Contribution ID: **197** Type: **Session**

Decentralizing for Resilience: Beyond Data Rescue in Global Climate Networks

Wednesday 15 October 2025 14:00 (1h 30m)

Background

For 30+ years, the scientific community has worked toward unified ocean and climate data networks. While initiatives like EarthCube, RDA, and WDS established critical foundations, centralized systems remain vulnerable to political shifts, technical failures, and disasters.

This session moves beyond theoretical discussions to **practical solutions**, building on the hard-won successes of previous initiatives while addressing their limitations. It proposes a bold yet practical vision for a **decentralized global data ecosystem** that strengthens global data resilience, enhances FAIR compliance, and leverages cutting-edge technologies like AI/ML to meet the demands of our rapidly changing environment.

Vision

We propose a network that is:

- **Distributed**: Regional hubs prevent single-point failures (e.g., Pacific/Arctic nodes)
- **AI-Optimized**: Expert-trained machine learning accelerates FAIR data curation
- **Equitable**: Actively reduces barriers for Global South participation
- **Secure Yet Open**: Federated repositories with standardized APIs

Objectives

1. **Diagnose Centralized Risks**
2. Analyze vulnerabilities in current systems using case studies
3. Highlight successful decentralized models from oceanographic and climate networks
4. **Define Decentralized Infrastructure**
5. Demo open-source tools for federated storage and AI quality control
6. Propose governance frameworks with UN/WMO oversight
7. **Launch Pilots**
8. Establish Pacific/Arctic monitoring hubs with distributed technical support
9. Prototype a Global Climate Observation Consortium (GCOC) with G20 funding mechanisms
10. **Align Policy**
11. Map outputs to SDGs and Paris Agreement targets
12. Draft agreements for open climate data access

Expected Outcomes

Participants will leave with:

- A nascent **roadmap** for transitioning to decentralized systems
- **Improved awareness** of AI/ML tools for faster FAIR data processing
- **Actionable policy ideas** for international data governance

Why This Fits IDW 2025

- **Local Action**: Partners with Australian/Pacific Island researchers on sea-level resilience
- **Global Need**: Addresses instability in centralized climate data systems
- **Technical Innovation**: Features AI curation tools in-development

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Session Format (90 min)

1. **Keynote (10 min)**: "Lessons from Vulnerable Centralized Networks"
2. **Lightning Talks (20 min)**:
3. **Workshop (30 min)**: Build a decentralization checklist using real Arctic datasets
4. **Panel (20 min)**: Policymakers \+ technologists debate implementation hurdles

Target Audience

- **Data Engineers** needing resilient architectures
- **Policy Teams** drafting international data agreements
- **Tool Developers** working on federated/AI solutions
- **Equity Advocates** for Global South access

Presenters:
- Steve Diggs (University of California Office of the President: CDL/UC3)
- Rebecca Cowley (CSIRO)

Track Classification:
- INFRA (Data Infrastructures)
- EQUITY (Inclusive Systems)

"This isn't about abandoning existing systems—it's about making them robust enough to survive the next 30 years of climate challenges."

Primary author: DIGGS, Stephen (University of California Office of the President)

Co-author: COWLEY, Rebecca (C)

Presenters: COWLEY, Rebecca (C); DIGGS, Stephen (University of California Office of the President)

Track Classification: SciDataCon2025 Specific Themes: Open research through Interconnected, Interoperable, and Interdisciplinary Data