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Conference Abstract

From Environmental Data to AI-ready Knowledge: Advanced Digital Infrastructures and Services for eLTER Research Infrastructure and Open Science

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Abstract

Long-term ecosystem research offers a unique opportunity to understand environmental change across decades, disciplines, and geographical scales. Yet its full scientific potential depends not only on collecting high-quality observations, but also on our ability to connect, interpret, and reuse them across diverse research communities. Bridging this gap requires a new generation of digital research infrastructures that bring environmental expertise and emerging technologies closer together.

The eLTER Research Infrastructure is addressing this challenge by building a connected digital ecosystem that supports the entire journey from environmental observations to scientific knowledge. Its evolving Cyberinfrastructure provides a foundation for FAIR and interoperable data, shared research services, and Open Science, while opening new opportunities for more advanced, reproducible, and integrated ecosystem research.

Looking ahead, emerging approaches to data quality, harmonisation, community-driven sharing of solutions, and artificial intelligence promise to reshape how researchers interact with environmental data and services. The ambition is not to replace scientific expertise, but to empower it through technologies that make research more efficient, accessible, and capable of addressing increasingly complex questions.

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This keynote explores the transition towards an AI-ready research infrastructure, highlighting both its technological opportunities and the essential role of scientific communities in shaping its future. Ultimately, the next generation of ecosystem research will depend not only on smarter technologies, but on our ability to build and use them together.

Keywords

Long-term Ecosystem Research, eLTER Research Infrastructure, Cyberinfrastructure, FAIR Data & Open Science, Emerging Technologies and Services, Artificial Intelligence

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Conflicts of interest

The authors have declared that no competing interests exist.