First experience in operationally monitoring and assessing the space weather impact on GNSS positioning

Service

The SWIPPA project provides specific space weather information to GNSS reference network operators in Germany and other European countries. The system includes the following key features:

- **Network Model Integrity**: The system uses ionospheric models to calculate the impact on GNSS signals. The accuracy is improved by including real-time data from ground-based monitoring stations.

- **TEC Calculation Error**: The service monitors the total electron content (TEC) and provides error estimates for improved positioning accuracy.

- **Scintillation Monitoring**: This feature helps in detecting and analyzing scintillation events, which can affect GNSS signal quality.

- **Space Weather Warning**: The service issues alerts for potential space weather events that could impact GNSS operations.

- **Cycle Slip Monitoring**: The system monitors for cycle slips in GNSS signals, which can degrade positioning accuracy.

- **S4 Index Monitoring**: The S4 index is used to assess the level of scintillation activity, which can impact signal quality.

Products

- **TEC Data**: The service provides TEC values for different areas, which are crucial for accurate positioning.

- **Gradient Maps**: These maps indicate areas with high ionospheric gradients, which can affect signal propagation.

- **TEC Trends**: The system analyzes TEC trends over time, providing insights into long-term ionospheric behavior.

- **Scintillation Maps**: These maps show areas prone to scintillation, helping in avoiding such regions for critical applications.

- **Space Weather Alerts**: The service issues immediate alerts for potential space weather events, ensuring timely preparation for operators.

Benefit

Benefits of the SWIPPA space weather service include:

- **Improved GNSS Signal Quality**: The service helps in maintaining the quality of GNSS signals, reducing the risk of data loss.

- **Enhanced Positioning Accuracy**: By providing timely warnings and data, operators can adjust their systems to maintain accuracy.

- **Reduced Operational Costs**: By avoiding repeated satellite re-acquisitions, the system helps in reducing costs associated with GNSS operations.

- **Increased Reliability**: The service enhances the overall reliability of GNSS systems, improving their availability and performance.

Consortium

The SWIPPA project is a collaborative effort involving several organizations, including:

- **German Aerospace Center**: Germany's leading space research institute.

- **IEEA**: Institute of Electromagnetic Engineering and Modeling, France.

- **LVMV**: Land Surveying Office of Mecklenburg-Vorpomern, Germany.

- **SWISSCOM**: Swiss telecommunications company.

- **University of Applied Sciences**: Neubrandenburg, Germany.

References


Website

http://www.kn.dlr.de/swippa/index.htm

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