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Ariel Data Challenge 2025: Advancing Exoplanetary Signal Extraction for the Ariel Space Telescope

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We propose a followup to our 2024 Ariel Data Challenge, which tackled the fundamental problem of extracting extremely faint exoplanetary signals hidden within non-linear noise. Despite attracting global participation with its realistic space mission simulation, the challenge remains unsolved, as even top solutions failed to meet the mission's strict requirements.

Our 2025 competition enhances the existing data pipeline with improved simulation fidelity that better reflects actual space observations and incorporates Ariel's latest observation strategy. This challenge has two key goals: developing solutions directly applicable to the Ariel Space Telescope mission and advancing methodologies for processing spatial-temporal data.

At its core, this competition promotes innovation in both denoising techniques and methods for proper uncertainty quantification. Advances made through this work will benefit numerous fields facing similar signal extraction challenges, including, but not limited to, earthquake analysis, remote sensing, Earth observation, and satellite imaging. At EPSC-DPS 2025, we would like to take this opportunity to advertise the challenge to the broader scientific community, share our insights developed during ADC 2024 edition, and discuss the role of challenges in helping to promote open science to external communities.