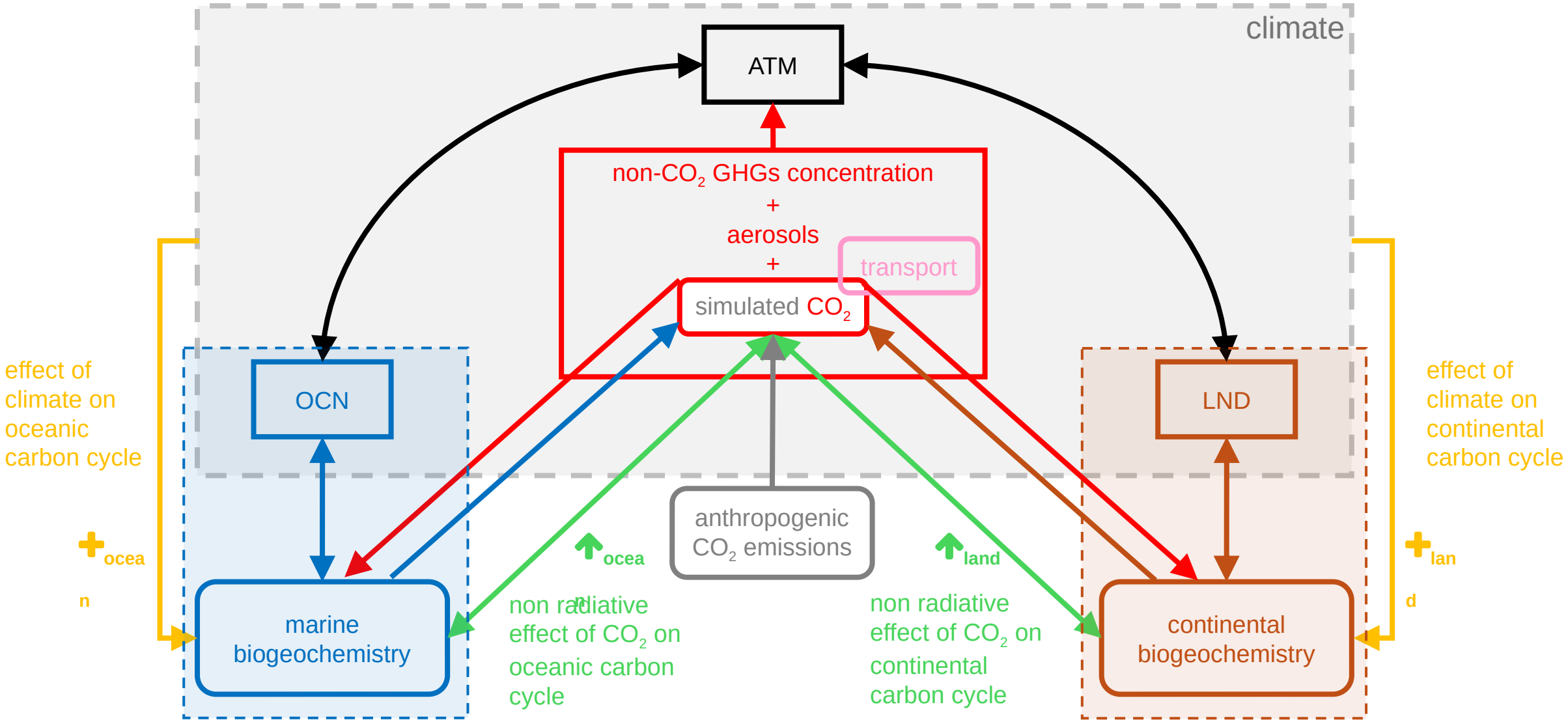
Retour sur les simulations C⁴MIP/CMIP6+ avec IPSL-CM6A-LR et IPSL-CM6A-ESMCO2

P. Cadule, O. Boucher, L. Bopp,
L. Fairhead, A. Caubel, O. Aumont, F. Hourdin, L. Kwiatkowski,
C. Ethé, P. Peylin, F. Maignan

Climate-Carbon Interactions

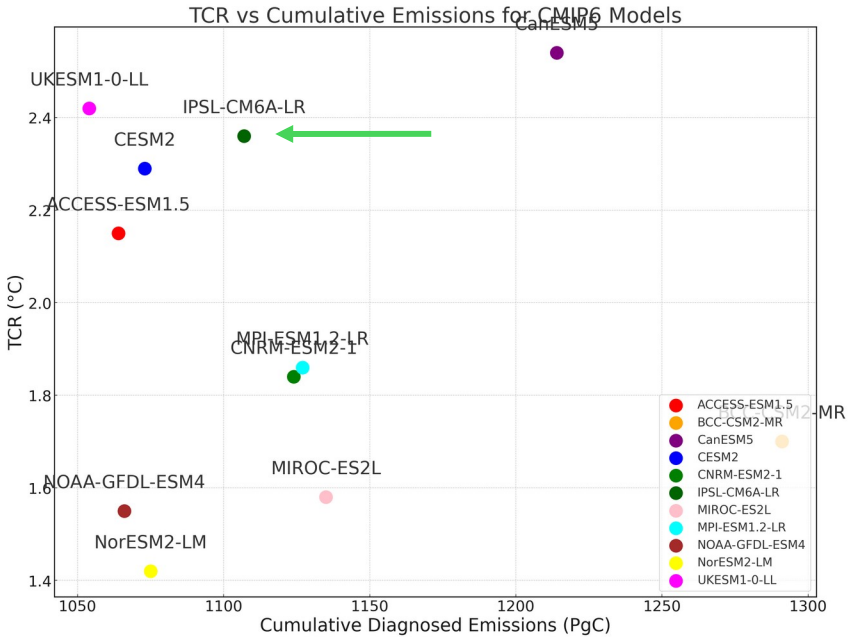


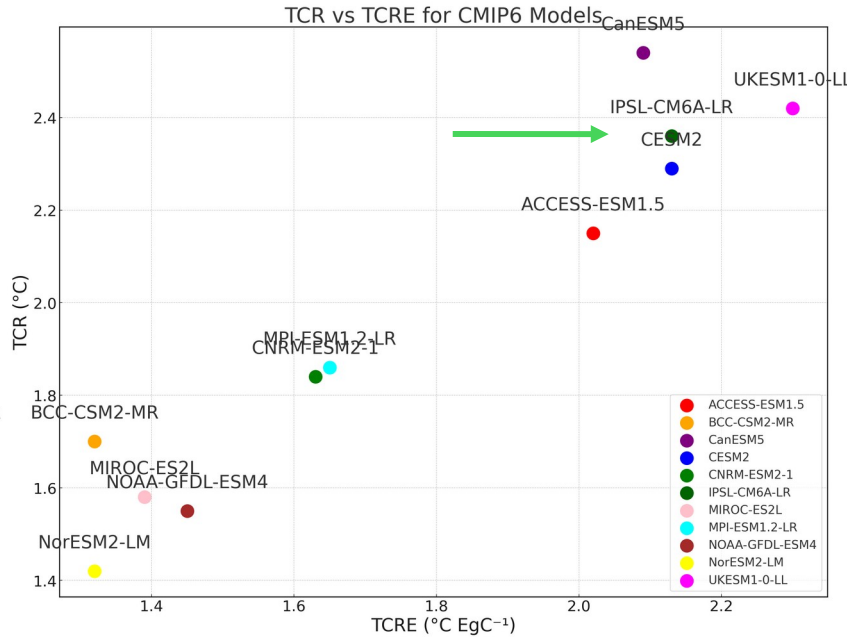
TCRE

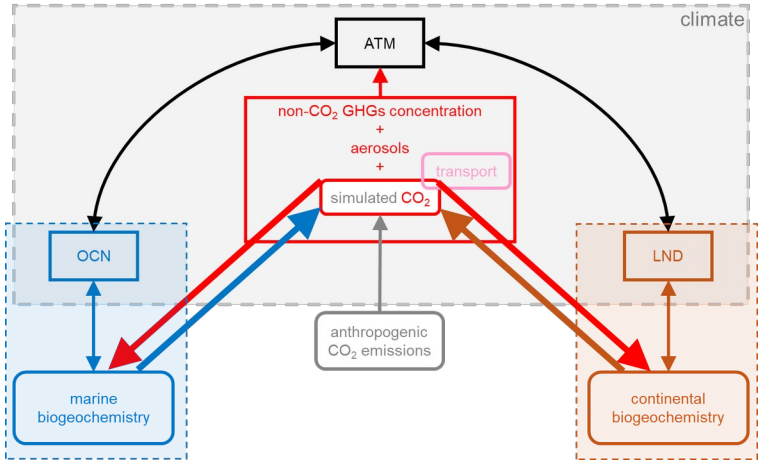
Transient Climate Response to cumulative Emissions

Useful indicator for adaptation and attenuation strategies

At 2xCO2
Idealized experiment « 1pctCO2 »

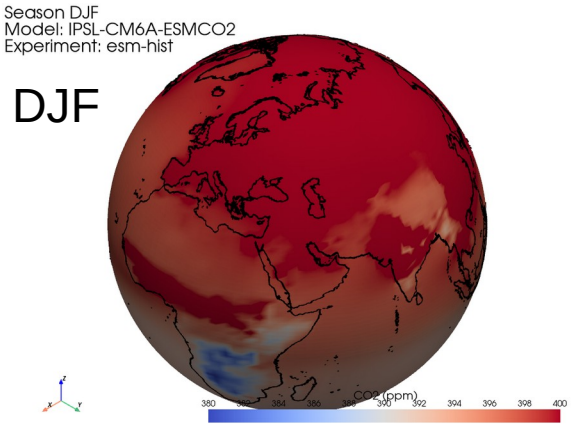


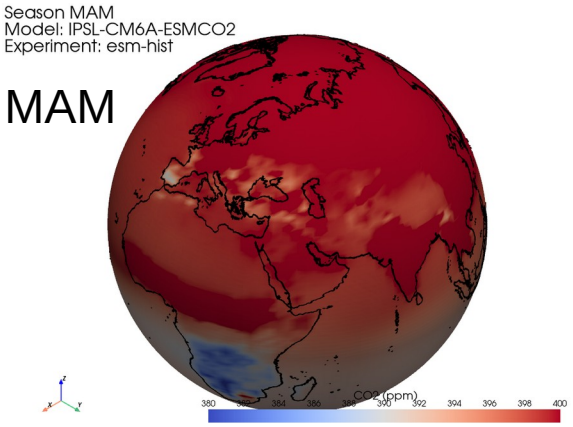


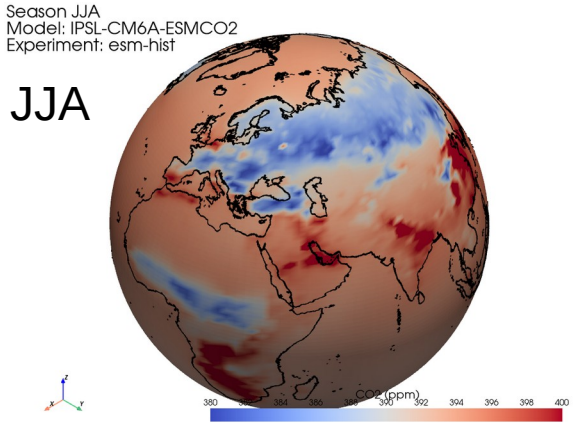


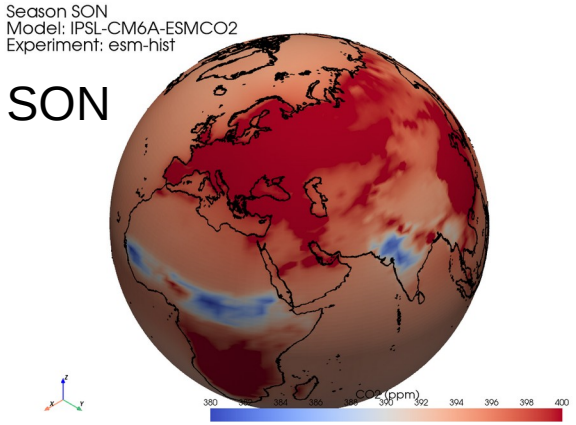
Arora et al., 2020

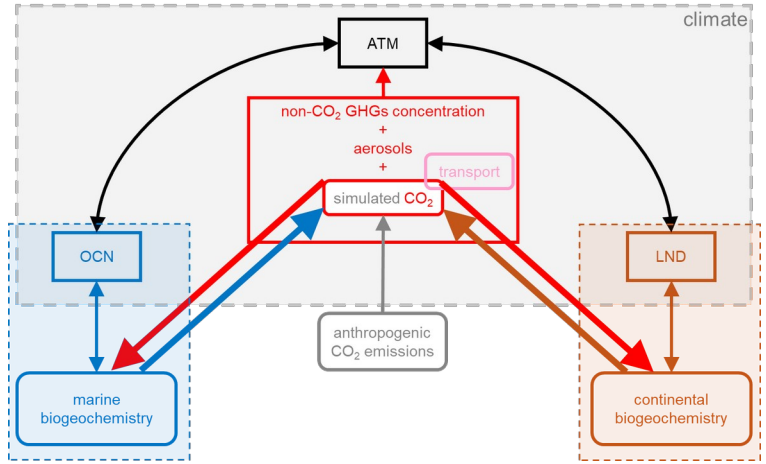
Transport of Atmospheric CO_2







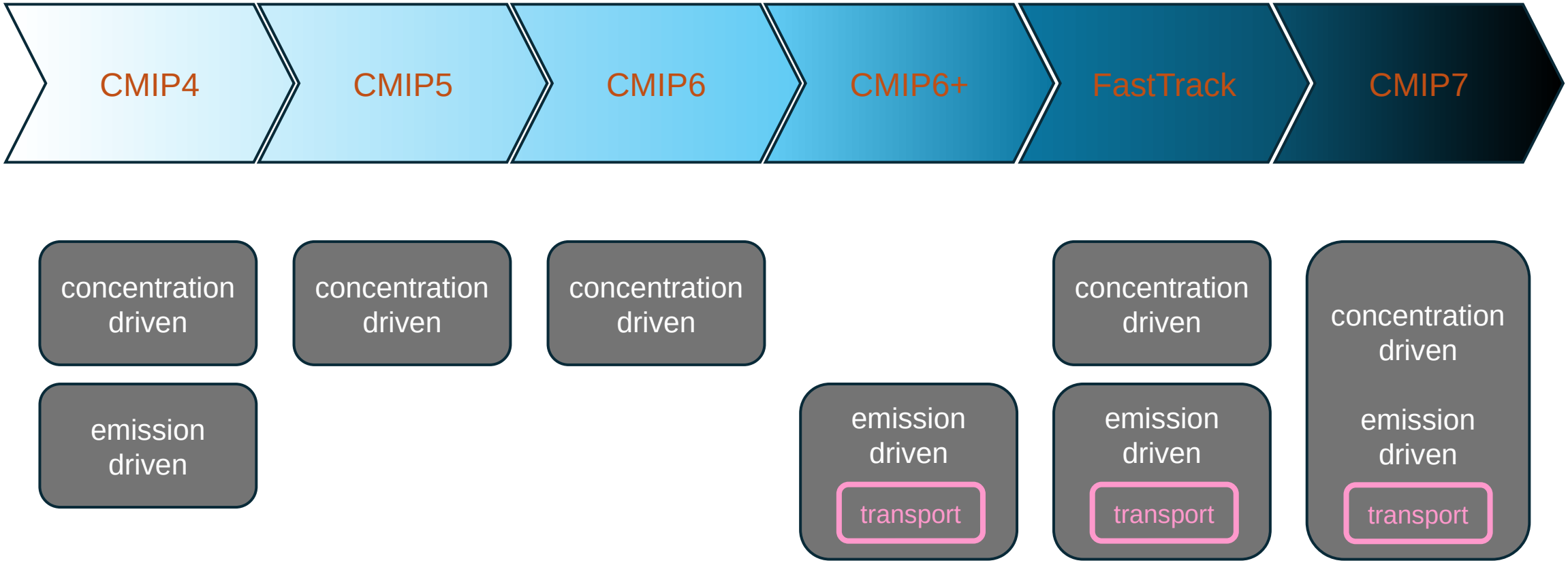




More realistic spatial and temporal representation of the simulated CO_2 concentration

Leading to a better representation of the carbon sinks

Evolution Path



Current Needs

- Other GHGs and aerosols radiative forcings
  - To estimate equivalent CO_2
- Confirm CO_2 radiative forcing
  - To confidently determine TCRE
- Wind patterns + Transport
  - To determine most appropriate inter-hemispheric gradient
  - To improve carbon sinks

Future Needs

- Coupling with INCA
  - Account for CO_2 induced by chemical reactions
  - Fires: lightning (TRACCS)

- Improved coupling with LMDZ
  - Fires: Account for injections heights of emissions (TRACCS)
  - Photosynthesis module: improvement of the GPP representation (F. Maignan)
  - Photosynthesis module: CO_2 gradient in canopy (J. Alléon)
  - Photosynthesis module: Direct and diffuse light fraction on photosynthesis (Y. Zhang)

See P. Peylin's presentation