

Thematic Sessions 1.

Harnessing the power of digital innovation for sustainable peace and resilience in the context of Climate Change (SDG16)

Advancing the Weather and Climate Early Warning System Value Chain through the Open Agenda

1. Observations (Data Collection)

- **Overview:** Comprehensive data collection through sensor networks, research infrastructures, environmental and earth observation platforms are critical foundation for early warning systems
- **Gaps**
 - o Sparse data collection coverage in some regions (e.g. Africa)
 - o Lack of infrastructure and guiding infrastructure roadmaps (e.g. sensor network, research infrastructure RIs etc)
- **Recommendations**
 - o National Research Infrastructure Roadmaps, Implementation, and sustainability of RIs
 - o Fostering Global Ecosystem of Research Infrastructure given the disparity in resourcing and sustainability of these infrastructure

platforms. The Brno Declaration and its implementation for example will be key¹

- **Open Hardware and Open Research Infrastructures**

2. Data

- **Overview:** Clean, complete, and FAIR (Findable, Accessible, Interoperable and Reusable) machine actionable data are a basis for development of models and accurate and reliable early warning systems and disaster management systems.
- **Gaps**
 - Lack of data infrastructure, data organisation and management (including through research data infrastructure, FAIR data repositories)
 - Lack of Policies to enable data sharing across jurisdictions.
 - Lack of Data Skills
- **Recommendations**
 - Development of National, and institutional Open Science policies and promotion of Open Science agenda
 - Development of Data Policies in times of crisis and cross boarder data sharing protocols
 - Development of Trustworthy and FAIR Data Repositories and testbed for interoperability and machine actionability
 - Capacity building and skills development in Data Stewardship

3. Models

- **Overview:** Accurate multi parameter high resolution weather and climate numerical and artificial intelligence models that ingest data and provide reliable and consistent predictions are critical to early warning systems and disaster risk management.

¹ <https://www.icri2022.cz/post/brno-declaration-on-fostering-a-global-ecosystem-of-research-infrastructures.html>

- **Gaps**
 - Limited Computational Infrastructure (e.g. Research and Operational HPC Systems to run models
 - Prevalence of closed source/Black Box proprietary models
 - Limited local capacity to develop and run models (and factoring local conditions) in developing countries.
- **Recommendations**
 - Sustainable investment in computational infrastructure
 - Development of open models (compare closed, proprietary black box models)
 - Capacity and Skills Development in Model Development and Testing

3. Applications/Products

- **Overview:** Digital Innovations, applications and weather and climate products – disaster risk management platforms are essential digital channels for Early Warning Systems and Climate sensitive sectors such as Agriculture, health, energy, water etc
- **Gaps**
 - Limited uptake and or availability of affordable digital innovations
 - Limited Capacity for local development and validation of digital innovations in the Global South
- **Recommendations**
 - Strengthening Innovation Ecosystems and creation of innovation ecosystems around climate change infrastructure and data.
 - Promote quadruple helix interactions (university, industry, Government, society), cocreation and open innovation platforms to support local development of digital solutions.
 - Development of Global Open Science Cloud (GOSC)² to foster collaboration on projects including on weather, climate change, disaster risk management etc where global collaboration not competition is key,

² <https://codata.org/initiatives/decadal-programme2/global-open-science-cloud/>

4. Information Dissemination

- **Overview:** Effective and timely information dissemination of early warning system and events information to relevant stakeholders groups (decision makers, planners, the public etc) through appropriate channels is critical
- **Gaps**
 - o Poor timely information dissemination through digital Pull and Push channels, platforms, and applications.
 - o Poor language inclusivity in regarding content and information – eg. Indigenous languages and content translation technologies (including artificial intelligence and computational linguistics tools)
- **Recommendations**
 - o Implementation of National, Regional and continental Artificial Intelligence, Digital transformation strategies that encapsulate advancement of future proof 4IR skilling (digital skills and data citizenship, cybersecurity awareness, ai ethics etc) of the stakeholders including the public.
 - o Promotion of Open Science and Citizen Science, public disclosure, and open engagement with societal actors; open engagement with other knowledge systems

The African Open Science Platform engages across all these facets and aims to position African scientists at the cutting edge of data intensive science by stimulating interactivity and creating opportunity through the development of efficiencies of scale, building critical mass through shared capacities, amplifying impact through a commonality of purpose and voice, and to engage in Global Commons to address continental and global challenges through joint action.

AOSP engages communities of practice – and has engaged Southern African Development Community (SADC) Weather and Climate Stakeholders – (Meteorological Services, Universities and High Performance Computing facilities etc) on a Regional Project in support of the SADC Cyberinfrastructure Framework Implementation around improvement of weather and climate early warnings in Southern Africa³

³ <https://datascience.codata.org/articles/10.5334/dsj-2019-034>