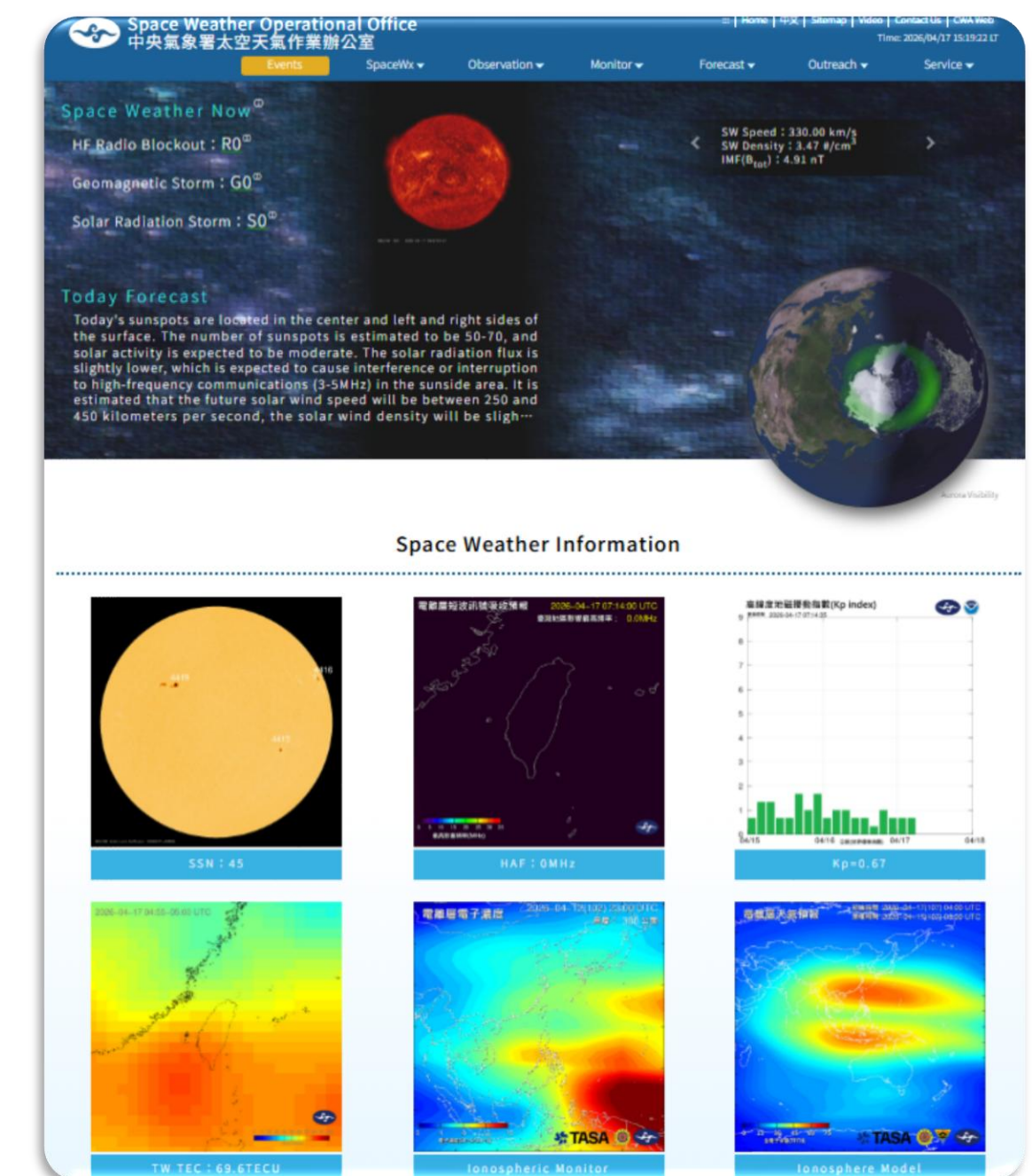
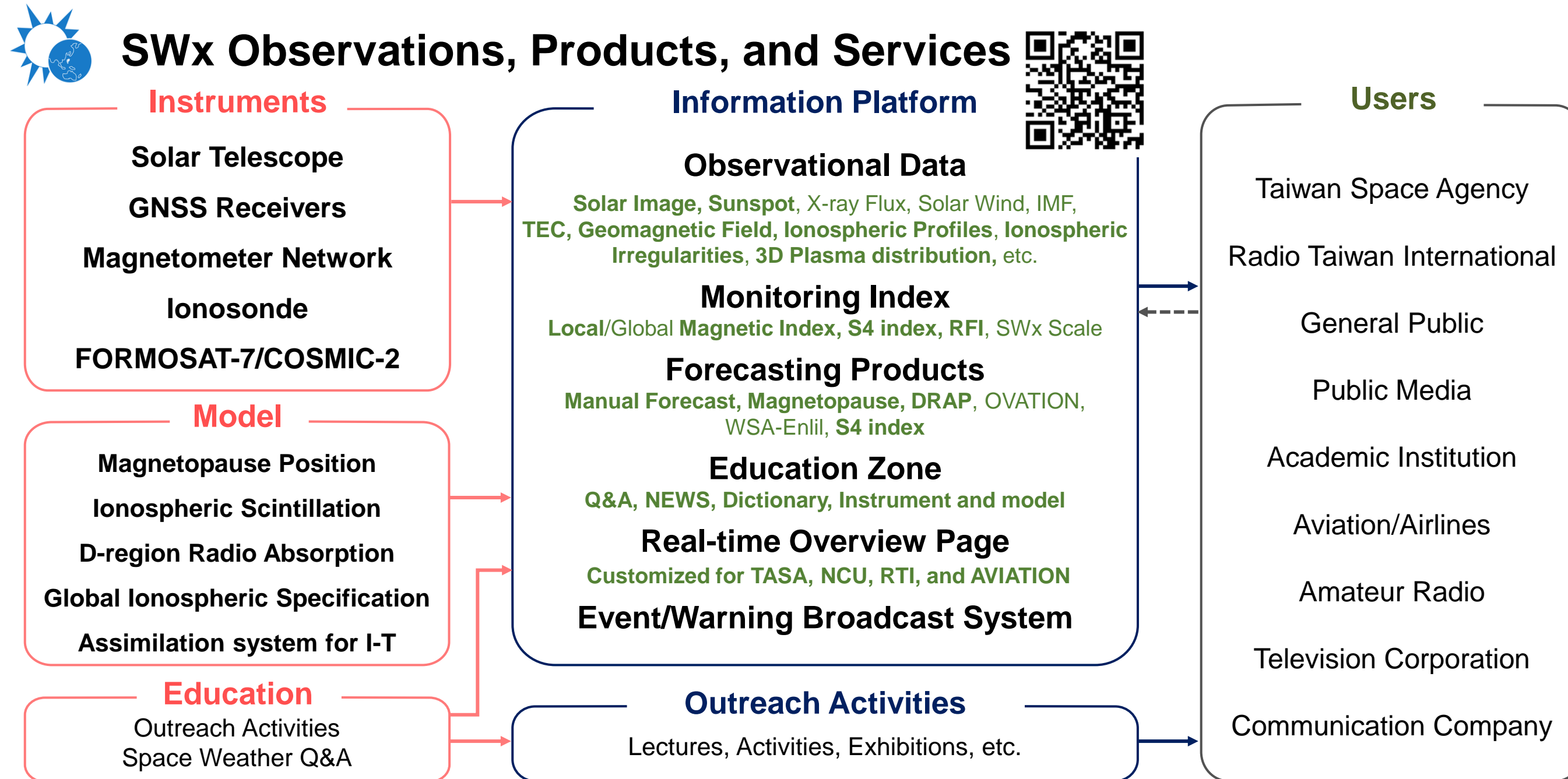


Fig. Website of the space weather service in CWA.

New organizational structure

Space Weather Services

Taipei Astronomy and Weather Station

- Hand-drawing sunspot
- Daily forecast
- Alert announcement
- Public Service

Space Weather Operational Office

- Website maintenance
- Model development
- Data provide
- Research

Taiwan Analysis Center for COSMIC

- RO/R data process
- GNSS data process
- Data archive
- Research

Thermospheric density and satellite orbit

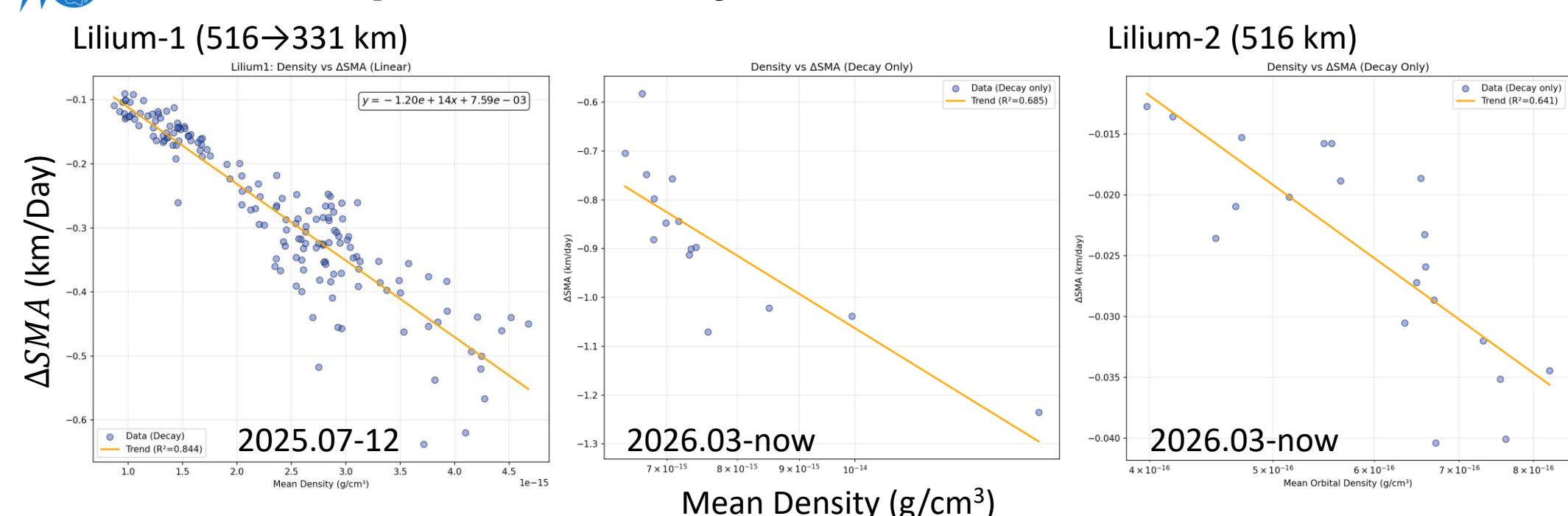


Fig. Correlation between Liliu-1/2 orbital decay (ΔSMA) and mean density from CWA's assimilated TIEGCM model. The strong linear relationship (up to $R^2 = 0.844$) demonstrates the model's reliability in capturing thermospheric density variations. This confirms the potential of using our model to forecast along-orbit neutral density and orbital decay rates for operational services.

New ionosphere product

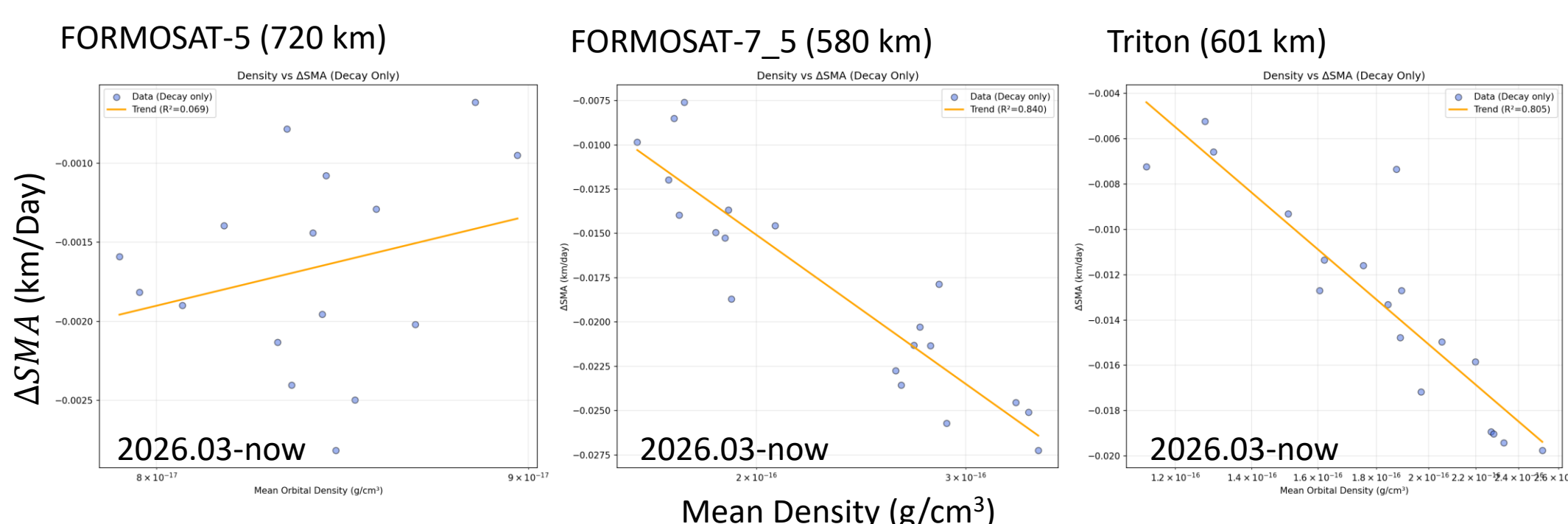
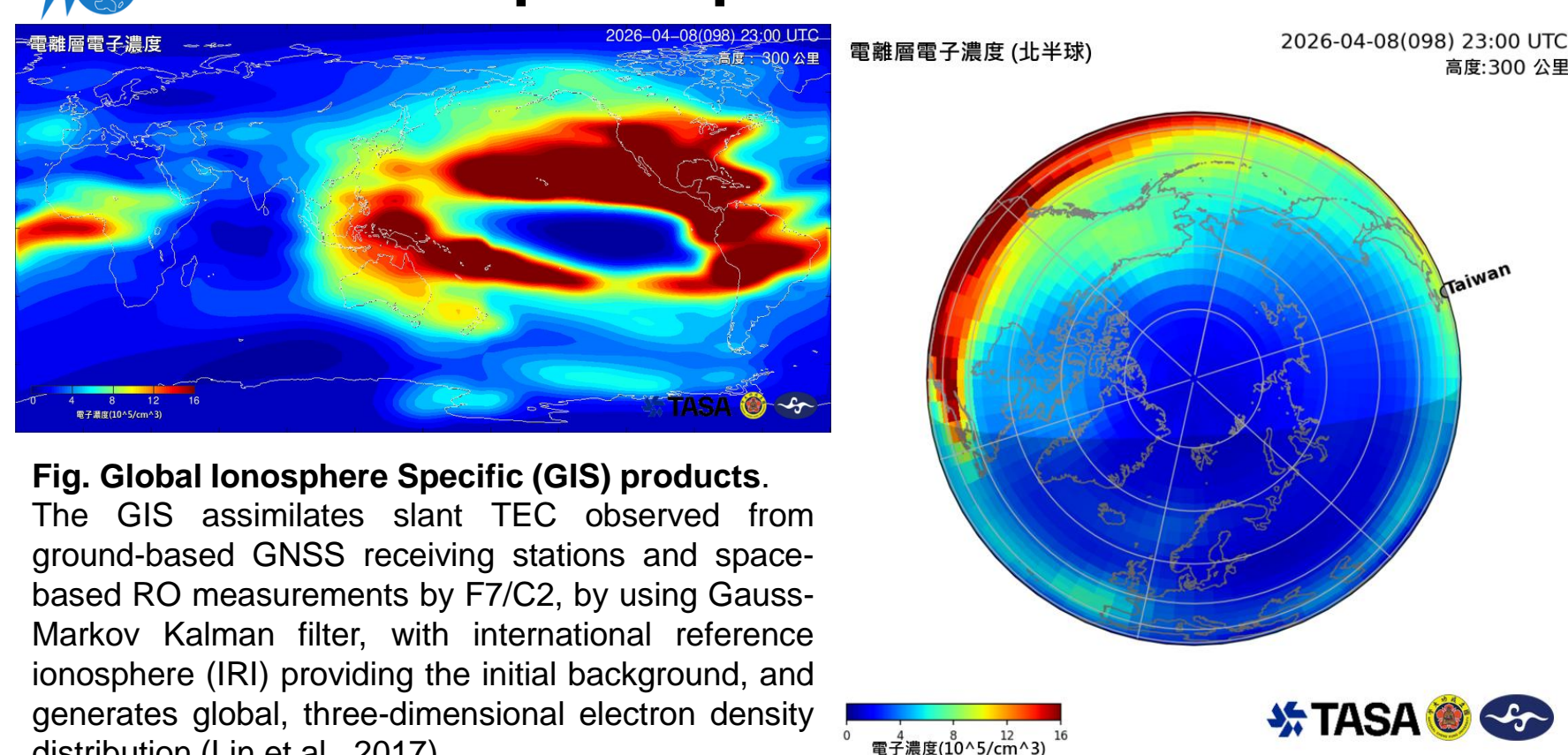


Fig. Comparison of orbital decay (ΔSMA) for FORMOSAT-5, FORMOSAT-7_5, and Triton against mean density from the CWA assimilated TIE-GCM model. The lower correlation of Formosat-5 may be attributed to its proximity to the model's upper boundary or frequent attitude maneuvers.

Asia-Oceania Space Weather Alliance meeting (AOSWA 2026) in Taiwan

- For the purpose of further development of space weather activities in the Asia-Oceania region such as research efforts, operational collaboration, data exchanges and other various works, the associate's organization have planned to hold an annual AOSWA workshop and few related sessions.
- AOSWA 2026** will be held concurrently with **TASTI 2026** (Taiwan International Assembly of Space Science, Technology, and Industry) and **NSAT+** (Nano-Satellite Symposium+).
- Dates: **November 8 (Sun) – November 11 (Wed), 2026**
- Venue: International Convention & Exhibition Centre Tainan (ICC Tainan)
- Registration and Abstract Submission are opening soon!**



AOSWA 2026
Asia-Oceania Space Weather Alliance
TAIWAN

- CWA has restructured its operations into three specialized working groups with 11 members, enhancing our capacity for delivering comprehensive space environment forecasts and services.
- The assimilated model demonstrates significant potential for operational services in forecasting along-orbit neutral atmospheric density and satellite orbital decay rates.
- We cordially invite you to submit your latest research to the AOSWA Workshop 2026 in Taiwan this November to further international collaboration in space weather services.
- Welcome to check out the space weather service website (swoo.cwa.gov.tw) for more information, products, and data. We are looking for possible international collaborations.