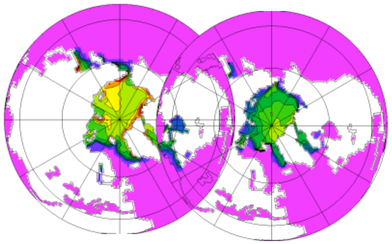

Evolution du modèle de glace dans IPSLCM : Passage de LIM2 à LIM3

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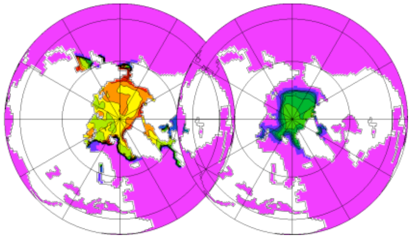
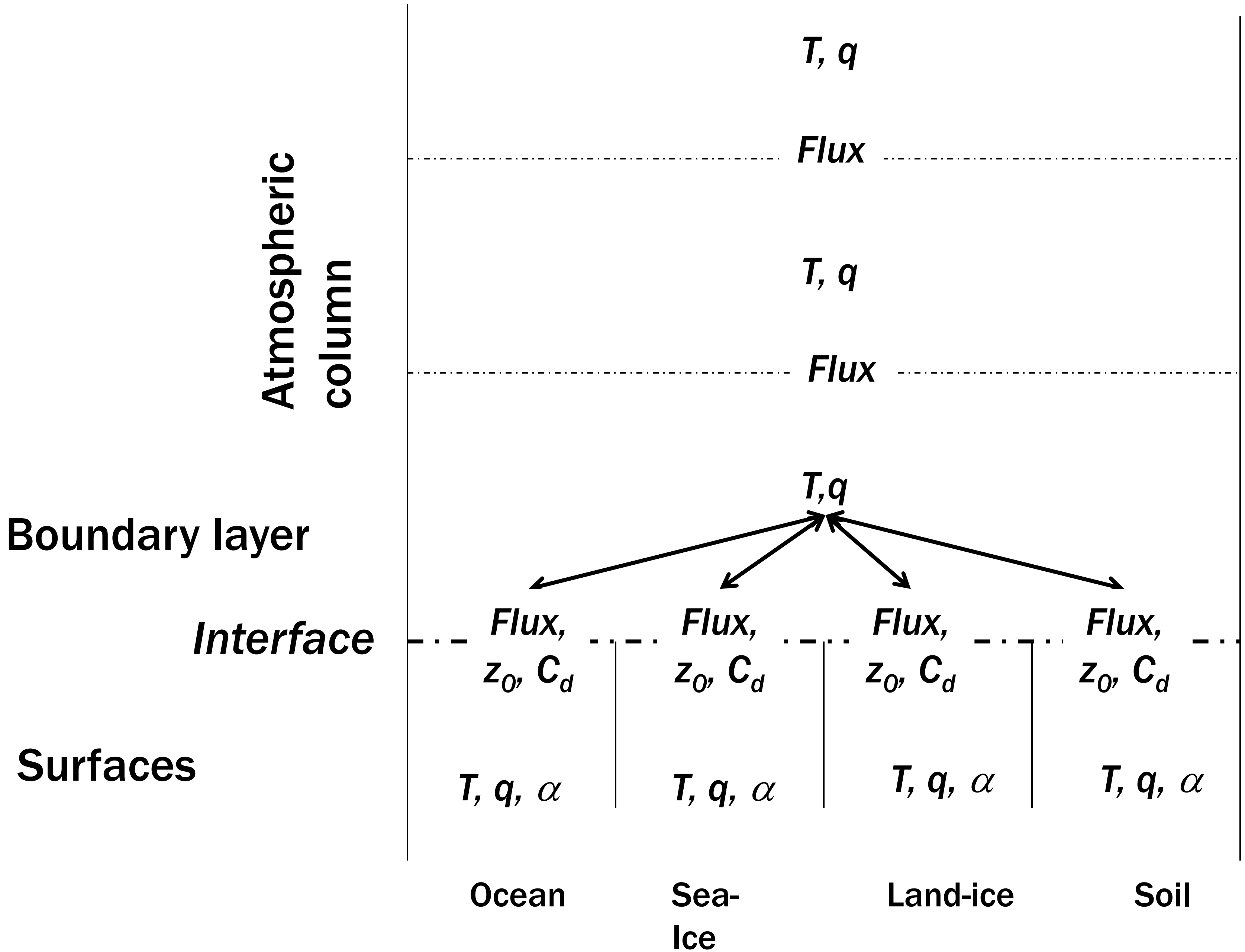
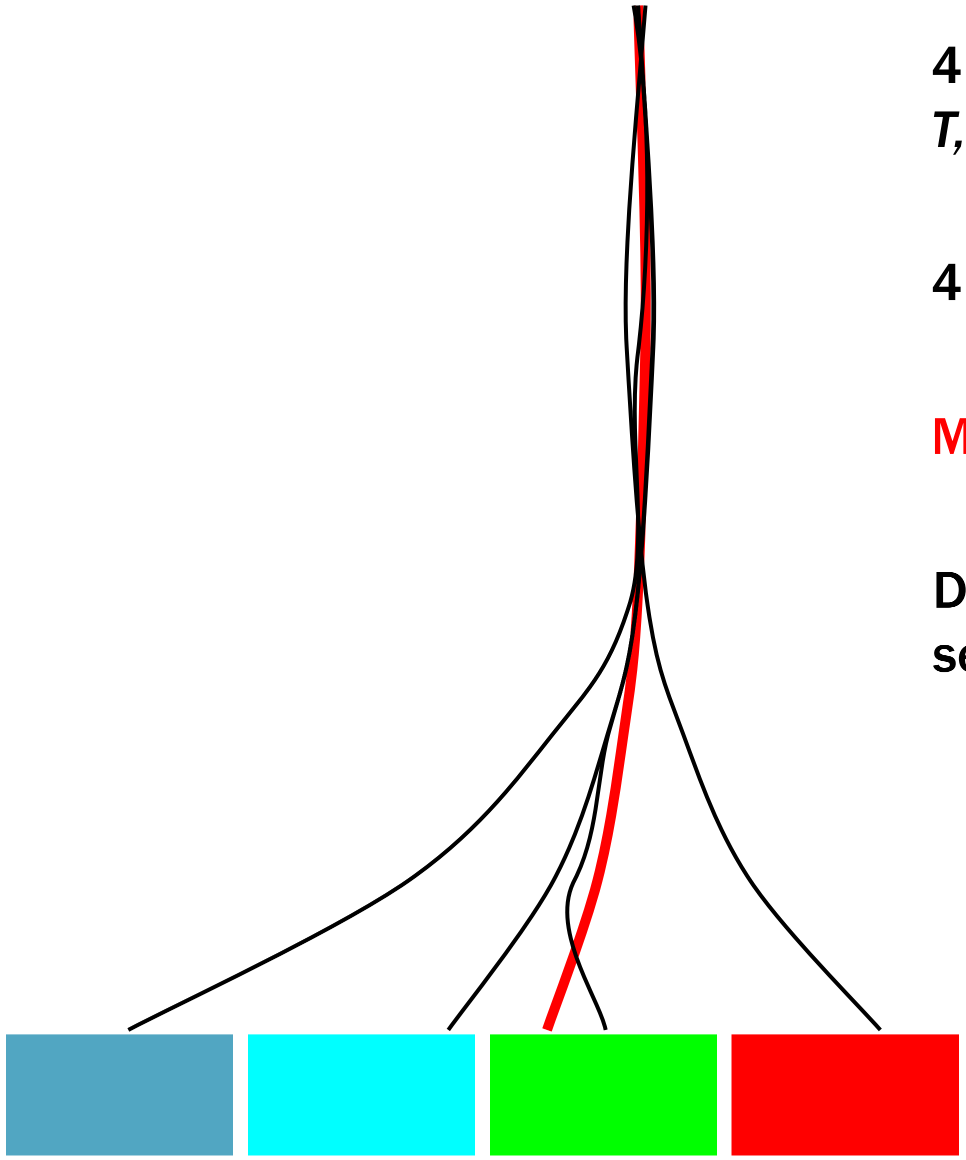


Tiling


Atmospheric column
Boundary layer
Interface
Surfaces
T, q
Flux
T, q
Flux
T,q
Flux, z_0, C_d
Flux, z_0, C_d
Flux, z_0, C_d
Flux, z_0, C_d
T, q, α
T, q, α
T, q, α
T, q, α
Ocean
Sea-Ice
Land-ice
Soil

Profils verticaux (atmosphère)



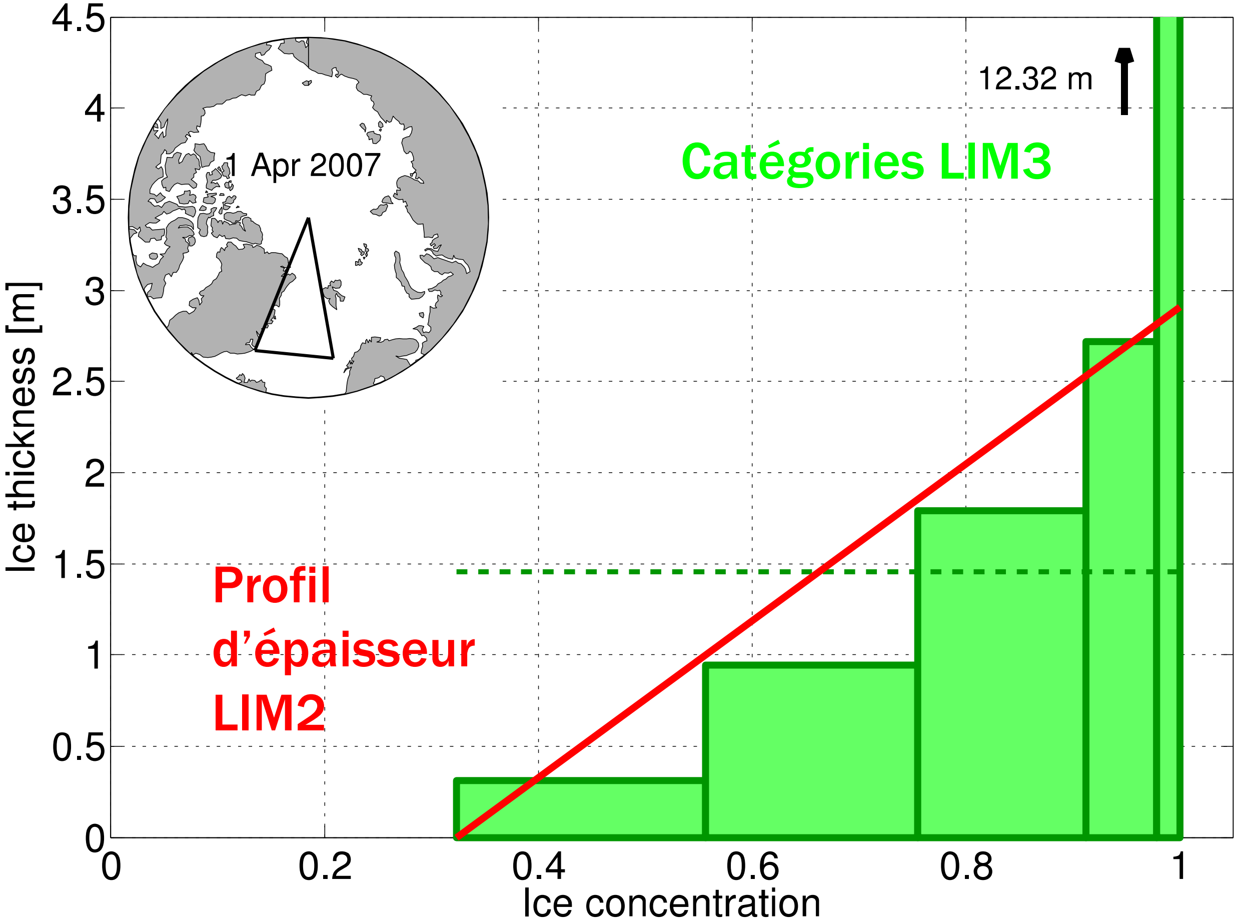
4 résolutions indépendantes de *T*, *q*, etc :

4 profils verticaux *T*, *q*

Moyenne après résolution

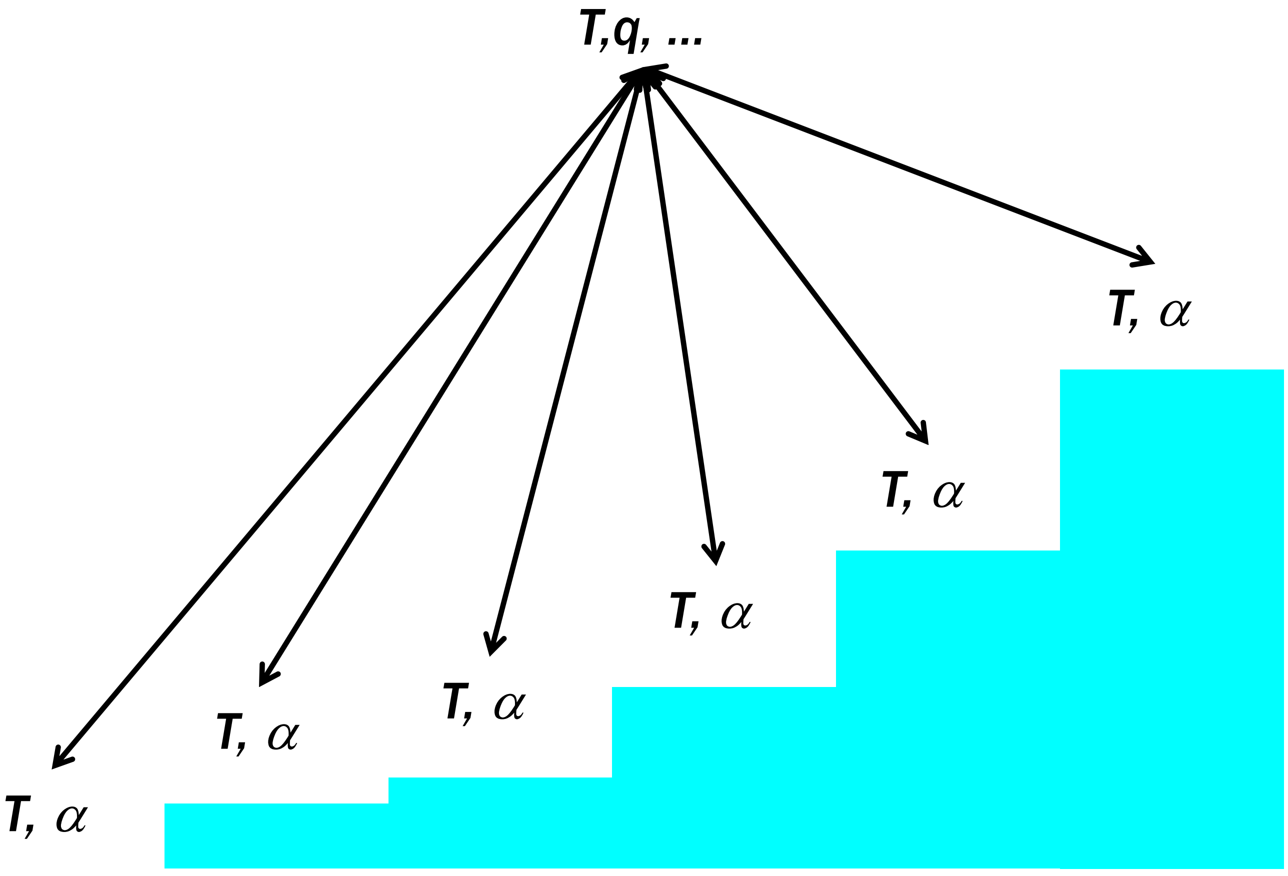
Différents modes de résolution selon la surface

LIM3 : multi catégorie

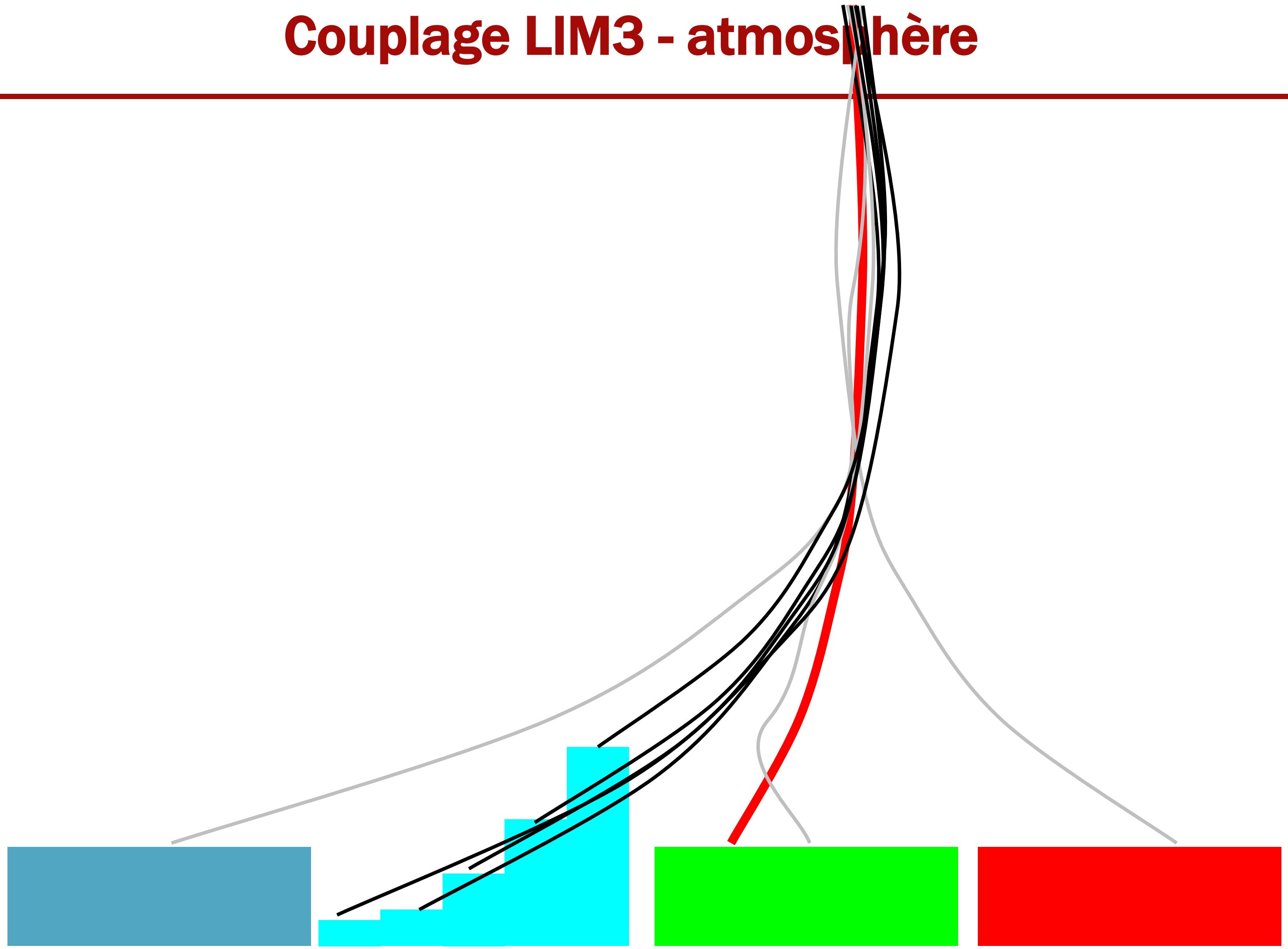


Massonet et al. (2011)

NEMO-LIM3 forcé : bulks

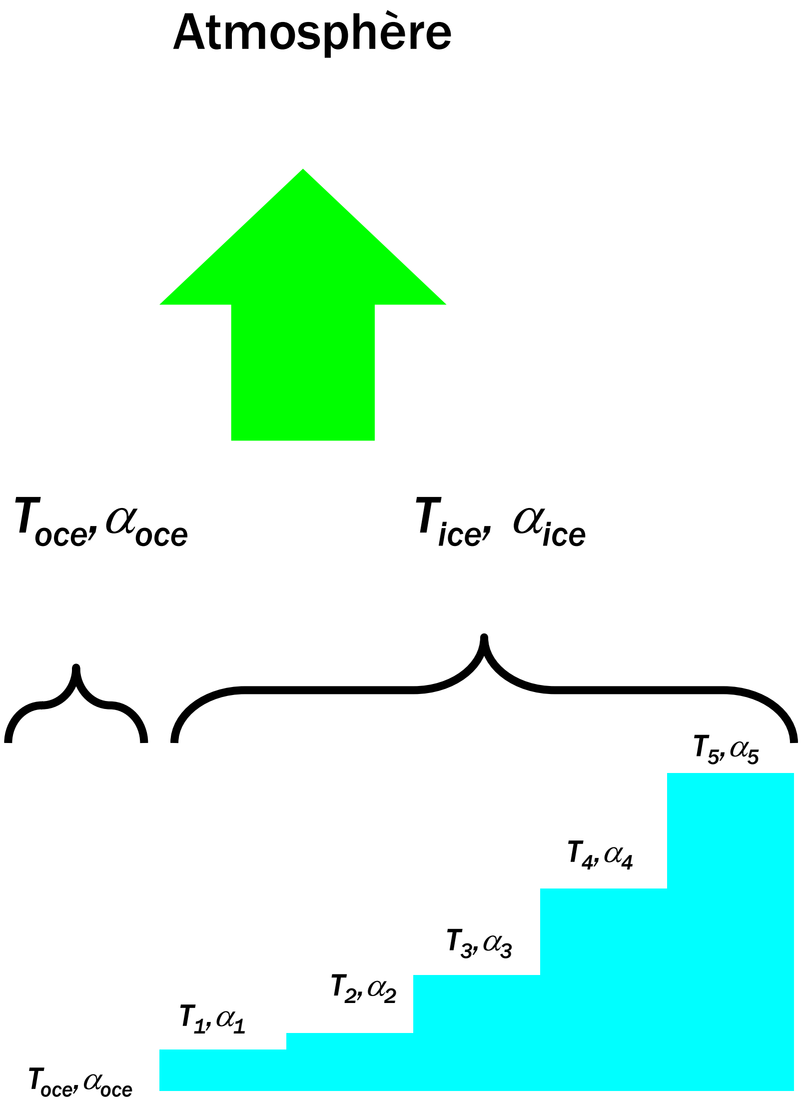


Couplage LIM3 - atmosphère



Dans LMDZ, une sous-surface par catégorie de glace ?

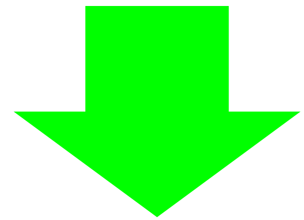
Couplage LIM3 - atmosphère



Atmosphère

$${}^{sw}Q_{oce/ice} \;,\; {}^{ns}Q_{oce/ice} \;,\; \tau_{oce/ice}$$

$$\partial^{ns}Q_{ice}/\partial T_{ice} = \partial^{turb}Q_{ice}/\partial T_{ice} + 4\sigma T^3$$



Répartition linéaire des flux sur les catégories de glace *n*=1 à 5

$${}^{ns}Q_n = {}^{ns}Q_{ice} + \partial^{ns}Q/\partial T.(T_n - T_{ice})$$

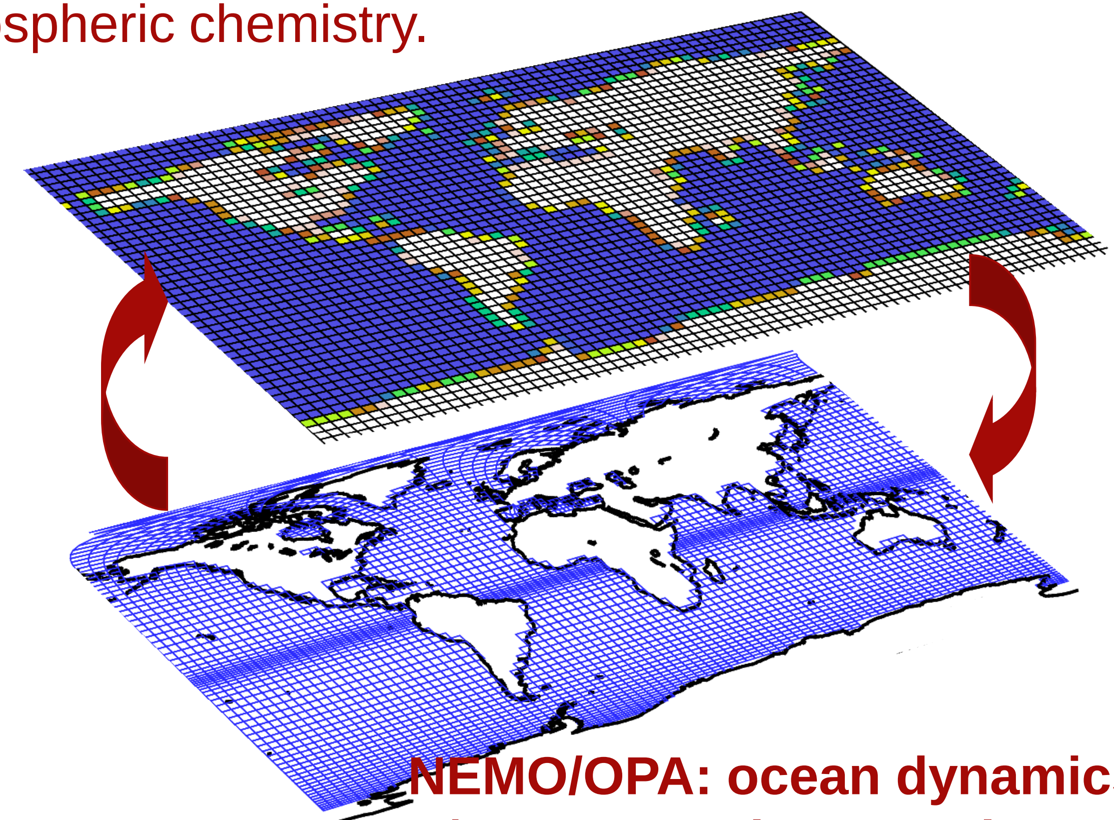
$${}^{sw}Q_n = \alpha_n/\alpha_{ice} \;.\; {}^{sw}Q_{ice}$$

Partie Gaëlle

En réserve

IPSLCM5 Model

LMDz : atmosphere dynamics and physics.
Orchidée : soil/atmosphere transfers -
Phenology - Vegetation dynamics - Carbone cycle - atmospheric chemistry.



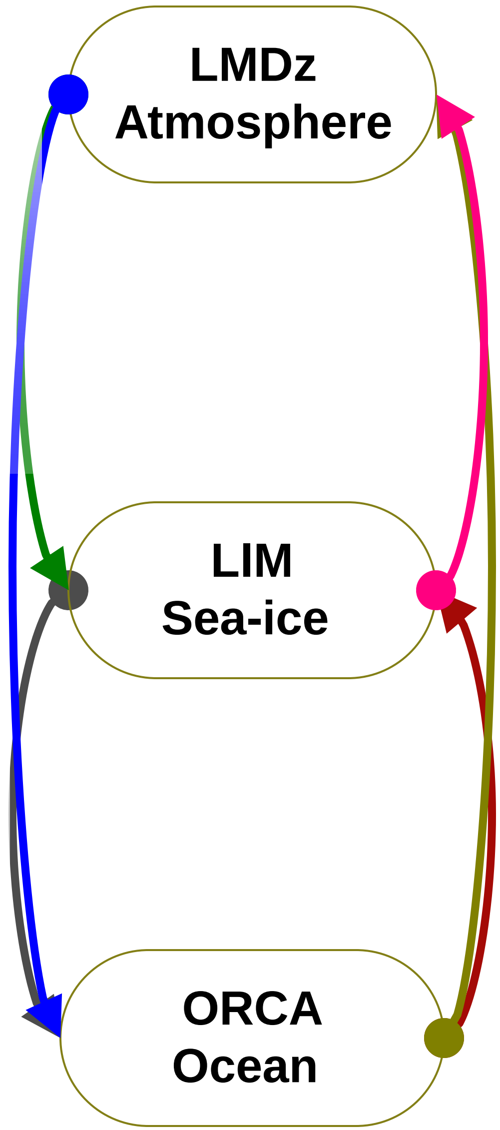
NEMO/OPA: ocean dynamics and physics
NEMO/PISCES carbone cycle - oceanic tracers
LIM : sea-ice dynamics and thermodynamics

Exchanged fluxes

Net solar flux (ocean).
Net solar flux (sea ice).
Net non-solar flux (ocean).
Net non solar-flux (sea ice).
Water budget (P-E), no runoff.
Solid precipitation (snow).
∂Q/∂T (turbulent) (sea ice).
Wind stress (sea ice).

Wind stress (open ocean).
Runoff.

Net solar flux.
Net non-solar flux.
Stress under sea ice.
Freshwater flux (conc./dil.).
Freshwater flux (volume flux for free surface).
Sea-ice fraction.

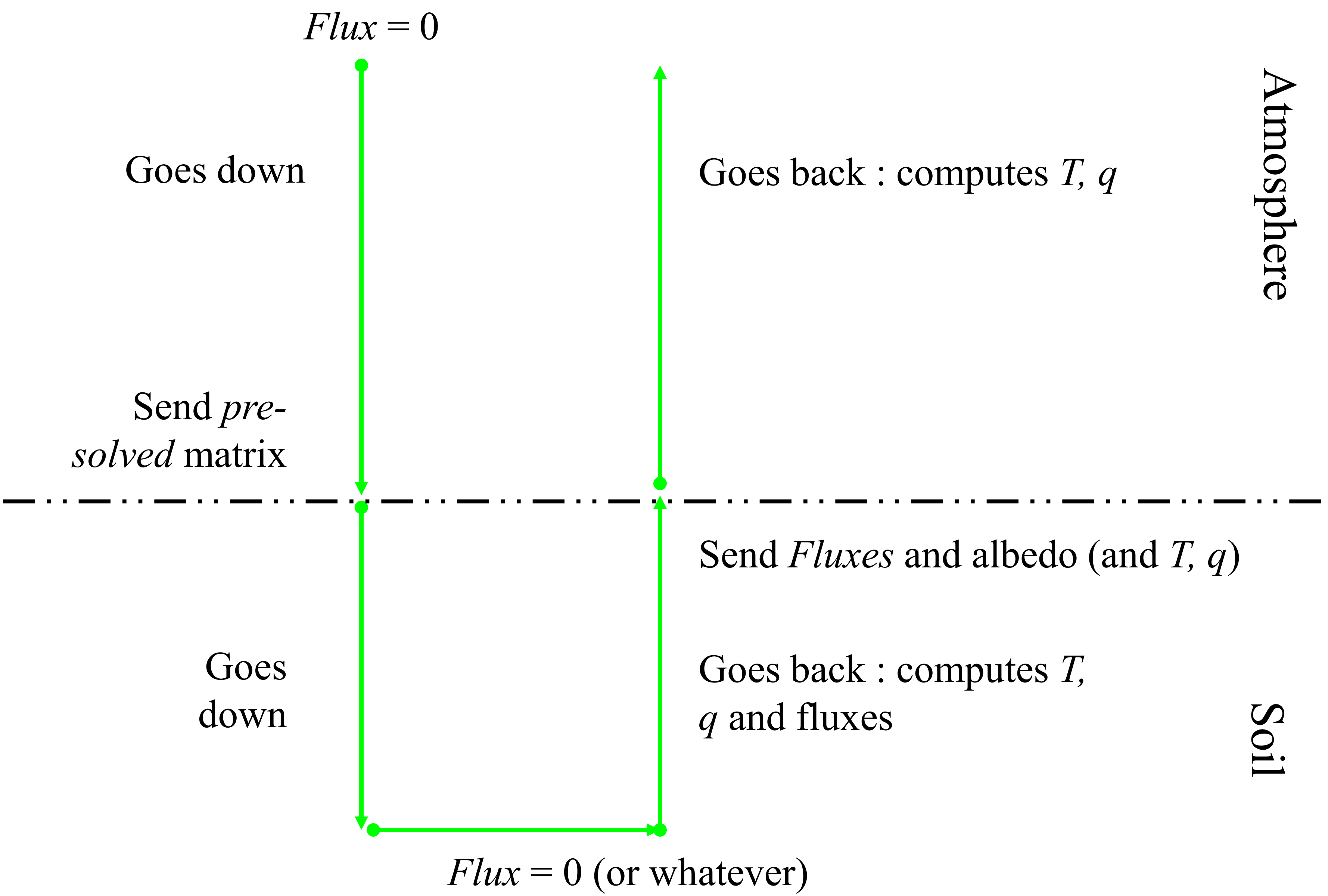


Sea-ice fraction.
Sea-ice albedo (weighted)
Sea-ice surface temperature (weighted)

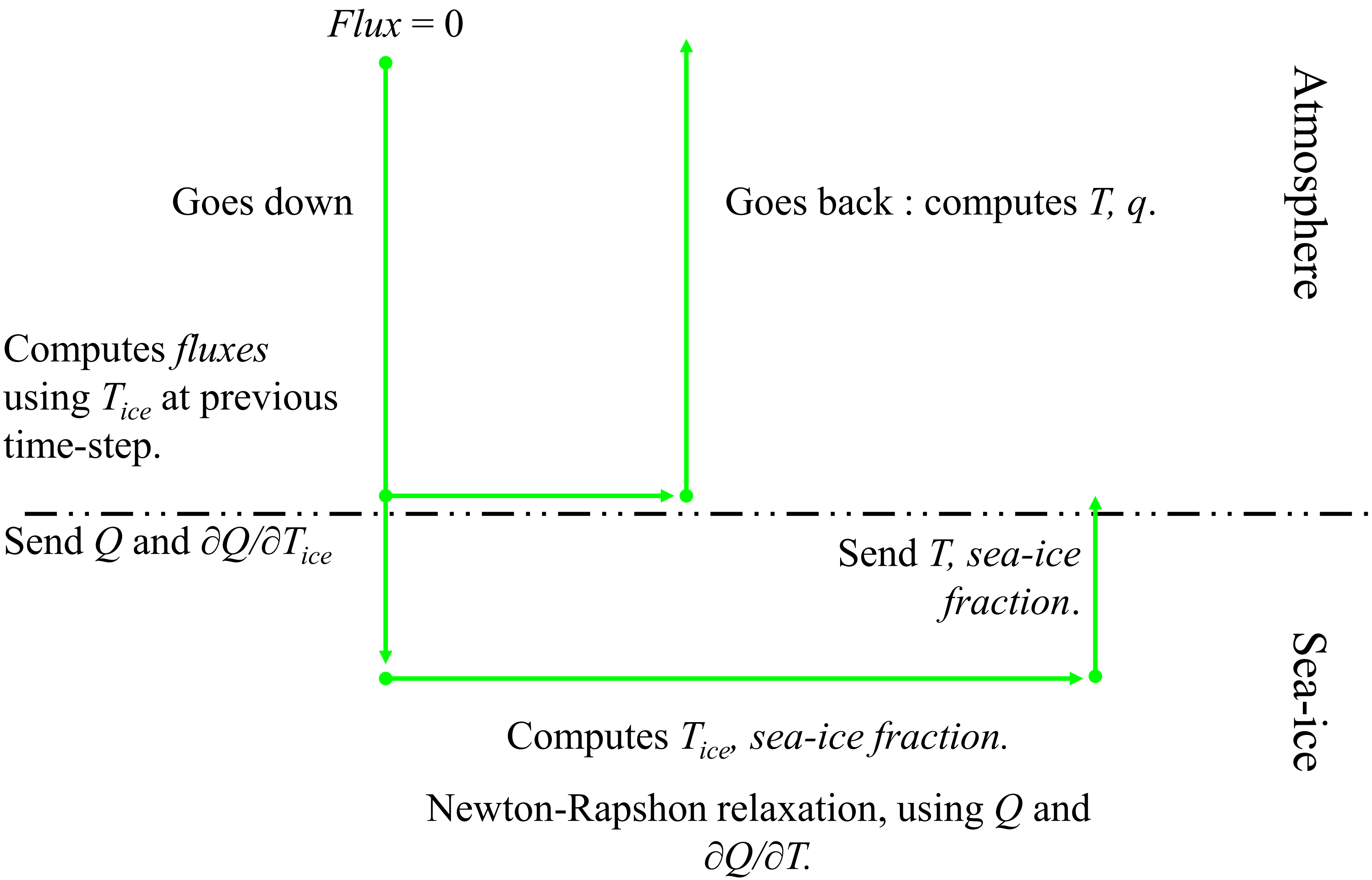
Ocean surface temperature (weighted)

Ocean surface temperature.
Ocean surface salinity.
Surface current.

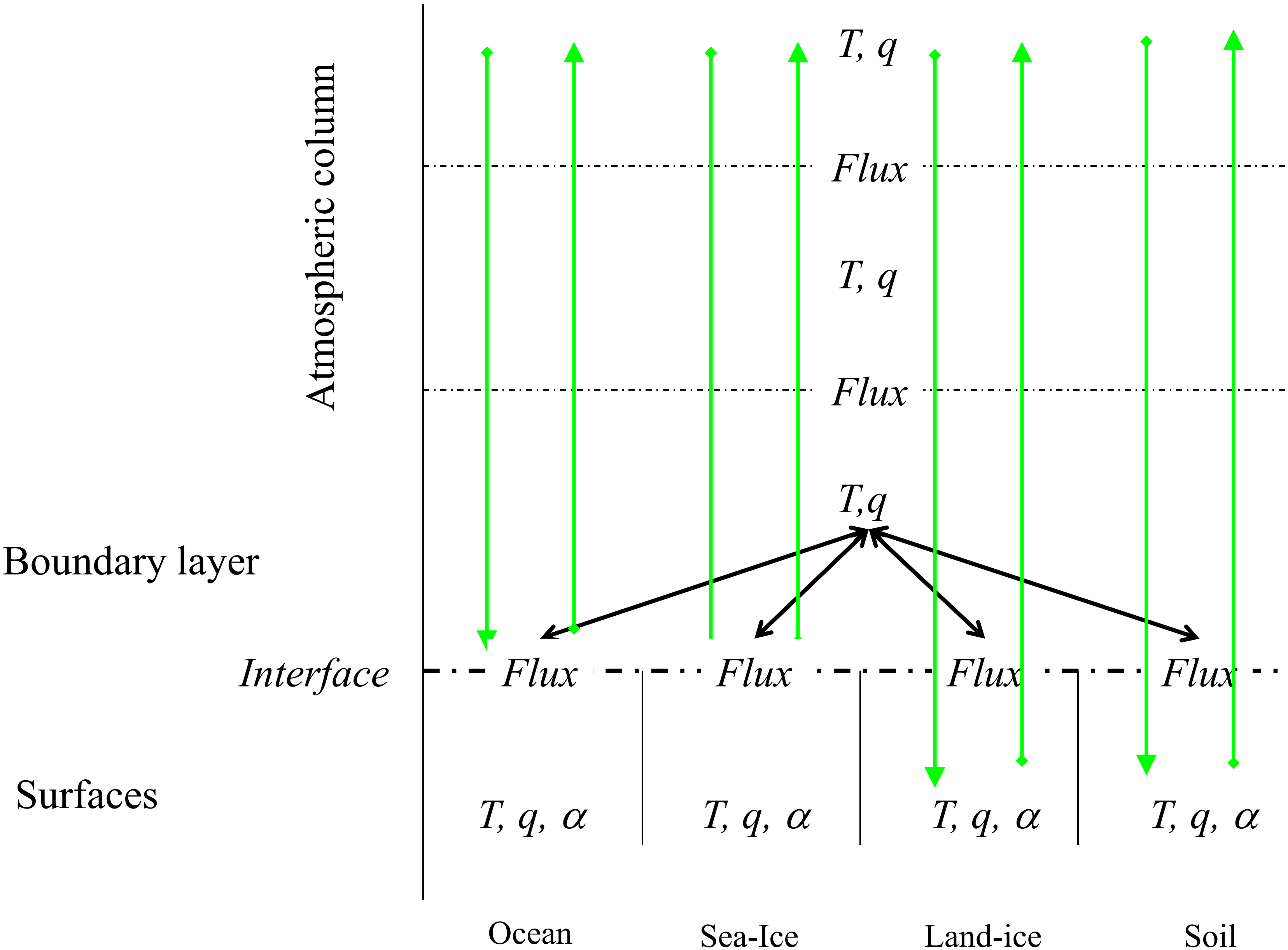
Resolution for continental surface : implicit.



Resolution for sea-ice : explicit.



Repartition



Resolution for wind

- Simple boundary condition at surface : **U**=0.
  - (surface velocity of ocean or ice are not used)

- 4 resolution with different z_0 (characteristic length) and C_d (cdrag), and averaging.

Radiative fluxes

- Radiative scheme uses mean albedo α and mean surface temperature T_{surf}.

- Albedo is used to distribute short-wave over the 4 surfaces.

$$Q_i^{up} = \frac{\alpha_i}{\alpha_{mean}} Q_{mean}^{up} = \alpha_i Q_{mean}^{down}$$

- Surface temperature is used to distribute long-wave : linearized.

$$Q_i^{up} = Q_{mean}^{up} + \frac{\partial Q}{\partial T}\left(T_i - T_{mean}\right) = Q_{mean}^{up} + \sigma T_{mean}^{3}\left(T_i - T_{mean}\right)$$

- Strong hypothesis : downward fluxes are equals over all surfaces.