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IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing Special Issue on “Resource-Constrained Multimodal Foundation Models: Toward Advanced Remote Sensing Applications”

The rapid development of multimodal foundation models tailored for resource-constrained scenarios is accelerating the evolution of intelligent remote sensing analysis from traditional "computing-intensive modeling" toward "efficient and lightweight deployment", bringing new research paradigms and technological opportunities to this field. Compared with conventional remote sensing multimodal models that heavily rely on powerful computing, large storage and sufficient bandwidth, resource-constrained multimodal foundation models adopt lightweight architectures, efficient computing paradigms and low-cost optimization strategies, which have the potential to break through long-standing bottlenecks in remote sensing, including difficult edge deployment, insufficient real-time inference capability, poor hardware compatibility and high deployment costs. Their key advantage lies in greatly reducing model parameters and computational overhead while retaining multimodal fusion capability and task performance. These models can migrate advanced multimodal modeling capabilities to resource-limited platforms such as spaceborne payloads, airborne devices and field terminals, significantly expanding the application scope and enhancing the processing capacity for complex land surface scenes, multi-source remote sensing data and spatiotemporal dynamic changes. They also provide strong support for developing practical remote sensing foundation models with low power consumption, easy deployment and strong generalization. This Special Issue aims to bring together the latest advances, representative methods and typical application achievements in this field, focusing on the key theories, core technologies and practical scenarios of resource-constrained multimodal foundation models in remote sensing image analysis, reasoning, real-time decision-making and engineering implementation. We sincerely welcome high-quality original research articles, review papers and application studies from both academia and industry, to jointly advance intelligent remote sensing technology into a new era featured by lightweight design, low-resource adaptation and cloud-edge collaborative deployment.

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

- Remote sensing multimodal representation learning and lightweight foundation model design (e.g., lightweight vision-language modeling, optimized multimodal fusion, cross-modal alignment, domain-adaptive foundation models for resource constraints).
- Language-guided remote sensing perception and reasoning under resource constraints (e.g., classification, detection, segmentation, change detection, spatial reasoning, spatiotemporal reasoning)
- Remote sensing image-text dataset construction and lightweight model adaptation with limited resources (e.g., image-text dataset construction, lightweight instruction tuning, few-shot reasoning data generation, knowledge-enhanced training, efficient domain fine-tuning).
- Applications of resource-constrained multimodal foundation models in remote sensing (e.g., agricultural monitoring, urban functional analysis, disaster assessment, ecological monitoring, on-orbit real-time interpretation, UAV edge perception).

Schedule

Sept. 01, 2026 Submission system opening
Feb. 28, 2027 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 “**Resource-Constrained Multimodal Foundation Models: Toward Advanced Remote Sensing Applications**” 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 \$1,800 per paper.

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