Climate variability and silicoflagellate fluxes in Alfonso Basin (southern Gulf of California)

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We conducted a study from January 2002 to February 2008 on silicoflagellate fluxes in Alfonso Basin at the entrance to the Gulf of California. Thirteen taxa were identified in sediment trap samples, with Octactis pulchra as the dominant species. Total flux climatology reached a maximum value of $5 \times 10^6$ skeletons m$^{-2}$ day$^{-1}$ in December and then sharply decreased to a minimum value in February ($2.3 \times 10^3$ skeletons m$^{-2}$ day$^{-1}$) concurrently with the climatological sea surface temperature (SST) minimum. Subsequently, there was a positive trend with a second relative maximum of $1.6 \times 10^6$ skeletons m$^{-2}$ day$^{-1}$ in September coincident with a maximum in climatological SST. During this period, there was a similar increase to $1.4 \times 10^6$ skeletons m$^{-2}$ day$^{-1}$ in May. Factor analysis identified three patterns of variation: “subtropical oceanic,” “subarctic,” and “equatorial El Niño.” Factors had reasonable correlations with the Pacific decadal oscillation (PDO), North Pacific Gyre oscillation (NPGO), and El Niño Modoki indices ($r=0.53, 0.67,$ and $0.63$, respectively). The first and second modes were apparently linked to decadal climatic conditions correlated to PDO and NPGO, as suggested by the silicoflagellate species Dictyocha messanensis forma messanensis and the assemblage of D. epiodon and Distephanus speculum, respectively; the third mode was related to the presence of warm equatorial-oceanic waters identified by D. messanensis forma spinosa, which defines El Niño influence. These results demonstrate the importance of the region where there is a confluence of the low-frequency, high-latitude PDO, NPGO, and high-frequency El Niño signals.

Palabras clave: interannual variability, Gulf of California, silicoflagellates, climate variability, seasonal pattern, subtropical region

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