Measuring salt shine to improve climate understanding

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From 14 - 25 August 2010, scientists from around the world will gather in Southern Turkey to measure the spectral reflectance of a few square kilometres of salt. These measurements will have a major impact on the future of satellite based Earth observation, and will ultimately improve our understanding of the Earth's climate.

For ten months of the year Tuz Gölü (Lake Tuz) in southern Turkey appears to be like any other lake. However, during July and August it dries to become a bright, pristine, white surface, which is ideal for calibrating Earth observation satellites.

Tuz Gölü is one of eight sites recently endorsed by the Committee on Earth Observation Satellites (CEOS) to become an international reference standard to evaluate satellites' sensor-to-sensor biases, and also to calibrate/validate their radiometric performance.

Observing the dynamic Earth

Satellite sensors are known to degrade significantly in-orbit. So it is very difficult to have confidence in any pre-flight assigned value of their radiometric characteristics. This makes measurements of subtle changes of the Earth (as needed for monitoring climate change) challenging.

Equally, routine measurements for agriculture, resource and disaster monitoring rely on linking data from different satellites to ensure

continuous time coverage, seeking to realise the vision of a Global Earth Observing System of Systems - GEOSS.

For the CEOS reference standards sites to be of use, their radiometric characteristics (as measured by ground teams) must be consistently evaluated and, of course, traceable to SI Units. The National Physical Laboratory (NPL), with funding from both the European Space Agency and the National Measurement Office, has led international efforts to achieve this. In 2009, NPL organised a pilot comparison for a few European experts, and 2010 sees experts from North and South America, Africa, Asia, as well as Europe taking part.

From standards lab to salt lake

The comparison exercise initially includes laboratory calibrations of all measurement instrumentation to NPL standards. This allows us to evaluate any instrumental biases, and remove them from the subsequent field based activities. This is followed by 9 days on Tuz Gölü (where temperatures often rise to 50 °C) where scientists measure the reflectance of a series of test-sites.

In addition to being the pilot for this comparison, NPL will also use its Gonio- Radiometric Spectrometer System (GRASS) to make measurements of the salt lake's surface reflectance from many different angles. This will allow corrections to be applied for satellites that cannot view Tuz Gölü from directly overhead.

Whilst the scientists make ground-based measurements at Tuz Gölü, a range of satellites will simultaneously measure the same site. This allows the satellites' performances to be evaluated.

This comparison marks the first step towards establishing an operational calibration service for Earth observation sensors. The long-term goal is

to automate and link the measurements of the eight reference sites as a network (LandNET), and then to tailor signals to match the different response and geometric conditions of different sensors. Ultimately, the site's characteristics will be calibrated from orbit using an in-flight standard sensor, such as the NPL TRUTHS mission for example.

More information: www.npl.co.uk/optical-radiatio … hange/research/truth

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