



## TNA PROJECT REPORT

1<sup>st</sup> Call of Proposals  
12 January – 3 April, 2012

### A) General Information

<b>Proposal reference number</b> <sup>(1)</sup>	CALL_1_5_12/1210181
<b>Project Acronym (ID)</b> <sup>(2)</sup>	RTC
<b>Title of the project</b> <sup>(3)</sup>	Reference Temperature Calibration
<b>Host Research Infrastructure</b> <sup>(4)</sup>	OGS-Oceanographic Calibration Centre (OGS-CTO)
<b>Starting date - End date</b> <sup>(5)</sup>	25 February 2013 - 01 March 2013
<b>Name of Principal Investigator</b> <sup>(6)</sup>	Dr. George Petihakis
<b>Home Laboratory</b>	HCMR Calibration Laboratory
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<b>Additional users</b> <sup>(7)</sup>	Manolis Ntoumas – HCMR technician Fotis Pantazoglou – HCMR technician

### B) Project objectives (max. 250 words)<sup>(8)</sup>

The purpose of the experiment was to acquire expertise, receive guidance, and gain “hands-on” experience in applying the procedures and Best Practice conventions for the calibration of oceanographic temperature sensors using primary reference standards. The OGS-Oceanographic Calibration Centre (OGS-CTO) is the oceanographic testing and calibration facility of the Department of Oceanography of the OGS (Istituto Nazionale di Oceanografia e di Geofisica Sperimentale), located in Trieste (Italy). It provides the scientific and technical infrastructure necessary for high-quality observations of the marine environment using procedures that repeatedly meet recognized international standards of excellence. The ability to calibrate and maintain sea-going instrumentation efficiently is fundamental for the quality of their services. The long-term goal is for HCMR to be able to perform such calibrations on its own premises. This is essential in order to ensure the quality of the data collected by the POSEIDON network (<http://poseidon.hcmr.gr>) and field surveys performed by HCMR.

### C) Main achievements and difficulties encountered (max. 250 words)<sup>(9)</sup>

HCMR has established an in-house calibration laboratory for the evaluation and calibration of its oceanographic sensors and instruments. For the calibration of the temperature sensors, two standard platinum thermometer(s) manufactured by Seabird Electronics, Inc. and a large temperature-controlled bath are employed. However, for proper calibration, the reference standard platinum thermometer(s) should be maintained within specifications by linearization, slope and offset adjustments using primary temperature standards (ITS-90 fixed points). The calibration of oceanographic temperature sensors using primary temperature standards requires expertise, and is a delicate and labour-intensive process, often associated with heavy costs for the operators. The HCMR calibration lab does not currently employ this calibration procedure. The JERICO RTC TNA provided the opportunity to validate and calibrate the two reference thermometer(s) which will be used as secondary reference standards for the HCMR calibration laboratory.

**D) Dissemination of the results** <sup>(10)</sup>

A report with the TNA results will be published in the JERICO webpage. <a href="http://www.jerico-fp7.eu/tna/calls-and-selection/first-call/approved-projects">http://www.jerico-fp7.eu/tna/calls-and-selection/first-call/approved-projects</a>
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**E) Use of the Infrastructure/Installation** <sup>(11)</sup>

	In situ	By remote
<b>Nr. of Users involved</b>	3	
<b>Access units (days/months/etc)</b>	5	
<b>In situ stay day / Remote Access duration</b>	5	

**F) User project scientific field**

<b>Main field</b> <sup>(12)</sup>	Earth Sciences & Environment
<b>Scientific description</b> <sup>(13)</sup>	Marine Science/Oceanography

**H) Technical and Scientific preliminary Outcomes (max. 2 pages)** <sup>(14)</sup>

The sensors under calibration were two SBE35 Deep Ocean Standards Thermometers (serial numbers 58 and 59) manufactured by Seabird Electronics, Inc. that were purchased by HCMR in 2007. One of them, the one bearing serial number (s/n) 59, had never been used in the field while the other has been employed in HCMR's evaluation/calibration experiments.

For the linearization procedure, the two sensors were placed in a Hart 7052 Seawater Calibration Bath together with a Metal-sheath SPRT Rosemount model 162 CE for taking reference temperature readings. Seven calibration set-points (28 °C to 2 °C) were chosen, and at each set-point, the bath temperature was logged for 10 minutes. The averaged data of the sensors at the different set-points and the corresponding temperature residuals with respect to the relevant reference temperatures are presented in Figure 1.

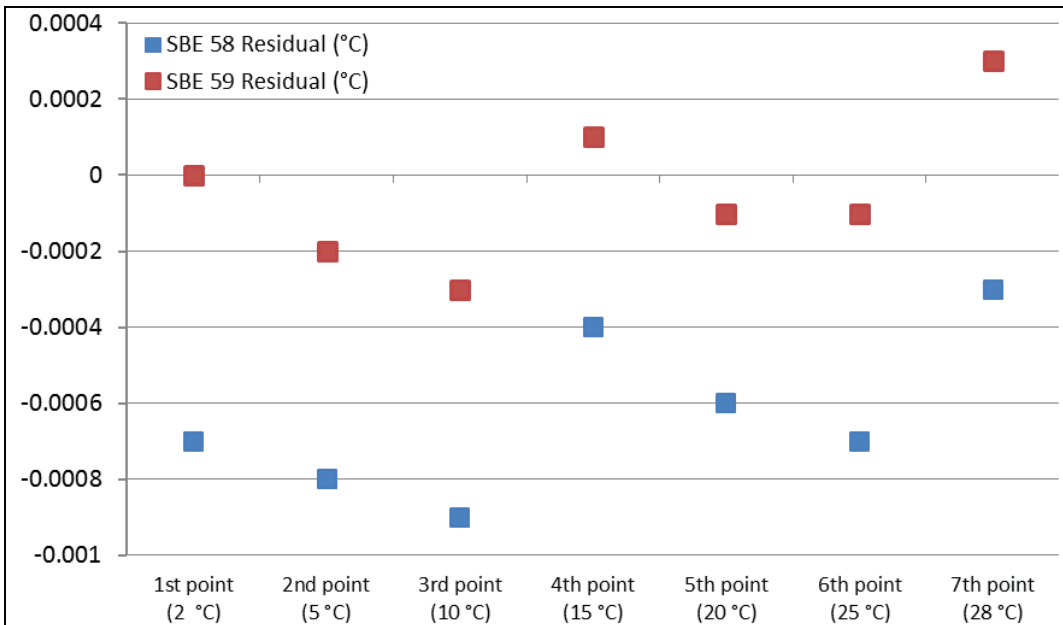


Figure1. The temperature residuals of the two SBE Deep Ocean Standards Thermometers.

The data showed that neither of the two sensors required any changes in their linearization coefficients at the present time. Subsequently, the slope and offset terms of the two sensors were evaluated one at a time at the Triple Point of Water (TPW) and the Melting Point of Gallium (MPGa) using appropriate, certified ITS-90 fixed point cells.

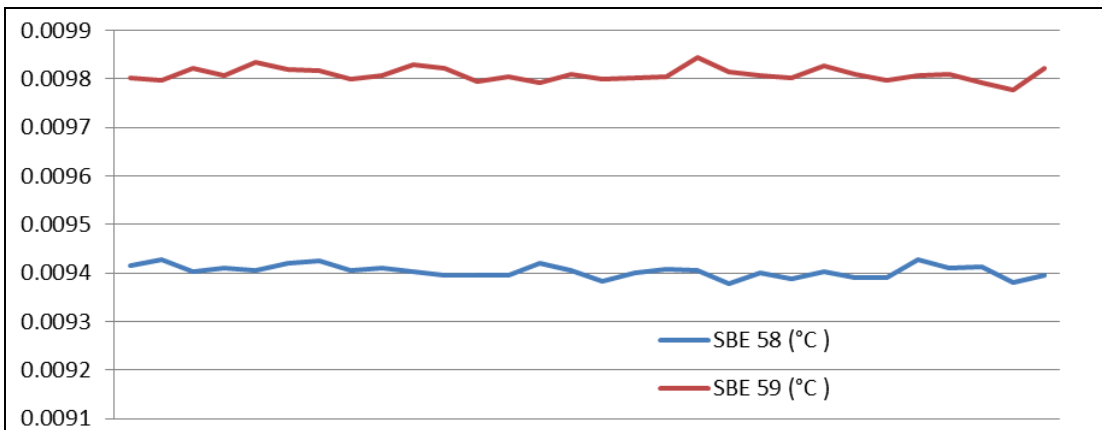
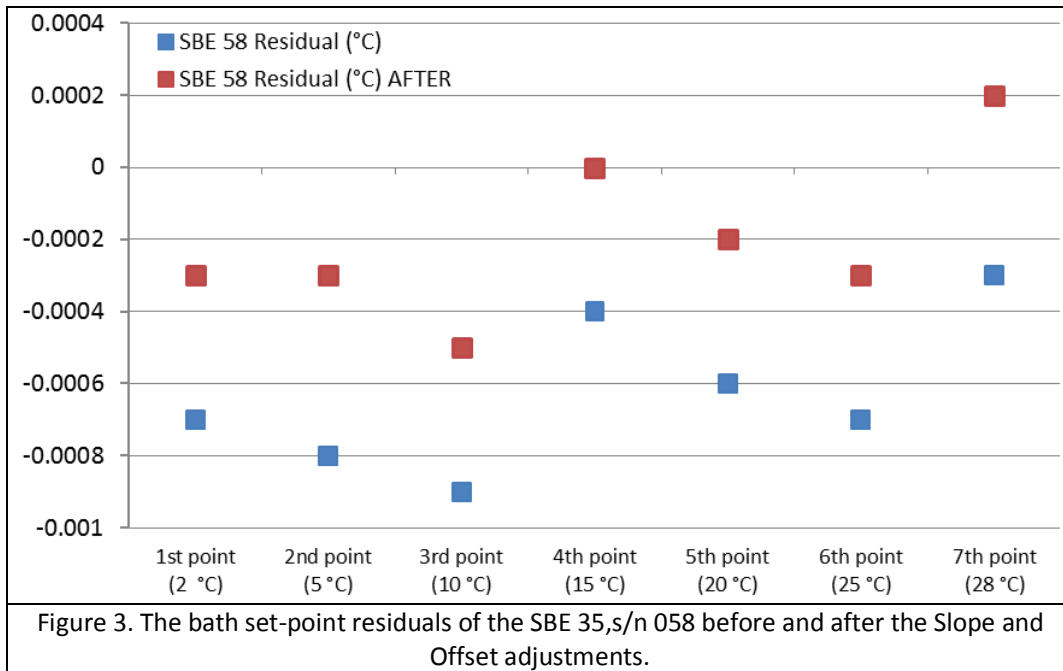


Figure 2. SBE thermometers logging at the Triple Point of Water (0.0098 °C, after the hydrostatic head effect correction).

The results indicated that the slope and the offset of one of the the units, specifically, s/n 58 had slightly changed since its last calibration (Table 1), and the experimental data was used to recompute a new slope and offset.

SBE 35 sn:058	As received	New
<b>Slope</b>	1.000015	1.0000002
<b>Offset</b>	-0.000285	0.00045

The performances of this unit with its “as received” and new slope and offset settings have been compared using the data from the linearization testing in Figure 3.



Both of the calibrated SBE 35 units will be used as reference sensors for temperature in the calibration laboratory of the HCMR at its facilities in Thalassokosmos in Crete (Greece).

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