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Assembling the International Surface Pressure Databank

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The International Surface Pressure Databank (ISPD) represents the world's largest collection of sub-daily surface and sea level pressure observations from land and marine platforms. Surface air pressure has been identified as an essential climate variable by the Global Climate Observing System (GCOS). Its variations and gradients characterize the thermal and dynamic structures of the atmosphere that impact daily life. Its global integral is the mass of the atmosphere. Surface air pressure is also closely related to the variability of the sea level of the world's oceans. To facilitate the study of these and other aspects of surface air pressure, the ISPD has been developed as a cooperative effort between the international Atmospheric Circulation Reconstructions over the Earth (ACRE) initiative and working groups of GCOS and the World Climate Research Program. It merges more than 40 national and international collections containing pressure observations. The majority of the observations are derived from the Integrated Surface Database (ISD) of land station observations and the International Comprehensive Ocean-Atmosphere Data Set (ICOADS) of marine observations. Tropical cyclone central pressure values from the latest International Best Track Archive for Climate Stewardship (IBTrACS) are also included. The ISPD contains observations starting in 1755, with most of the observations spanning the latter half of the nineteenth century to present. The ISPD is stored in the HDF5 format. HDF5 is a very flexible data model that can represent complex data objects and a wide variety of metadata. These observations are expected to be useful for reanalyses, climate and extreme event studies, and other climate impacts applications. They have already been used in the 20th Century Reanalysis Project (20CR). Studies of differences between 20CR output and ISPD observations (so called "feedback") have highlighted previously undetected errors in the original observations as well as pointing to the potential for improvements in 20CR.