28 May 2020

Revision of file Perseus-4.6\_40rivers\_genericmesh.xlsx

New sheets for DIS and DOX have been added.

New file: Perseus-4.6\_40rivers\_genericmesh\_May2020.xlsx

**Silicate river discharges in the Mediterranean Sea**

**Schink, David R. "Budget for dissolved silica in the Mediterranean Sea." *Geochimica et Cosmochimica Acta* 31.6 (1967): 987-999.**

No access to PDF, only abstract: Measurement of the silica flux through the Straits of Gibraltar shows a loss of 3.6 × 103 moles/second. Estimated influx from rivers and the Black Sea is 3.9 × 103 moles/sec. Apparently no substantial fraction of dissolved silica is lost as the rivers flow into the sea, nor from the water in the sea. Latest flow measurements at Gibraltar suggest a residence time of 170 yr for water in the sea. Diversion of Nile River water—8 % of the total silica input—should have no measurable effect on the silica concentration of the Mediterranean for a long time.

**Krom et al., 2014. Silica cycling in the ultra-oligotrophic eastern Mediterranean Sea**

Estimations only for the EAST MED:

Input from river: 27 × 109 mol Si yr−1 🡪 758.322 k t Si/y [109 gr Si yr−1]

Input from subterranean groundwater: 9.7 × 109 mol Si yr−1 🡪 272.43 k t Si/y

Input from dust deposition: 1 × 109 mol Si yr−1

Input from benthic flux: 57 × 109 mol Si yr−1

Input from Dardanelles: no data

**Ludwig et al., 2009. River discharges of water and nutrients to the Mediterranean and Black Sea: Major drivers for ecosystem changes during past and future decades?**

Silica river discharged can be computed as freshwater runoff multiplied by a representative concentration.

A global rappresentative Si concentration is 4 mg Si L-1 (peso atomico di Silicon is 28.0855 u) -> 142 mmol/m3

From Table 8; making averages:

Total flux of silica from river (post Aswan dam) without Dardanelles: 1016 x 103 t Si /y

River Input in the western Mediterranean Sea: 364 x 103 t Si /y [kt Si/y]

River Input in the eastern Mediterranean Sea: 653 x 103 t Si /y

**TÜRKOĞLU, MUHAMMET. "Temporal variations of surface phytoplankton, nutrients and chlorophyll a in the Dardanelles (Turkish Straits System): a coastal station sample in weekly time intervals." *Turkish Journal of Biology* 34.3 (2010): 319-333.**

Silicate concentration in the Dardanelles Strait: 3.02 ± 1.63 μM (mmol/m3)

**Turkoglu, Muhammet.** **"Red tides of the dinoflagellate Noctiluca scintillans associated with eutrophication in the Sea of Marmara (the Dardanelles, Turkey)." *Oceanologia* 55.3 (2013): 709-732.**

Silicate concentration in the Dardanelles Strait: 2.49±1.34μM

**Pavlidou, A., Krasakopoulou, E., & Souvermezoglou, E. (2010, May**). Dissolved oxygen and nutrient distribution in North Aegean Sea. In *39th CIESM Congress, Venice, Italy* (pp. 10-14)

Silicate concentration in Northern Aegean close to Dardanelles: 1.34±0.43 μM [mmol/m3]

**Souvermezoglou, Ε., Krasakopoulou, Ε., & Pavlidou, A. (2014).** Temporal and spatial variability of nutrients and oxygen in the North Aegean Sea during the last thirty years. *Mediterranean Marine Science*, *15*(4), 805-822.

Silica concentration in Black Sea Water in the Frontal Area (i.e., northern Aegean in front of dardanelles) in different seasons: 2.2 (SPR) and 2.124 (AUT) micromol/L [mmol/m3]

**[2 micromol/L -> 0.056172 mg Si/L]**

|  |  |  |  |
| --- | --- | --- | --- |
| **Silicate** | **Run off - mean 2000-2010**  **(data from Perseus)** | **representative concentration in river and water** | **River discharge**  **[ K t Si /y ]** |
| **39 rivers with runoff>50m5/s** | 275.813 km3/y  8745.96 m3/s | 4 mg Si/L  (Ludvig, 2009) | **1103.252** |
| **Dardanelles** | 302.01 km3/y | 2 micromol/L -> 0.056172 mg Si/L]  (Souvermezoglou et al., 2014) | **16.96** |

**Oxygen river discharges in the Mediterranean Sea**

Atomic weigth: 16 u

|  |  |  |  |
| --- | --- | --- | --- |
| **OXY** | **Run off - mean 2000-2010** | **Representative concentration in river and water** | **River discharge**  **[ Gmol O2 /y ]** |
| **39 rivers with runoff>50m5/s** | 275.813 km3/y  8745.96 m3/s | 250 mmol/m3  (saturation at 15° and 35 PSU)  (~5.5 ml/l; Russo et al., 2012) | 68.95325 Gmol O2 /y |
| **Dardanelles** | 302.01 km3/y | 220 mmol/m3  (Yalcin et a., 2017) | 66.4422 Gmol O2 /y |

**OXYGEN CONVERSION**

Cs(ml l−1 ) = Cs(μmol l−1 ) × 0.0223916 (molar volume of the gas at standard temperature and pressure (STP; 0 °C, 1 atmosphere), according to Weiss (1970))

Cs(ml l−1 ) = Cs(μmol l−1 ) × 0. 022414 according to ideal gas volume UNESCO tables and Benson and Krause (1984).

**Russo A., Carniel S., Sclavo M. and Krzelj M.,2012**. Climatology of the Northern-Central Adriatic Sea, Modern Climatology, Dr Shih-Yu Wang (Ed.), ISBN: 978-953-51-0095-9, InTech, Available from: http://www.intechopen.com/books/modern-climatology/climatology-of-the-northern-central-adriatic-sea

**Yalcin B., Artuz M.L., Pavlidou A., Cubuk S., Dassenakis M., 2017**. Nutrient dynamics and eutrophication in the Sea of Marmara: data from recent oceanographic research. Scienceof the Total Environment, 601-602, 405-424.