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

# Fraction of absorbed photosynthetically active radiation (FAPAR)

## ECV Product: Fraction of Absorbed Photosynthetically Active Radiation

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| **Name** | Fraction of Absorbed Photosynthetically Active Radiation | | | | |
| **Definition** | FAPAR is defined as the fraction of photosynthetically active radiation (PAR; solar radiation reaching the surface in the 0.4-0.7μm spectral region) that is absorbed by vegetation canopy.  Both black-sky (assuming only direct radiation) and white-sky (assuming that all the incoming radiation is in the form of isotropic diffuse radiation) FAPAR values may be considered. Similarly FAPAR can also be angularly integrated or instantaneous (i.e., at the actual sun position of measurement). Leaves-only FAPAR refers to the fraction of PAR radiation absorbed by live leaves only, i.e., contributing to the photosynthetic activity within leaf cells. | | | | |
| **Unit** | N/A | | | | |
| **Note** | LENGTH OF RECORD: Threshold: 20 years; Target: >40 years | | | | |
| ***Requirements*** | | | | | |
| **Item needed** | ***Unit*** | ***Metric*** | ***[1]*** | ***Value*** | ***Derivation and References and Standards*** |
| **Horizontal Resolution** | m |  | *G* | *10* | FAPAR plays a critical role in assessing the primary productivity   of   canopies,   the   associated   fixation   of atmospheric CO2  and  the  energy  balance  of  the  surface.  Application at 10 m; Climate Adaptation, CO2 fluxnet up scaling.  Best practices  <http://www.qa4ecv.eu/sites/default/files/D4.2.pdf> |
| *B* |  |  |
| *T* | *250* | Scale needed for regional and global carbon modeling. |
| **Vertical Resolution** | N/A |  | *G* |  |  |
| *B* |  |  |
| *T* |  |  |
| **Temporal Resolution** | day |  | *G* | *1* | When assimilated by model, this value corresponds to the climate model temporal resolution. In order to derive a better phenology accuracy. |
| *B* |  |  |
| *T* | *10* | When using for C02 exchanges modeling |
| **Timeliness** | day |  | *G* | *5* | In order to be useful in climate change services. |
| *B* |  |  |
| *T* | *10* | In order to be useful in environmental change services. |
| **Required Measurement Uncertainty** |  | one standard deviation or error covariance matrix,  with associated PDF shape (functional form of estimated error distribution for the term). | *G* | 5% for values higher than 0.05  And 0.0025 for values smaller | The values were assessed through physical link between FAPAR with the LAI and surface albedo uncertainties. |
| *B* |  |  |
| *T* | 10% for values higher than 0.05;  and 0.0025 for values smaller | The threshold value of uncertainty were assessed through physical link between FAPAR with the LAI and surface albedo uncertainties. |
| **Stability** | Rate of change over the available time period (% per decade) | Assessment of whether a trend exists with respect to reference data, taken into the definition, i.e. white-sky or black-sky and total versus ‘green foliage’. | *G* | *< 1.5%* | ‘The required stability is some fraction of the expected signal’ (see Ohring, et. al. 2005.). In the case that we have data over **10** years (= one decade)  N=**10** and U=**5%**  Assuming U constant along the period  It means S=SQRT(N\*U^2)/N=SQRT(N)\*U/N  **S=0.3\*U = 0.31 \* 10./100.0 = 1.5 %**  This number should be smaller than expected FAPAR trend. |
| *B* |  |  |
| *T* | *< 3%* | *Same as above with U = 10%* |
| **Standards and References** | *LENGTH OF RECORD: Threshold: 20 years; Target: > 40 years* | | | | |
| ***Adaptation and Extremes*** | | | | | |
|  | *Relevant? (Yes/No)* | *Sugg. Req. sufficient? (Yes/No)* | *Explanation* | | |
| **Adaptation[2]** | YES | YES | FAPAR also indicates the state and the level of vegetation photosynthetic activities that can be used for adaptation policies. | | |
| **Extremes[3]** | YES | YES | Impact on extreme event, such as drought, can be monitor by this ECV. | | |

[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: Click here to enter text. | Email: debhem@hotmail.co.uk |
| See my notes posted under Leaf Area Index, they also apply for FAPAR. | |

### Comment 2

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| --- | --- |
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| Please also refer to the comments on Leaf Area Index (LAI | |