Joint SCOR/IAPWS/IAPSO Committee on the Properties of Seawater (JCS)

Report to SCOR and IAPSO on JCS Activities Aug 2018-Apr 2019

JCS Executive	
Rich Pawlowicz (Chair)	Canada
Rainer Feistel (Vice-chair)	Germany
Steffen Seitz (Vice-chair)	Germany
Salinity/Density Taskgroup	
(Rich Pawlowicz) (Chair)	
Frank J. Millero	USA
(Steffen Seitz)	
Hiroshi Uchida	Japan
Stefan Weinreben	Germany
Youngchao Pang	China
Ryan Woosley	USA
Yohei Kayukawa	Japan
pH Taskgroup	
Andrew Dickson (Chair)	USA
Maria Filomena Camoes	Portugal
Daniela Stoica	France
Simon Clegg	UK
Frank Bastkowski	Germany
Relative Humidity Taskgroup	
Olaf Hellmuth	Germany
Jeremy Lovell-Smith	New Zealand
(Rainer Feistel)	
Stephanie Bell	UK
Export subgroup: Thermodynamics	
(Rainer Feistel)	
Expert subgroup: Numerical Modelling and Applications	
Trevor J. McDougall	Australia
Expert subgroup: Software	
Paul Barker	Australia
Industry Representatives	
Richard Williams (OSIL)	UK
Barbara Laky (Anton Paar)	Austria

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Meetings

In Sept. 2018, JCS held a series of workshops at the 17th International Conference on the Properties of Water and Steam (Prague, Czech Republic). These included a) a workshop on the aims and purpose of JCS, as well as meetings of a) the Salinity/Density taskgroup, b) the pH Taskgroup, and c) the RH Taskgroup, with an attendance of 14-19 scientists for each. As a result of these discussions, JCS recommended to SCOR, IAPWSO, and IAPWS that JCS continue as an organization sponsored by these organizations, that the JCS Terms of reference remain unchanged for the next cycle, and that the membership of the various JCS taskgroups, which are largely independent of one another, be increased slightly to assist them in their work, by including a number of scientists who are currently contributing to the tasks of JCS. Taskgroup chairs were also appointed. These recommendations were accepted and the current membership is listed above. In addition, a series of goals was developed to guide taskgroup activities over the next few years.

Web site

JCS maintains a web site at www.teos-10.org. This site gets 1600-2300 visitors per month (8574 in the past year, with 64304 "unique views[1]" since Oct 2010). Annual downloads are stable.

Web site Item	**Unique downloads June 2011-June 2013**	**Unique downloads June 2013-June 2014**	**Unique downloads June 2014-June 2015**	**Unique downloads June 2015-June 2016**	**Unique downloads June 2016-June 2017**	**Unique downloads June 2017-June 2018**	**Unique downloads June 2018-Apr 2019**
Manual	920	360	535	552	418	427	349
Getting Started	879	362	558	547	427	475	349
Slides	704	284	374	318	219	248	204
Primer	584	197	289	297	222	217	187
GSW MATLAB_v3_0	1920	1102	1485	1814	1235	1552	1233
GSW FORTRAN_v3_	366	222	171	162	127	116	82
GSW_C_v3_0	202	84	133	151	85	96	59
GSW_PHP	-	55	61	43	29	60	28
SIA_VB	72	100	46	45	45	48	43
SIA_FORTRAN	59	118	58	44	36	42	37

[1] The method of computing "unique views" changed in 2019.

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Other Progress

1) A new "European metrology network" (EMN) on Climate and Ocean has been formed, with a number of JCS members involved (however, the network is open to all to participate). First AGM will be 20-21 June at National Physical Laboratory (UK). In essence this is a network for creating and disseminating knowledge, and building coordinated infrastructure. It has Sections dedicated to atmosphere observation, ocean observation, and land and earth observation, and will have activities in these areas.
2) Progress in the pH taskgroup is being carried out under the auspices of SCOR WG 145. An effort is being made to identify the limitations of Harned cell measurements through an intercomparison exercise between AD's laboratory and the national standards laboratories in France, Germany, Japan and USA; a new postdoctoral researcher is involved in making these measurements.
3) SC has almost completed coding of a speciation model that will allow for the estimation of uncertainties in pH.
4) FJM/RP continue analysis of East Pacific Rise density anomaly data.
5) RP is working on understanding the diffusion of seawater and possible fractionations that result from this (MSc thesis scheduled for completion fall/2019)
6) SS is working towards making high-pressure measurements of conductivity traceable to the SI.
7) RF and JLS continue working towards procedures for making systematic error estimates.
8) RW is continuing with development of the 'best practices in density measurements' document.
9) The 2016 Metrologia papers have now been downloaded 15422 times (Overview 4587, Salinity 2371, pH 2387, RH 6067)
10) OH has written 2 book chapters to appear in a textbook on meterological measurements, and is working on a long paper: Real-Gas Effects in Humid Air: Possible Implications of the Advanced Seawater Standard TEOS-10 for Hygrometry at Atmospheric Pressure (authors OH, RF, JLS and 3 others).

Papers published

1) R. Feistel, (2019), Defining relative humidity in terms of water activity. Part 2: Relations to osmotic pressures. Metrologia, Volume 56, Number 1, 10.1088/1681-7575/aaf446

2) W. Ebeling, R. Feistel, H. Krienke (2019), On statistical calculations of individual ionic activity coefficients of electrolytes and seawater. I. Basics (researchgate preprint) 10.13140/RG.2.2.18591.20640

3) S. Seitz, P. Tonnes Jakobsen, M. Mariassy (2019), Metrological advances in reference measurement procedures for electrolytic conductivity. Metrologia 56, 1pp., 10.1088/1681-7575/ab1527

4) Müller, J.D., Bastkowski, F., Sander, B., Seitz, S., Turner, D.R., Dickson, A.G., Rehder, G., Metrology for pH measurements in brackish waters – part 1: Extending electrochemical pH_T measurements of TRIS buffers to salinities 5 – 20, Front. Mar. Sci. 5:176. doi: 10.3389/fmars.2018.00176

5) Vancoppenolle, M., Madec, G., Thomas, M., & McDougall, T. J. (2019). Thermodynamics of sea ice phase composition revisited. *Journal of Geophysical Research: Oceans*, 124, 615– 634. https://doi.org/10.1029/2018JC014611

6) Hellmuth, O., Shchekin, A.K., Feistel, R., Schmelzer, J.W.P., A.S. Abyzov, (2018), Physical interpretation of ice contact angles, fitted to experimental data on immersion freezing of kaolinite particles, Interfacial Phenomena and Heat Transfer, 6(1):37–74.

7) Anes, B., da Silva, RJNB, Oliviera, C., Cameos, MF (2019) Seawater pH measurements with a combination glass electrode and high ionic strength TRIS-TRIS HCl reference buffers - An uncertainty evaluation approach, TALANTA, 193 (2019) 118-122, 10.1016/j.talanta.2018.09.075

R. Pawlowicz

JCS chair, Apr 30 2019