Platforms, Digital Infrastructure & Interoperability

Thu. Nov 12, 2026 2:00 PM - 3:30 PM JST | Thu. Nov 12, 2026 5:00 AM - 6:30 AM UTC | Room B (Kujaku) (2F)

Oral B2 Digital Twin Infrastructure and Operational Services

Chair: Avichal Mehra, Shintaro Momose

3:15 PM - 3:30 PM JST | 6:15 AM - 6:30 AM UTC

[Z-NE6gfo-06] Building the South Atlantic Digital Twin of the Ocean

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The National Institute for Ocean Research (INPO) is leading a Brazilian initiative toward a Digital Twin of the South Atlantic, an interoperable and evolving environment that shall connect observations, numerical models, forecasting, artificial intelligence, high-performance computing, and visualization tools. The initiative will transform distributed scientific capabilities into actionable ocean intelligence and enable what-if scenarios for climate adaptation, marine spatial planning, disaster resilience, biodiversity conservation, maritime operations, blue economy, and evidence-based governance.

The South Atlantic presents a challenge for digital-twin development. It combines a vast spatial domain, critical ocean-climate processes, heterogeneous observing capacity, historical data gaps, and responsibilities distributed across multiple institutions. INPO's approach treats the twin not as a single model or platform, but as a federated ecosystem in which observations and simulations will be integrated across spatial and temporal scales, updated as new information becomes available, and adapted to different users and decisions.

A key enabling component is INPO's Ocean Data Storage and Distribution System (SADD), which transforms heterogeneous historical and contemporary observations into FAIR, interoperable data. Its cloud-based architecture connects data providers through standardized metadata, data harmonization, scalable storage, APIs, and AI. SADD will provide the trusted data infrastructure through which observations interact with models, forecasts, analytical services, and visualization environments. This infrastructure will be connected to forecasting environments which, in turn, will feed the Digital Twin of the South Atlantic, in a phased process.

The initiative is also an institutional innovation as INPO is articulating key players in Brazil from the public and private sectors, together with international partners, particularly through its formal partnership with Mercator Ocean International. Our aim is to support alignment with open standards and the global digital-ocean ecosystem. This combination of regional leadership, institutional federation, and interoperability offers a pathway toward an inclusive South Atlantic DITTO for a historically underrepresented ocean basin.

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