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## Time-series of the secondary nitrite maximum in the ETSP reveal tight coupling of ENSO and nitrogen processes in the OMZ

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The El Niño/Southern Oscillation (ENSO) is an irregularly periodic variation in winds and sea surface temperatures over the tropical eastern Pacific Ocean, affecting climate of much of the tropics and subtropics. Only recently model results suggested that both the warm (El Niño) and the cold phases (La Niña) of ENSO are affecting nitrogen processes such as denitrification in the oxygen minimum zones (OMZ) of the eastern tropical Pacific Ocean. The occurrence of a secondary nitrite maximum is usually taken as an indicator for ongoing nitrogen loss processes in OMZ. Here we present a compilation of the maximum nitrite concentrations found in the secondary nitrite maximum (mSNM) from the OMZ off Peru covering a period from 1960 to present. Based on the compilation of mSNM data we reconstruct a time-series of mSNM and correlated this to well-established ENSO indices such as the Oceanic Niño Index (ONI) and the Multivariate ENSO Index (MEI). We found a significant negative correlation of the mSNM with both ONI and MEI with a time lag of one month indicating that high(low) nitrite concentration of the secondary nitrite maximum are associated with La Niña(El Niño). We thus propose a direct impact of ENSO on nitrogen processes in the OMZ off Peru, with La Niña events promoting periods of massive nitrite accumulation. As climate change is suggested to result in more intense ENSO events, our study strongly points towards major changes in future nitrogen processes in the OMZ off Peru.

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