From Monsoon to Warm Pool: Progress Toward Deep Understanding on Western Pacific Paleoclimatic Dynamics

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New data and hypotheses of western Pacific paleoceanography based on high resolution marine sediment cores have been quickly developed in the past 10 years through active participations to IMAGES program. These IMAGES cores retrieved from the western Pacific (from the Okhotsk Sea to southern Papua margin) provide high quality paleoclimatic archive for better understanding the mechanisms controlling late Quaternary variability in the western Pacific from millennial to orbital and longer time scales. Our science objectives of the IMAGES programs have been particularly focused on reconstructing climate and surface ocean variability expressed in the East and South China Sea (ECS & SCS), and also on developing of new composite SST and terrestrial sediment input with multiple proxy approaches. New calibration data sets for paleo-estimation and new methods of time series analysis techniques, and new spectral models for interpreting the timing and amplitude of western Pacific climate dynamics, are also focuses of our program. Though most our IMAGES paleoceanographic records were interpreted by a dominant East Asian monsoon or Pacific warm pool variations, our studies indicated that the western Pacific paleoclimatic dynamics were also complicated by the evolution interplayed by sea level, inter-hemispheric, or inter-basin and possibly global interactions on different time and space scales. In particular, sea surface salinity changes linked with shifting on regional or global hydrological processes are overwhelmingly expressed in our paleoceanographic records of the past million years. Possible mechanisms for the surface hydrological changes include: (1) a redistribution of moisture from the Asian landmass to the western Pacific as a consequence of the changing East Asian summer monsoon strength; (2) changing moisture transport from the Pacific to the Indian, also a result of the changing monsoons (3) the migration of the Atlantic intertropical convergence zone (ITCZ), resulting water vapor flux changes from the Atlantic to Pacific cross-Isthmus; (4) changes in advection of salt via the surface ocean circulation; and (5) changes in the isotopic composition of precipitation and runoff. The complicated western Pacific paleoclimatic dynamics shown in our studies motivates us to develop more independent paleosalinity or hydrological proxies such as organic biomarkers and also future planning of coring proposals for retrieving more high quality from the western Pacific open sea regions (Papua, Indonesia).