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Taking stock of observing capabilities for designing a pan-African atmospheric and climate research infrastructure (KADI): Lessons learnt from Kenya and best practices.

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Climate change is having an accelerating global impact through the increased frequency, magnitude and duration of droughts, fires, floods and other extreme climatic events. The most vulnerable populations bear the greatest brunt of these impacts. The societal solutions to this crisis depend also on how scientific research can address the air quality-climate-health nexus. Observations are needed as a foundation for air quality and climate services to address UN Sustainable Development Goals (SDGs). The atmospheric observing capabilities in most countries in Low- and Middle Income Countries (LMIC) remain often sketchy and heterogeneous, are established based on opportunities, and often not designed for integration into the operational infrastructures of the National Meteorological and Hydrological Services. As a result, operation often lacks sustainability and compatibility, and data are not easily and widely available. This is true for meteorological and climatological observations, but is even more pronounced for the complex instrumentation required to monitor greenhouse gases and short-lived climate pollutants. The development of standardised observations in sustainable research infrastructures (RIs) can overcome some of these issues.

The Horizon Europe funded KADI project (**K**nowledge and climate services from an **A**frican observation and **D**ata research **I**nfrastructure) aims to provide the conceptual framework for the future implementation of an All-African RI that delivers the science-based services to fully address the requirements of the Paris agreement and the SDGs.

The KADI project works towards the development of a comprehensive design for a pan-African climate observation system and research infrastructure using the climate services identified and

required by key stakeholders as a guiding design principle. Knowledge is compiled and gaps identified through the SEACRIFOG collaborative inventory tool, the OSCAR/Surface, OSCAR/Space and OSCAR/Requirements tools, as well as a comprehensive survey and other stakeholder engagement. A pilot project focused on Kenya collects and integrates information on user requirements, existing and past observing capabilities, and services. Based on extensive engagement with stakeholders who use or provide weather, climate and atmospheric composition services, lessons-learnt and best practices for future endeavours will be distilled. The outputs from this will further inform the strategic design of the long-term observational and data infrastructures required.

The results so far suggest that services need to cover diverse requirements of a wide range of stakeholders. Sustainable standardized observations are a critical foundation. Sustainability requires long-term commitment of the operating institution at various organizational levels. Information derived from observations is often required with short lead times. Twinning programs and personnel exchange between new and established stations or laboratories can be effective to advance and transition new monitoring capabilities into full operation.

The presentation will introduce the approaches and first results.