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# ENSO induced shifts of the Subarctic Front in the North Pacific over the past 700 ka: Evidence from planktic foraminiferal proxy data

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The subarctic front (SAF) in the pelagic Pacific Ocean is the northernmost front that separates the Oyashio Current, which marks the southern boundary of the subpolar gyre, from the Kuroshio Current, the northern boundary of the subtropical gyre. Its strong sea surface temperature (SST) gradient is not a stable and permanent feature but shifts on timescales from interannual to glacial/interglacial. Yet the complex interplay of different driving mechanisms for this phenomenon is not yet entirely understood. In this study, we present newly retrieved data from the Emperor Seamount chain that reveals a link between long-term ENSO (El Niño /Southern Oscillation) dynamics in the tropics and shifts of the SAF. Here, we use marine sediment core SO264-45-2 (46°33.792'N, 169°36.072'E), recovered from the Emperor Seamount Chain during R/V SONNE Cruise SO264 in 2018 to reconstruct changes in (sub-) surface temperature and salinity via a combined Mg/Ca and $\delta^{18}O$ analyses of the shells of the shallow living planktic foraminifera *Globigerina bulloides* and the near thermocline living *Neogloboquadrina pachyderma*. This reveals that SST and salinity do not show a clear glacial/interglacial pattern during the last 280 ka and thus we assume that the SAF was south of the core site during this time interval. Prior to 280 ka, SSTs were significantly higher and show greater amplitudes than after 280 ka, while the subsurface temperature stayed relatively constant. Such high SSTs together with the observed higher sea surface salinities prior to 280 ka indicate that water from the Kuroshio-Oyashio transition zone temporarily reached the core site in form of a warm surface water lens. This points to a northward displacement of the SAF of at least 5° so that it was located right above the core site. This way very small north and southward displacements e.g. in relation to glacial/interglacial periods would have caused SST changes as high as we observe them in the time interval 280-700 ka. Notably, this assumed shift of the SAF at 280 ka occurs simultaneously to a change from more La Niña-like to more El Niño-like conditions in the tropical Pacific. Moreover, warm phases in the time interval 280-700 ka seem to occur during times of more La Niña-like conditions in the tropics, while cold phases seem to be related to more El Niño-like conditions. As our study area is linked to the subtropical gyre via the Kuroshio Current, we assume that the observed shifts of the SAF at our study site were caused by the enhancement of the Kuroshio Current in time intervals of more La Niña-like like conditions.