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IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing

Special Issue on

“Large Language Models-Enhanced Low-Altitude Remote Sensing: Advances, Applications, and Challenges”

Low-altitude remote sensing (LARS), enabled by unmanned aerial vehicles (UAVs) and aerostats, has emerged as a cornerstone technology for addressing global challenges in environmental sustainability, urban planning, disaster management, and infrastructure monitoring. Modern LARS systems generate massive amounts of heterogeneous data daily, yet traditional artificial intelligence (AI) approaches struggle to reconcile these modalities. For instance, agricultural monitoring requires simultaneous analysis of multispectral crop health imagery, weather sensor data, and textual field reports, which is a task that demands seamless cross-modal alignment. However, current solutions rely on task-specific models, leading to fragmented workflows. The rapid development of LARS systems has exposed critical bottlenecks in data processing efficiency, cross-domain generalization, and decision-making agility, particularly when handling multimodal data streams (e.g., optical, LiDAR, SAR, thermal) in dynamic environments. Large language models (LLMs), originally designed for text generation, have demonstrated unprecedented capabilities in multimodal reasoning and context-aware decision-making, which align well with LARS requirements. Therefore, the integration of LLMs into LARS will be promising and may bring new solutions to various applications within the LARS field.

This special issue aims to address the urgent need for a focused discussion on the integration of LLMs into LARS, and bring together cutting-edge research on LLM-enhanced LARS applications, addressing technical innovations, real-world applications, and critical challenges. By fostering interdisciplinary research at the nexus of AI and geoscience, ultimately put LARS toward autonomous, efficient, safe, and scalable systems.

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

- LLM-enhanced multimodal data fusion and cross-domain alignment in remote sensing
- LLM-enhanced data quality assessment and enhancement strategies in remote sensing
- LLM-enhanced heterogeneous data fusion in remote sensing applications
- LLM-enhanced synthetic data evaluations and utilization in remote sensing
- LLM-enhanced multi-UAVs collaboration in low-altitude remote sensing
- LLM-enhanced LARS applications in precision agriculture and environmental monitoring
- LLM-enhanced LARS applications in urban planning and disaster management
- Edge deployment and lightweight model optimization for low-altitude remote sensing
- Data security and privacy protection in LLM-enhanced low-altitude remote sensing systems
- Case studies showcasing the impact of LLMs on AI performance in low-altitude remote sensing

Schedule

1 Nov 2025 Submission system opening

31 May 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 “Large Language Models-Enhanced Low-Altitude Remote Sensing: Advances, Applications, and Challenges” 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 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, 2025, IEEE J-STARS, as a fully open-access journal, is charging a flat publication fee \$1,800 per paper.

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