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IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing
Special Issue on "*Multimodal Deep Reinforcement Learning for Autonomous Earth Observation and Remote Sensing*"

Earth observation systems are transitioning from passive sensing infrastructures toward intelligent and autonomous platforms. This shift is driven by the increasing availability of heterogeneous sensing modalities such as optical imaging, hyperspectral sensors, Synthetic Aperture Radar (SAR), LiDAR, Global Navigation Satellite Systems (GNSS), UAV platforms, and distributed in-situ sensors. The integration of these diverse data sources enables comprehensive monitoring of complex Earth processes. However, the scale and heterogeneity of modern remote sensing data require advanced learning frameworks capable of adaptive decision-making and dynamic interaction with the environment.

Deep Reinforcement Learning (DRL) offers a promising paradigm for enabling such autonomy by allowing intelligent agents to learn optimal sensing and decision strategies through environmental interaction. When combined with multimodal learning, DRL can fuse heterogeneous data streams to support context-aware and adaptive Earth observation, with applications ranging from disaster monitoring and environmental surveillance to precision agriculture and urban analytics. Despite growing interest in Artificial Intelligence (AI) for remote sensing, research on DRL-based autonomous Earth observation remains limited and fragmented.

This Special Issue seeks to advance the field by bringing together research on theoretical foundations, algorithmic innovations, system architectures, and practical applications of multimodal DRL for next-generation Earth observation systems.

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

- Multimodal DRL for Earth observation
- Autonomous satellite and UAV sensing systems
- Adaptive sensor tasking and observation scheduling
- Closed-loop remote sensing and real-time monitoring
- Multi-agent DRL for cooperative sensing
- On-board learning and edge intelligence for spaceborne platforms
- Intelligent data acquisition, compression, and prioritization
- Hybrid physics-informed and DRL models
- Transformer-based architecture for sequential decision-making in Earth observation
- Diffusion models and generative learning for adaptive sensing and environmental simulation
- Integration of foundation models with DRL for Earth system intelligence
- Human-in-the-loop DRL for Earth observation systems
- DRL for applications like, but not limited to, disaster monitoring and response, climate change analysis and environmental system monitoring, precipitation nowcasting and short- to medium-term forecasting, hyperspectral band selection, smart cities and urban sensing, time-series analysis, etc.
- Benchmark datasets and simulation environments for DRL in remote sensing

Schedule

March 30, 2026	Submission system opening
August 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 "**DRL4EORS**" 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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