

***Interactive comment on “Numerical
implementation and oceanographic application of
the thermodynamic potentials of water, vapour,
ice, seawater and air –
Part 2: The library routines” by D. G. Wright et al.***

Dr Nycander (Referee)

jonas@misu.su.se

Received and published: 17 May 2010

This is in effect a 'User's guide' for the comprehensive SIA source code library for the thermodynamic properties of liquid water, water vapour, ice, seawater and humid air. It is very well written, and generally gives a clear understanding of the structure of the library and of how to use it. It will certainly be of great value for all users.

However, one thing that I think could be improved is the explanation of the relation between the SIA library, the GSW library, and the gsw-routines of the SIA library.

C239

As far as I have been able to understand, the GSW library starts with defining the IAPSW-09 Gibbs function for sea water, while the SIA library starts with defining the IAPSW-95 Helmholtz energy for liquid water, then derives a Gibbs function from that, and finally adds the salinity part to arrive at a Gibbs function for sea water. The latter method is numerically slower, but give a larger range of validity, and a more accurate result when the salinity is very small.

This should all be explained concisely in one place, for example at the end of section 3, so that it can be understood without consulting various tables.

Many users will be faced with a choice between the SIA library and the GSW library, and I think they should be given more explicit advice on this choice.

For example, I believe that a user who just wants to implement the equation of state in a global ocean model without sea ice should use the GSW library, since it is faster. But should someone who wants to model the outflow of a river into the sea also use the GSW library, or should he use the SIA library, since it is better at handling very low salinities? If sea ice is included in an ocean model, one clearly has to use the SIA library to describe the phase transition between water and ice. But does this mean that one should use the SIA library also for the equation of state in the interior of the ocean, for consistency? Or is it better to use the GSW library for that, since it is faster, or perhaps the gsw-routines of the SIA library? A discussion of these and similar questions would be very helpful.

Interactive comment on Ocean Sci. Discuss., 7, 649, 2010.