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Announcement

Replacement of EOS-80 with the International Thermodynamic Equation of Seawater—2010 (TEOS-10)

The Intergovernmental Oceanographic Commission (IOC), with the endorsement of the Scientific Committee on Oceanic Research (SCOR) and the International Association for the Physical Sciences of the Oceans (IAPSO), has adopted the International Thermodynamic Equation Of Seawater—2010 (TEOS-10) as the official description of seawater and ice properties in marine science. All oceanographers are now urged to use the new TEOS-10 algorithms and variables to report their work. The TEOS-10 computer software, the TEOS-10 Manual[1] and other documents may be obtained from www.TEOS-10.org. A notable difference of TEOS-10 compared with EOS-80 is the adoption of Absolute Salinity to be used in scientific journals to describe the salinity of seawater and to be used as the salinity argument in the TEOS-10 algorithms that give the various thermodynamic properties of seawater. Note, however, that the salinity that is reported to national databases must remain Practical Salinity as determined on the Practical Salinity Scale of 1978. The practice of storing one type of salinity in national databases (Practical Salinity), but using a different type of salinity in publications (Absolute Salinity), is exactly analogous to our present practice with temperature; *in situ* temperature is stored in databases (since it is the measured quantity), but the temperature variable that is used in publications is a calculated quantity, being potential temperature to date under EOS-80, and from now, Conservative Temperature under TEOS-10.

To avoid confusion while the use of Practical Salinity in scientific publications is phased out, authors and editors are requested to ensure that salinity is specifically identified as being either Practical Salinity with the symbol S_P or Absolute Salinity with the symbol S_A. In addition, the method used to compute the location-dependent relationship between S_P and S_A should be explicitly stated. The more prominent advantages of TEOS-10 compared with EOS-80 are

- For the first time the influence of the spatially varying composition of seawater is systematically taken into account through the use of Absolute Salinity. In the open ocean, this has a non-trivial effect on the horizontal density gradient, and thereby on the ocean velocities and transports calculated via the "thermal wind" relation.
- The new salinity variable, Absolute Salinity, is measured in SI units (e.g. g kg^{-1}).
- The Gibbs function approach of TEOS-10 allows the calculation of internal energy, entropy, enthalpy, potential enthalpy and the chemical potentials of seawater as well as the freezing temperature, and the latent heats of freezing and of evaporation. These quantities were not available from EOS-80 but are essential for the accurate accounting of "heat" in the ocean and for the consistent and accurate treatment of air-sea and ice-sea heat fluxes in coupled climate models.
- In particular, Conservative Temperature Θ accurately represents the "heat content" per unit mass of seawater, and is to be used in place of potential temperature θ in oceanography.
- The thermodynamic quantities available from TEOS-10 are totally consistent with each other; this was not the case with EOS-80.

A brief introduction to TEOS-10, "Getting started with TEOS-10 and the Gibbs Seawater (GSW) Oceanographic Toolbox", is available on the TEOS-10 web site (www.TEOS-10.org). This lists all the functions in the GSW computer software toolbox and also illustrates the differences associated with using Absolute Salinity and Conservative Temperature compared with using Practical Salinity and potential temperature.

Capitan Javier Valladares, *Chairman*, Intergovernmental Oceanographic Commission

Prof. Dr. Wolfgang Fennel, *President*, Scientific Committee on Oceanic Research

Prof. Eugene G. Morozov, *President*, International Association for the Physical Sciences of the Oceans

[1] IOC, SCOR and IAPSO, 2010: The International Thermodynamic Equation of Seawater—2010: Calculation and use of thermodynamic properties. Intergovernmental Oceanographic Commission, Manuals and Guides No. 56, UNESCO (English), 196 pp.

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