CCT member and observer Activity Report

Period: June 2024 to May 2026

Institute: Justervesenet (JV)

State economy: Norway

Number of persons involved in thermometry of the institute: 5

Short summary of research and development:

Coordinating a European funded project 22RPT03 MultiFixRad on implementation of high temperature fixed points for radiation thermometry (finishing May 2026).

Participating in European funded project 22IEM07 INFOTherm on creating a European integrated metrology service for calibration and validation of fiberoptic measurements of temperature.

Participating in European funded project 22IEM03 PriSpecTemp on measuring air temperature from spectroscopic probing of energy states of molecules. JV has designed and fabricated an isothermal optical gas cell for high-precision spectroscopic temperature measurements. The system was characterised over a temperature range of 240–350 K.

Participating in European funded project 24RPT03 A2TM on advancement of air temperature metrology capabilities, focusing on radiation effects on air temperature probes under controlled conditions.

Coordinates the Euramet TC-IM 1561 project which explores whether networks of bilateral comparisons are a viable alternative for key comparisons.

In an internal project, JV has designed and constructed a new primary dewpoint generator in the range from – 80 °C frostpoint to +80 °C dewpoint with traceability in a SPRT calibrated at JV. The design was presented as a poster at Tempmeko 2025, and the device is in daily operation for customer calibrations. We checked the performance against calibrated dewpoint mirrors and are working towards CMCs.

Short summary of recent comparison activity:

- EURAMET.T-K10: Key Comparison: Realisations of the ITS-90 scale over the range from the Ag fixed-point to 2600 °C. In progress.
- EURAMET.T-K9: Fernando Sparasci et al 2024 *Metrologia* 61 03005. DOI 10.1088/0026-1394/61/1A/03005
- EURAMET.T-K9.1: Åge Andreas Falnes Olsen and Kristjan Tammik 2024 *Metrologia* 61 03006. DOI 10.1088/0026-1394/61/1A/03006

Short summary of other activities:

JV is working closely with **The Norwegian Meteorological Institute** regarding the GCOS surface reference network (GSRN) station in Norway. We have characterized the probes and logger unit, assisting with uncertainty budget and are currently calibrating temperature probes.

Link to bibliography or list of bibliography (last 5 years):

Publications:

Pearce, J., Machin, G., Todd, A., Martin, M. J., Pan, Y., Zhou, K., **Olsen, Å**., Kowal, A., Gaiser, C., Kawamura, Y., & Nakano, T. (2026). Future traceability of practical primary thermometry and self-validating thermometry. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, 384* (2312), 20240453. https://doi.org/10.1098/rsta.2024.0453

Ertürk, M., Karabulut, M., Kadı, Ö. F., Gözönünde, C., Broberg, P., **Olsen, Å. A. F**., & Nasibli, H. (2026). MultiFixRadSoft: A Comprehensive Tool for Primary Relative Radiometric Scale Realization in Radiation Thermometry. *Sensors*, *26*(8), 2489. https://doi.org/10.3390/s26082489

Hadidi, K., & Li, G. (2025). FEM analysis of thermal properties of an optical gas cell for ro-vibrational spectroscopic thermometry. *Measurement: Sensors, 38*, 101639. https://doi.org/10.1016/j.measen.2024.101639

Sadli, M., Kňazovická, L., Pavlásek, P., Nasibli, H., Bourson, F., & **Olsen, Å. A. F.** (2024). New capabilities for the realisation and the dissemination of the kelvin at high temperature in Europe. *Measurement: Sensors*, Elsevier BV, p. 101624. https://doi.org/10.1016/j.measen.2024.101624

Olsen, Å.A.F., Bergerud, R.A., Opel, K., Rothmund, P., & Holmen, J.-E. (2024). Design of a setup for reproducible calibration of air thermometers. *Temperature: Its Measurement and Control in Science and Industry*, Vol. 9, AIP Publishing, p. 130003. https://doi.org/10.1063/5.0234406

Sparasci, F., **Olsen, Å.A.F., Bergerud, R.A., Opel, K., Kvernmo, G.**, et al. (2024). EURAMET.T-K9 regional key comparison ITS-90 SPRT calibration from the Ar TP to the Zn FP. *Metrologia*, 61(1A), p. 03005. https://doi.org/10.1088/0026-1394/61/1A/03005

Olsen, Å.A.F. & Tammik, K. (2024). Linkage for Metrosert to CCT-K9 via the EURAMET.T-K9.1 bilateral comparison. *Metrologia*, 61(1A), p. 03006. https://doi.org/10.1088/0026-1394/61/1A/03006

Olsen, Å.A.F. (2024). Design of a setup for reproducible calibration of air thermometers. *ITS10 Proceedings*. https://doi.org/10.6028/NIST.SP.2100-05

Eisermann, R., Krenek, S., Habisreuther, T., Ederer, P., Simonsen, S., Mathisen, H., Elsmann, T., Edler, F., Schmid, D., Lorenz, A., & **Olsen, Å. A. F.** (2022). Metrological Characterization of a High-Temperature Hybrid Sensor Using Thermal Radiation and Calibrated Sapphire Fiber Bragg Grating for Process Monitoring in Harsh Environments. *Sensors*, 22(3), 1034. https://doi.org/10.3390/s22031034

Presentations:

Åge Andreas Falnes Olsen: O-22: Temperature traceability for the GSRN pilot station in Ås, Norway. MMC 2025, Wien, 25.–26.06.2025.

Peter Rothmund: O-14: Experimental work on temperature controlled cell. MMC 2025, Wien, 25.–26.06.2025.

Kianoosh Hadidi: Versatile engineering of an optical cell for high-precision gas thermometry in spectroscopy. TEMPMEKO & ISHM 2025, Reims.

Åge Andreas Falnes Olsen: Design of a setup for reproducible calibration of air thermometers. ITS10, Anaheim, April 2023.

Åge Andreas Falnes Olsen: O-94: ATM EURAMET project 1459 – Interlaboratory comparison of methods of calibration. MMC 2023, Torino, 26.–30.09.2023.

Reidun Anita Bergerud: O-24: Stakeholder survey on soil moisture measurements – Results from an online questionnaire. MMC 2023, Torino, 26.–30.09.2023.

Åge Andreas Falnes Olsen: Air temperature traceability – learning points from the ILC, and implications for met & clim. EPM-projectseminar, Torino, 11.06.2024.

Posters:

Peter Rothmund: Construction of a Primary Dewpoint Generator. TEMPMEKO & ISHM 2025, Reims.

Rasmussen, A.N., Olsen, Å.A.F., & Clausen, S.: Design and construction of novel interpolating pyrometers for use in relative primary thermometry. TEMPMEKO & ISHM 2025, Reims.