

Twenty Years of WCRP/GEWEX Baseline Surface Radiation Network (BSRN) activities, operations, data, and results

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Originally conceived and institutionalized within WCRP in 1988, the BSRN began field data gathering activities on 1 January 1992 after organizational and measurement specification requirements had been met. The need for the BSRN was originally recognized primarily from the dearth of globally-remote surface thermal infrared observations to which planned satellite surface radiation budget products would need to be compared in order to meet requirements for validation. It soon became apparent that there was also a need for more extensive and improved ground-based in situ observations of all components of the surface radiation budget for multiple applications in climate research. These data could be used not only to provide for better verification of satellite products but also for radiative transfer and related climate model comparisons and for providing valuable detailed records of local to regional surface radiation climatology. Data accumulation from five field sites began in 1992, joined by five more in 1993, four more in 1994 and so on until by 2010 52 sites have provided qualified data to the network archive, now located at the Alfred Wegener Institute in Bremerhaven Germany. Forty-one of those sites have continued to submit data since they started with lag times of up to three years, while only three sites have discontinued operations. Several "candidate" sites have been approved for participation but which are yet to submit data. The data are extensively used for satellite validation and in various modeling studies as well as providing observational records of inter- and intra-annual variability. Related contributions have been made to the assessment of possible worldwide variations in both solar and thermal IR annual means. The proliferation of the network and its achievements relied on the reduction in observational uncertainty that included instrumentation improvements and the development and promotion of international-consensus absolute-calibration reference standards for irradiance quantities for which such standards did not previously exist. The overall effort also required highly advanced data handling and archival capabilities. This presentation will provide an account of the major activities and accomplishments of the BSRN along with the status of current progress and participation in climate research activities. Note: All participation in, and contributions to, BSRN have been voluntarily provided by individuals and their sponsoring governments and/or institutions. Major contributions, such as: five or more field sites, providing for the physical data archive and web services, or providing extensive documentation, have been made by Switzerland, Germany, Canada, Brazil, Japan, and the United States. The Authors wish to acknowledge all those who have worked to contribute time, expertise, and data to the BSRN, which includes more than 70 individuals from more than 20 countries.