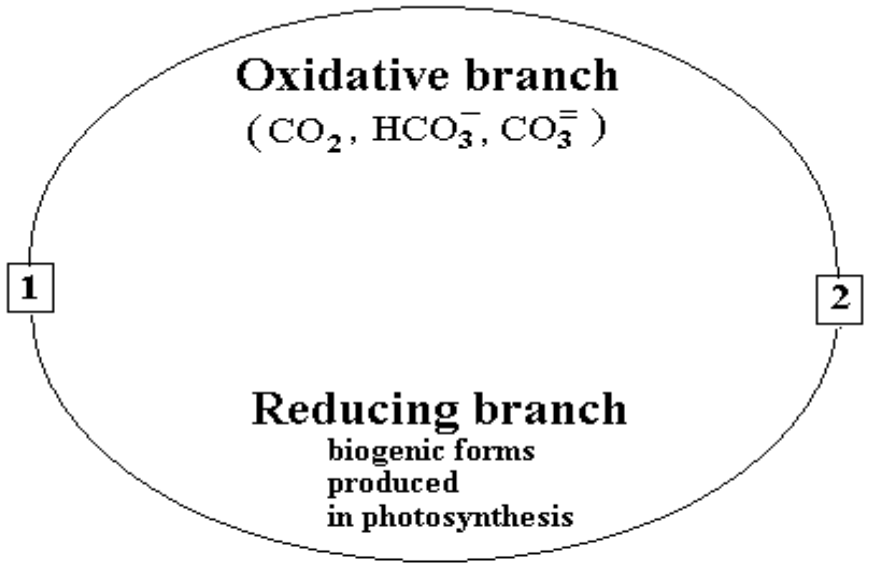
Global Carbon Cycle. Interactions of photosynthesis and Earth crust processes

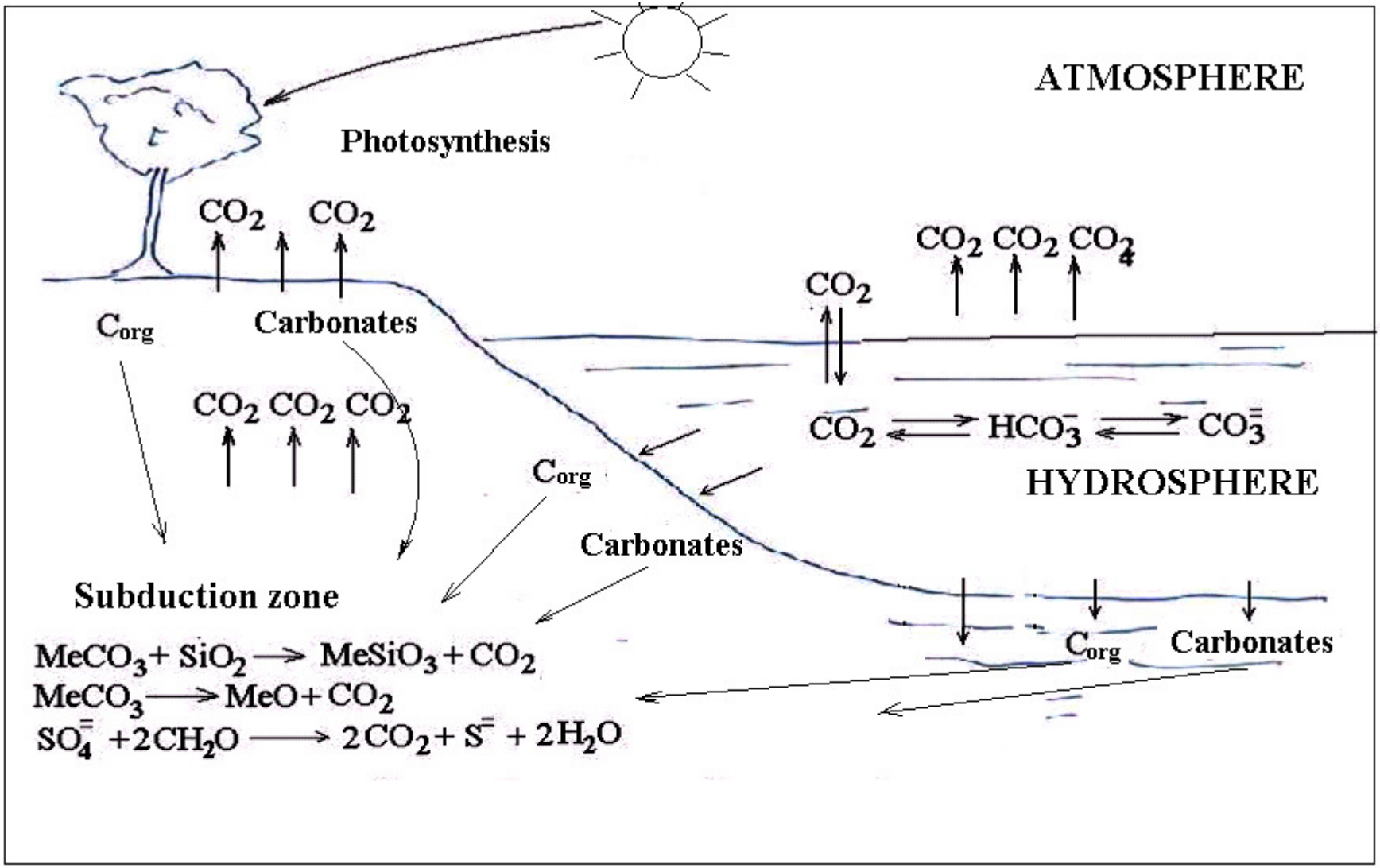
A.A. Ivlev
Russian State Agrarian University
of K.A. Timiryazev
Moscow, Russia

What is global carbon cycle?



1 Photosynthesis
2 Respiration, oxidation of OM in subduction zone, and other oxidizing processes in the Earth crust

Global carbon cycle system



Two geological concepts make the grounds for carbon cycle model:

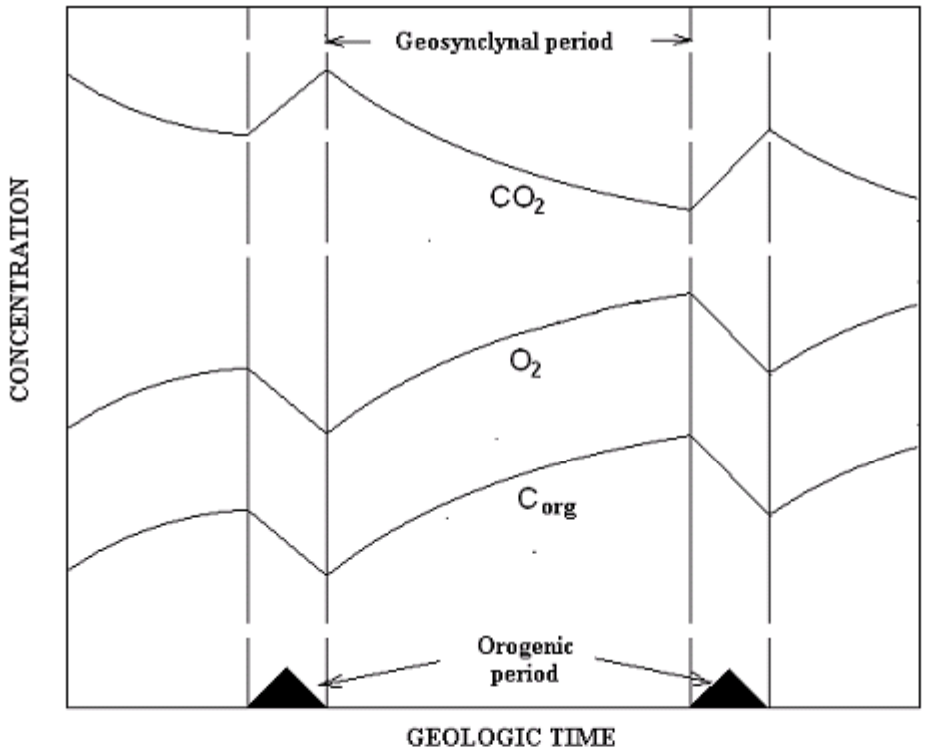
1. **Plate tectonics model (Flint, 1973; Monin, 1977)**

2. **Orogenic cycles model (Rutten, 1971)**

The new approach to carbon cycle model combines two concepts and suggests:

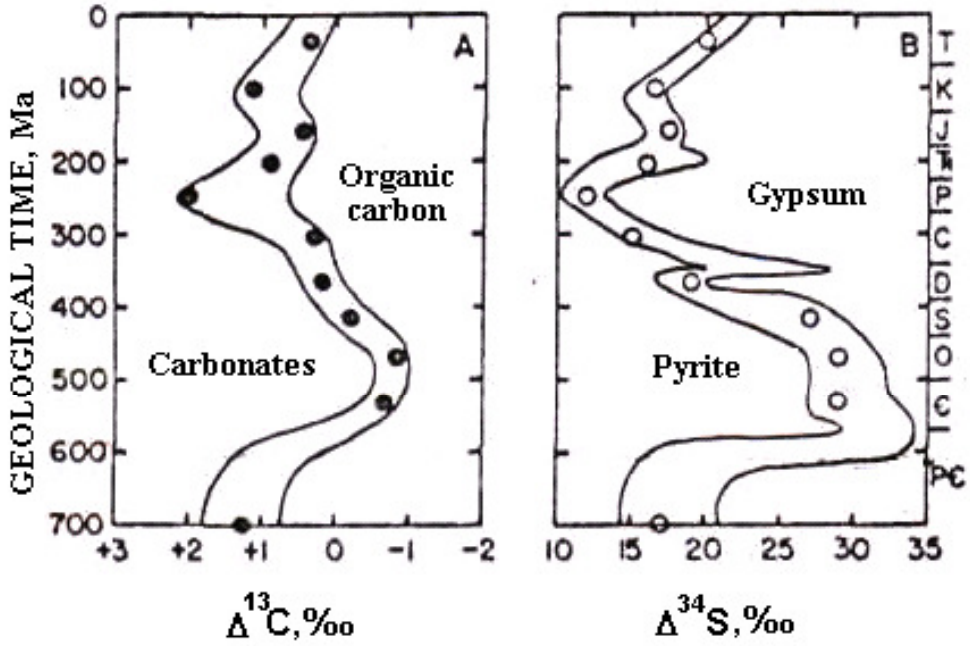
1. Lithospheric plates movement is irregular and determines pulsating CO2 injections into “atmosphere – hydrosphere” system.
2. In orogenic period plates move quickly and collisions are frequent. In geosynclynal period plates move slowly and collisions are rare.

Dynamics of some global carbon cycle parameters



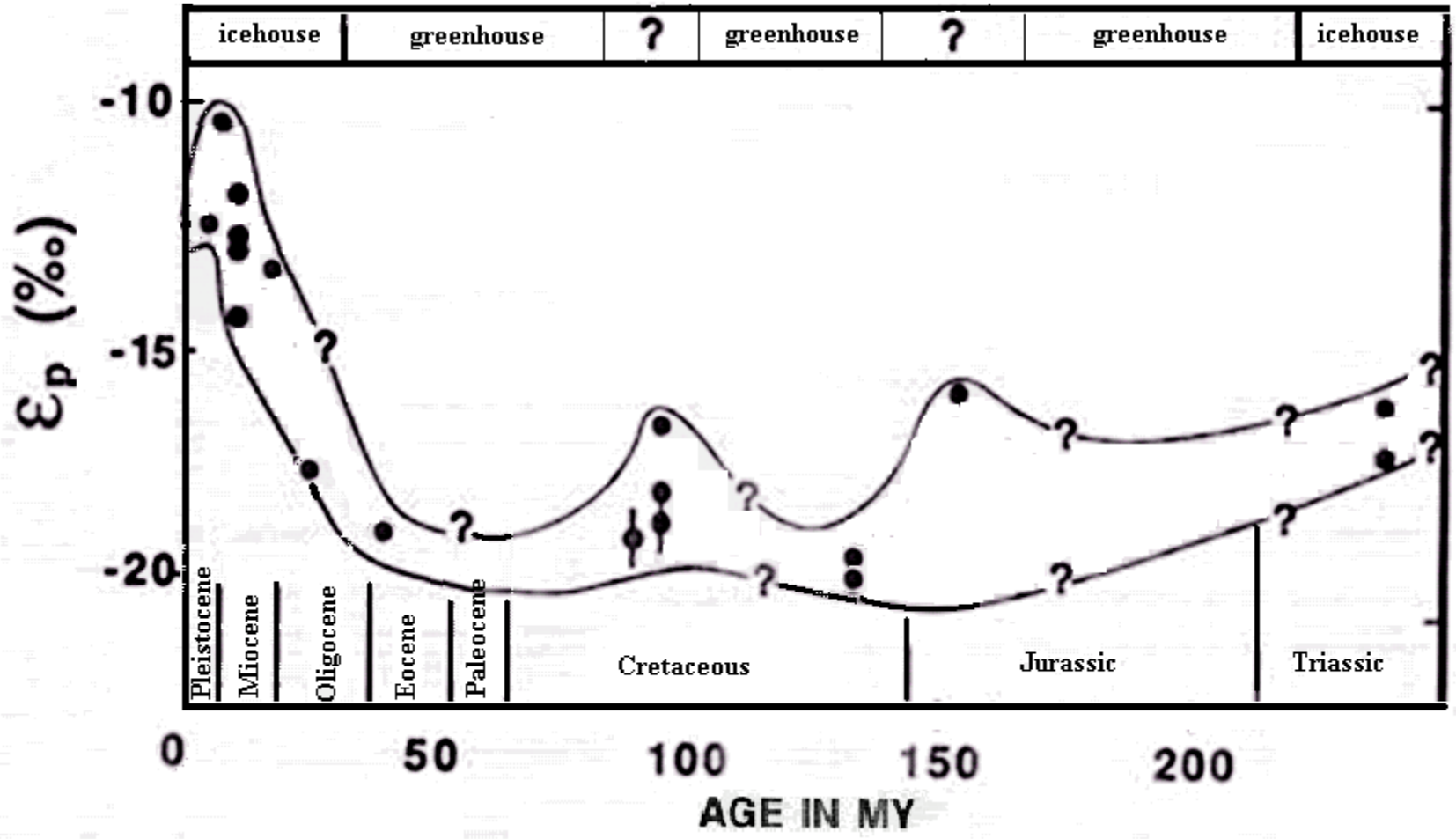
$$CO_2 + H\,O \xrightarrow{h\nu} CH_2O + O_2$$

Argument 1. Carbon and sulfur cycles coupling

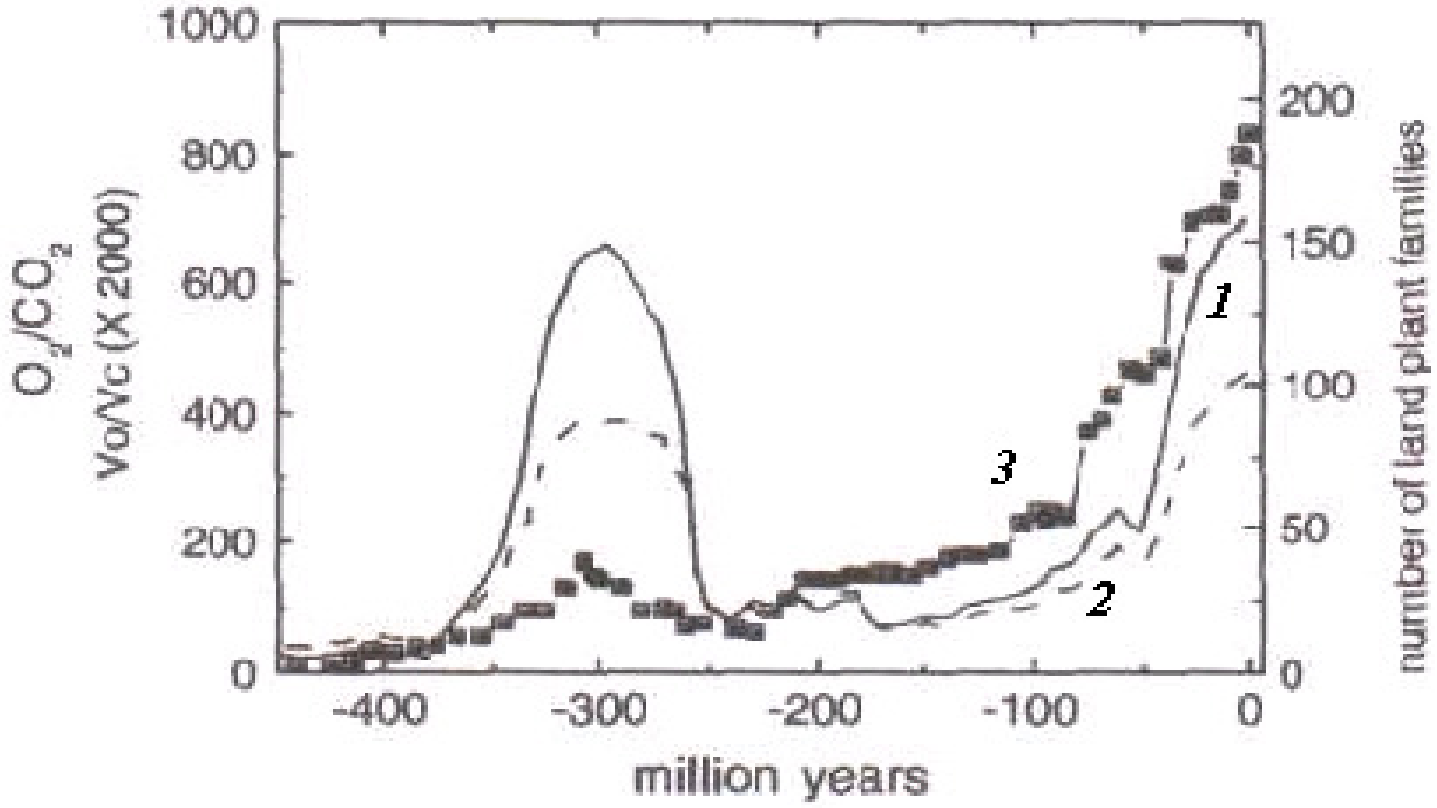


$$SO_4^{=} + 2CH_2O \longrightarrow 2CO_2 + S^{=} + 2H_2O$$

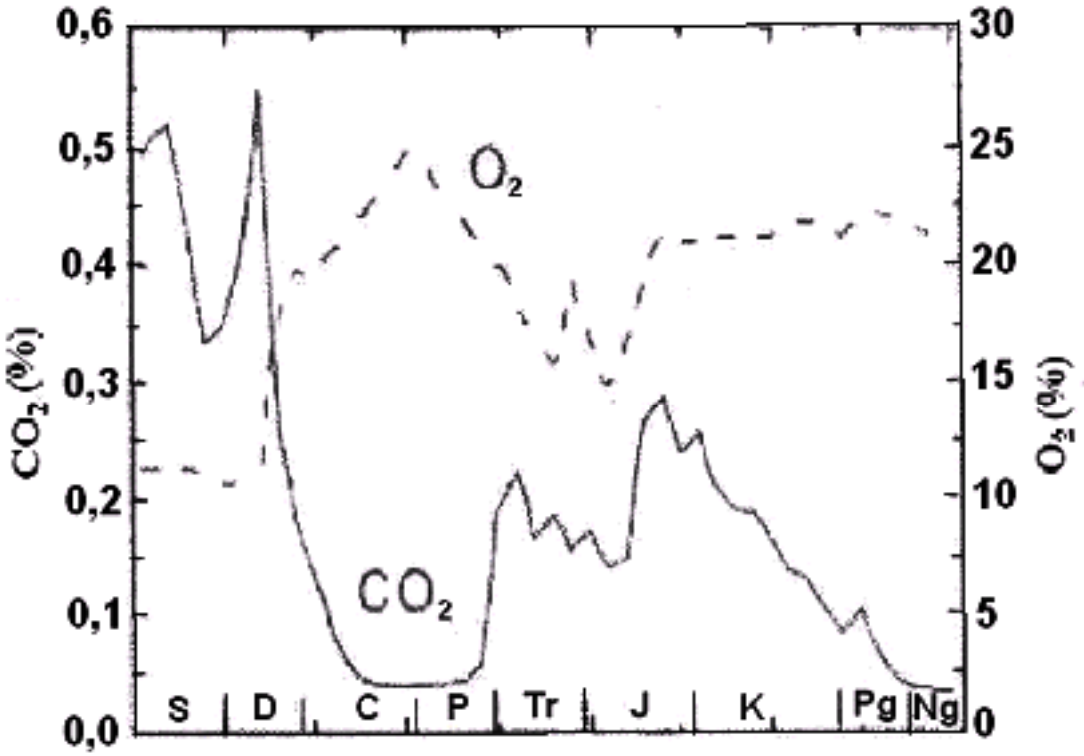
Argument 2. Climatic correlations



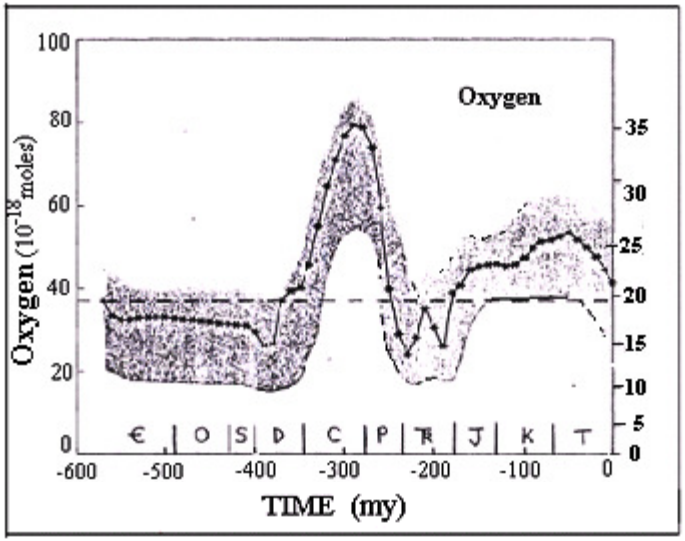
Argument 3. Correlation of biodiversity rate with oxygen concentration

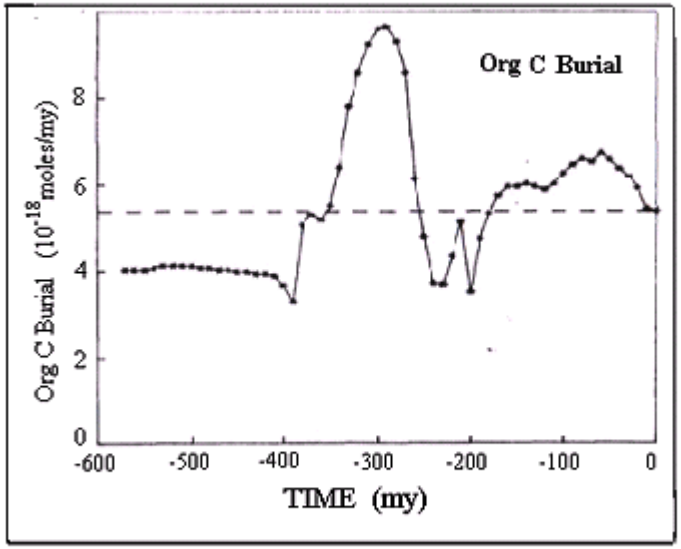


Argument 6 Anti-phase dynamics of atmospheric CO2 and oxygen in geological time (Igamberdiev & Lee, 2006)

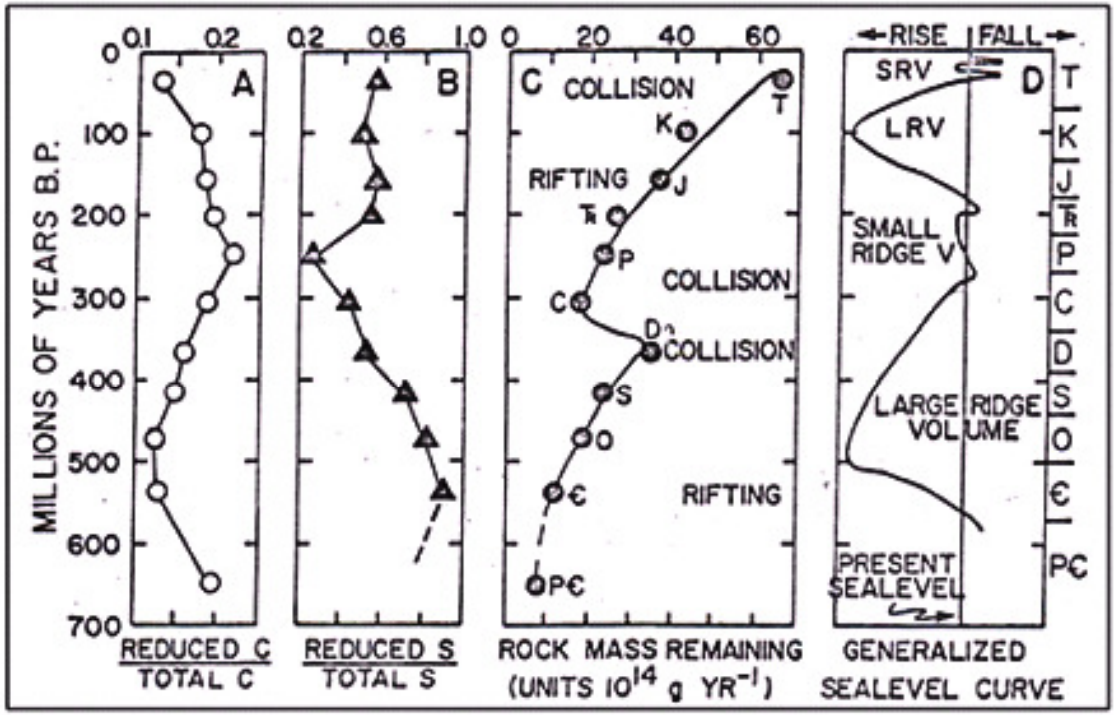


Argument 7. Similar dynamics of atmospheric oxygen and burial organic carbon rate





Argument 8. Geological correlations



The conclusions

1. **Global carbon cycle is considered as a transfer of the element from one geospheres to another under the control of redox state of the element.**
2. **The transition of carbon from the oxidative to the reduced state is provided by photosynthesis. The reverse transition is realized through the numerous oxidation processes. The main contributor to oxidation of organic matter is the sulfate reduction in the subduction zones.**
3. **According to the model, global carbon cycle and photosynthesis appeared simultaneously and developed synchronously. Their evolution was followed by decrease in CO_2 and by growth of O_2 concentrations in the atmosphere and by accumulation of organic matter in the Earth deposits.**
4. **Carbon and sulfur cycle are coupled through the sulfate reduction occurring in subduction zone**

Thank you for your attention