SciDataCon 2025



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Type: Session

Integrating Ecosystem Observatories: Data Collaboration Across Continental-Scale Research Infrastructures

Tuesday 14 October 2025 16:00 (1h 30m)

Research infrastructure initiatives play a critical role in enabling data-intensive science by providing the capabilities and services necessary for researchers to deliver innovative outcomes. In the environmental sciences, continental-scale research infrastructures facilitate consistent and standardised data collection across broad spatial and temporal scales. These datasets, collected through in-situ measurements, aerial and satellite-based remote sensing, long-term monitoring, citizen science, and model outputs, are diverse and complex. These data are crucial for detecting and quantifying environmental changes, validating remote sensing products, and calibrating models. Effective management of these vast and heterogeneous data collections requires a robust infrastructure to ensure they are Findable, Accessible, Interoperable, and Reusable (FAIR) at local, regional, and global scales.

This session will convene data infrastructure specialists, data scientists, data engineers, and researchers to explore how ecosystem research infrastructures, such as the Terrestrial Ecosystem Research Network (TERN, Australia), National Ecological Observatory Network (NEON, USA), South African Environmental Observation Network (SAEON), Integrated Carbon Observation System (ICOS), and European Long-Term Ecological Research (eLTER) are advancing data management and related infrastructure to build interoperable large-scale ecosystem observing networks to support global ecological understanding. For example, all of these research infrastructures, under the umbrella of the Global Ecosystem Research Infrastructure (GERI), are piloting data harmonisation across numerous data products for use in ecological drought research. This session will explore barriers, opportunities, and challenges to:

- Manage and process large-scale datasets from in-situ and remote sensorsList item
- · Share indigenous data guided by CARE principles
- Apply FAIR principles, persistent identifiers, and semantic web technologies to enable data sharing across platforms and jurisdictions
- · Develop data and metadata standards and controlled vocabularies for interoperability
- Leverage cloud-based infrastructure and high-performance computing platforms to support national and global collaborations
- · Discuss strategies to foster data sharing and interoperability to enable data-intensive research at scale
- Address policy and governance challenges for the equitable use of infrastructure
- Develop and support next-generation infrastructure to provide curated training datasets and integrate Artificial Intelligence and Machine Learning (AI/ML) capabilities to advance global-scale research and innovation

The session will feature presentations, interactive and panel discussions. We invite contributions on the cyberinfrastructure capabilities of environmental research infrastructure that address barriers, opportunities, and challenges for cross-infrastructure collaboration. Panel discussions will explore the challenges of crosscontinental data integration, highlight existing collaborative efforts, and identify opportunities and potential use cases that could benefit from global-scale research coordination. By the end of the session, participants will gain a shared understanding of current challenges, emerging opportunities, and actionable paths forward to advance collaboration across continental-scale research initiatives. **Primary authors:** GURU, Siddeswara (University of Queensland); Dr BROWN, Renée (The University of New Mexico); Dr LANEY, Christine (NEON USA); Dr WOHNER, Christoph (Environment agency Austria); Mr CHILOANE, Leo (South African Environmental Observation Network); Ms HELLSTRÖM, Margareta (Lund University)

Presenters: GURU, Siddeswara (University of Queensland); Dr LANEY, Christine (NEON USA); Dr WOHNER, Christoph (Environment agency Austria); Mr CHILOANE, Leo (South African Environmental Observation Network); Ms HELLSTRÖM, Margareta (Lund University)

Track Classification: SciDataCon2025 Specific Themes: The Transformative Role of Data in Sustainable Development Goals and Disaster Resilience