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Modern Scientific Metadata Management: Atmospheric Radiation Measurement (ARM) Facility Data Center

Maggie Davis, Richard Cederwall, Giri Prakash, and Ranjeet Devarakonda

Oak Ridge National Laboratory, Climate Change Science Institute, United States of America (davismr@ornl.gov)

Atmospheric Radiation Measurement (ARM), a U.S. Department of Energy (DOE) scientific user facility, is a key geophysical data source for national and international climate research. Utilizing a standardized schema that has evolved since ARM inception in 1989, the ARM Data Center (ADC) processes over 1.8 petabytes of stored data across over 10,000 data products. Data sources include ARM-owned instruments, as well as field campaign datasets, Value Added Products, evaluation data to test new instrumentation or models, Principal Investigator data products, and external data products (e.g., NASA satellite data). In line with FAIR principles, a team of metadata experts classifies instruments and defines spatial and temporal metadata to ensure accessibility through the ARM Data Discovery. To enhance geophysical metadata collaboration across American and European organizations, this work will summarize processes and tools which enable the management of ARM data and metadata. For example, this presentation will highlight recent enhancements in-field campaign metadata workflows to handle the ongoing Multidisciplinary Drifting Observatory for the Study of Arctic Climate (MOSAIC) data. Other key elements of ARM data center include: the architecture of ARM data transfer and storage processes, evaluation of data quality, ARM consolidated databases. We will also discuss tools developed for identifying and recommending datastreams and enhanced DOI assignments for all data types to assist an interdisciplinary user base in selecting, obtaining, and using data as well as citing the appropriate data source for reproducible atmospheric and climate research.