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IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing
Special Issue on "Towards Semantic and Reasoning-Enabled Remote Sensing: Vision-Language Models for Retrieval, Interpretation, and Interaction"

Recent advances in Vision–Language Models (VLMs) have introduced a transformative paradigm for artificial intelligence by bridging visual perception and natural language understanding. While traditional deep learning approaches in remote sensing have achieved remarkable success in tasks such as land-cover classification, object detection, and change detection, they remain largely limited to perceptual-level recognition tasks and lack the ability to perform semantic reasoning, contextual interpretation, and interactive analysis.

The integration of VLMs into remote sensing opens new possibilities for semantic Earth observation, enabling natural-language querying of geospatial data, cross-modal retrieval of satellite imagery, multimodal reasoning for environmental monitoring, and interpretable explanations of complex geographic phenomena. By jointly modeling visual and textual information, VLMs allow Earth observation archives to become more accessible, interactive, and knowledge-driven.

Despite these opportunities, significant challenges remain. Most existing VLMs are trained on natural image datasets and exhibit substantial domain gaps when applied to remote sensing modalities such as SAR, hyperspectral, LiDAR, and UAV imagery. In addition, limited annotated datasets, heterogeneous spatial resolutions, and the complexity of geospatial reasoning introduce further obstacles for reliable and scalable deployment.

This Special Issue aims to bring together the latest research advances in Vision-Language Models for remote sensing, focusing on semantic understanding, multimodal reasoning, cross-modal retrieval, and explainable geospatial analytics. The goal is to promote the development of next-generation AI techniques that enable remote sensing systems to move beyond recognition toward semantic intelligence and knowledge-driven Earth observation.

The broad topics include (but are not limited to):

- Few-shot, zero-shot, and open-vocabulary geospatial semantic understanding with VLMs
- Semantic indexing and cross-modal retrieval for large-scale EO using VLMs
- Vision–language reasoning for environmental, urban, and industrial geospatial analytics
- Generative and captioning-based VLMs for remote sensing change detection
- Cross-modal alignment and fusion of SAR, hyperspectral, LiDAR, and multispectral data
- Explainable VLMs for visual–textual reasoning in EO decision support
- Fine-tuning, domain adaptation, and benchmarking for RS-specific VLMs
- VLM applications in disaster response, agriculture, climate, and ecology
- Prompt engineering, instruction tuning, and RAG for geospatial VLMs
- Trustworthy and robust VLM frameworks for Earth observation intelligence

Schedule

April 1, 2026 Submission system opening
October 31, 2026 Submission system closing

Format

All submissions will be peer reviewed according to the IEEE Geoscience and Remote Sensing Society guidelines. Submitted articles should not have been published or be under review elsewhere. Submit your manuscript on http://mc.manuscriptcentral.com/jstars, using the Manuscript Central interface and select the "**Towards Semantic and Reasoning-Enabled Remote Sensing: Vision-Language Models for Retrieval, Interpretation, and Interaction**" special issue manuscript type. Prospective authors should consult the site https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9082768 for guidelines and information on paper submission. All submissions must be formatted using the IEEE standard format (double column, single spaced). Please visit http://www.ieee.org/publications_standards/publications/authors/author_templates.html to download a template for transactions. Please note that since Jan. 1, 2026, IEEE J-STARS, as a fully open-access journal, is charging a flat publication fee of $1,800 per paper.

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