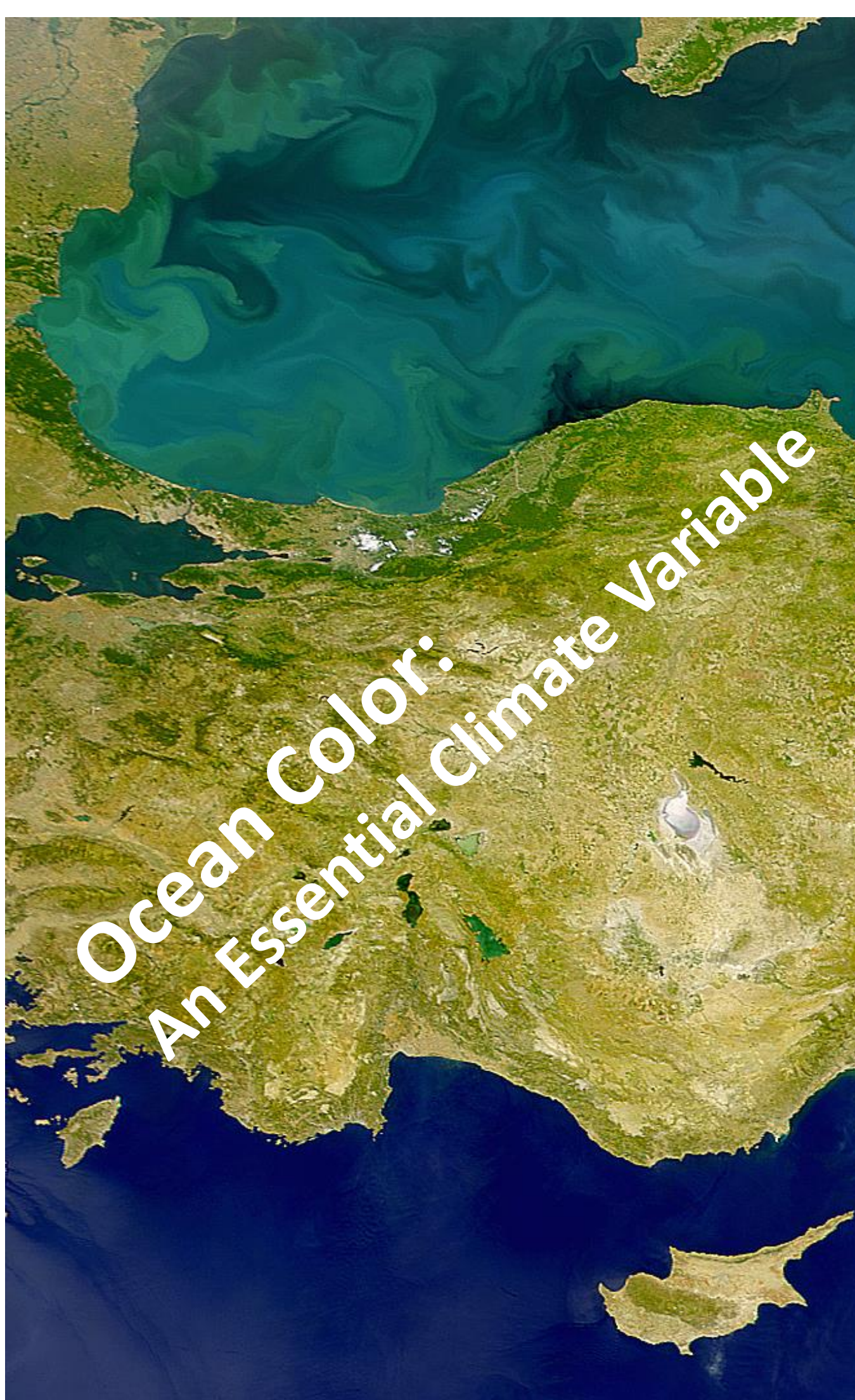
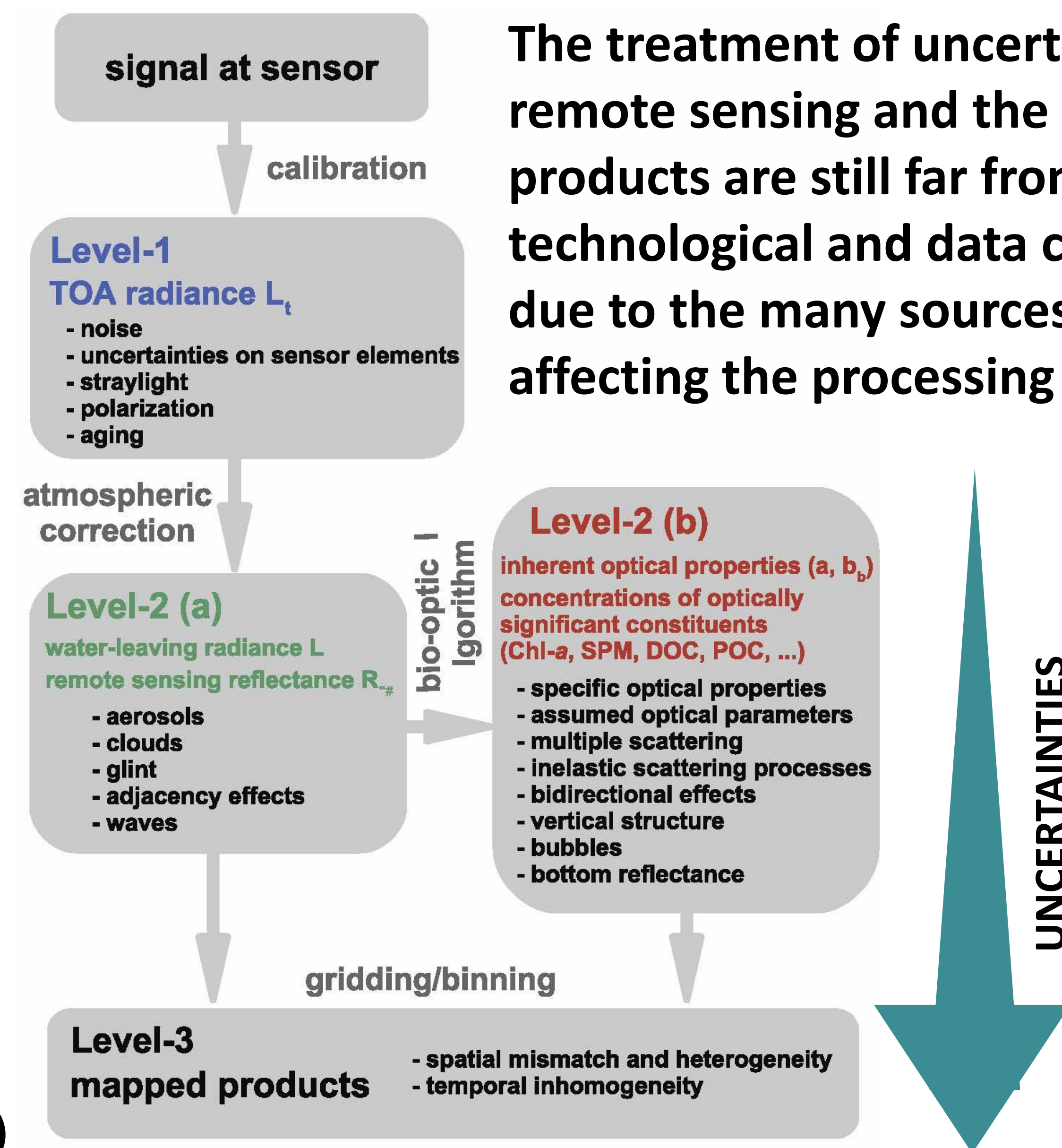


# Uncertainties in ocean colour remote sensing – How metrology can help



IOCCG (2019)



The treatment of uncertainties for ocean color remote sensing and the provision of dedicated products are still far from mature. Besides past technological and data constraints, this is partly due to the many sources of uncertainties affecting the processing of these data.

The IOCCG (International Ocean - Colour Coordinating Group, [www.ioccg.org](http://www.ioccg.org)) has produced a report presenting the state-of-the-art on that topic as well as listing recommendations.

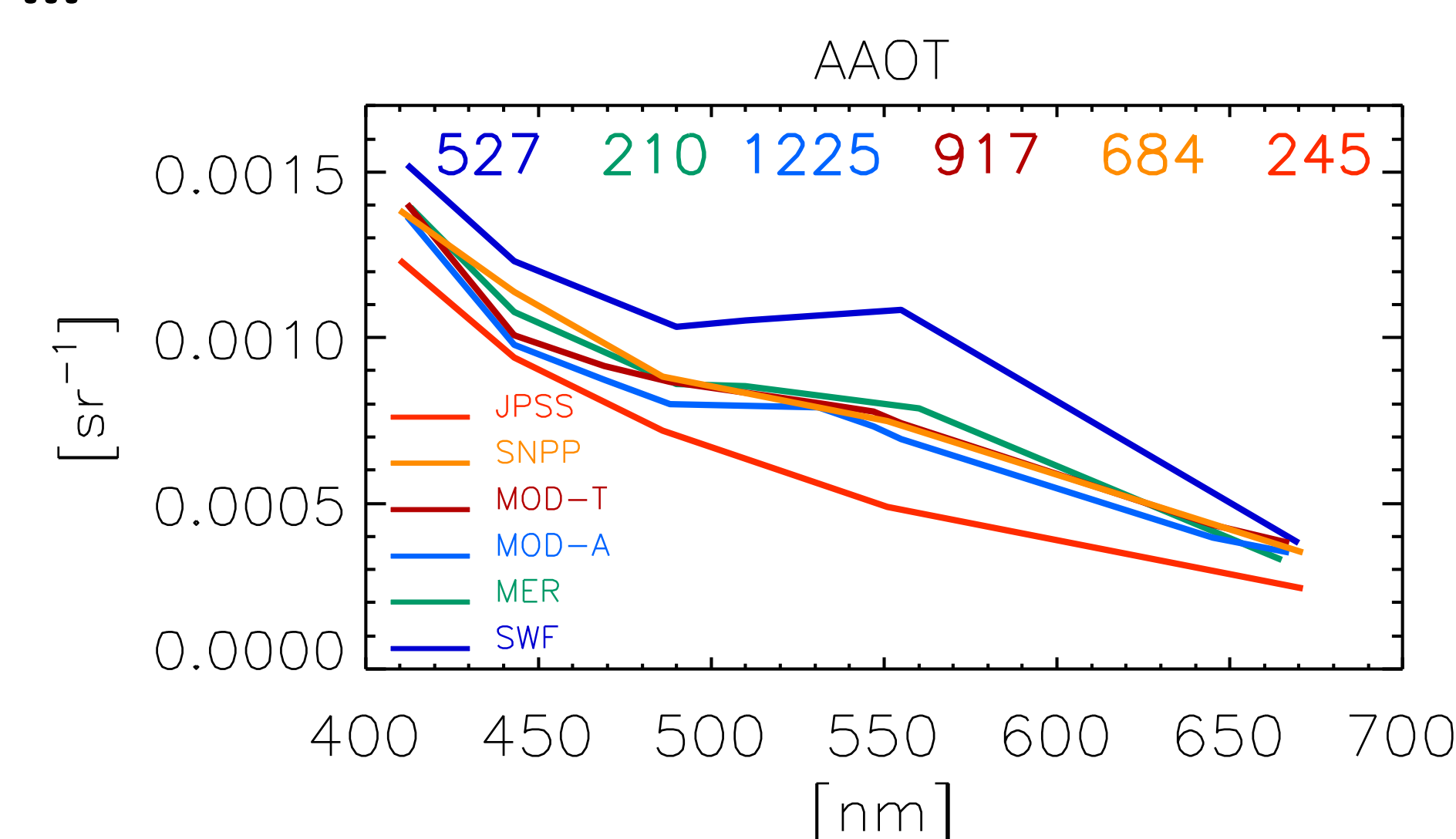
## Report outline:

- Terminology and Main Principles
- Sources of Uncertainties
- Uncertainty Estimates
- Representation and Distribution of Uncertainties
- Requirements for Different Applications
- Recommendations

## Way forward:

- Promotion of awareness & good practices
- Consistent use of terminology
- Open-access codes
- Uncertainties at top-of-atmosphere
- Error propagation to Level-3
- New paradigms for the use of field data
- ...

## Examples - North Adriatic (Mélin 2021, 2022)



## Validation statistics

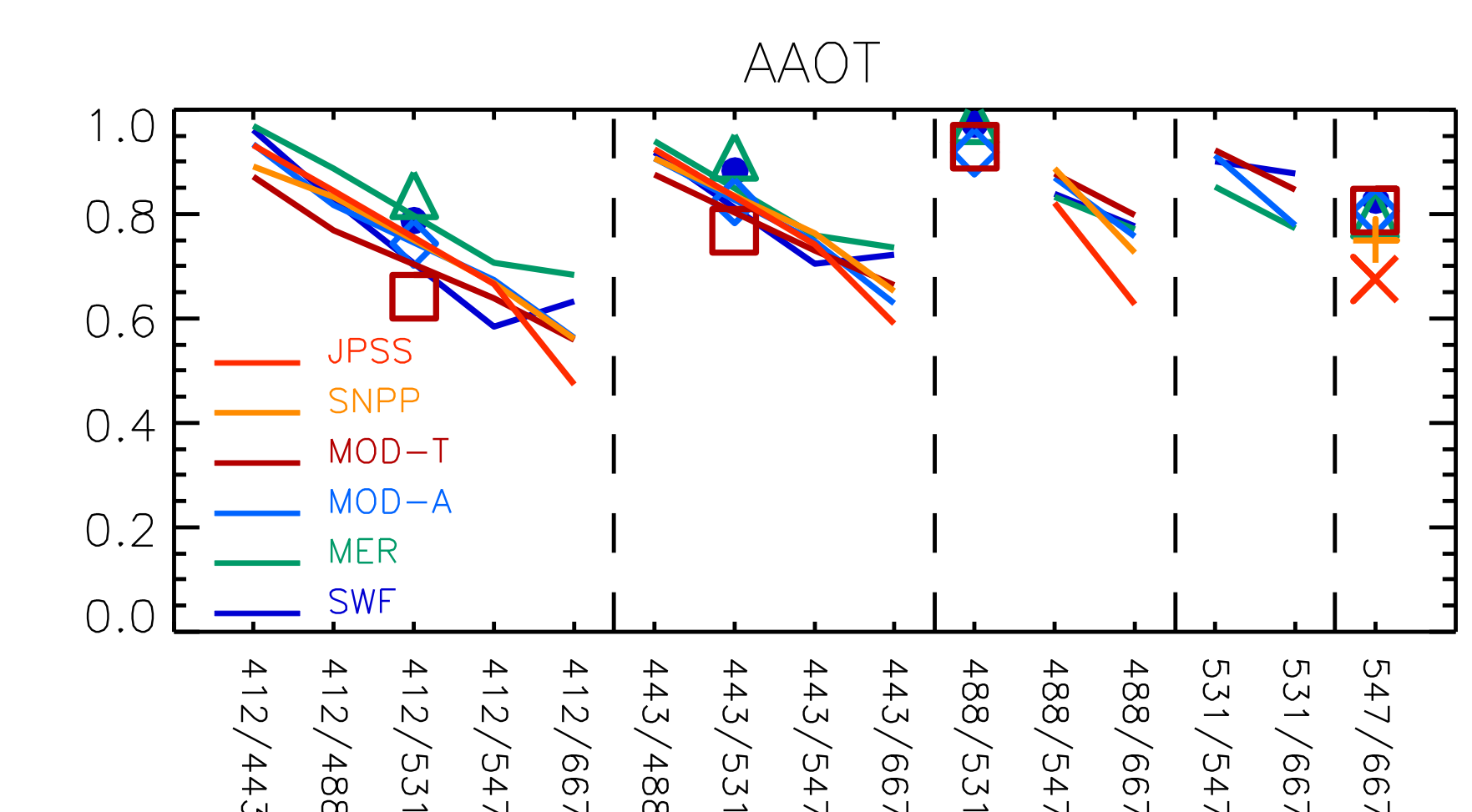
Uncertainty estimates

## Inter-band error correlation

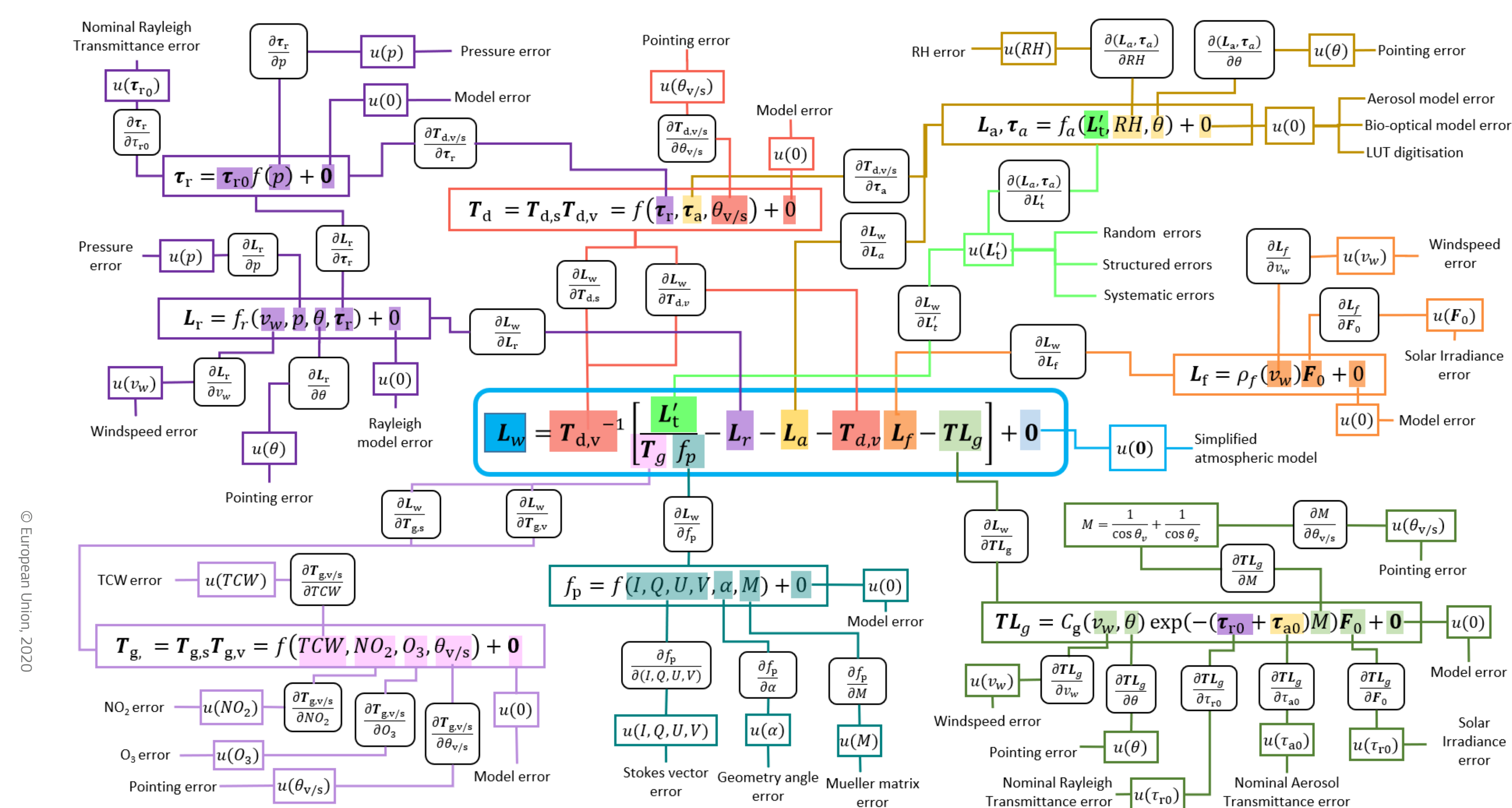
Implications for error propagation through bio-optical algorithms

## Inter-mission error correlation

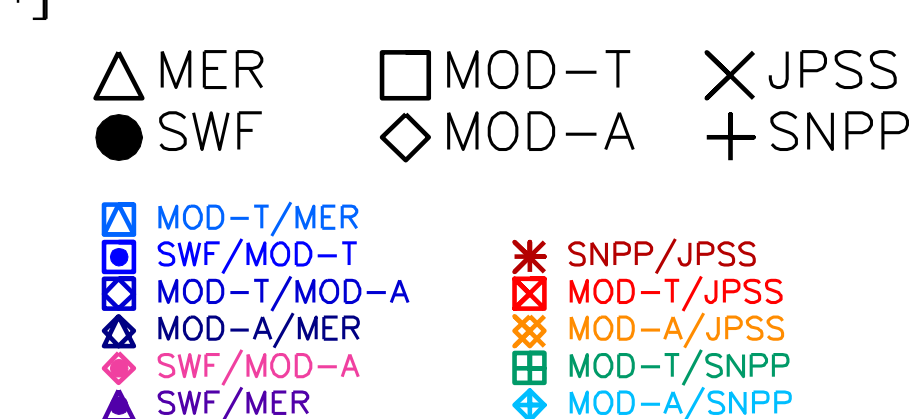
Implications for error propagation to multi-mission products



## Uncertainty tree diagram applied to an atmospheric correction algorithm (De Vis et al. 2022)



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## References:

De Vis, P., F. Mélin, S. Hunt, R. Morrone, M. Sinclair, B. Bell : Ancillary data uncertainties within the SeaDAS uncertainty budget. *Remote Sens.*, 10.3390/rs14030497, 2022.  
IOCCG #18: Uncertainties in Ocean Colour Remote Sensing. F. Mélin (ed.), IOCCG Report Series, No. 18, International Ocean Colour Coordinating Group, Dartmouth, Canada, 164pp., 2019  
Mélin, F.: From validation statistics to uncertainty estimates: Application to VIIRS ocean color radiometric products at European coastal locations. *Frontiers in Marine Science*, 8, 790948, 2021.  
Mélin, F.: Validation of ocean color remote sensing reflectance data: Analysis of results at European coastal sites. *Remote Sens. Environ.* 280, 113153, 2022.