*Category: Analysis Tools or Interactive Tools*

*Title:*

OWT-classification: Optical Water Type classification for ocean, coastal and inland waters

*Short description:*

This tool provides spectral analysis of surface water color through remote-sensing reflectance. Users can input reflectance spectra obtained from in situ measurements, simulations, or satellite data. Using the classification method by Bi & Hieronymi [2024], the tool extracts three key variables from the reflectance, allowing the differentiation of ten optical water types. This classification enhances the assessment of ecological conditions of water bodies, particularly for large-scale, routine satellite observations.

Input

|  |  |  |  |
| --- | --- | --- | --- |
| **Id** | **Title** | **Data Type** | **Description** |
| input\_data\_url | Input data | string | URL to your input file. *(or option for direct file uploaded? – this file would be a .csv or .nc)*  Link to examples: "Rrs\_demo\_AquaINFRA\_hyper.csv" (tabulated hyperspectral reflectance data), "Rrs\_demo\_AquaINFRA\_msi.csv" (tabulated reflectance data at Sentinel-2 MSI bands), "Rrs\_demo\_AquaINFRA\_olci.csv" (tabulated reflectance data at Sentinel-3 OLCI bands)  *Link to satellite scene or CMEMS URL?* |
| input\_option | Type of input | string | Type of input:   * csv: for text data input (first line wavelength, following lines remote-sensing reflectance) * sat: for satellite product input containing reflectance (e.g., Sentinel-3 OLCI Level-2) |
| sensor | Sensor name | string | Spectral band configuration of satellite mission (includes adaptation to sensor spectral response functions).   * HYPER: hyperspectral remote-sensing reflectance between 400 and 800 nm * AERONET\_OC\_1: [ 400 412 443 490 510 560 620 665 779 866 ] * AERONET\_OC\_2: [ 412 443 490 532 551 667 870 ] * CMEMS\_BAL\_HROC: [ 443 492 560 665 704, 740, 783 865 ] (Copernicus Marine Service Baltic Sea High-Resolution Ocean Colour) * CMEMS\_BAL\_NRT (Copernicus Marine Service Baltic Sea Near Real Time) * CMEMS\_MED\_MYINT (Copernicus Marine Service Mediterranean Sea Multi-Years Interim) * CZCS: [ 443 520 550 670 ] * GOCI: [ 412 443 490 555 660 680 745 865 ] * HawkEye: [ 412 447 488 510 556 670 752 867 ] * MERIS: [ 413 443 490 510 560 620 665 681 709 754 779 865 ] * MODIS\_Aqua: [ 412 443 469 488 531 547 555 645 667 678 748 859 ] * MODIS\_Terra: [ 412 443 469 488 531 547 555 645 667 678 748 859 ] * MSI\_S2A: [ 443 492 560 665 704 740 783 835 ] * MSI\_S2B: [ 442 492 559 665 704 739 780 835 ] * OCTS: [ 412 443 490 516 565 667 862 ] * OLCI\_S3A: [ 400 412 443 490 510 560 620 665 674 682 709 754 779 866 ] * OLCI\_S3B: [ 400 412 443 490 510 560 620 665 674 681 709 754 779 866 ] * OLI: [ 443 482 561 655 865 ] * SeaWiFS: [ 412 443 490 510 555 670 865 ] * VIIRS\_JPSS1: [ 411 445 489 556 667 746 868 ] * VIIRS\_JPSS2: [ 411 445 488 555 671 747 868 ] * VIIRS\_SNPP: [ 410 443 486 551 671 745 862 ] |
| output\_option | Output option | string | Output option.   * 1: for standard output with five variables * 2: for extensive output including memberships of all water types |

Output

|  |  |
| --- | --- |
| **Option** | **Description** |
| If input\_option == csv | The output is a text file (.csv). |
| If input\_option == sat | The output is a NetCDF file (.nc) of the same dimensions and geo-reference as the input file. |
| If output\_option == 1 | 5 Output variables   * AVW: Apparent Visible Wavelength between 400 and 800 nm * Area: Trapezoidal area of remote-sensing reflectance at RGB bands. * NDI: Normalized Difference Index of remote-sensing reflectance at green and red bands * Index value of water class * Total membership values from all ten water types |
| If output\_option == 2 | 15 Output variables   * AVW: Apparent Visible Wavelength between 400 and 800 nm * Area: Trapezoidal area of remote-sensing reflectance at RGB bands. * NDI: Normalized Difference Index of remote-sensing reflectance at green and red bands * Index value of water class * Total membership values from all ten water types * Weighted membership in OWT class 1 * Weighted membership in OWT class 2 * Weighted membership in OWT class 3a * Weighted membership in OWT class 3b * Weighted membership in OWT class 4a * Weighted membership in OWT class 4b * Weighted membership in OWT class 5a * Weighted membership in OWT class 5b * Weighted membership in OWT class 6 * Weighted membership in OWT class 7 |

Reference

Bi, S., & Hieronymi, M. (2024). Holistic optical water type classification for ocean, coastal, and inland waters. Limnology and Oceanography, 69(7), 1547-1561.

<https://aslopubs.onlinelibrary.wiley.com/doi/full/10.1002/lno.12606>

CMEMS (2023). Copernicus Marine Product User Manual for Ocean Colour Products

<https://catalogue.marine.copernicus.eu/documents/PUM/CMEMS-OC-PUM.pdf>

*At the moment there are not all options available. If text data is input, all sensor configurations are available. For satellite data, only Sentinel-3 OLCI Level-2 full resolution is available. Options for CMEMS configurations are discussed.*