

Interactive comment on “Thermodynamic properties of standard seawater” by J. Safarov et al.

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Received and published: 14 May 2009

This manuscript addresses the shortage of data identified in the 16th IAPWS Certified Research Need regarding the Thermophysical Properties of Seawater (ICRN 16). ICRN 16 identifies a need for data on the density of seawater for temperatures between the freezing point and the boiling point, for pressures up to 100 MPa and for salinities up to saturation. Beyond the critical pressure, temperatures up to at least 680 K are identified as being of interest for research on hydrothermal vents. At atmospheric pressure, the temperature range up to 120 °C and salinity range up to 70 g/kg is identified as being of particular interest for power station cooling and desalination.

The current paper considers only seawater with a Practical Salinity of 35 and thus does not address the need for high salinity data. However, it considers temperatures

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up to 194.91 °C and pressures up to 140 MPa and thus makes a major contribution to filling an important hole in observations of the thermophysical properties of seawater. In addition, a careful review of previous work is provided by the authors. Although I am not an expert in instrumentation, the methods applied are clearly described and consistency of the results with previous work has been demonstrated. It thus appears very likely that the methodology used is reliable. In my opinion, the work should be published.

There are, however, concerns associated with the version of the manuscript posted on OSD. Although the work is worthwhile and the overall presentation is well structured and easy to follow, the English presentation is in general quite poor. In places it is so poor that it obstructs the communication of information. This is a technical problem to eliminate. Since the number of edits required was large I have communicated my suggestion to the authors directly by email. A version in which the English presentation is substantially improved is now available from Dr. Safarov. The changes include many minor technical changes, a modification of the title to clarify that the contribution focuses on high temperatures and pressures, and numerous clarifications included by Dr. Safarov in response to the questions raised.

In my opinion, the revised version available from Dr. Safarov is already acceptable for publication. The one question that remains of some concern is the nature of the uncertainties in the results presented. In particular, it would be useful if the authors could separate uncertainties associated with the determination of the density of pure water from the uncertainties associated with the presence of sea salt in the solution. If this could be done, then the overall uncertainties might be reduced by substituting the pure water results with those available from the International Association for the Physical Properties of Water and Steam (IAPWS-95). It is not clear, however, whether or not the authors have the information available to make this distinction and I do not consider this step to be essential for publication.

