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PDO- and East Asia Winter Monsoon-related variability detected in coral records from 4 islands in the North Pacific Gyre

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Decadal variations in the East Asian Monsoon, Pacific Decadal Oscillation (PDO), as well as El Nino Southern Oscillation (ENSO), are considered to play an important role for the regional climate of the NW Pacific. Their interactions may evolve under the progress of the global warming. However, our knowledge on the future climate is limited mostly due to the lack of long-term and precise records. Here we compared the centennial-long $d^{18}O$ and Sr/Ca records in modern *Porites* corals from four sites along the North Pacific Gyre in order to examine past changes in the relationship among the major climate variability. By applying a possible regime shift detection method, it was revealed that evident PDO pattern dominated in the records from the mid-ocean sites, Ogasawara (27°6'N, 142°11'E) and Guam (13°35'N, 144°50'E). In contrast, corals from Ishigaki (12°10'N, 124°20'E) and Bicol (13°03'N, 124°01'E), proximal sites to the continent, indicated strong influence of the East Asian Winter Monsoon, with an evident decreasing trend in its decadal component. Interestingly, both Ishigaki and Bicol records during the 19th century showed significant covariation linked to the PDO, suggesting the PDO as the ruling variability all over the NW Pacific in the past. Weakening of the decadal component of winter monsoon intensity and PDO influence in the marginal sites of the NW Pacific may be associated to impaired Siberian High development during winter while the Aleutian Low remains unchanged under the global warming trend in the 20th century.

Keywords: Pacific Decadal Oscillation, East Asian Winter Monsoon, coral skeletal climatology, North Pacific Gyre, climatic regime shift