

EGU25-6396, updated on 19 Jun 2025

<https://doi.org/10.5194/egusphere-egu25-6396>

EGU General Assembly 2025

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## Predictability and feedbacks of the changing ocean carbon sink – insights from Earth system models

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The strength of the ocean carbon sink is maintained by the physical, biological, and chemical processes. Any change in these processes may alter the carbon-climate feedbacks and affect the rate of global change. Our predictive understanding of the susceptibility of these feedbacks to global change is heterogeneous: some responses are well quantified, whilst for some, even the direction of change is unclear. This makes representing ocean biogeochemical cycles as an interactive component of Earth system models (ESMs) a key scientific challenge. This challenge unfolds in resolving the critical marine biological and physical processes, as well as their feedbacks in high spatial resolutions on climate-relevant time scales. Thereby, advancements in ocean biogeochemical ESM components need to embrace emerging observational and laboratory evidence, together with novel computational technologies. This lecture will discuss the current progress, challenges and opportunities in addressing knowledge gaps in our predictive understanding of the changing ocean carbon sink, its variability and feedbacks in the Earth system.