NASA SOLAR AND METEOROLOGICAL DATA FOR SUSTAINABLE BUILDINGS

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ABSTRACT

The Prediction of Worldwide Energy Resource (POWER) Project is building on the success of the Surface meteorology and Solar Energy (SSE) Internet-based prototype system (http://eosweb.larc.nasa.gov/sse). POWER is part of the Energy Management program theme within NASA's Earth-Sun System Applied Science Program that adapts information from NASA satellite observations and modeling into prototype data sets useful for renewable energy resource estimation.

The current POWER prototype system contains over 200 parameters based upon solar and meteorological data on a one degree latitude by one degree longitude grid over the entire globe. Monthly climatological averages are available over a 10-year time period from July 1983 through June 1993 (soon to be expanded to near present), augmented by diurnal information and daily averaged time series data for many parameters.

This paper focuses on the POWER solar and meteorology parameters pertinent to the design of sustainable buildings. Development of the parameters contained in this new archive (prototype available at http://earth-www.larc.nasa.gov/solar/buildings) is based on needs defined in documents from the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE), the American Solar Energy Society (ASES), The American Institute of Architects (AIA), and the American Society of Landscape Architects (ASLA). This new Internet-based prototype system provides a user friendly, consolidated global solar and meteorological suite of parameters useful for feasibility studies of building orientation, daylighting, heating and cooling needs. Parameters include horizontal and tilted-surface insolation, illuminance, air temperature, wind speed and wind direction. The paper describes the parameters, data quality, and the Internet-based access to this new sustainable buildings prototype system.

Figure 1 shows a preliminary buildings climatology map for the globe that was constructed using the methodology of Briggs et al. (http://www.energycodes.gov). SSE 10-year monthly averaged air temperature, annual heating/cooling degree days, and NASA/NOAA Global Precipitation Climatology Project precipitation data were used as inputs.
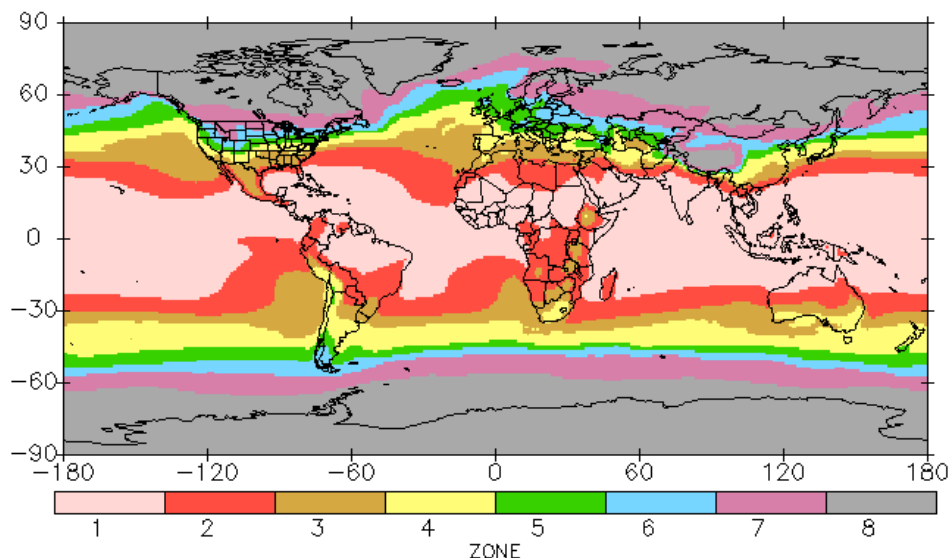

Fig. 1: Preliminary buildings climatology map