**Ocean Colour ECV maturity**

**CORE-CLIMAX self evaluation**
- v1.0 = Initial Operations
- v2.0 = Full Operations

**Applies to basic OC-CCI product set:**
- Rrs, chlorophyll
- Kd490
- IOPs

**Case 1 (open ocean)**

<table>
<thead>
<tr>
<th>Maturity</th>
<th>SOFTWARE READINESS</th>
<th>METADATA</th>
<th>USER DOCUMENTATION</th>
<th>UNCERTAINTY CHARACTERISATION</th>
<th>PUBLIC ACCESS, FEEDBACK, UPDATE</th>
<th>USAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Conceptual development</td>
<td>None</td>
<td>Limited scientific description of the methodology and available from PI</td>
<td>None</td>
<td>Restricted availability from PI</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>Research grade code</td>
<td>Research grade</td>
<td>Comprehensive scientific description of the methodology, report available, and limited product user guide available from PI; paper on methodology is submitted for IOPs</td>
<td>Standard uncertainty information is identified or defined; limited validation done; limited information on uncertainty available</td>
<td>Data available from PI; feedback through scientific exchange, regular updates by PI</td>
<td>Research: Benefits for applications demonstrated, DSS: Potential benefits identified</td>
</tr>
<tr>
<td>3</td>
<td>Research code with partially applied standards: code contains header and comments, and a README file; PI affirms portability, numerical reproducibility, and no security problems</td>
<td>Standards defined; sufficient to use and understand the data and extract discovery metadata</td>
<td>Score 3 + paper on methodology published; comprehensive validation report available from PI and a paper on validation is submitted; comprehensive user guide is available from PI; limited description of operations except available from PI</td>
<td>Some 2 + standard nomenclature applied; validation extended to full product data coverage; comprehensive information on uncertainty available; methods for automated monitoring defined</td>
<td>Data and documentation publicly available from PI; feedback through scientific exchange, regular updates by PI</td>
<td>Research: Benefits for applications demonstrated, DSS: Use costing and benefits emerging</td>
</tr>
<tr>
<td>4</td>
<td>Score 3 + draft software installation user manual available. 3rd party affirms portability, numerical reproducibility, and no security problems</td>
<td>Score 3 + standards sufficiently applied; meets international standards for the data set; enhanced discovery metadata; limited location level metadata</td>
<td>Score 3 + comprehensive scientific description available from data provider; paper on validation is submitted; comprehensive user guide available from data provider; comprehensive description of operations concept available</td>
<td>Some 3 + procedures to establish SI traceability are defined; intercomparison against corresponding CORs (other methods, models, etc.); quantifiable estimates of uncertainty provided within the product; characterization more or less uncertain data points; automated monitoring partially implemented</td>
<td>Data record and documentation available from data provider and PI; feedback and data provider’s version control; mechanism established feedback mechanism; regular updates by PI</td>
<td>Score 3 + Research: Clariations on product usage in operational DSS: Societal and economic benefits discussed</td>
</tr>
<tr>
<td>5</td>
<td>Score 4 + operational code following publication. 3rd party installs and tests the code operationally; full compliance with standards; complete discovery metadata; complete location level metadata</td>
<td>Score 4 + comprehensive scientific description available from data provider; report on data assessment results exists; user guide is regularly updated with updates on product and validation; description on practical implementation is available from data provider</td>
<td>Score 4 + SI traceability partly established; data provider participates in one international data assessment; comprehensive validation of the data; uncertainty estimates; automated monitoring fully implemented (all production levels)</td>
<td>Some 4 + source code available by Data Provider</td>
<td>Score 4 + Source code available by Data Provider; feedback mechanism and international data quality assessment is considered in periodic data record updates by Data Provider</td>
<td>Some 4 + Source code available by Data Provider; feedback mechanism and international data quality assessment is considered in periodic data record updates by Data Provider</td>
</tr>
</tbody>
</table>
| 6        | Score 5 + fully compliant with standards, Turmeric System | Score 5 + regularly updated | Score 5 + journal papers on product updates are and more comprehensive validation and validation of quantitative uncertainty estimates are published; operations concept regularly updated | Score 5 + SI traceability established; data provider participates in multiple international data assessments; incorporating feedback into the product development cycle; temporal and spatial error margins quantified; automated monitoring in place with results fed back to other accessible information, e.g. metadata or documentation | Score 5 + Source code available to the public and capability for continuous data provision is established (ICDR) | Score 5 + Research Product and its applications becomes reference in multiple research fields | Score 5 + Research Product and its applications becomes reference in multiple research fields

**Initial operations**

**Full operations**

**Research**
R&D Component
Essential for:

- Complex waters
  - Coastal
  - River outflows
  - Blooms
- Derived products
  - Phytoplankton type
  - Phytoplankton size structure
  - Carbon products
  - ..
- New Sensors
  - Sentinel 3
  - ..
- Uncertainty characterisation
  - SI traceability
  - “Comprehensive validation of the uncertainty estimates”
• Operational should not mean static

• Essential to monitor research and adopt new developments

• Institutionalise CCI cyclical improvement model
  - Regular, established, quantitative procedure for evaluating and integrating improvements

• System Engineering
  • Robust and fast processing system

Staying up to date

- New sensors
- New in situ data
- New algorithms

Algorithm intercomparison

Initial plan: linear (blue boxes)
New plan: Iterative, continuing science input
Lesson Learned: Important to include periodic comparison, update of algorithms and reprocessing of OC-CI products as science progresses

Algorithm selection

New insights

• Product generation
• Data merging

Internal Evaluation
External Evaluation (e.g., IOCCG)
User Feedback

Iterative Loop