**Enabling and demonstrating SI traceability of ECVs and climate data records**

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The need for SI traceability to ensure integrity and trust in the Essential Climate Variables (ECVs) and services and information derived from them is well established. However, the means to achieve and demonstrate this in a universally consistent manner across the world and between variables, particularly for the complex bio-geophysical variables that make up many of the ECVs is challenging.

In 2010, the WMO and the National metrology Institutes (NMIs), guardians of the SI, through its international coordinating body, Bureau International des Poids et Mesures (BIPM) held a workshop to instigate a dialogue to start to address this issue. Some NMIs were already highly active whilst others were relatively new to the field but all concluded the urgency and priority to work closer with the climate community to better understand its needs and where appropriate to develop new standards and methods.

In parallel, space agencies and other international bodies, GEO, CEOS, EU were similarly recognising the need for improved quality assurance and means to evidence uncertainty. Concepts such as the Quality assurance framework for Earth Observation (QA4EO) were born and initiatives such as ESA climate change initiative started to specify the need for traceability in a more rigorous manner. In 2013 the EU initiated, amongst others, a project called QA4ECV to develop and demonstrate a QA framework for ECVs, to be built around ‘metrological traceability’ and another called MetEOC to develop new SI standards and methods for ECVs in 2014. In these latter projects, it has been recognised that the concept of SI traceability has to extend beyond the physical measurand to encompass the retrieval algorithm and provide the means to ascribe an uncertainty to the resultant climate information in a manner that is easily interpreted by all users.

In May 2015, NPL in conjunction with ESA, Eumetsat, EU, UK meteorological offices and University of Reading organised a meeting of climate experts to consider the ECVs and their specifications in terms of metrological rigour, consistency and how well these are being met. The workshop produced a set of recommendations to both the climate and metrology community on priorities and actions to address to improve SI traceability.

These, together with examples on proposed new QA strategies, generic tools and methods to aid the climate community move towards a coherent fully SI traceable climate observing system will be described.