# Supplementary materials

Section S1:

The literature search involved searching the referencing software Google Scholar in the English language with the search terms listed below and assessing the first 50 results by the inclusion criteria (Methods).

List of search terms used in the literature search:

* Total alkalinity relationship
* Total inorganic carbon relationship
* Tropical total alkalinity
* Subtropical total alkalinity
* North Atlantic total alkalinity
* Atlantic total alkalinity
* Amazon total alkalinity
* Madeira total alkalinity
* Orinoco total alkalinity
* Congo total alkalinity
* Mississippi total alkalinity
* St Lawrence total alkalinity
* Mediterranean total alkalinity
* Tropical total inorganic carbon
* Subtropical total inorganic carbon
* North Atlantic total inorganic carbon
* Atlantic total inorganic carbon
* Amazon total inorganic carbon
* Madeira total inorganic carbon
* Orinoco total inorganic carbons
* Congo total inorganic carbon
* Mississippi total inorganic carbon
* St Lawrence total inorganic carbon
* Mediterranean total inorganic carbon

Table S1: Summary of the literature references detailing the TA and DIC algorithms used in the algorithm evaluation in the Amazon and Congo River domains. Each algorithm is provided with the input variables used to initialise it, the RMSD reported in the literature if given and notes on how the relationship was derived. Some of the literature references provide algorithms for either TA or DIC whereas some provide algorithms for both. Also note that some literature references include multiple algorithms for the same variable on different scales.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Total Alkalinity | | | | Dissolved inorganic carbon | | | |
| Region | Literature reference for algorithm | Predictor variables | Reported RMSD (μ mol kg-1) | Stated as valid for the following conditions | Notes | Predictor variables | Reported RMSD (μ mol kg-1) | Stated as valid for the following conditions | Notes |
| Amazon | ([Astor et al., 2017](#_ENREF_3)) | SSS | None | Valid in the surface 100m. Suitable in the Eastern and Western parts of the Caribbean Sea sub basin (Latitudes 10°N to 11.4°N and Longitudes -66.1°W to 64.3°W). Only valid for SSS between 35.5 and 37. | (Amazon TA algorithms 1-4). Four region specific algorithms. Algorithms were developed using a single cruise dataset. | - | - |  | - |
| ([Brewer et al., 1995](#_ENREF_9)) | SSS,  DO, SiO4, PO4-, NO3- | None | Valid in the surface 250m of the North Atlantic. (Latitudes 0°N to 80°N and Longitudes -100°W to 30°W). Only valid for SSS between 31 and 37.5, SST between -2 and 28°C, PO4- 0 to 2.2 μmolkg-1, SiO4- 0 to 65 μmolkg-1 and NO3- 0 to 34 μmolkg-1. | (Amazon TA algorithms 5). Algorithm developed using the transient tracers in the ocean dataset. | SST, SSS, DO, NO3-, PO4- | None | Valid in the surface 250m of the North Atlantic (Latitudes 0°N to 80°N and Longitudes -100°W to 30°W). Only valid for SSS between 31 and 37.5, SST between -2 and 28°C, PO4- 0 to 2.2 μmolkg-1, DO 100 to 420 μmolkg-1 and NO3- 0 to 34 μmolkg-1.. | (Amazon DIC algorithms 1). Algorithm developed using the transient tracers in the ocean dataset. |
| ([Cai et al., 2010](#_ENREF_12)) | SSS | 7.9 | Valid in the surface 250m of the Western Tropical Atlantic and Caribbean (Latitudes 0°N to 20°N and Longitudes -60°W to 40°W) between salinities of 24 and 37. | (Amazon TA algorithms 6) The Amazon river plume region algorithm is the only one used here. Algorithm developed using data from 19 cruises. | - | - |  | - |
| ([Cooley and Yager, 2006](#_ENREF_13)) | SSS | 9.6 | Valid in the surface 1000m in the region influenced by the Amazon plume (Latitudes 3°N to 14°N and Longitudes -40°W to 59°W). Only valid for SSS between 25 and 35 and, SST between 20 and 30°C. | (Amazon TA algorithms 7). Algorithm developed using data from two cruises. | SSS | 11.6 | Valid in the surface 1000m in the region influenced by the Amazon plume (Latitudes 3°N to 14°N and Longitudes -40°W to 59°W). Only valid for SSS between 25 and 35 and, SST between -20 and 30°C.. | (Amazon DIC algorithms 2). Algorithm developed using data from two cruises. |
| ([Lee et al., 2000](#_ENREF_33)) | - | - |  | - | SSS | Region and season dependent | Valid between 5°N and 5°S. Some of the models are valid where the SST is between 18°C and 29C where NO3- > 0.5umol/kg. Another where NO3- < 0.5umol/kg. A third where SST IS > 29°C and NO3- < 0.5umol/kg. | (Amazon DIC algorithms 3) Single algorithm from multiple models. Algorithm developed using data from the OACES cruises and some WOCE cruises. |
| ([Lefèvre et al., 2010](#_ENREF_35)) | SSS | 11.6 | Valid at 5m in the tropical and subtropical Atlantic (Latitudes 10°S to 12°N and Longitudes -56°W to 30°W). Only valid for SSS between 18 and 36.5 and, SST between 25 and 30°C. | (Amazon TA algorithms 8). Algorithm developed using data from 19 cruises. | SSS | 16.2 | Valid at 5m in the tropical and subtropical Atlantic. (Latitudes 10°S to 12°N and Longitudes -56°W to 30°W). Only valid for SSS between 18 and 36.5 and, SST between -25 and 30°C. | (Amazon DIC algorithms 4). Algorithm developed using data from 19 cruises. |
| ([Lefèvre et al., 2017](#_ENREF_36)) | - | - |  | - | SSS | 27.1 | Valid in surface ocean in the tropical and subtropical Atlantic including the Amazon Shelf. (Latitudes 5°S to 10°N and Longitudes -55°W to 35°W). Only valid for SSS between 1 and 37 and, SST <27.8°C. | (Amazon DIC algorithms 5). Algorithm developed using data from 30 cruises. |
| ([Millero et al., 1998](#_ENREF_40)) | SSS,SST | 4.0 | Valid for the surface ocean between 30°N and 30°S with a SST between 20 and 29°C and for SSS between 33.75 and 36. | (Amazon TA algorithms9). Algorithm developed using data from several programmes (see their Table 2). | - | - |  | - |
| ([Ternon et al., 2000](#_ENREF_48)) | SSS | 9.5 | Valid for the surface ocean in the Amazon plume region. (Latitudes 7.5°S to 7.5°N and Longitudes -55°W to 35°W). Only valid for SSS between 17 and 37 and, SST between 26 and 30°C. | (Amazon TA algorithms 10). Algorithm developed using data from three cruises. | SSS | 19.1 | Valid for the surface ocean in the Amazon plume region (Latitudes 7.5°S to 7.5°N and Longitudes -55°W to 35°W). Only valid for SSS between 17 and 37 and, SST between 26 and 30°C. | (Amazon DIC algorithms 6). Algorithm developed using data from three cruises. |
| Congo | ([Bakker et al., 1999](#_ENREF_4)) | - | - |  | - | SSS, SST | 8.6 (B99\_lcr1), 5.5 (B99\_lcr2), 14.1 (B99\_out) | Valid at 12m in the Congo outflow. For the first algorithm (Latitudes 7.5°S to 15°N and Longitudes --30°W to 8°W). Only valid for SSS between 34 and 36.5 and, SST between 20 and 30°C.  For the second algorithm (Latitudes -1°S to 4°N and Longitudes -30°W to 0°E). Only valid for SSS between 34 and 36.5 and, SST between 20and 30°C.  For the third algorithm (Latitudes 10°S to 5°N and Longitudes -0°W to 5°E). Only valid for SSS between 33 and 36 and, SST between 26.2 and 29.9°C. | (Congo DIC algorithms 1-3)Three region specific algorithms. Algorithm developed using data from the ANT XI/1 and ANT XI/5 datasets. |
| ([Brewer et al., 1995](#_ENREF_9)) | SSS, SST, SiO4-, NO3-, PO4- | None | Valid for the surface 250m of the ocean in the North Atlantic (Latitudes 0°N to 80°N and Longitudes -100°W to 30°W). Only valid for SSS between 31 and 37.5, SST between -2 and 28°C, PO4- 0 to 2.2 μmolkg-1, SiO4- 0 to 65 μmolkg-1 and NO3- 0 to 34 μmolkg-1. | (Congo TA algorithms 1). This algorithm is valid for this region but there were no MDB entries left after applying algorithm stipulations. Algorithm developed using data from TTO. | SSS, SST, DO, NO3-, PO4- | None | Valid for the surface 250m of the ocean in the North Atlantic (Latitudes 0°N to 80°N and Longitudes -100°W to 30°W). Only valid for SSS between 31 and 37.5, SST between -2 and 28°C, PO4- 0 to 2.2 μmolkg-1, DO 100 to 420 μmolkg-1 and NO3- 0 to 34 μmolkg-1.. | (Congo DIC algorithms 4). Algorithm developed using data from TTO. |
| ([Goyet et al., 1998](#_ENREF_25)) | SSS | 4.9 | Valid for the surface ocean (Latitudes 32°S to 8°N and Longitudes -40°W to 15°W). Only valid for SSS between 35 and 37.5 and, SST between 20 and 30°C. | (Congo TA algorithms 2). Algorithm developed using data from a single cruise. | - | - |  | - |
| ([Lee et al., 2000](#_ENREF_33)) | - | - |  | - | SSS, SST, NO3- | Region and season dependent | Valid between 5°N and 5°S. Some of the models are valid where the SST is between 18°C and 29C where NO3- > 0.5umol/kg. Another where NO3- < 0.5umol/kg. A third where SST IS > 29°C and NO3- < 0.5umol/kg. | (Congo DIC algorithms 5). Single algorithm from multiple models. Algorithm developed using data from the OACES cruises and some WOCE cruises. |
| ([Lee et al., 2006](#_ENREF_34)) | SSS, SST | Yes but region dependent | Valid in the surface 30m between 30°N and 30°S where SST > 20°C and SSS is between 31 and 38. | (Congo TA algorithms 3). Single algorithm with RMSD reported by region and season. The algorithm was developed using data from the WOCE, JGOFS and OACES datasets. | - | - |  | - |
| ([Takahashi et al., 2014](#_ENREF_46)) | SSS, NO3- | 12.6 | Valid for the surface 50m of the ocean between 40°N and 40°S. Only valid for SSS between 31 and 38. | (Congo TA algorithms 4)Uses potential alkalinity (PA) to get TA. Algorithm developed using data from GLODAP, CARINA and LDEO. | - | - |  | - |
| ([Vangriesheim et al., 2009](#_ENREF_49)) | - | - |  | - | SSS | None  None | Valid at the surface. For the first algorithm(Latitudes 10°S to 1.5°S and Longitudes -4°W to 12°E). Only valid for SSS between 33 and 36. and the second (Latitudes 10°S to 1.5°S and Longitudes -4°W to 12°E). Only valid for SSS between 23 and 36.. | (Congo DIC algorithms 6-7). Two individual algorithms. Algorithm developed using the BIOZAIRE3 dataset |

Table S2: Table of all algorithms that were identified by the literature search but excluded from the algorithm evaluation. The literature references of the papers are given along with a short and more detailed reason for why these algorithms were not included in the algorithm evaluation.

|  |  |  |
| --- | --- | --- |
| Literature reference for algorithm | Reason for exclusion | Explanation for exclusion |
| ([Alin et al., 2012](#_ENREF_1)) | Out of geographical range. | The algorithm is only applicable to the West coast of the USA. |
| ([Arrigo et al., 2010](#_ENREF_2)) | Out of geographical range. | The algorithm is only applicable to water North of 66N (Arctic Ocean). |
| ([Brasse et al., 1999](#_ENREF_8)) | Out of geographical range. | The algorithm is only applicable in the German bight. |
| ([Broullón et al., 2019](#_ENREF_10)) | Invalid method. | A neural network approach was used which is beyond the scope of this work. |
| ([Brown et al., 2010](#_ENREF_11)) | Equation not suitable | They provide a DIC regression with SSS, potential temperature, O2, NO3- and TA Atlantic subtropical (~25°N) for three separate years. As TA is needed to predict DIC, this algorithm can not be used. |
| ([Cross et al., 2013](#_ENREF_14)) | Out of geographical range. No equation provided. | The algorithm is only applicable to the Bering sea. No equation was given for the TA and SSS relationship. |
| ([Dafner et al., 2001](#_ENREF_15)) | Out of geographical range. | The algorithm is only applicable to Strait of Gibraltar. |
| ([De la Paz et al., 2007](#_ENREF_16)) | Out of geographical range. | The algorithm is only applicable to the Iberian Peninsula. |
| ([Druffel et al., 2005](#_ENREF_17)) | No equation provided. | No equation was given for DIC and SSS relationship in the Amazon plume and Atlantic Ocean. |
| ([Fine et al., 2016](#_ENREF_18)) | Already included | This study used the [Lee et al. (2006](#_ENREF_34)) algorithm which is already included in the algorithm evaluation. |
| ([Fox et al., 1987](#_ENREF_19)) | No equation provided. | No equation was given for TA and SSS relationship in the Mississippi delta. |
| ([Goyet et al., 1998](#_ENREF_25)) | Insufficient salinity range | Valid at the surface in the Atlantic (Latitudes 32°S to 8°N and Longitudes -40°W to 15°W). Only valid for SSS between 35 and 37.5 and, SST between 20 and 30°C. |
| ([Goyet et al., 1999](#_ENREF_26)) | Out of geographical range. | The algorithm is only applicable to the Indian Ocean. |
| ([Guo et al., 2012](#_ENREF_27)) | Invalid method. | A box model was used to predict TA and DIC in the Mississippi plume; this is beyond the scope of this work. |
| ([Gleitz et al., 1995](#_ENREF_23)) | No equation provided. | No equation was given for TA and DIC relationships with SSS, PO4-, DO, SiO4-, not attempt to create a predictive algorithm. |
| ([Jiang et al., 2014](#_ENREF_30)) | No equation provided. | No equations were given for relationships in the Atlantic tropics/subtropics. |
| ([Körtzinger et al., 2001](#_ENREF_32)) | Out of geographical range. | The algorithm is only applicable 60°N and 5°S, at 22°W |
| ([Nondal et al., 2009](#_ENREF_41)) | Out of geographical range. | The TA and DIC algorithms are only applicable to the Northeast Atlantic only and the North Sea up to 10W. Separate TA fit for Arctic river runoff (SST, SSS) (their eq. 6 and 7). DIC fit for separate seasons (SST, SSS, NO3-) (their eq. 8 and 9). |
| ([Pérez et al., 1998](#_ENREF_42)) | Out of geographical range. | The algorithm is only applicable to the North Sea / North Atlantic. |
| ([Santana‐Casiano et al., 2007](#_ENREF_43)) | Out of geographical range. | The algorithm is only applicable to the single Northeast Atlantic site North of Gran Canary. |
| ([Sasse et al., 2013](#_ENREF_44)) | Invalid method. | SOM clustering methodology was used which is beyond the scope of this work. |
| ([Takatani et al., 2014](#_ENREF_47)) | Out of geographical range. | The algorithm is only applicable to Pacific ocean. |
| ([Vázquez-Rodríguez et al., 2012](#_ENREF_50)) | Not valid at the surface | The algorithm is only applicable to 100-200m depths. |
| ([Velo et al., 2009](#_ENREF_51)) | Invalid method. | Fits were performed for quality control purposes and are thought to be suboptimal for prediction. |
| ([Velo et al., 2013](#_ENREF_52)) | Invalid method. | Used a neural network to predict TA, this is beyond the scope of this work. |
| ([Wootton and Pfister, 2012](#_ENREF_53)) | Out of geographical range. | The algorithm is only applicable to West coast of North America (Washington state). |

Table S3: OceanSODA-UNEXE dataset variable names, units, sources were relevant and short explanations of each.

|  |  |  |  |
| --- | --- | --- | --- |
| Abbreviated name | Full variable name | Units | Notes |
| SST | Sea surface temperature | Kelvin | Always saved. SST used to derive either TA or DIC. Always used in PyCO2SYS v1.7 calculations ([Humphreys et al., 2022](#_ENREF_29)).  Will be one of the three datasets below re-gridded onto a 1°x1° monthly grid. The SST dataset is detailed in the SST variable long name and the global attributes.  1. European Space Agency Climate Change Initiative (ESACCI) SST v2.1 ([Merchant et al., 2019](#_ENREF_39);[Good et al., 2019](#_ENREF_24))  2.CORA v5.2 ([Szekely et al., 2019](#_ENREF_45))  3. OISST v2.1 ([Huang et al., 2021](#_ENREF_28);[Banzon et al., 2016](#_ENREF_5)) |
| SSS | Sea surface salinity | unitless | Always saved. SSS used to derive either TA or DIC. Always used in PyCO2SYS v1.7 calculations ([Humphreys et al., 2022](#_ENREF_29)).  Will be one of the four datasets below re-gridded onto a 1°x1° monthly grid. The SSS dataset is detailed in the SSS variable long name and the global attributes.  1. European Space Agency Climate Change Initiative (ESACCI) v2.31 ([Boutin et al., 2021](#_ENREF_7);[Boutin et al., 2020](#_ENREF_6))  2. CORA v5.2 ([Szekely et al., 2019](#_ENREF_45))  3. ISAS-15 ([Kolodziejczyk et al., 2021](#_ENREF_31);[Gaillard et al., 2016](#_ENREF_20))  4. RSS-SMAP v4.0 ([Meissner et al., 2018](#_ENREF_37);[Meissner et al., 2019](#_ENREF_38)) |
| SiO4-4 | Silicate | μmol kg−1 | Always saved as always used in PyCO2SYS v1.7 calculations ([Humphreys et al., 2022](#_ENREF_29)). Taken from the World Ocean Atlas (WOA) volume 4 ([Garcia et al., 2013b](#_ENREF_22)) |
| NO3- | Nitrate | μmol kg−1 | Present if used by TA or DIC algorithm. Taken from the World Ocean Atlas (WOA) volume 4 ([Garcia et al., 2013b](#_ENREF_22)) |
| PO4-3 | Phosphate | μmol kg−1 | Always saved as always used in PyCO2SYS v1.7 calculations ([Humphreys et al., 2022](#_ENREF_29)). Taken from the World Ocean Atlas (WOA) volume 4 ([Garcia et al., 2013b](#_ENREF_22)) |
| DO | Dissolved oxygen | μmol kg−1 | Present if used by TA or DIC algorithm. Taken from the World Ocean Atlas (WOA) volume 3 ([Garcia et al., 2013a](#_ENREF_21)) |
| TA | Total alkalinity | μmol kg−1 | If this netCDF file name is TA, TA is calculated with a literature algorithm (the reference for that algorithm is given in the TA variable name and the global attributes) using the SST and SSS datasets in this file (the dataset name, version number and references for the SST and SSS dataset are given in their variable long names and in the global attributes).  If this netCDF file name is DIC, than TA was imported from the TA netCDF. The details of the algorithm and datasets used to generate that are detailed in that file. |
| DIC | Dissolved inorganic carbon | μmol kg−1 | If this netCDF file name is DIC, DIC is calculated with a literature algorithm (the reference for that algorithm is given in the DIC variable name and the global attributes) using the SST and SSS datasets in this file (the dataset name, version number and references for the SST and SSS dataset are given in their variable long names and in the global attributes).  If this netCDF file name is TA than DIC was imported from the DIC netCDF. The details of the algorithm and datasets used to generate that are detailed in that file. |
| fCO2 | Fugacity of carbon dioxide | μatm | Calculated with PyCO2SYS v1.7 ([Humphreys et al., 2022](#_ENREF_29))using TA,DIC, SIO4 and PO4 with SST and SST in the respective file |
| *p*CO2 | Partial pressure of carbon dioxide | μatm | Calculated with PyCO2SYS v1.7 ([Humphreys et al., 2022](#_ENREF_29))using TA,DIC, SIO4 and PO4 with SST and SST in the respective file |
| pH\_total\_scale | pH on the total scale as defined by ([Zeebe and Wolf-Gladrow, 2001](#_ENREF_54)) | unitless | Calculated with PyCO2SYS v1.7 ([Humphreys et al., 2022](#_ENREF_29))using TA,DIC, SIO4 and PO4 with SST and SST in the respective file |
| pH\_seawater\_scale | pH on the seawater scale as defined by ([Zeebe and Wolf-Gladrow, 2001](#_ENREF_54)) | unitless | Calculated with PyCO2SYS v1.7 ([Humphreys et al., 2022](#_ENREF_29))using TA,DIC, SIO4 and PO4 with SST and SST in the respective file |
| pH\_free\_scale | pH on the free scale as defined by ([Zeebe and Wolf-Gladrow, 2001](#_ENREF_54)) | unitless | Calculated with PyCO2SYS v1.7 ([Humphreys et al., 2022](#_ENREF_29))using TA,DIC, SIO4 and PO4 with SST and SST in the respective file |
| CO3-2 | Carbonate ions | μmol kg−1 | Calculated with PyCO2SYS v1.7 ([Humphreys et al., 2022](#_ENREF_29))using TA,DIC, SIO4 and PO4 with SST and SST in the respective file |
| HCO3- | Bicarbonate ions | μmol kg−1 | Calculated with PyCO2SYS v1.7 ([Humphreys et al., 2022](#_ENREF_29))using TA,DIC, SIO4 and PO4 with SST and SST in the respective file |
| H+ | Hydrogen ions | μmol kg−1 | Calculated with PyCO2SYS v1.7 ([Humphreys et al., 2022](#_ENREF_29))using TA,DIC, SIO4 and PO4 with SST and SST in the respective file |
| omega\_calcite | Calcite saturation state | unitless | Calculated with PyCO2SYS v1.7 ([Humphreys et al., 2022](#_ENREF_29))using TA,DIC, SIO4 and PO4 with SST and SST in the respective file |
| omega\_aragonite | Aragonite saturation state | unitless | Calculated with PyCO2SYS v1.7 ([Humphreys et al., 2022](#_ENREF_29)) Using TA,DIC, SIO4 and PO4 with SST and SST in the respective file |

Table S4: Summary table of variables in Amazon and Congo plumes. All values are averaged to 2 decimal places.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Amazon | | | | Congo | | | |
| Variable | Time period | Mean Value | Standard  Deviation | Minimum Value | Maximum  Value | Mean Value | Standard  Deviation | Minimum Value | Maximum  Value |
| DIC | Annual | 1978.13 | 20.83 | 1100.31 | 2035.90 | 1954.52 | 17.21 | 1181.61 | 2097.88 |
| JFM | 1996.54 | 11.08 | 1108.85 | 2035.90 | 1924.15 | 8.88 | 1181.61 | 2047.34 |
| AMJ | 1976.92 | 10.99 | 1100.31 | 2035.90 | 1934.37 | 9.87 | 1657.11 | 2083.18 |
| JAS | 1959.48 | 9.19 | 1235.50 | 2035.90 | 1993.82 | 3.43 | 1749.11 | 2097.88 |
| OND | 1979.73 | 9.12 | 1337.87 | 2035.89 | 1967.42 | 8.98 | 1496.93 | 2074.27 |
| TA | Annual | 2344.22 | 16.47 | 1684.05 | 2422.4 | 2289.24 | 10.16 | 2098.18 | 2420.86 |
| JFM | 2359.26 | 5.28 | 1688.50 | 2422.39 | 2271.03 | 4.04 | 2098.18 | 2401.76 |
| AMJ | 2347.38 | 11.19 | 1684.05 | 2422.37 | 2269.18 | 8.38 | 2098.63 | 2420.86 |
| JAS | 2327.18 | 7.78 | 1684.84 | 2422.39 | 2313.10 | 5.59 | 2104.3 | 2410.59 |
| OND | 2342.95 | 9.40 | 1688.54 | 2422.40 | 2303.65 | 2.98 | 2098.49 | 2407.44 |
| pH using SSSSST from TA algorithm | Annual | 8.20 | 0.00 | 8.16 | 8.35 | 8.21 | 0.01 | 8.08 | 8.46 |
| JFM | 8.20 | 0.00 | 8.17 | 8.34 | 8.21 | 0.01 | 8.12 | 8.46 |
| AMJ | 8.20 | 0.00 | 8.17 | 8.35 | 8.21 | 0.00 | 8.13 | 8.40 |
| JAS | 8.19 | 0.00 | 8.16 | 8.33 | 8.21 | 0.00 | 8.13 | 8.36 |
| OND | 8.19 | 0.00 | 8.16 | 8.33 | 8.20 | 0.01 | 8.08 | 8.36 |
| pH using SSSSST from DIC algorithm | Annual | 8.19 | 0.00 | 8.15 | 8.34 | 8.20 | 0.01 | 8.06 | 8.48 |
| JFM | 8.20 | 0.00 | 8.17 | 8.34 | 8.21 | 0.01 | 8.12 | 8.48 |
| AMJ | 8.19 | 0.00 | 8.15 | 8.34 | 8.21 | 0.00 | 8.11 | 8.41 |
| JAS | 8.19 | 0.00 | 8.16 | 8.33 | 8.20 | 0.00 | 8.13 | 8.36 |
| OND | 8.19 | 0.00 | 8.16 | 8.31 | 8.20 | 0.01 | 8.06 | 8.37 |
| pCO2 using SSSSST from TA algorithm | Annual | 363.21 | 5.22 | 183.86 | 422.25 | 344.3 | 5.33 | 153.84 | 500.49 |
| JFM | 355.55 | 2.05 | 186.23 | 403.77 | 343.58 | 7.14 | 153.84 | 441.55 |
| AMJ | 360.74 | 3.88 | 183.86 | 405.42 | 343.31 | 3.97 | 182.29 | 418.55 |
| JAS | 367.20 | 3.08 | 190.86 | 422.25 | 340.72 | 2.19 | 208.27 | 416.67 |
| OND | 369.95 | 2.37 | 199.27 | 412.88 | 349.60 | 4.36 | 205.14 | 500.49 |
| pCO2 using SSSSST from DIC algorithm | Annual | 366.38 | 5.02 | 187.99 | 420.07 | 348.60 | 5.81 | 147.20 | 523.78 |
| JFM | 358.36 | 1.90 | 187.99 | 402.75 | 349.16 | 7.78 | 147.20 | 431.50 |
| AMJ | 364.56 | 3.78 | 190.49 | 419.09 | 344.96 | 4.05 | 179.97 | 440.92 |
| JAS | 370.33 | 3.35 | 193.41 | 420.07 | 346.16 | 2.06 | 208.93 | 428.10 |
| OND | 372.85 | 2.09 | 208.24 | 418.40 | 354.10 | 5.27 | 203.95 | 523.78 |
| Omega Aragonite using SSSSST from TA algorithm | Annual | 3.98 | 0.02 | 3.25 | 4.09 | 3.85 | 0.05 | 2.97 | 5.55 |
| JFM | 3.97 | 0.01 | 3.27 | 4.06 | 4.02 | 0.07 | 3.36 | 5.55 |
| AMJ | 3.97 | 0.02 | 3.25 | 4.06 | 3.92 | 0.05 | 3.13 | 5.00 |
| JAS | 3.97 | 0.01 | 3.27 | 4.09 | 3.67 | 0.03 | 2.97 | 4.31 |
| OND | 3.99 | 0.01 | 3.32 | 4.08 | 3.81 | 0.04 | 3.17 | 4.96 |
| Omega Aragonite using SSSSST from DIC algorithm | Annual | 3.95 | 0.02 | 2.76 | 4.07 | 3.82 | 0.05 | 2.92 | 5.68 |
| JFM | 3.95 | 0.01 | 3.25 | 4.06 | 3.98 | 0.08 | 3.27 | 5.68 |
| AMJ | 3.94 | 0.02 | 2.76 | 4.05 | 3.89 | 0.05 | 3.05 | 5.05 |
| JAS | 3.94 | 0.01 | 3.23 | 4.07 | 3.64 | 0.02 | 2.92 | 4.33 |
| OND | 3.96 | 0.01 | 3.22 | 4.06 | 3.78 | 0.05 | 3.09 | 5.05 |
| Omega Calcite using SSSSST from TA algorithm | Annual | 5.98 | 0.03 | 5.08 | 6.10 | 5.82 | 0.08 | 4.55 | 8.35 |
| JFM | 5.99 | 0.01 | 5.11 | 6.07 | 6.04 | 0.11 | 5.06 | 8.35 |
| AMJ | 5.98 | 0.02 | 5.08 | 6.07 | 5.91 | 0.07 | 4.76 | 7.55 |
| JAS | 5.97 | 0.02 | 5.10 | 6.10 | 5.58 | 0.04 | 4.55 | 6.61 |
| OND | 5.99 | 0.01 | 5.16 | 6.09 | 5.76 | 0.06 | 4.78 | 7.46 |
| Omega Calcite using SSSSST from DIC algorithm | Annual | 5.94 | 0.03 | 4.29 | 6.07 | 5.78 | 0.08 | 4.47 | 8.61 |
| JFM | 5.96 | 0.01 | 5.07 | 6.07 | 5.98 | 0.12 | 4.91 | 8.61 |
| AMJ | 5.93 | 0.02 | 4.29 | 6.06 | 5.87 | 0.07 | 4.64 | 7.65 |
| JAS | 5.92 | 0.01 | 5.03 | 6.07 | 5.54 | 0.03 | 4.47 | 6.64 |
| OND | 5.94 | 0.01 | 5.01 | 6.06 | 5.72 | 0.07 | 4.65 | 7.62 |

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