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

Report to SCOR and IAPSO on JCS Activities Aug 2012-June 2013

Executive	
Rich Pawlowicz (Chair)	Canada
Rainer Feistel Vice-chair	Germany
Trevor J. McDougall (Vice-chair)	Australia
Salinity/Density Subgroup	
Frank J. Millero	USA
(Rich Pawlowicz)	Canada
Steffen Seitz	Germany
Hiroshi Uchida	Japan
Stefan Weinreben	Germany
pH Subgroup	
Maria Filomena Camoes	Portugal
Andrew Dickson	USA
Petra Spitzer	Germany
Relative Humidity Subgroup	
Olaf Hellmuth	Germany
Jeremy Lovell-Smith	New Zealand
Thermodynamics	
(Rainer Feistel)	
Numerical Modelling and Applications	
(Trevor J. McDougall)	
Software	
Paul Barker	Australia
Industry Representatives	
Paul Ridout (OSIL)	UK
Barbara Laky (Anton Paar)	Austria

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Meetings

JCS has not met this year. However, a first meeting is scheduled during the 2013 International Conference on the Properties of Water and Steam (Greenwich, UK, Sept 2013). Workshops are scheduled for the Salinity/Density, pH, and Relative Humidity subgroups.

Activities

1. Sept 2012 – EURAMET ENVO5 project has workshop (Berlin), many ENVO5 members are also in JCS.
2. October 2012 – RP, RF, HU attended IAPWS annual meeting. JCS formally sponsored by IAPWS.
3. October 2012 – JCS formally sponsored by SCOR
4. October-December 2012 – JCS membership developed
5. Dec 2012 – RF circulates current draft of BIPM position paper; salinity/density stable, major revisions on pH and RH sections.
6. Jan 2013 – a major oceanographic instrument vendor implements TEOS-10 in their software product.
7. March 2013 – several articles in the Chinese scientific literature on the preparation and Chinese Standard Seawater were translated by RP and Chuning Wang and circulated for discussion. Chinese oceanographers have developed their own Standard Seawater based on the KCL standard. PR provides more information about OSIL knowledge of Chinese SSW.
8. March 2013 – RF circulates draft of BIPM position paper, pH stabilizing, RH still needs work.
9. April 2013 – TM works with a major physical oceanography journal to get them to implement the correct notation for TEOS-10 (they were initially quite resistant).
10. April 2013 – Salinity/Density subgroup begins work on a 'density best practices' document.
11. April-June 2013 – TM and PB work with a different major instrument vendor to implement TEOS-10 in their CTD processing software, should be available 'soon'.
12. June 2013 – TM posts 18 hours of lecture notes on TEOS-10 to www.teos-10.org
13. June 2013 – Initial meeting of EURAMET project (successor to ENV05)

Web site

www.teos-10.org is getting approximately 1000 visitors per month of which about 600 are “unique”. These monthly numbers have remained relatively constant since Jan 2012.

Web site Item	**Unique downloads since June 2011**
Manual	920
Getting Started	879
Slides	704

Primer	584
GSW_MATLAB_v3_0	1920
GSW_FORTRAN_v3_	366
GSW_C_v3_0	202
SIA_VB_V3_0	72
SIA_FORTRAN_V3_0	59

In addition, RP as chair has dealt with several emails regarding industrial applications of TEOS-10 in high turbidity environments and the history of salinity determination.

Papers published

1. R. Feistel, TEOS-10: A New International Oceanographic Standard for Seawater, Ice, Fluid Water, and Humid Air, International Journal of Thermophysics: Volume 33, Issue 8 (2012) , Page 1335.
2. Pawlowicz, R., and R. Feistel, Limnological Applications of the Thermodynamic Equation of Seawater 2010 (TEOS-10), Limnology and Oceanography:Methods, 10:853-867, (2012)
3. McDougall, T. J., D. R. Jackett, F. J. Millero, R. Pawlowicz and P. M. Barker, 2012: A global algorithm for estimating Absolute Salinity. Ocean Science, 8, 1117-1128.
4. Safarov, Berndt, Millero, Feistel, Heintz, and Hassel, (P,\rho,T) Properties of seawater at brackish salinities: Extensions to high temperatures and pressures, Deep Sea Res. I, 78, 95-101, (2013)
5. Graham, F. S. and T. J. McDougall, 2012: "Quantifying the non-conservative production of Conservative Temperature, potential temperature and entropy". Journal of Physical Oceanography, 43, 838-862.

Book Chapters and other:

1. Pawlowicz, R. (2013) Key Physical Variables in the Ocean: Temperature, Salinity, and Density. Nature Education Knowledge 4(4):13 http://www.nature.com/scitable/knowledge/library/key-physical-variables-in-the-ocean-temperature-102805293
2. McDougall, Feistel and Pawlowicz, "Thermodynamics of Seawater". In "Ocean Circulation and Climate 2nd edition", G. Siedler, J. A. Church, J. Gould and S. M. Griffies, eds., Academic Press, Final version submitted. (2013)
3. Hellmuth, O., Khvorostyanov, V.I., Curry, J.A., Shchekin, A.K., Schmelzer, J.W.P., Feistel, R., Djikaev, Y.S., Baidakov, V.G. (2013): Selected Aspects of Atmospheric Ice and Salt Crystallisation. Review Series on Selected Topics of Atmospheric Sol Formation, Volume 1. Nucleation Theory and Applications, Joint Institute for Nuclear Research, Dubna, Russia
4. Feistel, R., Wagner, W. (proposers): Guideline on a Low-Temperature Extension of the IAPWS-95 Formulation for Water Vapor. The International Association for the Properties of Water and Steam, Boulder, Colorado, USA, October 2012

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Papers in Preparation:

1. Metrological challenges for measurements of key climatological observables: Oceanic salinity and pH, and atmospheric humidity, R Feistel, R Wielgosz, S A Bell, M F Camoes, J R Cooper, P Dexter, P Fisicaro, D P Gatley, A H Harvey, M Heinonen, O Hellmuth, N Higgs, H-J Kretzschmar, J W Lovell-Smith, T J McDougall, R Pawlowicz, S Seitz, P Spitzer, D Stoica and H Wolf. (Position paper on future cooperation activities between BIPM and IAPWS, to be published in Metrologia)
2. Kretzschmar, H.-J., Feistel, R., Wagner, W., Miyagawa, K., Harvey, A.H., Cooper, J.R., Hiegemann, M., and Herrmann, S., Industrial Formulation of the Thermodynamic Properties of Seawater, Desalination, in preparation
3. Kretzschmar, H.-J., Feistel, R., Wagner, W., Miyagawa, K., Harvey, A.H., Cooper, J.R., Hiegemann, M., and Herrmann, S. (proposers): Advisory Note No. 5: Industrial Calculation of the Thermodynamic Properties of Seawater. The International Association for the Properties of Water and Steam, Greenwich, UK, September 2013, in preparation
4. Feistel, R., Lovell-Smith. J. (proposers): Guideline on a Virial Equation for the Fugacity of H2O in Humid Air. The International Association for the Properties of Water and Steam, Greenwich, UK, September 2013, in preparation

R. Pawlowicz

JCS chair, June 24, 2013