

瀬戸内海における海面クロロフィルaの時空間変動
Spatio-temporal variations of sea surface chlorophyll-a in the Seto Inland Sea

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Sea surface chlorophyll-a (SSC) is a key indicator of phytoplankton biomass and productivity and is shaped by physical and biogeochemical processes in marine ecosystems. The Seto Inland Sea (SIS), Japan's largest semienclosed estuary, exhibits complex SSC variability driven by seasonal nutrient dynamics, oceanic intrusions, and atmospheric forcing. This study investigates the spatiotemporal variability in SSC in the SIS from 1998 to 2024 via satellite-derived datasets, with an emphasis on seasonal cycles, long-term changes, and the impacts of extreme thermal events, including marine heatwaves (MHWs) and marine cold spells (MCSs). The results demonstrate pronounced spatial contrasts among subregions: central bays and channels (e.g., Hiroshima Bay, Hiuchi-nada, Harima-

nada, and Osaka Bay) exhibit stratification-paced blooms with SSC peaks in spring and autumn, whereas outer gateways and shelf-influenced areas (southern Kii Channel and Tosa Bay) follow a mixing/intrusion-paced regime strongly influenced by upwelling and oceanic intrusions. Change-point analysis revealed that both El Niño–Southern Oscillation (ENSO) phases and typhoon passages triggered abrupt SSC shifts, whereas Hiroshima Bay showed no significant long-term seasonal changes (probability < 0.9). Over the study period, 462 MHWs and 395 MCSs were detected, with MHWs predominantly suppressing SSC (67.53%) and MCSs enhancing it (70.89%). These effects were most pronounced in the inner SIS, where strong stratification and limited mixing amplify phytoplankton responses.