

Fig.DR1 : Schematic illustration of ECO-GEOCLIM (resulting from a coupling between a biodiversity model (ECO) with GEOCLIM (sum of COMBINE and GCM (here FOAM coupled with LPJ)).

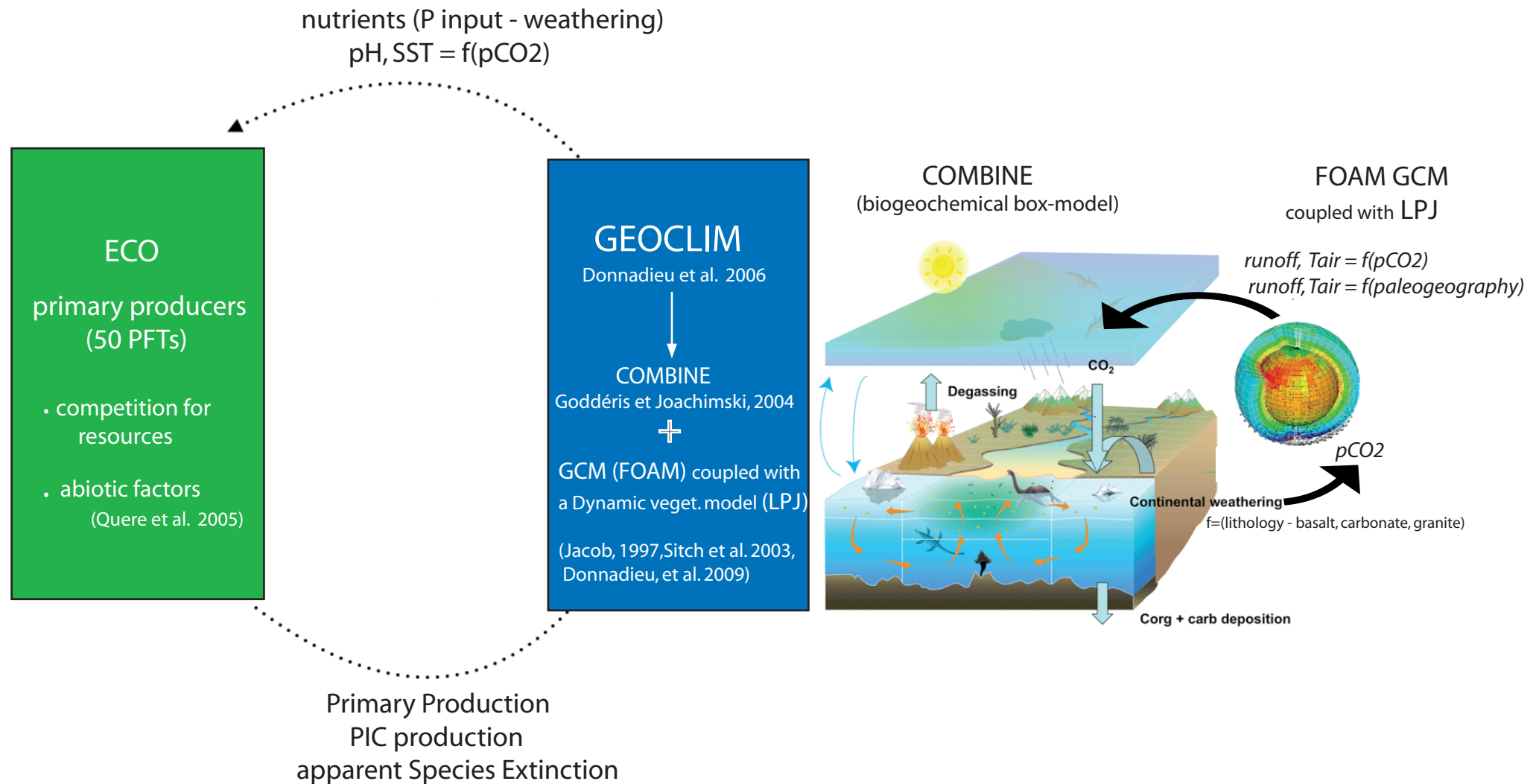
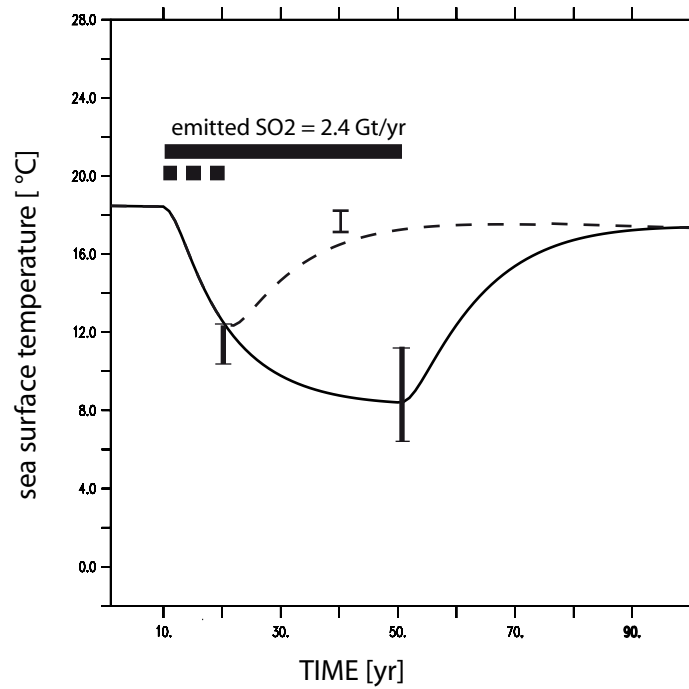


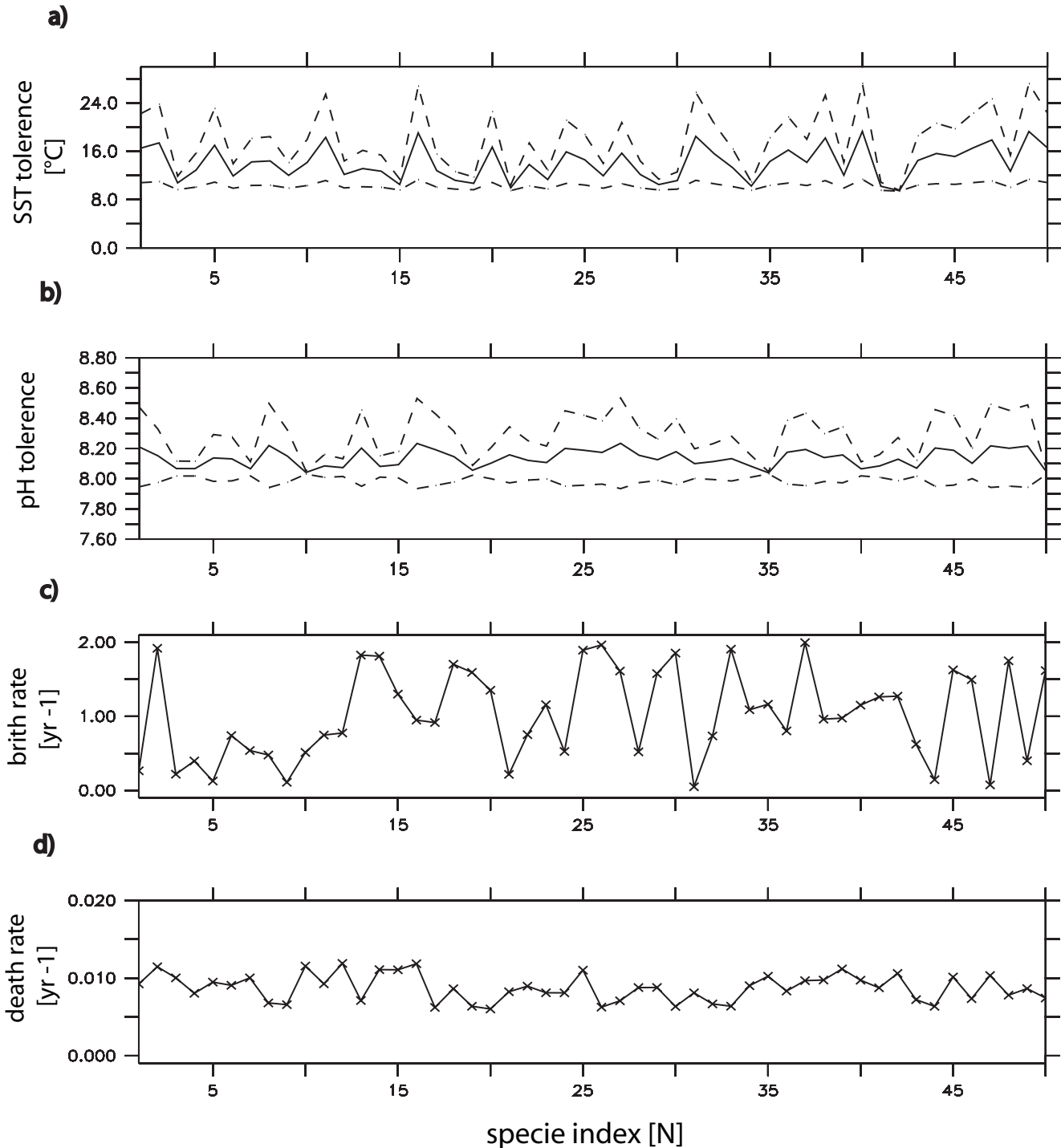
Fig. DR2: climatic adjustment for representing cooling induced by S-aerosols



Sea surface temperature change [-50°S/+50°N] and its dependence on eruption duration. Duration of eruption is indicated by bars (10 and 40 years of continuous eruption). Mass of SO₂ emitted is held constant to 2,4Gt of SO₂ per year. Error bars present outputs extracted from Schmidt et al. 2016. Compared to Schmidt et al. results, an enhanced cooling is predicted in the aftermath of 10 years pulse caused by dissolution of a part of atmospheric carbon in surface oceans.

Fig.DR3 : Biological parameters

a and **b**) the continuous line represents temperature/pH optimums, dashed lines being the standard deviation (σ) showing the tolerance of marine organisms. **c** and **d**) birth/death rates indicate percent of available biomass growing/dying each year. For instance a birth rate fixed to 1 means that the whole population is able to grow (a rate of 2 means that without limiting factor the entire population is expected to double in the same period).

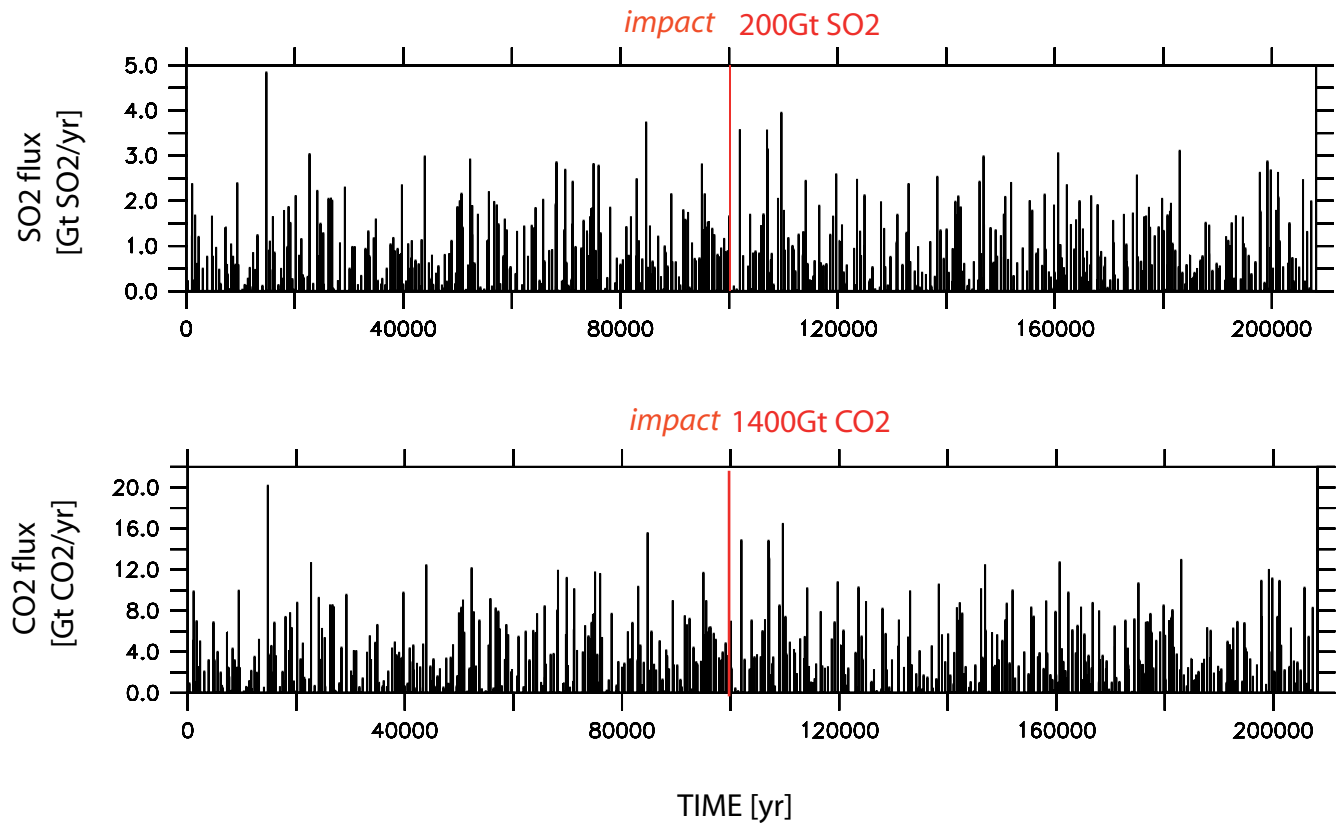


N = 50 species, all being primary producers (17 calcifying and 33 noncalcifying species)

* calcifying species (specie index=3,5,7,9,12,14,20,21,23,25,27,29,35,39,42,45,50).

For representing Neritan ocean, number of calcifying species living the open ocean is reduced to 5 (specie index = 12, 20, 25, 29, 39)

Fig.DR4 : volcanic sequence of Deccan Traps and time-coincidence with the Chicxulub impact



Emitted gases over the course of Deccan Traps : SO2 (top panel) and CO2 (bottom panel). The following sequence corresponds to the emplacement of the Main Province (~500 eruptive events, 208 kyrs of duration). The red line indicates the Chicxulub impactor for AD scenarios.

Fig.DR5 AD-Cretan simulations with 2 different time coincidences between Deccan Traps and Chicxulub impact. The grey band corresponds to the duration of the main phase of the Deccan Traps.

