

Field: Earth Science/ Geosciences/ Environment

Planning Group Members:

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Session Topic:

CO₂ and Climate Change: Past - Present - Future

Global climate change due to fossil fuel burning is a matter of great societal concern, and understanding the anthropogenic signal against major CO₂ oscillations in the geological record is one of the grand challenges of contemporary earth and ocean sciences. This interdisciplinary session highlights recent findings from geology, oceanography, climate modelling and marine ecology, drawing a time line from the paleoenvironmental effects of CO₂ change as archived in ancient sediments and rocks, through contemporary responses of ocean currents and biota to future changes in the ocean-climate system as predicted by computer simulation studies. Direct effects of CO₂ change include changes in the biogeochemistry of the oceans and its effect on ocean calcification - i.e. the capacity of marine organisms (many algae, molluscs and corals) to produce their carbonate shells or skeletons. The balance between carbonate precipitation and dissolution is a key regulatory function in marine ecosystems, but other ecosystem processes are also affected. Indirect effects concern CO₂ and the greenhouse effect changing i.a. precipitation patterns, ocean currents and the meridional transport of heat. Untangling the physical, biogeochemical and biological web of direct and indirect effects, couplings and feedbacks against the backlog of paleoclimate change provides an important frontier of science to predict earth system responses in the next decades to centuries.

Speakers at JGFoS will introduce frontier studies of the CO₂ problem from various aspects.