Generation of a multi-decadal Earth Radiation Budget Thematic Climate Data Record: Balancing accuracy, precision, and availability to meet the needs of the community

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NASA’s Earth Radiation Budget Science Team, ERB-ST, (Previously known as the CERES Science Team) is a multi-disciplinary team led out of NASA’s Langley Research Center which has the responsibility for governance of the nation’s multi-decadal Earth Radiation Budget Climate Data Record, ERB CDR. The Science Data Processing System which produces the ERB-CDR is highly complex, producing Level one through Level 4 products. The system ingests data from 15 different instruments on 9 different spacecraft (5 GEO and 4 LEO) as well as other ancillary information, producing 25 different products with consistent TOA, Surface, and atmospheric radiative fluxes, cloud and aerosol properties on multiple spatial and temporal scales. Spatial scales vary from instantaneous/pixel (25 km), 1-deg grid, zonal, regional and global means while temporal scales vary across instantaneous, hourly, 3 hourly to monthly scales. Accuracy and precision values vary across the various spatial and temporal scales, with the long-term goal of measuring decadal trends of better than 0.3 W/m\(^2\) per decade.

Instrument calibration and precision, as measured through the post-launch protocols, is one of many considerations that drive the decision to reprocess, others include, but are not limited to validation and instantiation of new algorithms across all levels of products, outside teams reprocessing the products we ingest, the launch of new instrumentation to replace operational weather imagers on Geo satellites, updates to processing hardware, and of course resource availability. These all need to be managed/considered in order to provide the global community products of sufficient accuracy and precision on a time-scale which allows continued advancement and discovery of key scientific questions such that policy makers may make informed decisions.

This presentation will highlight the processes and protocols the Earth Radiation Budget Science Team utilizes to guide reprocessing decisions, identifying lessons learned and best practices.