



NEWSLETTER

IMEKO Technical Committee 12

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Dear Colleagues,

The second issue of the TC12 newsletter for this year is ready. We report several recent news on thermal metrology, hygrometry and thermophysical properties. Since the last newsletter, significant events took place: some EMRP projects were launched and others are going at full speed; the TEMPMEKO 2013 web site is running; the Euramet TCT meeting was held in Istanbul in 18-19 April, opened by a workshop on the thermometry projects held at UME the previous day; the 26th CCT meeting was held in May at BIPM. This issue comes with a slight delay, but we wanted to give you as soon as possible all relevant information.

Andrea Merlone

TEMPMEKO 2013 ***Web site opened***

TEMPMEKO 2013, the 11th *Symposium on Temperature and Thermal Measurements in Industry and Science* will be held in the island of Madeira from 14th to 18th October 2013.

The main event of TC12 is ready to start its operative activities. The organizational work is starting its critical phase and updated information can be found on the official web site:

<http://www.tempmeko2013.pt>

The website contains now full information on the logistics, travel, accommodation, dates, and other matters. Additional information will be reported along the progress of the organizational work. Please check it often for updates. We report here the important dates. Keep them in mind!

First call for papers	October 2012
Abstracts due	31st January 2013
Notification of acceptance	31st April 2013
Submission of papers	30th June 2013
Start of registration	31st January 2013
Conference start	14th October 2013

Agreement has been reached with the Editor of the International Journal of Thermophysics and it is confirmed that the papers presented at the event that pass the peer review process will be published in 4-5 special issues of that journal in 2014-15.

Here's the welcome message from Eduarda Filipe, TEMPMEKO 2013 National Organising Committee Chair

As NOC Chairperson of the TEMPMEKO 2013 Symposium, it is a honor and a privilege to welcome you to Funchal, capital of the Madeira Islands, Portugal. The settlement of this wonderful Atlantic archipelago, discovered in the 14th Century, started in 1419 by João Gonçalves Zarco and Tristão Vaz Teixeira. Madeira island, known as

the Atlantic Pearl and a well-known tourist destination was chosen to host TEMPMEKO 2013, the 12th International Symposium on Temperature and Thermal Measurements in Industry and Science, to be held on October 14-18, 2013.

The organization of this event by SPMet, Portuguese Society of Metrology and RELACRE, Portuguese Network of Accredited Laboratories Association has the support of IMEKO TC12, of the Madeira Autonomous Regional Authorities and of IPQ, Portuguese Institute for Quality – the Portuguese NMI

The TEMPMEKO 2013 website is available at <http://www.tempmeko2013.pt> and there you will find useful details concerning the important dates for the conference along with information about the accommodation and transportation arrangements. This website is the principal communication channel for the conference, so be sure to visit it often.

Eduarda Filipe

TC12 Sessions at the IMEKO World Congress



The 20th IMEKO World Congress (WC) has been held in Busan, South Korea from 8 to 14 September 2012. Full and updated information on the event may be found at

<http://imeko2012.kriss.re.kr/>

All the TC12 sessions took place in the first two days of the event. A total of twenty-four

contributions on temperature and thermal measurements have been accepted for presentation: three oral sessions devoted to “Traceable Temperatures” and “Temperature Applications” (2 sessions) for a total of 16 contributions and eight additional papers as posters.

An informal open meeting related to TC12 activities was held on September 12.

Francesco Righini

HiTeMS: High temperature metrology for industrial applications (>1000 °C)

The EMRP project HiTeMS is working towards developing a suite of methods and techniques for improving the measurement of high temperatures in industry on a broad front in a coherent and comprehensive way. In contact thermometry the project aims to characterise thermocouple drifts at high temperatures, develop methods for mitigating sensor drifts to above 2000 °C and develop the means for assigning thermocouple reference functions to 2000 °C. Whilst in non-contact thermometry aims to develop novel methods for emissivity compensation, correction for window transmission (to above 2000 °C) and demonstrably introduce ITS-90 traceability into laser heat treatment at ~1300 °C.

The project began in Sep 11 and has 15 partners. Its first annual meeting was held at CEM, Madrid, 21-22 June 2012. Good progress was reported on all of the workpackages and initial results presented. Some initial highlights were the results from the self-validating sensors, the robust high temperature fixed points for window corrections and the

facilities for thermocouple reference function determination.

It is hoped that a round table discussion will be held at Metrologie 2013 in Paris on high temperature measurement problems addressed by HiTeMS and a dedicated conference session held at Tempmeko 13, Maderia discussing the initial technical findings of the project.

If you are interested in getting involved or benefiting from the research underway in HiTeMS please contact the coordinator.

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InK – Implementing the new kelvin

The EMRP project “Implementing the new kelvin” was selected for funding in late 2011. The project aims to make a step change improvement in primary thermometry over six orders of magnitude; 0.0009 K to 3000+ K. This change will be effected through developing primary thermometry methods that both challenge and supplant the defined scales at high (>1000°C) and low (<1 K) temperatures, whilst at intermediate temperatures new $T - T_{90}$ values will be determined with uncertainties approaching 1 mK. The project involves 14 partners, both National measurement Institutes (NMIs) and Universities from around the world.

The project has four workpackages (WP) with the following objectives:

WP1 and 2 together will provide the platform for directly realising and disseminating the new kelvin at high temperatures i.e. above 1000 °C by primary radiometric methods. In WP1 for the first time definitive thermodynamic temperatures will be assigned to a set of high temperature fixed points

(Co-C (1324 °C), Pt-C (1738 °C), and Re-C (2474 °C)). WP2 will rigorously investigate two independent methods for realising and disseminating thermodynamic temperature and provide recommendations as to the most reliable approach.

WP3 will generate new values for $T - T_{90}$ between -272 °C (~1 K) and 1000 °C with uncertainties of ~1 mK. It will do this by bringing together the results from different primary thermometry experiments from eight different institutes. The results will be compared and dominant systematic uncertainties identified and eliminated.

WP4 will develop primary thermometry methods for realising and disseminating thermodynamic temperature from 0.0009 K to 1 K and aims to resolve the long standing discrepancy in the data on which the current provisional low temperature scale of 2000 (PLTS-2000) is based.

The project begins with the kick-off meeting at INRiM 10-11 Oct 2012. This will be followed by two technical workshops, held in parallel on the 12th Oct, one on acoustic thermometry and another on uncertainties in primary radiometric thermometry.

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NOTED News ***Novel techniques for traceable temperature dissemination***

In the 2011 call of the European Metrology Research Program (EMRP) the project “Novel Techniques for Traceable Temperature Dissemination” was approved for funding. This project is focused on the development of new

advanced techniques for providing improved traceability to the kelvin to support its wider and simpler dissemination to the users. In May 2012 the contract was signed and the project started the 1st of June.

The 19th of June a workshop was held in Tres Cantos organized by Centro Español de Metrología, coordinator of the project. The objective of the workshop was to present the activities of the project to the thermometry community and to establish a direct contact with other interested parties. There were about 40 attendees from European National Metrology Institutes (NMIs), Accredited Laboratories, Manufacturers and end users. The workshop was very fruitful and very interesting collaborations were established that are being formalized by means of an exchange of letters with the project coordinator.

In this project 13 NMIs from 12 European Countries participate. Furthermore, 7 research mobility grants are in negotiation for researchers of NMIs from other 4 additional European countries, most of them not participating in the EMRP. These grants will contribute to establish new metrology expertise in these countries in the field of contact thermometry, allowing capacity building, convergence and avoiding the division between strongest regions in metrology research and the others.

Dolores del Campo

project coordinator.

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Clinical Temperature Measurement workshop

30 January 2012, NPL Teddington



Teddington, UK – Temperature as an indicator of fever and disease is as old as medicine itself.

Recent developments have realised high-speed and high-resolution systems, but temperature, its measurement and relationship to the human body still hold many new areas of understanding and innovation.

Today patient temperature remains a fundamental physiological measurement used not only for observation and diagnosis but also in surgery (thermal ablation), cancer therapy (high intensity focused ultrasound, HIFU) and brain therapy (hypothermia treatment).

A variety of temperature measuring technologies are used clinically and these can be separated into two categories: Contact (oral thermometers, axillary thermometers, temporal strips, thermocouples) and non-contact devices (ear thermometers and thermal imagers)

This full day meeting had a strong set of international speakers discussing different approaches and advancements in clinical temperature measurement.

<http://www.youtube.com/playlist?list=PL08A8E92B0363DA68&feature=plcp>

Graham Machin

***Euramet TC-T meeting and
workshop***
18-19 April 2012, UME Istanbul

The EURAMET Technical Committee for Thermometry (TC-T) annual meeting was held in Istanbul on April 18th to 20th 2012. The meeting, perfectly hosted by UME, was held in a beautiful location, in the center of the historic Peninsula of Istanbul, right along the shore lane of the Sea of Marmara and just a few steps away from Sultanahmet.

As usual, ½ day was dedicated to Thermometry Field issues, ½ day to Humidity subfield issues and ½ day to common issues (BIPM, EURAMET, EMRP, ...). The activities of the TC-T are carried out by 4 Working Groups (WG on CMC Review, WG on Strategy, WG on Best Practice and WG on Thermophysical Properties of Materials) and the annual meeting offered the occasion to present the activities performed in the past year and review the tasks of the WGs.



TCT members at the 2012 meeting in Istanbul

Besides the usual meeting, a one day workshop on the involvement of the TC-T in the EMRP Programme was held at UME premises in Kocaeli, which included not only technical presentations on the JRP's in which the TC-T is more heavily involved, but also discussions on what we learnt

from it by sharing the experience of the coordinators and our plans for the future EMRP calls.

Andrea Peruzzi

Euramet TC-T Chair Person

***Thermal metrology for
Environment***

As reported on previous TC12 issues, since 2010 the relationships and cooperation between metrologists and meteorologists, have been enforced and enriched through the signature of the CIPM Mutual Recognition Arrangement (MRA) by the World Meteorological Organization (WMO), relevant recommendation of BIPM CCs to CIPM and new research projects.

During 2011 the cooperation became operative and research projects started their activities. We now have metrologists sitting in relevant boards of the climate studies and meteorological community, such as the Global Climate Observing System – Reference Upper air Network (GRUAN) and the International Temperature Initiative (see previous TC12 newsletter). At the same time the liaisons with stakeholders and meteorologists is well exemplified in the many collaboration in funded research projects. Meteorological services and scientists bring their view and address part of the objectives of those projects dealing with traceability and uncertainty evaluation in thermal metrology applied to meteorological observation and Earth temperature trend evaluation. We'll keep on updating the results arising from this new and relevant field of dissemination of the metrological approach to such a fundamental field of research of science and its application to instruments and measurements procedures.

Andrea Merlone

CCT 26th meeting

On 24 and 25 May the 26th meeting of the Comité Consultatif de Thermométrie¹ (CCT) took place as usual at BIPM in Sevres, Paris. While thanking Prof. Huseyin Ugur for his great activity as CCT president in the period 2000 to 2012, we warmly welcome Prof. Duan Yuning as the new CCT president.



CCT members at the 2012 meeting

The CCT meeting was anticipated by the separate WGs meetings, starting from Monday 21. Dr. Rainer Feistel, chair of International Association for the Properties of Water and Steam (IAPWS), Subcommittee Seawater (SCSW), was invited to the meetings of WG6 on humidity, WG2 on secondary thermometry and to the plenary. This external presence to the works of CCT clearly represents a new trend in metrology, adopted by CCT too, leading to a more robust cooperation with external Institutions. The scientific community represented by scientist involved in environment and climate studies is one of the most important stakeholders for the thermal metrology scientists. This new trend is also reflected in a change of the Terms of Reference for the CCT WG2 on secondary thermometry, that during the 2012 session decided to state that its mission is also

- to gather and review techniques and provide authoritative guidance for dissemination of

temperature measurements through secondary methods;

- to monitor new perspectives, needs, projects and activities related to traceability, quality assurance and calibration procedures for temperature measurements by means of secondary thermometers.

This new ToR has been accepted by the CCT and now can be a useful tool to open the discussion to communities that are directly involved in the decisions taken by the CCT. This represents a relevant novelty, not only for the CCT, but for all the CIPM CCS.

Andrea Merlone

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TC12 News

New TC12 member.

Dr. Dolores Del Campo Maldonado, Temperature Department, Centro Espanol de Metrologia, Madrid, Spain, has recently joined the Committee and is warmly welcome.

News submission invitation

We invite all readers to submit news on: practical and thermodynamic thermometry; temperature scales and fixed points; temperature and humidity measurements, calibration and control devices, methods and data analysis; Boltzmann constant and new definition of the kelvin, medical and biological thermometry; temperature and humidity measurements for meteorology and climate studies; earth surface and atmosphere thermometry and hygrometry, temperature and humidity metrology applications.

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