Comments from Public Consultation on ECV Requirements 13/01 – 13/03 2020 for:

# Earth radiation budget

## ECV Product: Radiation Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | Radiation Profile | | | | |
| **Definition** | Vertical profile of upward and downward LW and SW radiation components | | | | |
| **Unit** | W/m2 | | | | |
| **Note** | For the application area of global climate monitoring no requirements exist. Thus the requirements of the individual components are taken | | | | |
| **Requirements** | | | | | |
| **Item needed** | **Unit** | **Metric** | **[1]** | **Value** | **Derivation and References and Standards** |
| **Horizontal Resolution** | km |  | G | 10 |  |
| B | 50 |  |
| T | 100 |  |
| **Vertical Resolution** | km |  | G | 1 |  |
| B | 2 |  |
| T | 4 |  |
| **Temporal Resolution** | hr |  | G | 1 |  |
| B | 24 |  |
| T | 720 | resolving diurnal cycle |
| **Timeliness** | hr |  | G | 1 |  |
| B | 24 |  |
| T | 720 |  |
| **Required Measurement Uncertainty** | W/m2 |  | G | 0.1/0.2 | Shortwave radiation/Longwave radiation  A factor of 2 was applied to gain the breakthrough value and a factor of 4 was applied to estimate the threshold value. |
| B | 0.2/0.4 |
| T | 0.4/0.8 |
| **Stability** | W/m2/decade |  | G | 0.025/0.05 | Shortwave radiation/Longwave radiation |
| B | 0.05/0.1 |
| T | 0.1/0.2 |
| **Standards and References** |  | | | | |
| **Adaptation and Extremes** | | | | | |
|  | Relevant? (Yes/No) | Sugg. Req. sufficient? (Yes/No) | Explanation | | |
| **Adaptation[2]** |  |  | Reviewers are invited to suggest answers for these fields | | |
| **Extremes[3]** |  |  | Reviewers are invited to suggest answers for these fields | | |

[1]Goal (G); Breakthrough (B) (not mandatory, more as one possible); Threshold (T), for definitions see [Guidelines](http://tiny.cc/ecv-review)

[2] Is the ECV Product directly relevant to support Climate Adaptation?

[3] Can the ECV Product be used to monitor climate extremes or aspects of extremes?

NO COMMENT

## ECV Product: Solar Spectral Irradiance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | Solar Spectral Irradiance | | | | |
| **Definition** | Total Solar Irradiance (TSI); when measured as a function of wavelength it is the spectral irradiance | | | | |
| **Unit** | W/m2/μm | | | | |
| **Note** |  | | | | |
| **Requirements** | | | | | |
| **Item needed** | **Unit** | **Metric** | **[1]** | **Value** | **Derivation and References and Standards** |
| **Horizontal Resolution** | N/A |  | G |  |  |
| B |  |  |
| T |  |  |
| **Vertical Resolution** | N/A |  | G |  |  |
| B | Spectral resolution: 1 nm < 290 nm; 2 nm 290-1000 nm; 5 nm 1000-1600 nm; 10 nm 1600-3200 nm; 20 nm 3200-6400 nm; 40 nm 6400-10020  20000 nm spacing up to 160000 nm |  |
| T |  |  |
| **Temporal Resolution** | hr |  | G |  |  |
| B |  |  |
| T | 24 |  |
| **Timeliness** | hr |  | G |  |  |
| B |  |  |
| T | 24 |  |
| **Required Measurement Uncertainty** | % |  | G | 0.3 | (200-2400 nm) |
| B | 1.5 |
| T | 3 |
| **Stability** | %/decade |  | G | 1 | (200-2400 nm) |
| B | 5 |
| T | 010 |
| **Standards and References** |  | | | | |
| **Adaptation and Extremes** | | | | | |
|  | Relevant? (Yes/No) | Sugg. Req. sufficient? (Yes/No) | Explanation | | |
| **Adaptation[2]** |  |  | Reviewers are invited to suggest answers for these fields | | |
| **Extremes[3]** |  |  | Reviewers are invited to suggest answers for these fields | | |

[1]Goal (G); Breakthrough (B) (not mandatory, more as one possible); Threshold (T), for definitions see [Guidelines](http://tiny.cc/ecv-review)

[2] Is the ECV Product directly relevant to support Climate Adaptation?

[3] Can the ECV Product be used to monitor climate extremes or aspects of extremes?

### Comment 1

|  |  |
| --- | --- |
| Author: ECMWF | Email: ecresgcosreqs@gmail.com |
| A range of 200-2400 nm is stated here but the SSI out to much longer wavelengths is required. Remember that there is 50 W m-2 of solar energy at wavelengths longer than 2.4 microns, 12 W m-2 at wavelengths longer than 4 microns and 1 W m-2 at wavelengths longer than 9 microns. (Robin Hogan, ECMWF.) | |

## ECV Product: Downward Short-Wave Irradiance at Top of the Atmosphere

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | Downward Short-Wave Irradiance at Top of the Atmosphere | | | | |
| **Definition** | Flux density of the solar radiation at the top of the atmosphere | | | | |
| **Unit** | W/m² | | | | |
| **Note** |  | | | | |
| **Requirements** | | | | | |
| **Item needed** | **Unit** | **Metric** | **[1]** | **Value** | **Derivation and References and Standards** |
| **Horizontal Resolution** | km |  | G |  |  |
| B |  |  |
| T |  |  |
| **Vertical Resolution** | N/A |  | G | N/A | N/A |
| B | N/A | N/A |
| T | N/A | N/A |
| **Temporal Resolution** | hr |  | G |  |  |
| B |  |  |
| T | 24 |  |
| **Timeliness** | hr |  | G | 1 |  |
| B | 24 |  |
| T | 720 |  |
| **Required Measurement Uncertainty** | W/m2 |  | G | 0.04 |  |
| B | 0.08 |
| T | 0.12 |
| **Stability** | W/m2/decade |  | G | 0.01 |  |
| B | 0.02 |
| T | 0.04 |
| **Standards and References** |  | | | | |
| **Adaptation and Extremes** | | | | | |
|  | Relevant? (Yes/No) | Sugg. Req. sufficient? (Yes/No) | Explanation | | |
| **Adaptation[2]** |  |  | Reviewers are invited to suggest answers for these fields | | |
| **Extremes[3]** |  |  | Reviewers are invited to suggest answers for these fields | | |

[1]Goal (G); Breakthrough (B) (not mandatory, more as one possible); Threshold (T), for definitions see [Guidelines](http://tiny.cc/ecv-review)

[2] Is the ECV Product directly relevant to support Climate Adaptation?

[3] Can the ECV Product be used to monitor climate extremes or aspects of extremes?

NO COMMENT

## ECV Product: Upward Short-Wave Irradiance at Top of the Atmosphere

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | Upward Short-Wave Irradiance at Top of the Atmosphere | | | | |
| **Definition** | Flux density of solar radiation, reflected by the Earth surface and atmosphere, emitted to space at the top of the atmosphere | | | | |
| **Unit** | W/m² | | | | |
| **Note** |  | | | | |
| **Requirements** | | | | | |
| **Item needed** | **Unit** | **Metric** | **[1]** | **Value** | **Derivation and References and Standards** |
| **Horizontal Resolution** | km |  | G | 10 |  |
| B | 50 |  |
| T | 100 |  |
| **Vertical Resolution** | N/A |  | G | N/A | N/A |
| B | N/A | N/A |
| T | N/A | N/A |
| **Temporal Resolution** | hr |  | G | 1 |  |
| B | 24 | Daily  resolves the diurnal cycle |
| T | 720 | Monthly allows a regional monitoring |
| **Timeliness** | hr |  | G | 1 |  |
| B | 24 |  |
| T | 720 |  |
| **Required Measurement Uncertainty** | W/m2 |  | G | 0.2 | NOAA Tech Rep. NESDIS 134;  Ohring et al. 2003 / 2005)  A factor of 2 was applied to gain the breakthrough value and a factor of 4 was applied to estimate the threshold value. |
| B | 0.5 |
| T | 1 |
| **Stability** | W/m2/decade |  | G | 0.06 | NOAA Tech Rep. NESDIS 134 |
| B | 0.15 |
| T | 0.3 |
| **Standards and References** | Ohring 2004  Ohring 2005  NOAA Tech Rep. NESDIS 134 | | | | |
| **Adaptation and Extremes** | | | | | |
|  | Relevant? (Yes/No) | Sugg. Req. sufficient? (Yes/No) | Explanation | | |
| **Adaptation[2]** |  |  | Reviewers are invited to suggest answers for these fields | | |
| **Extremes[3]** |  |  | Reviewers are invited to suggest answers for these fields | | |

[1]Goal (G); Breakthrough (B) (not mandatory, more as one possible); Threshold (T), for definitions see [Guidelines](http://tiny.cc/ecv-review)

[2] Is the ECV Product directly relevant to support Climate Adaptation?

[3] Can the ECV Product be used to monitor climate extremes or aspects of extremes?

NO COMMENT

## ECV Product: Upward Long-Wave Irradiance at Top of the Atmosphere

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | Upward Long-Wave Irradiance at Top of the Atmosphere | | | | |
| **Definition** | Flux density of terrestrial radiation emitted by the Earth surface and the gases, aerosols and clouds of the atmosphere at the top of the atmosphere | | | | |
| **Unit** | W/m² | | | | |
| **Note** |  | | | | |
| **Requirements** | | | | | |
| **Item needed** | **Unit** | **Metric** | **[1]** | **Value** | **Derivation and References and Standards** |
| **Horizontal Resolution** | km |  | G | 10 |  |
| B | 50 |  |
| T | 100 |  |
| **Vertical Resolution** | N/A |  | G | N/A | N/A |
| B | N/A | N/A |
| T | N/A | N/A |
| **Temporal Resolution** | hr |  | G | 1 |  |
| B | 24 | Daily  resolves the diurnal cycle |
| T | 720 | Monthly allows a regional monitoring |
| **Timeliness** | hr |  | G | 1 |  |
| B | 24 |  |
| T | 720 |  |
| **Required Measurement Uncertainty** | W/m2 |  | G | 0.2 | NOAA Tech Rep. NESDIS 134;  Ohring et al. 2003 / 2005)  A factor of 2 was applied to gain the breakthrough value and a factor of 4 was applied to estimate the threshold value. |
| B | 0.5 |
| T | 1 |
| **Stability** | W/m2/decade |  | G | 0.05 | NOAA Tech Rep. NESDIS 134  Requirements for decadal stability and bias can be derived from theoretical assumptions about the minimum anticipated signal to detect climate trends (Ohring 2004, 2005). Ohring et al. assume the required stability to be 1/5 of the expected climate signal. To detect a climate signal the stability should be better than 10 % of the uncertainty. |
| B | 0.1 |
| T | 0.2 |
| **Standards and References** | Ohring 2004  Ohring 2005  NOAA Tech Rep. NESDIS 134 | | | | |
| **Adaptation and Extremes** | | | | | |
|  | Relevant? (Yes/No) | Sugg. Req. sufficient? (Yes/No) | Explanation | | |
| **Adaptation[2]** |  |  | Reviewers are invited to suggest answers for these fields | | |
| **Extremes[3]** |  |  | Reviewers are invited to suggest answers for these fields | | |

[1]Goal (G); Breakthrough (B) (not mandatory, more as one possible); Threshold (T), for definitions see [Guidelines](http://tiny.cc/ecv-review)

[2] Is the ECV Product directly relevant to support Climate Adaptation?

[3] Can the ECV Product be used to monitor climate extremes or aspects of extremes?

NO COMMENT