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Long-term records characterizing Earth system changes: ESDRs and CDRs

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Both NASA and NOAA have been working towards development and publication of long-term, consistent, well-calibrated records of various parameters that describe the Earth system and how it has been changing over time. With its focus on climate, NOAA refers to such records as Climate Data Records (CDRs). To indicate coverage of a broader set of Earth science disciplines, NASA refers to the records as Earth System Data Records (ESDRs). The ESDRs useful for describing climate change can be referred to as CDRs. NASA defines ESDRs to mean unified and coherent set of observations of a given parameter of the Earth system, which is optimized to meet specific requirements in addressing science questions. The focus in generating these records is on measurements, rather than specific instruments or missions. The science measurement focus brings together expertise in multiple instrument characterization and calibration, data processing, science-based product generation and distribution, science tools, and interactive relationships with the broader science community. The ESDRs are generally decades-long time series of Earth system parameters, derived using data from multiple instruments. NOAA adheres to the CDR definition established by the National Research Council (NRC, 2004), specifically that a CDR is a time series of measurements of sufficient length, consistency, and continuity to determine climate variability and change. However, NOAA's CDRs are focused on the needs of decision-makers, scientists and policy-makers. Therefore, upon transitioning a CDR from research into operations, NOAA commits to its sustained and systematic production within a reasonable period after future observations (e.g., within 2 days). The CDRs are developed and archived in accordance with the guidelines from the Global Climate Observing System (GCOS, 2010) and World Meteorological Organization's (WMO's) Sustained, Coordinated Processing of Environmental Satellite Data for Climate Monitoring (SCOPE-CM; 2009) activity, designed to ensure full documentation, transparency and scientific stewardship in the generation of Essential Climate Variables. Both agencies are actively developing ESDRs and CDRs. NASA's program called Making ESDRs for Use in Research Environments (MEaSUREs) consists of 30 different projects that produce and provide to the community ESDRs covering several Earth science disciplines. Each project generates products using mature and documented algorithms with community consensus and transfers them for archiving and distribution by one of NASA's Earth Science Data Centers before the project ends. NOAA is similarly focused on transitioning only mature CDRs, which have demonstrated societal value, into an operational context. NOAA expects to be sustaining 10 CDRs in operations by late 2011, and currently funds more than 20 competitively-selected CDR development projects that will transition algorithms into operations in future years.