# Press Releases

April 25, 2014
JAMSTEC

## "California Niño/Niña" Phenomenon Discovered for the First Time

Dr. Chaoxia Yuan and Dr. Toshio Yamagata, Application Laboratory, Japan Agency for Marine-Earth Science and Technology (JAMSTEC: Asahiko Taira, President) have demonstrated the existence of intrinsic costal ocean-atmosphere coupled phenomenon in the costal ocean off Baja California and California for the first time. It is named California Niño/Niña in its intrinsic sense.

The costal ocean off Baja California and California is located near the eastern edge of the subtropical high. The equatorward alongshore surface wind drives the surface water offshore under the influence of the earth' rotation. To compensate this surface water, cold subsurface water upwells. Because of this, the sea surface temperature is kept low in this region.

In some years, however, the upwelling is reduced (enhanced) and thus the costal ocean becomes warmer (colder) than normal. Such interannual variability in sea surface temperatures along the coast has been considered to be related to El Niño/La Niña events in the tropical Pacific. However, the present study has demonstrated for the first time that an intrinsic coastal ocean-atmosphere coupled mode, which is independent of El Niño/Niña events, may contribute to the interannual variability in sea surface temperatures, particularly in summer.

The regional air-sea coupled phenomenon seems to be analogous to the well-known El Niño/La Niña in the equatorial Pacific Ocean but with much smaller time and space scales. Therefore it is named California Niño/Niña. This new phenomenon is considered to give significant impacts on marine ecosystems regional weather, and agriculture along the west coast of North America. It is, therefore, useful to develop a seasonal prediction system by use of a coupled ocean-atmosphere model which resolves the California Niño/Niña. The effort in this direction is under way.

These research results have been published in the Nature Publishing Group's online scientific journal *Scientific Reports* on April 25, 2014 (Japan time).

Title: California Niño/Niña
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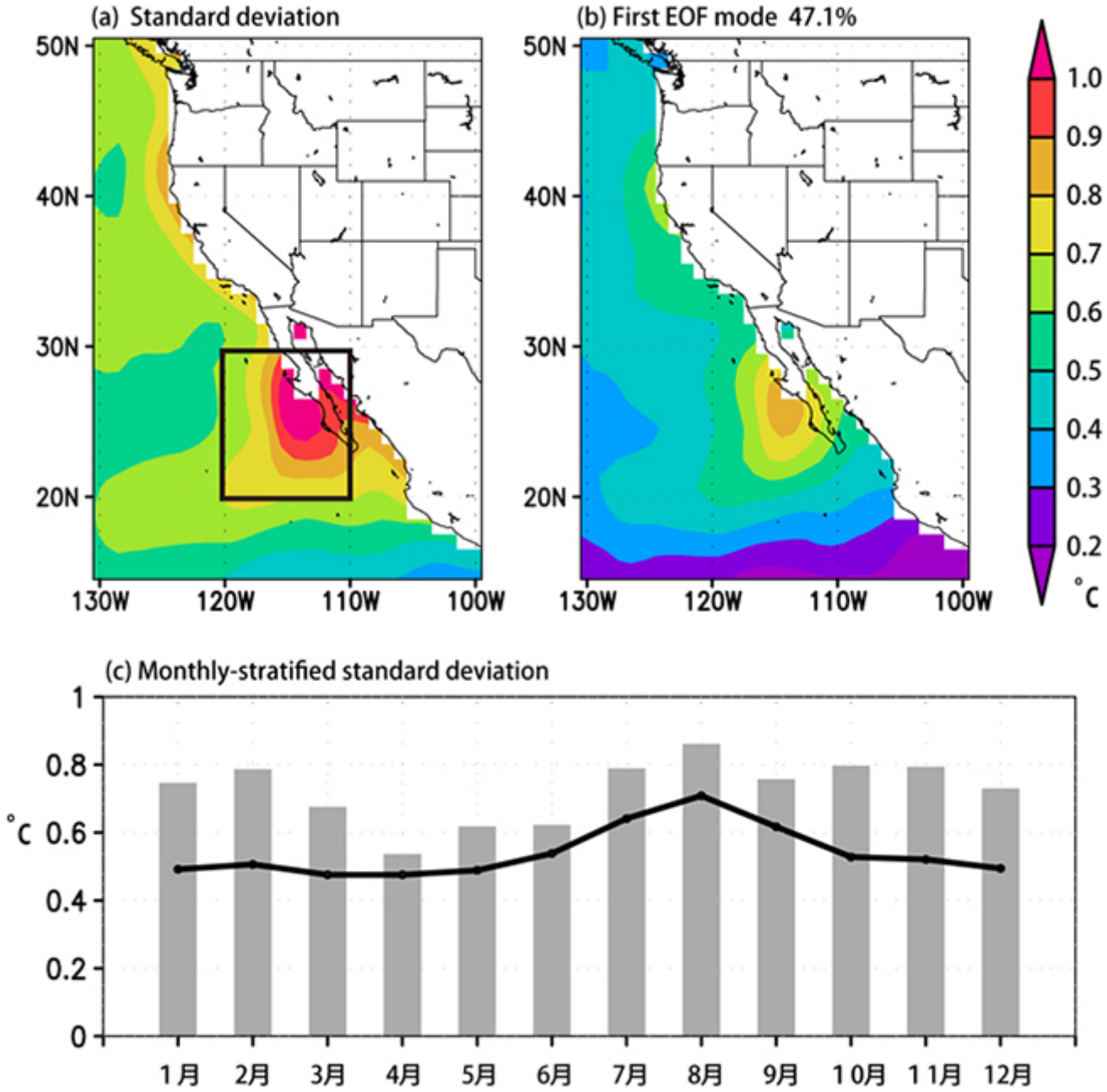


Figure 1: (a) Standard deviation and (b) the first EOF mode of the monthly SST anomalies and (c) the monthly-stratified standard deviations (grey bar) of California Niño/Niña indices for the period of January 1982 to December 2011. The enclosed coastal ocean by the dark frame (110°W–120°W, 20°N–30°N) in (a) is the region where the averaged SST anomalies are defined as the California Niño/Niña indices. The dark line in (c) denotes the monthly-stratified standard deviations of California Niño/Niña indices after the simultaneous variations related to ENSO are linearly regressed out.

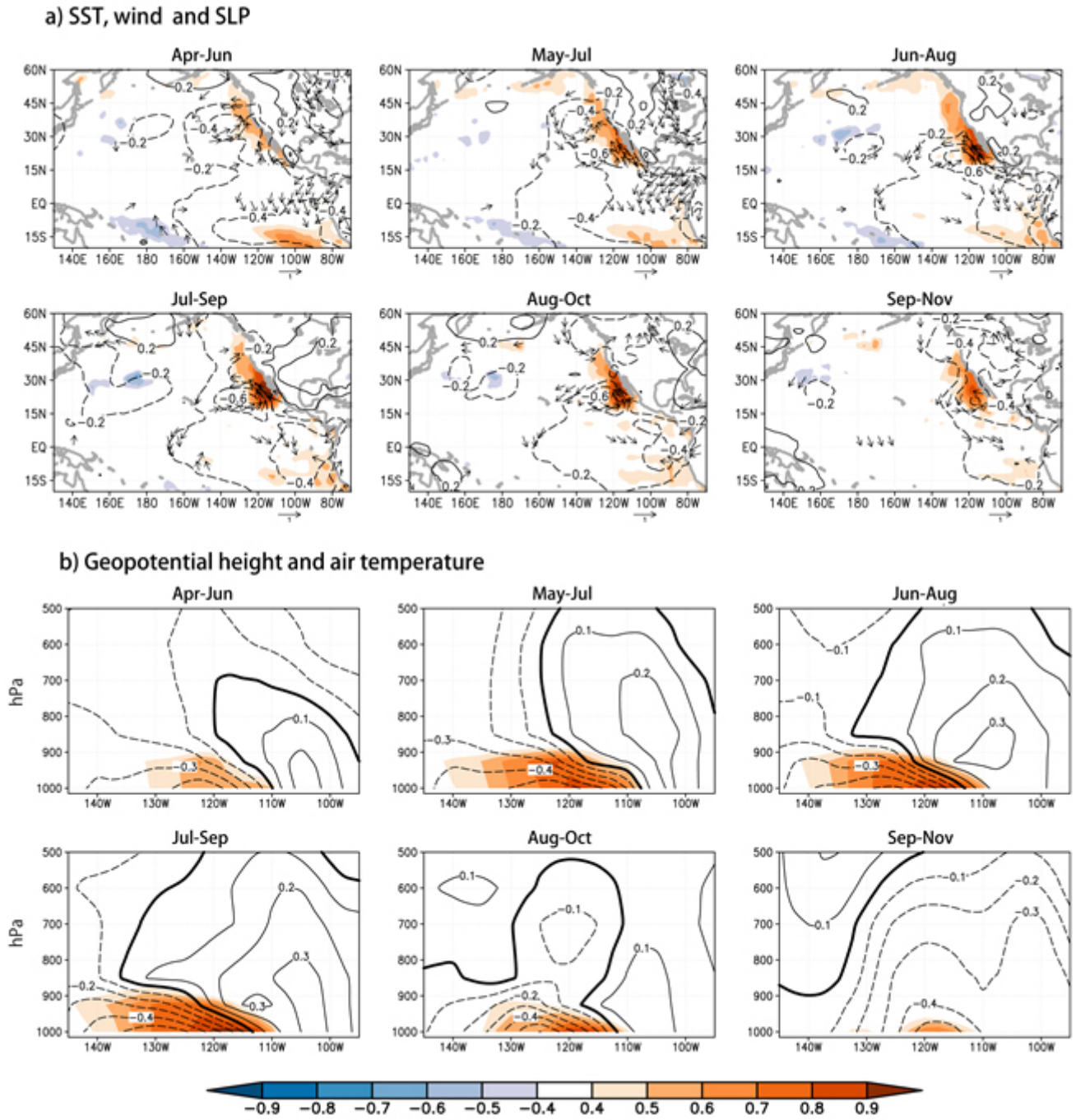


Figure 2: (a) Lead-lag correlation coefficients between the July-September California Niño/Niña indices and 3-month-running mean anomalies SST (shading), SLP (contour) and 10-meter-height wind (vector) from 1982-2011. (b) As in (a), but for the vertical-zonal section of geopotential height (contour) and air temperature (shading) at 25°N. Coefficients with SST, wind, and air temperature significant at the 95% confidence level (~0.4) by the two-tailed t test are shown only.

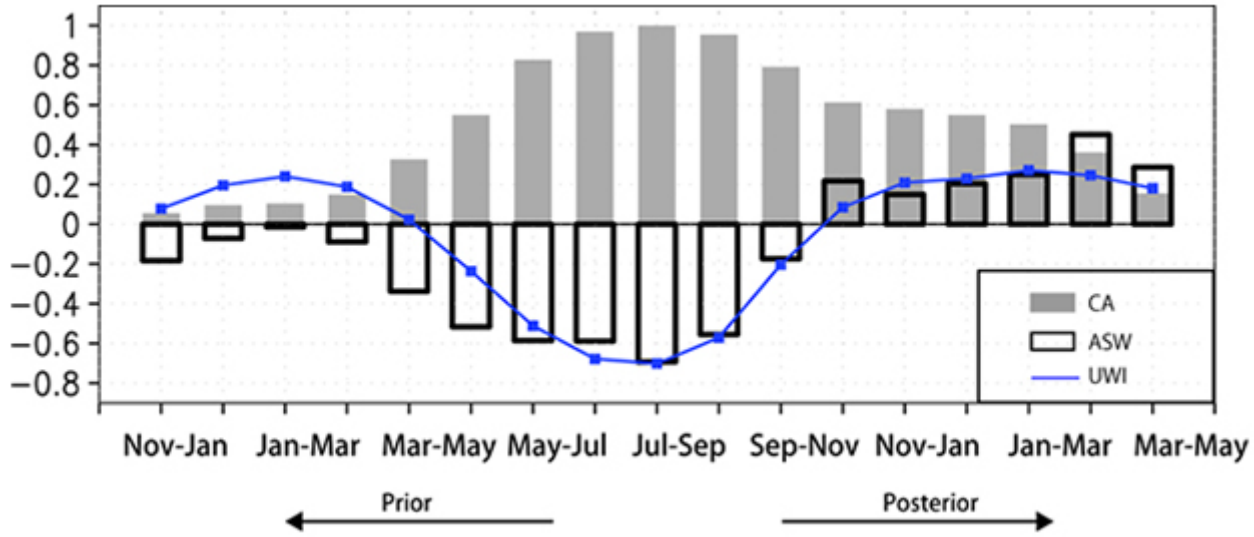


Figure 3: (a) Lead-lag correlation coefficients between the July-September California Niño/Niña indices and the 3-month-running mean California Niño/Niña (CA, grey filled bar), along-shore surface wind (ASW, dark open bar) and upwelling (UWI, blue line) indices from 1982-2011. The ASW is positive equatorward, and UWI positive upward. Coefficients of ±0.4 are significant at 95% confidence level by the two-tailed *t* test.

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