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## Pacific CO<sub>2</sub> fluxes pattern analysis through SST clustering

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Elucidating the coherent spatio-temporal patterns of historical ocean CO<sub>2</sub> fluxes is an essential step to understand the dominant drivers of their variability and predict how they may be altered by future climate change. Here, we applied an unsupervised classification of SST to tease out and assess the spatial and temporal variability of marine CO<sub>2</sub> uptake in the Pacific basin. The classification is performed using a Gaussian Mixture Model (GMM) that decomposes the Probability Density Function of a dataset into a weighted sum of Gaussian distribution. Classification is performed on monthly SST anomalies from the JRA-55 reanalysis and CMIP6 historical simulations. The associated patterns of CO<sub>2</sub> fluxes anomalies in both observations and models are evaluated for consistencies. Our objective is to determine the ability of the GMM-based clustering method, applied on surface temperature, to retrieve relevant physical mechanisms that predominantly explain the observed spatial and temporal CO<sub>2</sub> fluxes patterns. The evolution of these clustering-based patterns, as projected by the models, under future scenario will also be presented.