Model description

PISCES has currently twenty-four compartments. There are five modeled limiting nutrients for phytoplankton growth: Nitrate and Ammonium, Phosphate, Silicate and Iron. It should be mentionned that phosphate and nitrate+ammonium are not really independant nutrients in PISCES. There are linked by constant Redfield ratios but the nitrogen pool undergoes nitrogen fixation and denitrification. Thus this means that if the latter two processes are set to zero and if the sizes of the nitrogen and phosphorus pools are identical, the distributions of both nutrients should be exactly the same.

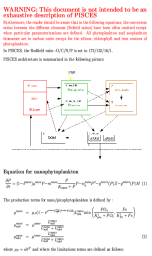
Four living compartments are represented: two phytoplankton size-classes/groups corresponding to nanophytoplankton and diatoms, and two zooplankton size classes which are microzooplankton and mesozooplankton. For phytoplankton, prognostic variables are total biomass, the iron, chlorophyll and silicon contents. This means that the Fe/C, Chl/C and Si/C ratios of both phytoplankton groups are fully predicted by the model. For zooplankton, only the total biomass is modeled. For all species, the C/N/P/O2 ratios are assumed constant and are not allowed to vary. The bacterial pool is not yet explicitely modeled.

There are three non-living compartments: semi-labile dissolved organic matter, small and big sinking particles. As for the living compartments, the C, N and P pools are not distinctly modeled. Thus, constant Redfield ratios are imposed for C/N/P.

However, the iron, silicon and calcite pools of the particles are explicitely modeled. As a consequence, their ratios are allowed to vary. Calcite and biogenic silica are supposed to sink at the speed of the big particles. All the non-living compartments experience aggregation due to turbulence and differential settling.

In addition to the ecosystem model, PISCES also simulates dissolved inorganic carbon, total alkalinity and dissolved oxygen. The latter tracer is also used to define the regions where oxic or anoxic remineralization takes place.

There does not exist yet a comprehensive userguide neither a detailed description of the **PISCES** model. However, some documents may be helpful for the reader or the user to understand the model architecture and design. A short description of the model is available (click on the image beside). The default values of the different parameters are also listed. This document is still beta version as it has not been double checked yet. I am waiting for some feedbacks to correct and improve it. Furthermore, after the code is cleaned up and made more independant of the OPA model, a detailed userguide will be written in which the code will be explained. However, the science behind the model should not change much in the next six months as the model is supposed to be in a pretty much stable version.



Last update: 9th, November 2004