



Figure 1 - Schematic view of the CNRM-CM6-1 climate model in "AMIP mode", that is not coupled to the NEMO ocean model. The model couples the ARPEGE-Climat v6.3 general circulation model with the ISBA-CTRIP system to simulate atmospheric, land surface, and hydrological processes. The ISBA land surface model includes a one-layer vegetation interception scheme, CO₂-responsive plant transpiration, bare soil evaporation, snow sublimation, a 12-layer snow scheme, and a 14-layer explicit soil scheme for temperature, moisture, and soil ice. Soil moisture is computed within the rooting depth, which varies from 0.2 to 8 meters depending on the vegetation type, while soil temperature is simulated down to 12 meters. Subgrid hydrology accounts for surface runoff, deep drainage, and recharge fluxes, with groundwater interactions modeled over the low land fraction of the grid cell affected by the water table, f_{wtd} (illustrated by the grey footprint around the river). The CTRIP hydrological model simulates river discharge using total runoff from ISBA, dynamically solving river velocity with Manning's formula and incorporating a flooding scheme to compute flood volume and extent. It also includes a two-dimensional groundwater scheme for unconfined aquifers, representing time variations in water table depth, interacting with rivers and fed by the recharge rate simulated by ISBA. The coupling between ISBA and CTRIP is achieved via the OASIS-MCT interface, allowing interactions between floodplains, soil, and atmosphere through evaporation, infiltration, and precipitation interception, as well as upward capillary fluxes into the unsaturated soil over f_{wtd} . Variables involved in these coupling processes are shown in black. Further details are available in Decharme et al. (2019).