FLEX - ESA's Photosynthesis Mission

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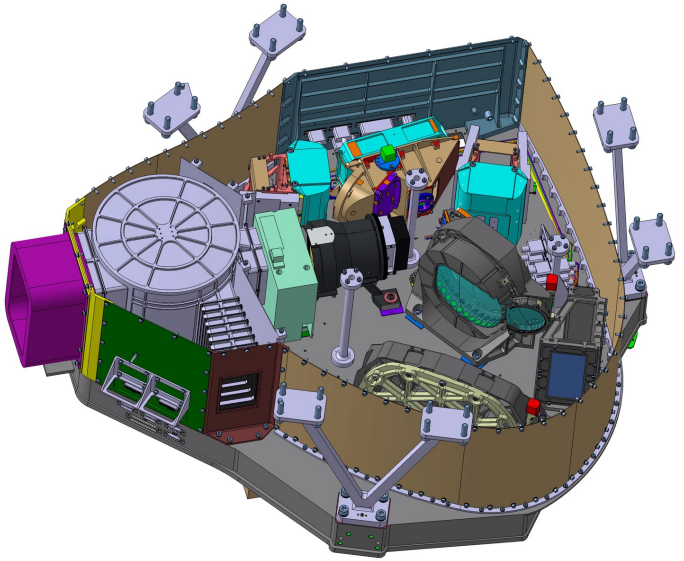
FLEX – Fluorescence EXplorer Overview

Science Goals

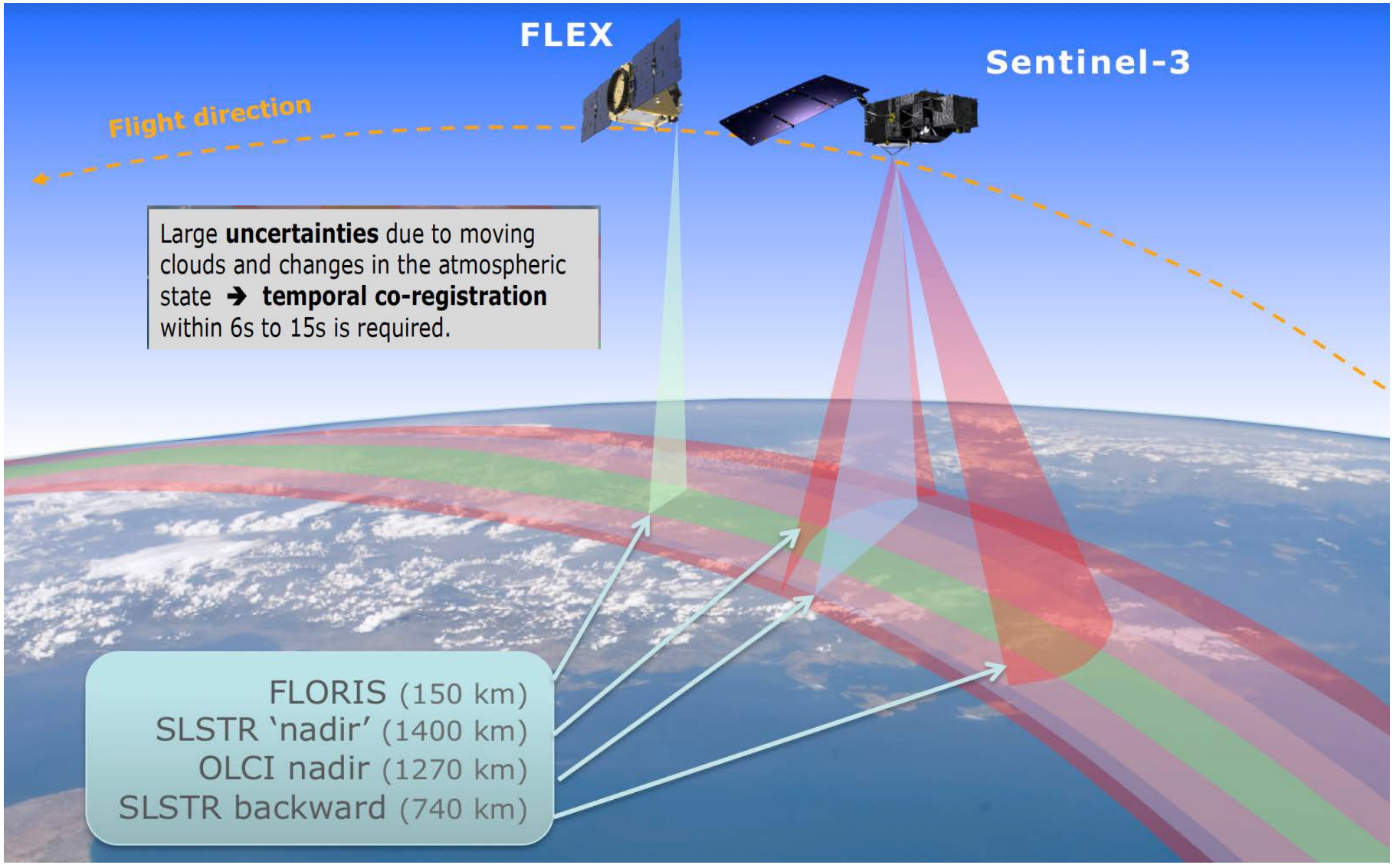
- Quantify the exchange of carbon between plants and the atmosphere
- Provide better insight into plant functioning and health
- Provide vegetation stress indices



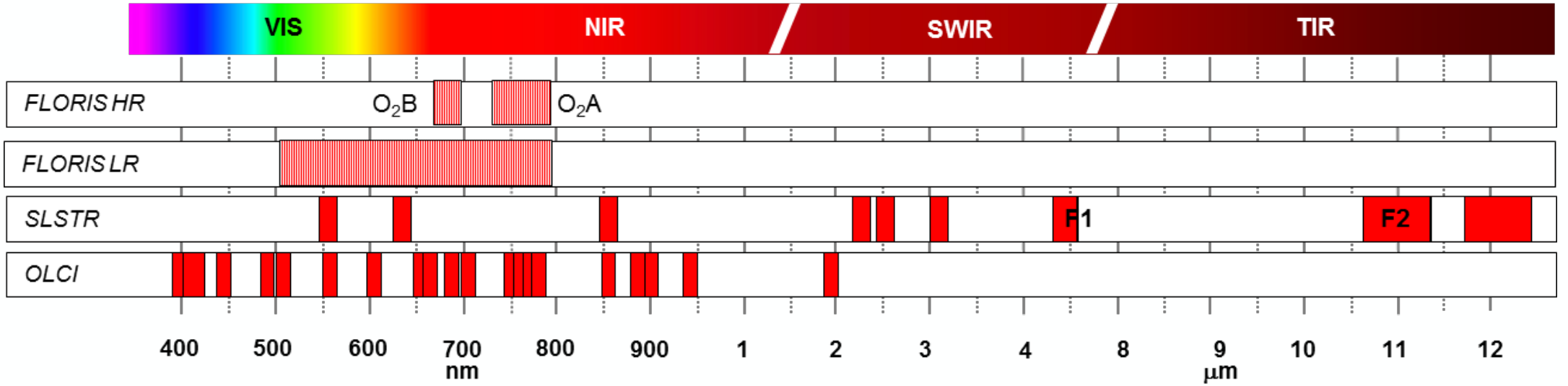
Payload: Visible to Near Infrared

- Two spectrometers :
  - High spectral Resolution – HR
  - Low spectral resolution – LR
- One telescope

FLEX Mission Implementation



Spectral Coverage

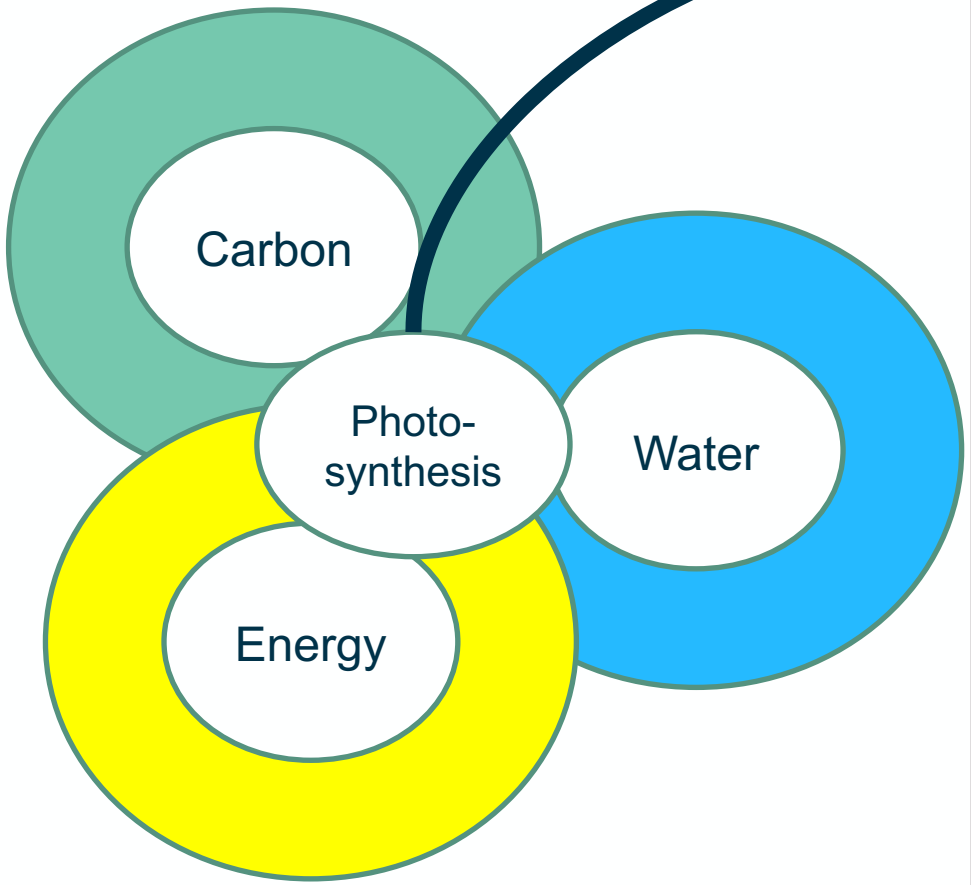


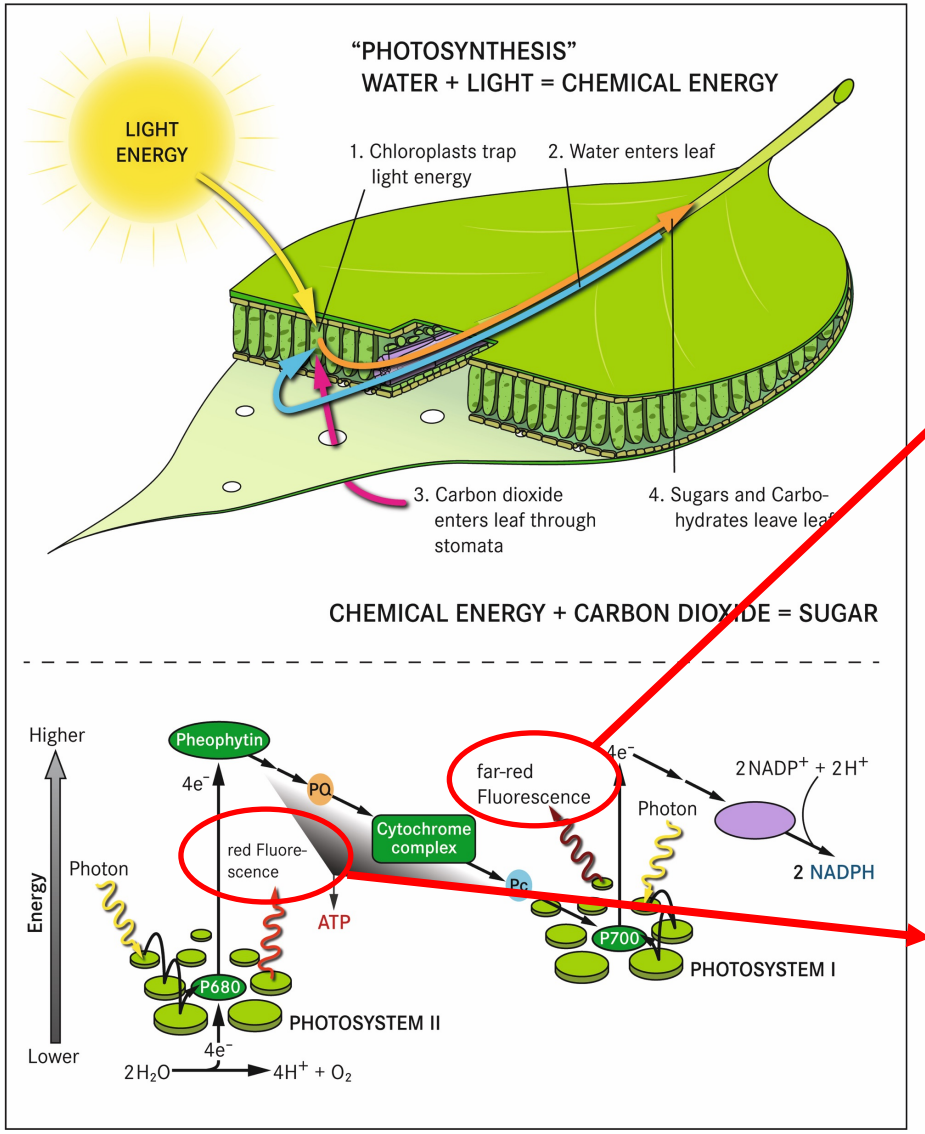
FLORIS (300 m SSD)
- Fluorescence
- Photochemical Reflectance Changes
- Atmospheric correction
- True reflectance

S-3 OLCI-4 (300 m SSD)
- Aerosols and water vapour
- Biophysical variables (Chlorophyll, LAI, ...)
- Reflectance
- Cross calibration
- Context information

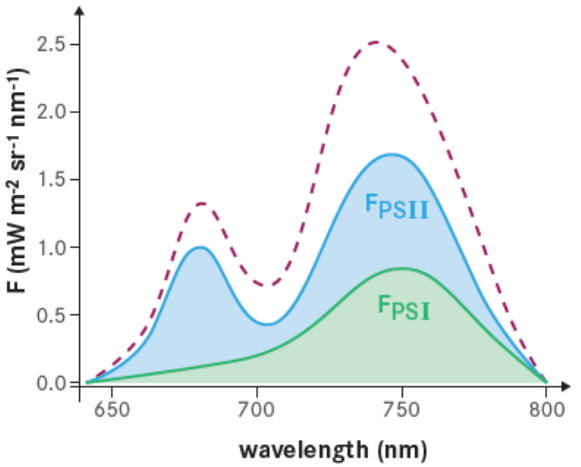
SLSTR (500m –1 km SSD)
- Aerosols,
- Surface Reflectance
- Surface Temperature
- Clouds (cirrus)

Fluorescence and Photosynthesis



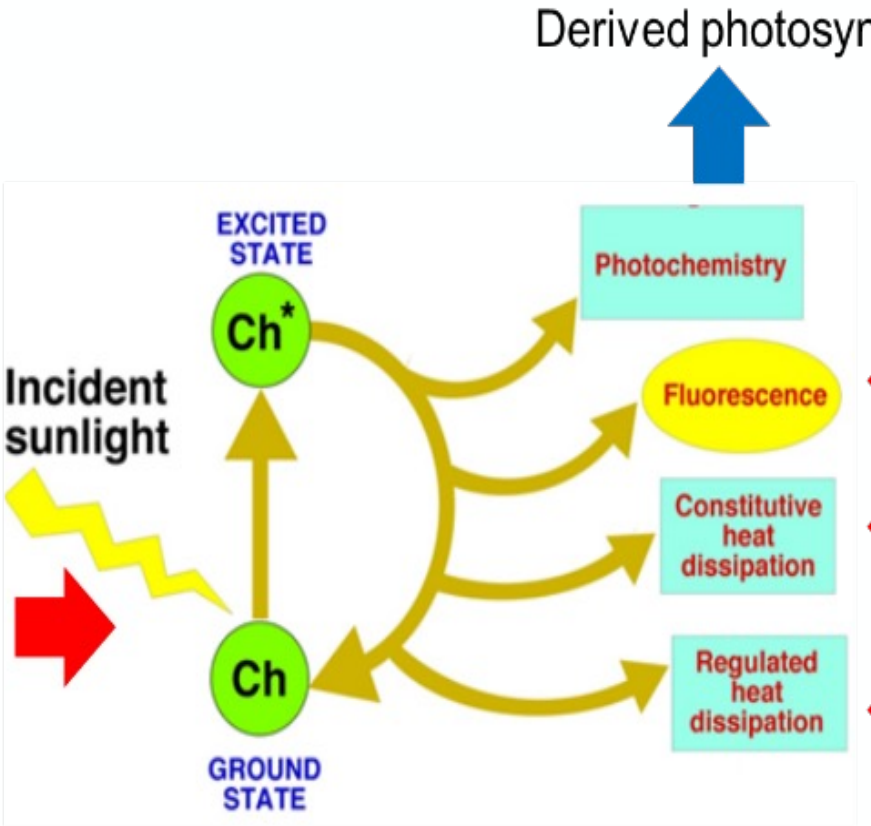


Observed in the O_2A absorption band



Observed in the O_2B absorption band

The Fate of Light



Solar energy absorbed by chlorophyll

Total fluorescence emission

Temperature

Reflectance changes (500-600 nm)

Uncertainty Traceability

< 30% photosynthetic efficiency

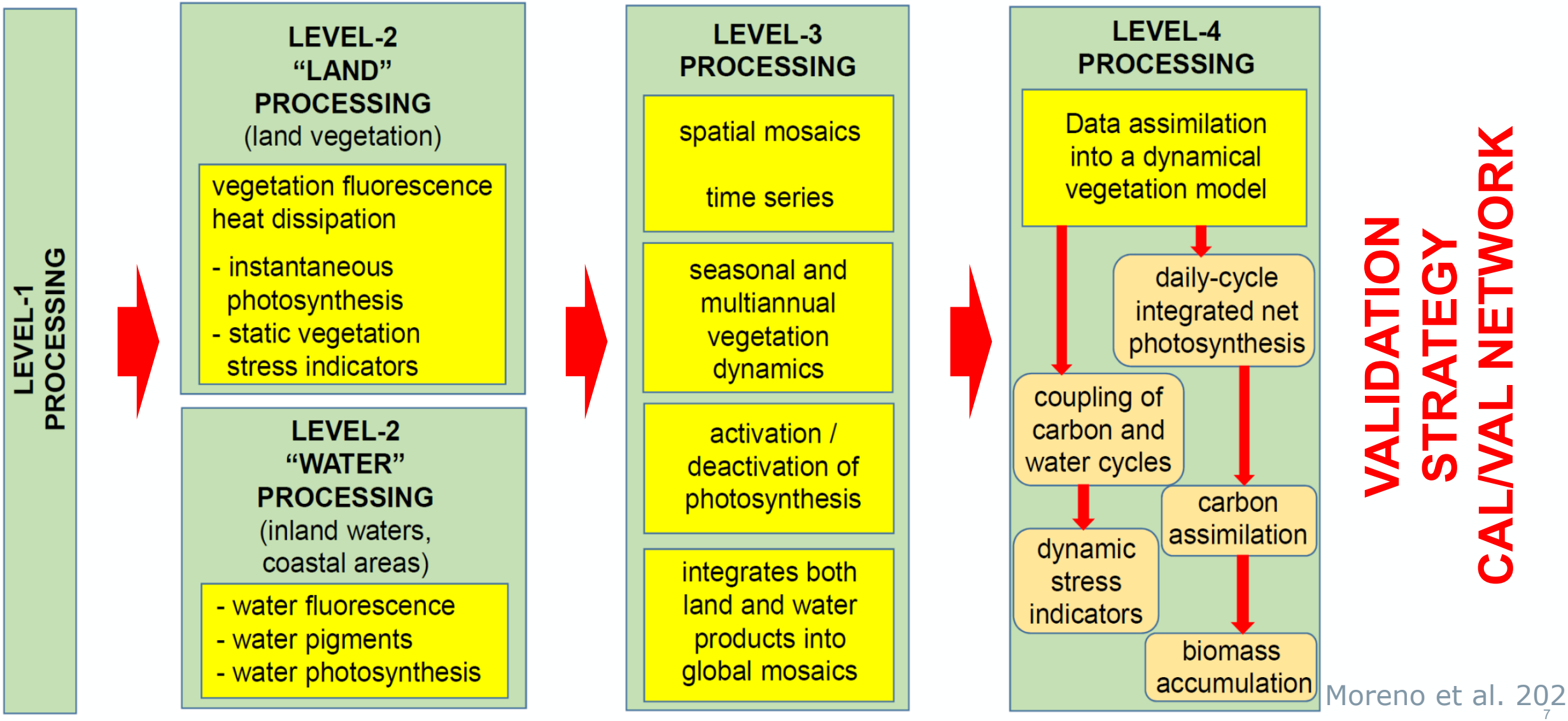
< 10% fluorescence
(at a reference level of 2 mW m^{-2} sr^{-1} nm^{-1})

< 2 K LST

< 30% NPQ
(non-photochemical energy dissipation efficiency)

< 10% FAPARGreen

Data Processing Strategy and Products (TBC)



Moreno et al. 2022