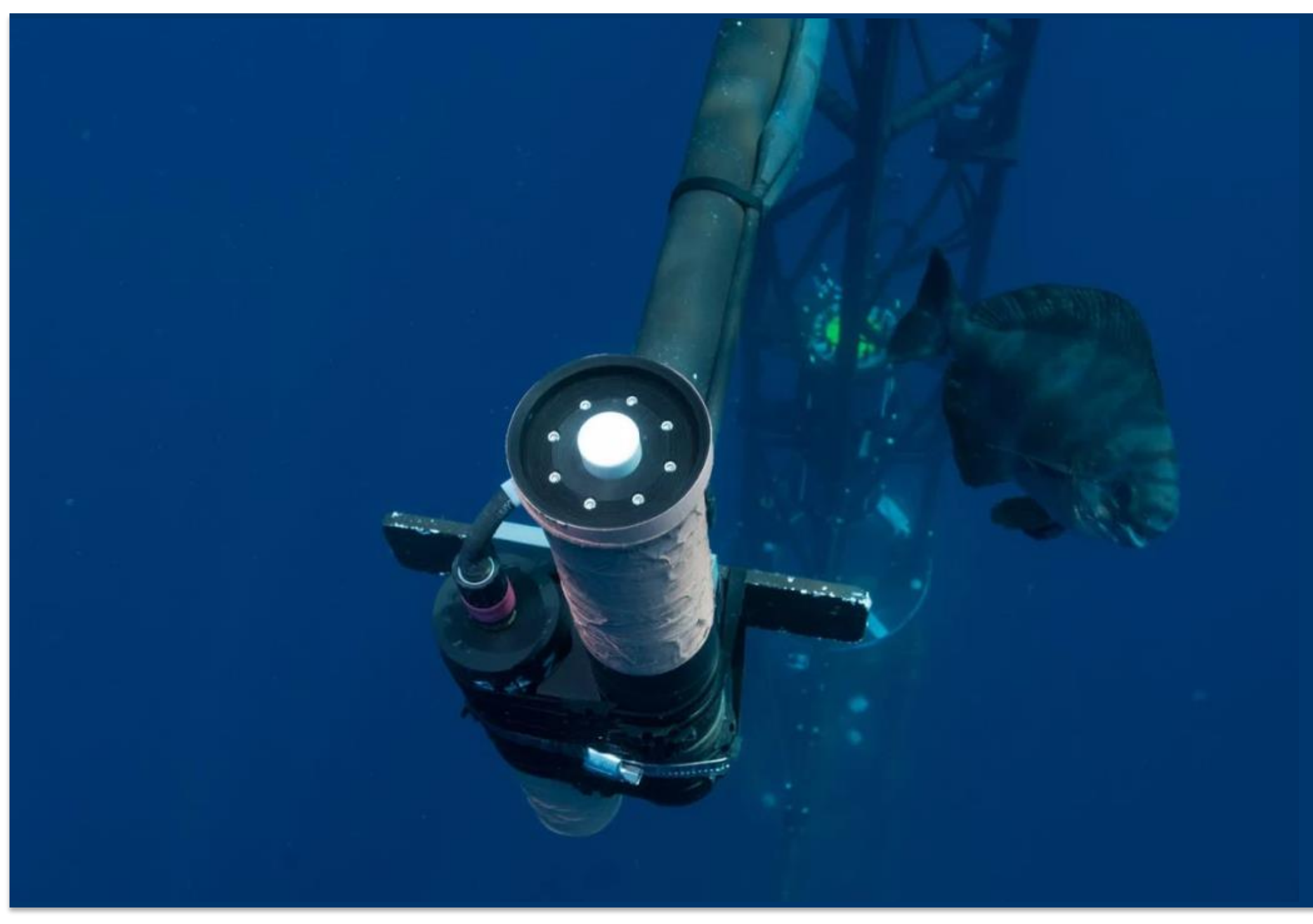

BOUSSOLE Hyperspectral instruments the valuable but challenging way forward

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ABSTRACT

Ocean-Colour remote sensing measurements are a crucial source of information about the biological and biogeochemical properties of oceans, and the climate quality of the Earth system. The oceans absorb much more light than the continents, so instruments on-board satellites need to be sensitive enough to detect small changes of light emerging from the water. Therefore, to obtain quality assured ocean colour data products, there is a need for system vicarious calibration (SVC). Instruments semi-permanently mounted on buoys provide in situ measurements for SVC purposes, it is then essential to fully establish their performance and estimate a robust uncertainty budget for the in situ derived data.

Hyperspectral instruments allow to collect more data than their multispectral equivalent; they reduce the need of spectral normalisation and their data can be matched with any satellite ocean colour sensor. Nevertheless, it is common to find disagreements in data collected with off the shelf hyperspectral and multispectral instruments. We present the results of hyperspectral instrument characterisation from a subset of the BOUSSOLE [1,2,3] buoy radiometers.

BOUSSOLE

(Bouée pour l'acquisition

de Séries Optiques à Long Terme)

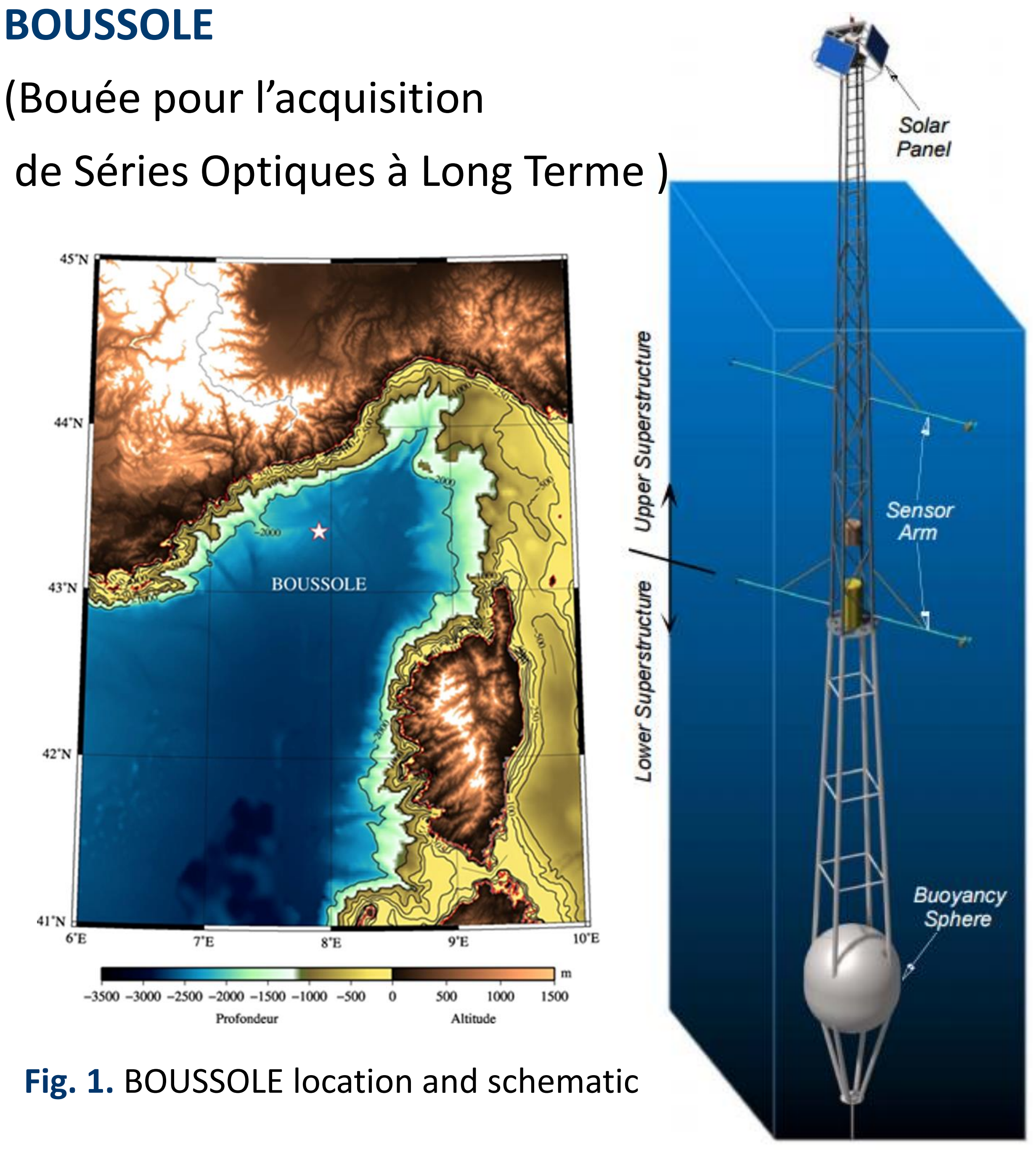

Fig. 1. BOUSSOLE location and schematic

LABORATORY TESTS

Satlantic [4] hyperspectral instruments ware used

Calibrated spectral range 350 nm- 800 nm

Bandwidth 10 nm

Spectral sampling 3.3 nm

Fig. 2. Satlantic hyperspectral radiometers

TEMPERATURE DEPENDENCE

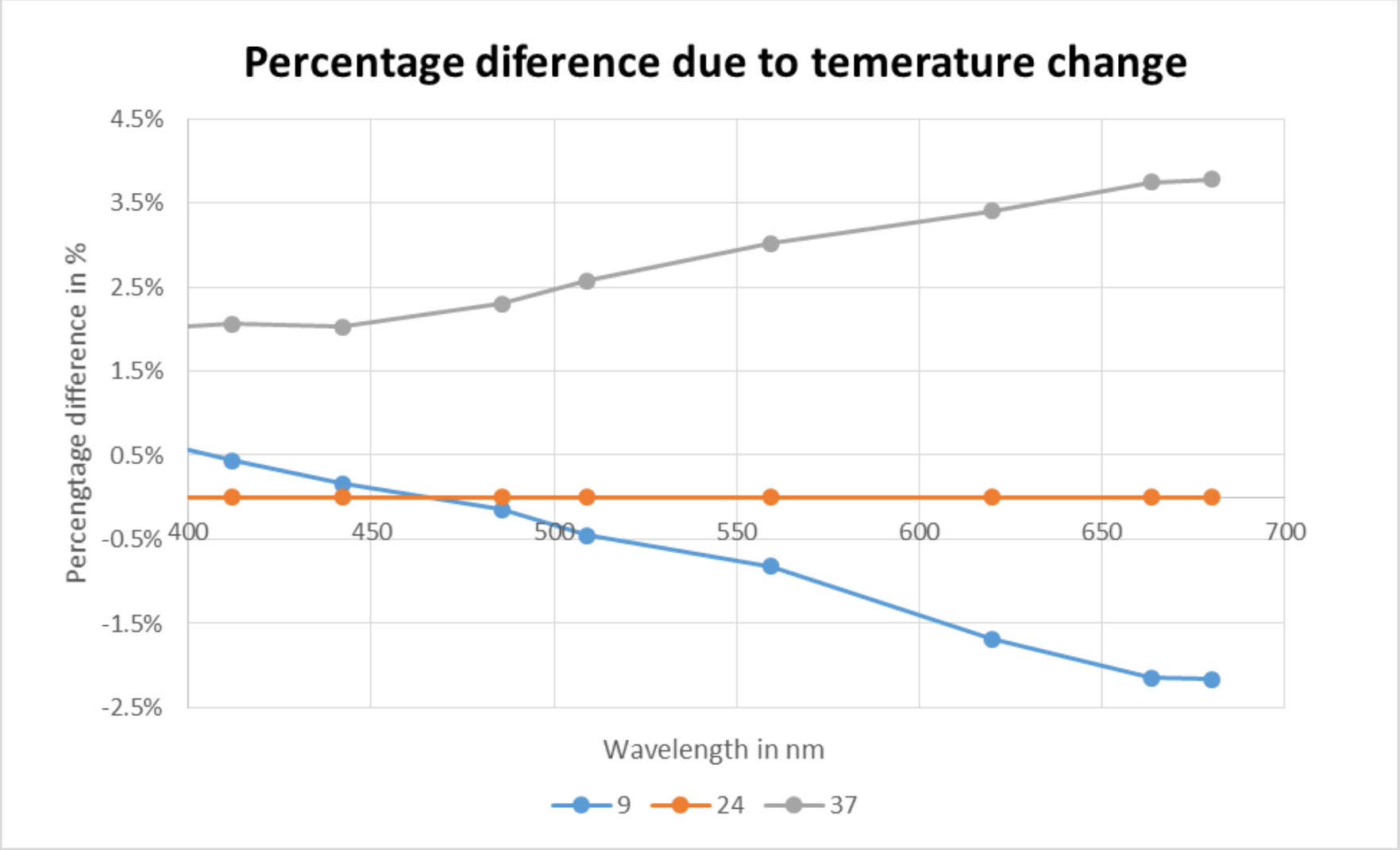

Fig. 3. Instrument response at three difference temperatures 9º C, 24º C and 37º C degrees. The percentage difference from the nominal 24º C is presented. The point of the plot represent S3 spectral bands.

STRAIGHT LIGHT

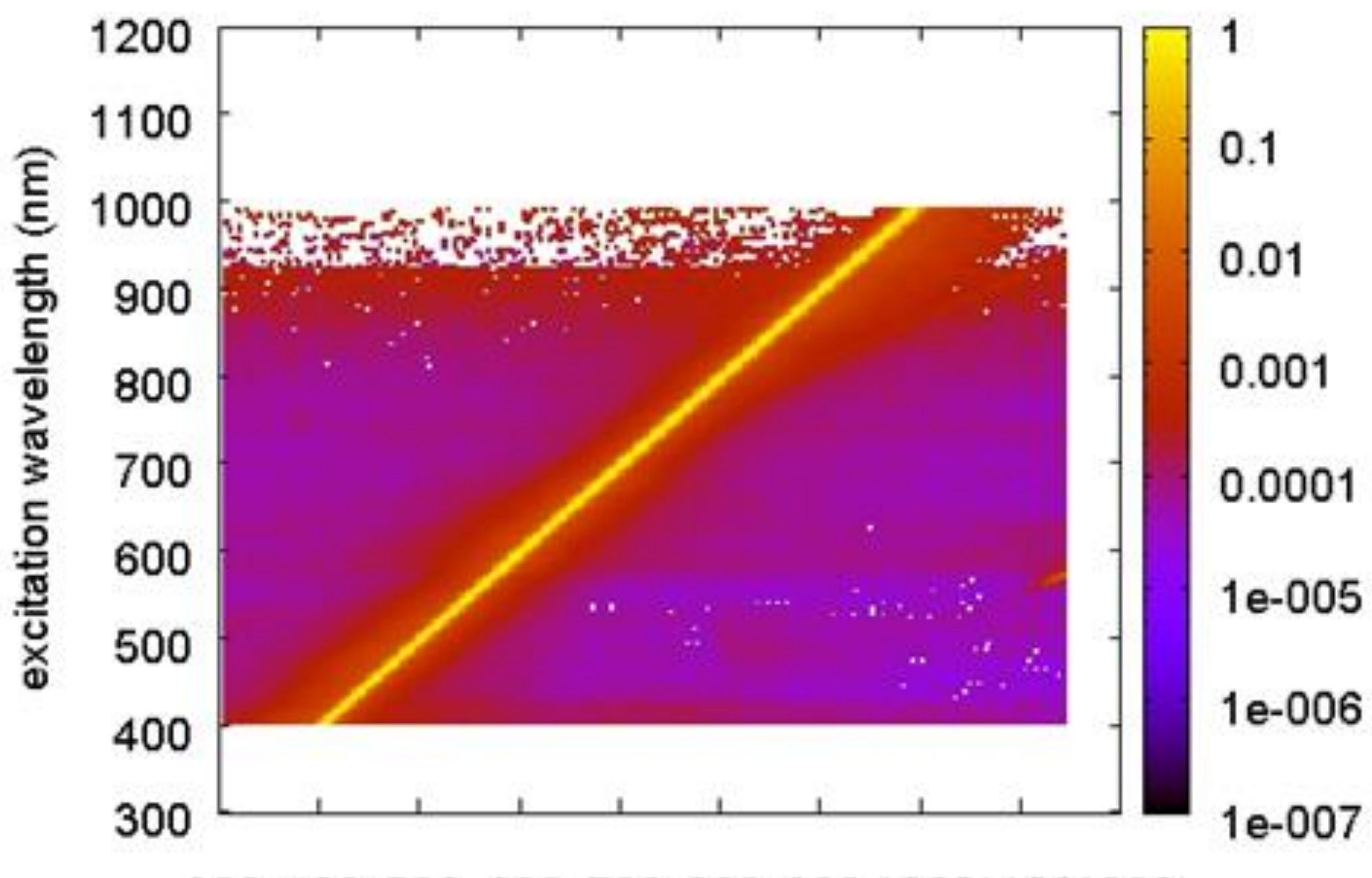

Fig. 5. Straight light matrix recorded using a monochromatic source (STAIRS [5]) that matched each pixel central wavelength. The bright diagonal represents each pixel in band response, any signal detected outside the diagonal is a measure of " unwanted" the spectral straight light.

DETECTOR LINEARITY

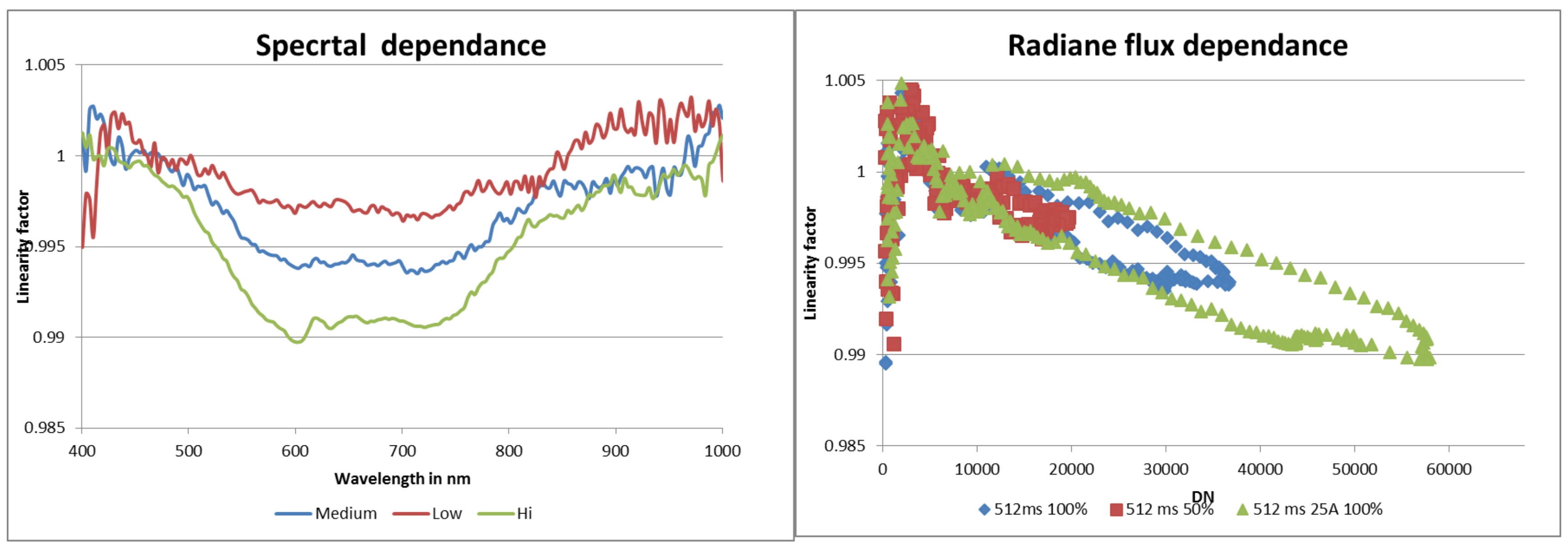

Fig. 4. Detector linearity for a perfect deters should be 1. Left: presented for the entire wavelength range at three difference radiance flux levels. Right the same data presented according to the DN recorded value.

CONCLUSIONS

Obtained through a set of laboratory test results show spectral dependence for all three characterisations, thus a correction coefficients derived do vary with wavelengths for example longer wavelengths are more affected by temperature.

The correction coefficient will be applied to the in situ data and this would reduce the measurements uncertainty.

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ACKNOWLEDGEMENTS

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