**National Environmental Public Health Tracking Network**
**Global Horizontal Irradiance (GHI) Metadata**

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| **Publication Date** | 11/07/2018 |
| **Background** | Global Horizontal Irradiance (GHI) is the total amount of shortwave radiation received by a horizontal surface from above. The available county-level data show the temporal and spatial trends of population-weighted irradiance levels throughout the contiguous United States from 1991 to 2012.<br><br>The GHI data is provided by the Environmental Remote Sensing group at the Rollins School of Public Health at Emory University, led by Prof. Yang Liu. The 1991-1997 data are calculated based on the GHI data from the National Solar Radiation Data Base (NSRDB), and the 1998-2012 data are calculated based on the GHI data from SolarAnywhere irradiance data. |
| **Data Values** | Each record describes daily population-weighted GHI value in one county of a given state. The unit is $Wh/m^2$.<br><br>The following are included in each file:<br>STATEFIPS: FIPS codes for states<br>COUNTYFIPS: FIPS codes for counties<br>YEAR: Year<br>MONTH: Month of the year, from 1-12<br>DAY: Day of the month, from 1-31<br>GHI: County-level population weighted daily GHI<br><br>NAs in the dataset appear as missing values; these refer to no valid data and are caused by invalid retrievals from NSRDB or SolarAnywhere. We suggest to treat NAs as missing. |
| **Geographic Scale & Scope** | All states in the contiguous United States by county |
| **Time Period** | January 1, 1991 – December 31, 2012 |
| **Raw Data Processing** | *Part 1. Data based on NSRDB solar data (1991-1997):*<br>Daily GHI values were calculated from original hourly METSTAT modeled GHI values on NSRDB sites. Daily files were produced, each containing daily GHI values of all NSRDB sites on U.S. continent. Universal Kriging (UK) with external trend (elevation) were employed to interpolate GHI values to centers of population tracts (from United States Census Bureau, https://www.census.gov/geo/reference/centersofpop.html) based on daily NSRDB GHI data. The max distance for UK was set as 500 kilometers. Therefore, NA was given if UK failed at the centroids of tracts. Population weighted daily GHI values were then calculated in county level.<br><br>*Part 2. Data based on SUNY solar data (1998-2012):*<br>Daily GHI values were calculated from original hourly GHI values on SUNY grids with 10 km x 10 km resolution; valid daily GHI values were calculated by summing all 24 valid hourly GHI values within the day. Otherwise, daily GHI value was marked as NA. Daily GHI of one SUNY grid was assigned to a population census tract if the center of tract fell into this SUNY grid. Population weighted daily GHI values were calculated at the county level. |

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| | *Part 3. Combine county-level population weighted GHI data from NSRDB and SolarAnywhere*<br>Time trends of county-level population-weighted GHI based on NSRDB and SUNY products in 1998-2005 were compared, and excellent agreement was found between the two sets. Therefore, time-series daily population-weighted GHI data on county level was produced by using NSRDB-based data for 1991-1997, and using SolarAnywhere-based data for 1998-2012.<br><br>No values were omitted from the original dataset. All missing data were caused by failed or invalid retrievals in the original dataset. Overall, 8,036 daily files were produced during the study period (8,036 days in total). |
| **Additional Information** | Renewable Resource Data Center. National solar radiation data base. http://rredc.nrel.gov/solar/old_data/nsrdb/<br><br>SolarAnywhere. Available datasets and geographic coverage. https://www.solaranywhere.com/validation/data/datasets/ |