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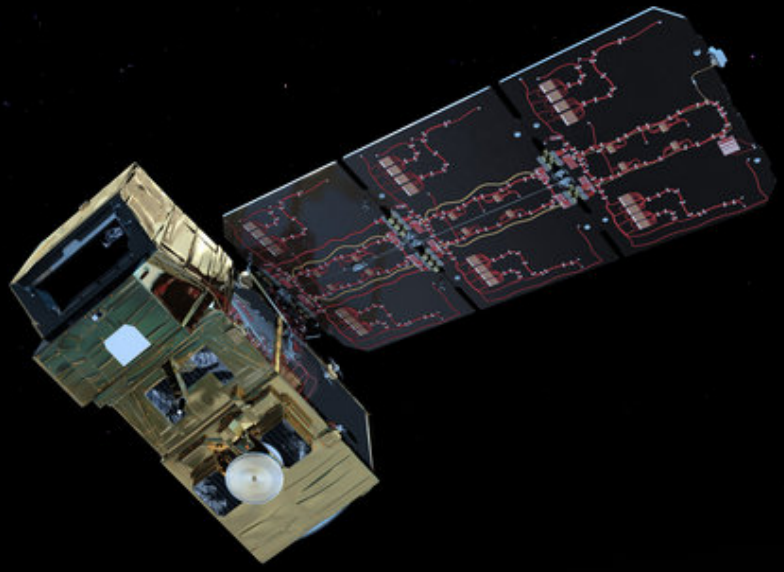
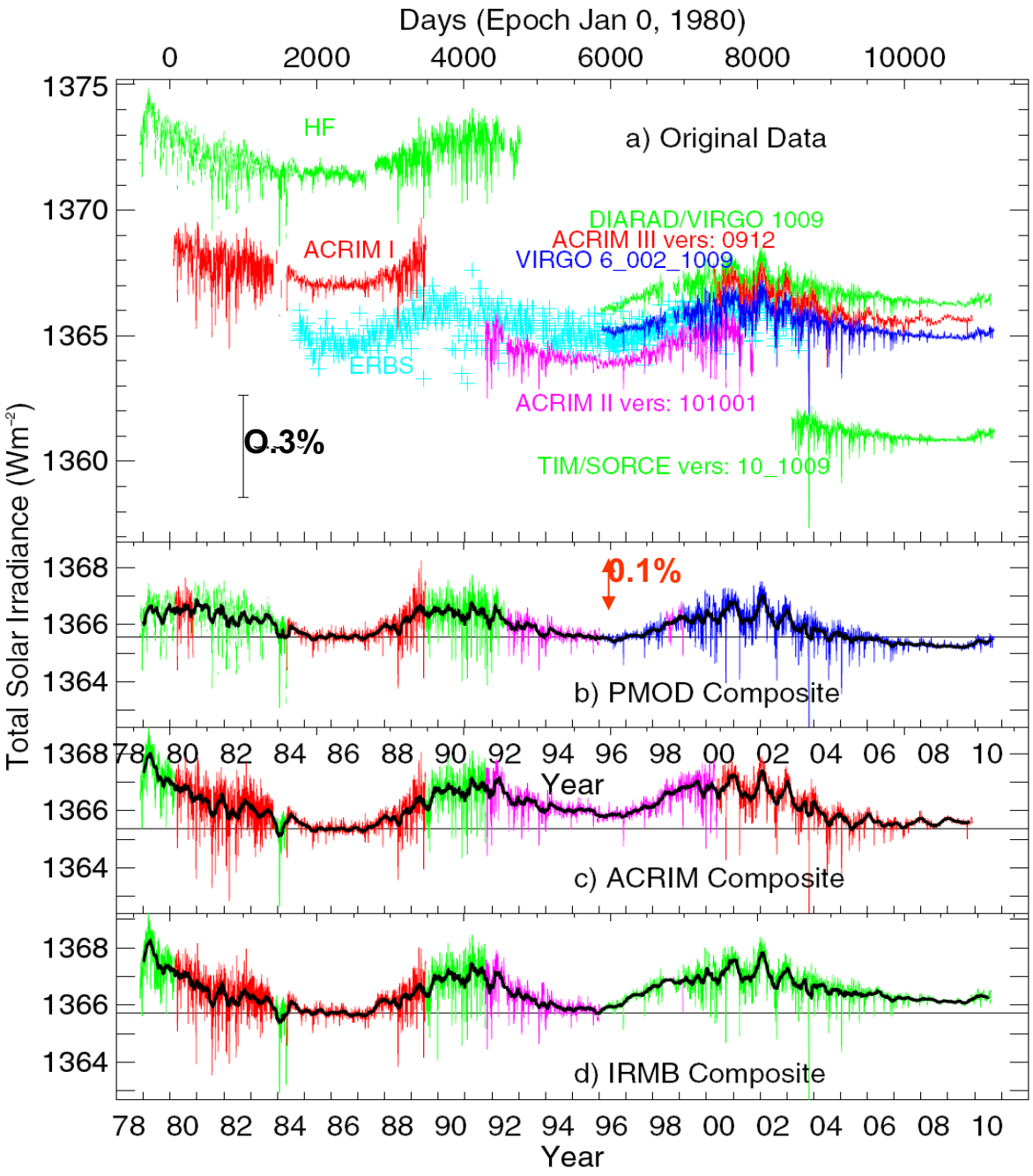
FIDUCEO workshop Lisbon 17-19th April 2018

Introduction to Harmonisation



- Identical worldwide
- Century-long stability
- Absolute accuracy

How do we observe a climate signal reliably?



Total Solar Irradiance Composite

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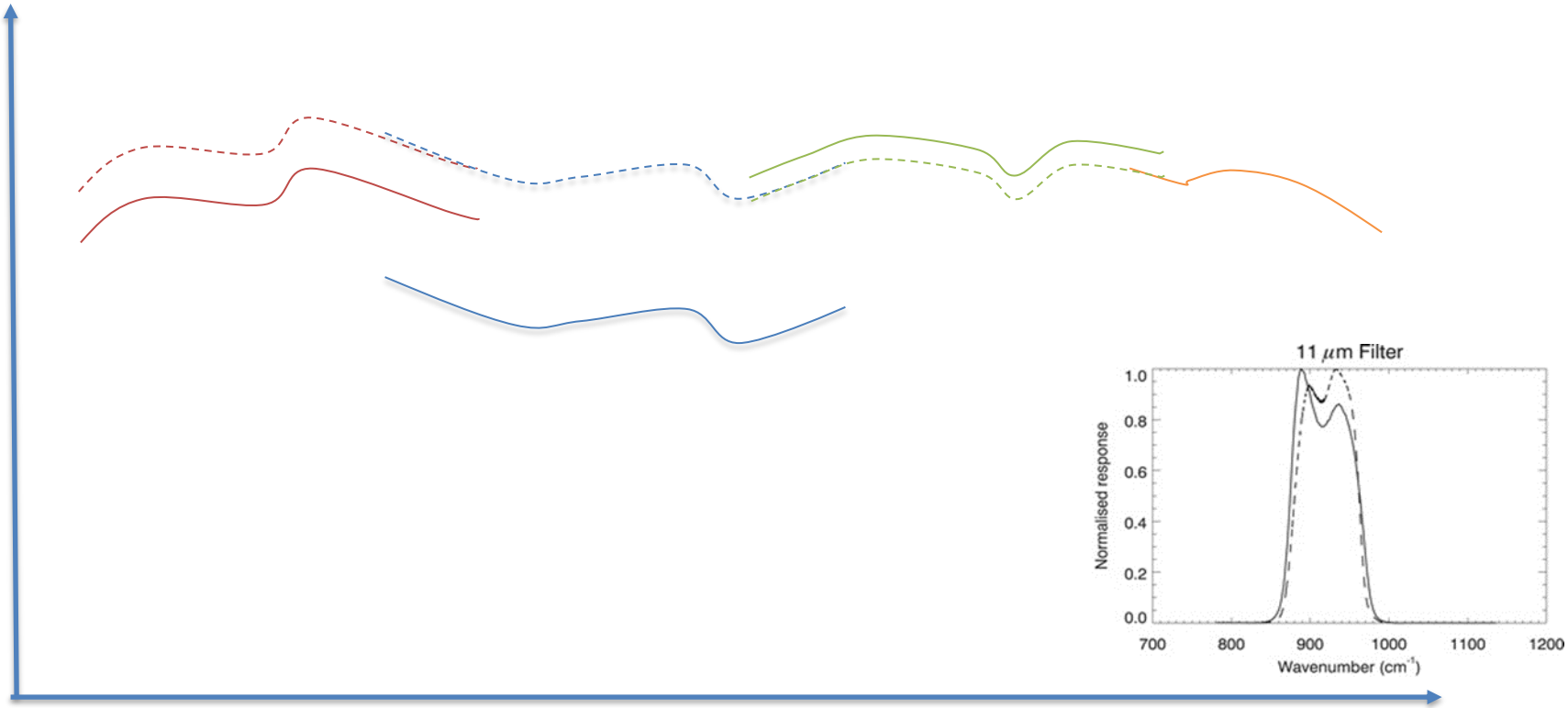
Harmonisation



Resolving discrepancies between sensors through recalibration, respecting known differences

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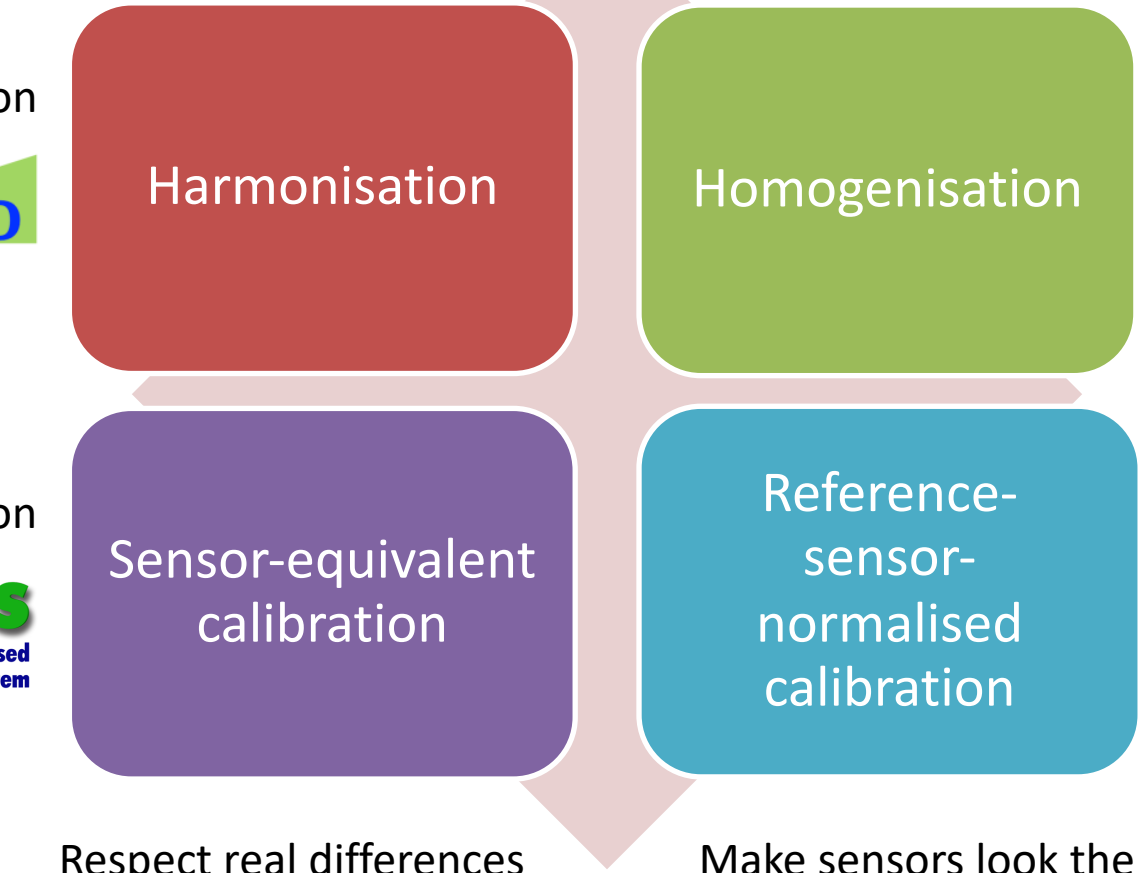
Harmonisation, Homogenisation and Bias Correction

Recalibration

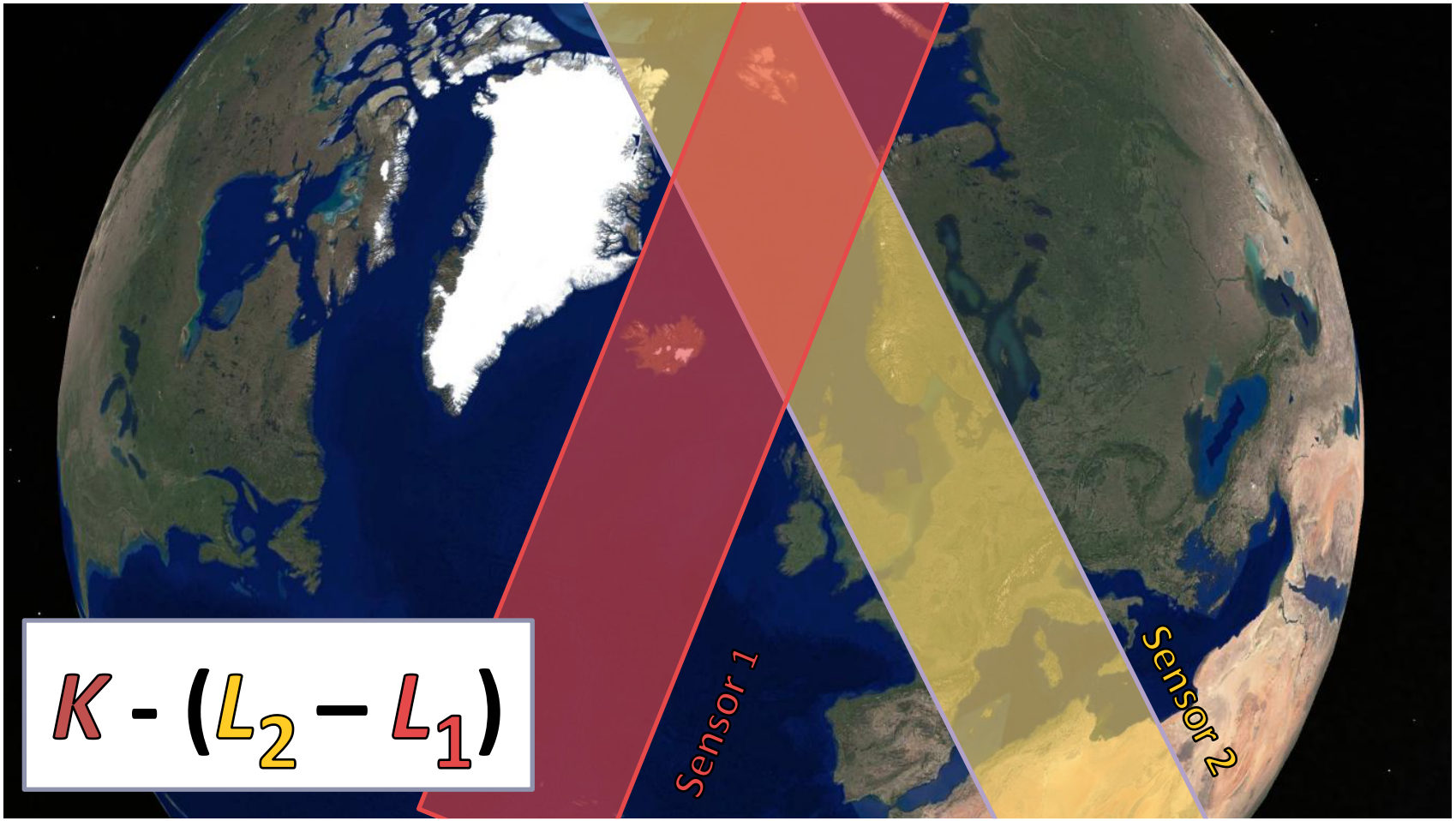
Bias Correction



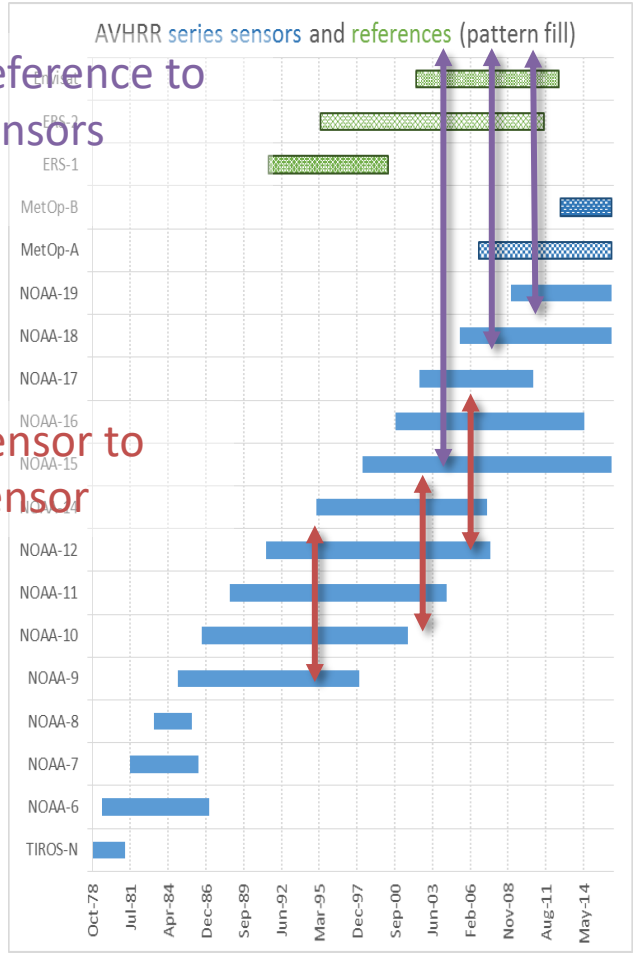
Aims of FIDUCEO harmonisation

- Provide a Fundamental Climate Data Record based on recalibrated (harmonisation not bias correction) sensors using our best understanding of the sensor physics
- Base that FCDR on metrological principles and provide rigorous uncertainties
- Harmonisation (not homogenisation): sensor real differences are maintained for resolution at the CDR generation

Comparison



Match-ups



- Reference radiance, or sensor-to-sensor
- Many (150 million +)
- Correlated

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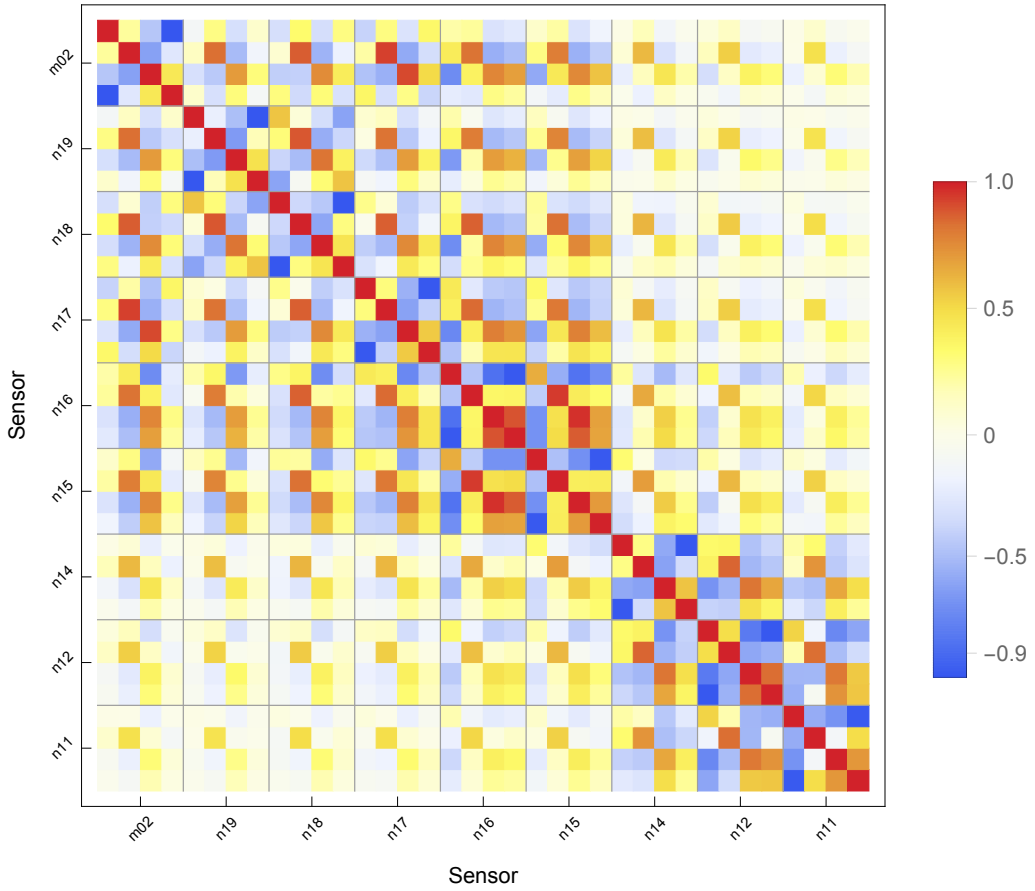
Harmonisation coefficients

$$L_E = a_0 + \frac{a_1 L_T - a_2 C_T^2}{\dot{C}_T} C_E + a_2 C_E^2 + 0$$

- Physical quantities (maybe conceptualised)
- Better estimates obtained from external information than from pre-flight calibration
- Estimated in a consistent way relative to a reference (not SI, but the best we can do)

Harmonisation coefficients: what comes out



- Set of a_i for each sensor in the series
- Covariance matrix for the a_i for all sensors

This goes into the FCDR generation for the sensors and the uncertainty associated with the FCDR

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