

Surface Radiation Parameters: Joule/m2 to Watt/m2

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For data produced at ECMWF, the radiation parameters for surface and single levels, e.g. Surface Solar Radiation, are so-called accumulated parameters, i.e. the data is accumulated over a certain time period. The units are Joule per square metre, accumulated over the respective period.

To get Watts per square metre, divide the accumulated values by the time period in seconds over which the data has been accumulated:

Examples

For **ERA5 daily** data (stream=oper), the accumulation period is 1 hour (3600 seconds). Hence to convert to W/m2:

$$\text{SSR [W/m2]} = \text{SSR [J/m2]} / (3600 \text{ seconds})$$

The result will be the average flux over the one hour ending at 'Step'.

For **ERA5 daily ensemble** data (stream=enda), the accumulation period is 3 hours. Hence to convert to W/m2:

$$\text{SSR [W/m2]} = \text{SSR [J/m2]} / (3 * 3600 \text{ seconds})$$

The result will be the average flux over the three hours ending at 'Step'.

[More about ERA5 'steps'](#)

[List of ERA5 accumulated parameters \(Table 3\)](#)

In ERA5, for "surface and single level parameters" mean rates are available, in addition to the accumulations. These mean rates represent the accumulation over a time period, divided by the length of the time period in seconds (in addition, the hydrological parameters have been scaled by the density of water). The units include "per second", such as W/m2. See the [ERA5 data documentation](#), [List of ERA5 mean rate parameters \(Table 4\)](#).

For **ERA-Interim daily** data (as for ECMWF operational data), the accumulation period is specified by the 'Step', in hours from the beginning of the forecast. Hence to convert to W/m2:

$$\text{SSR [W/m2]} = \text{SSR [J/m2]} / ('Step' * 3600 \text{ seconds})$$

The result will be the average flux over 'Step' hours, from the beginning of the forecast.

[More about ERA-Interim 'steps'](#)

[List of ERA-Interim surface accumulated parameters \(Table 9\)](#)

The mean flux in a time interval is obtained by taking the difference of the accumulated values between the corresponding time steps divided by the time difference in seconds. The result is a mean value for that time interval.

Related articles

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