Geophysical Research Abstracts
Vol. 18, EGU2016-7883, 2016
EGU General Assembly 2016

Environmental Prime Movers for Prehistoric Colonization of Islands in Remote Oceania

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The peopling of Remote Oceania was one of the last great waves of human migration in the ancient past. Beginning around 3500 BP, peoples from Island Southeast Asia began colonizing western Micronesia, and shortly thereafter ca. 3400 BP, Lapita groups began moving east from Near Oceania (e.g., the Solomons and Bismarck Archipelago) to islands in Eastern Melanesia and West Polynesia, including Vanuatu, Fiji, Tonga, and Samoa. It is remarkable that over the next 2500 years, even the most remote islands, known now to represent the distant nodes of the Polynesian triangle (New Zealand, Hawaii, and Easter Island), were eventually visited by Austronesian speakers and their descendants across this seemingly boundless ocean. One of the more enduring questions—and one that has perplexed scholars for decades—is how and when these ancient seafarers were able to develop navigational/wayfinding techniques and seafaring technologies to overcome a number of environmental challenges. This would ultimately help determine what combination of social and environmental stimuli forced or encouraged people to colonize some of the most isolated patches of land on earth. To advance our understanding of ancient Pacific colonization strategies, we integrate seafaring simulation models, ease of eastward travel estimates based on land distribution and wind pattern analysis, and new climatic datasets for precipitation in Micronesia and Polynesia to examine intra-annual variations in wind and precipitation that would have influenced travel. Combined with statistical modeling of winds and currents, we argue that: land distribution could have contributed to the pause in eastward expansion seen at about 3000 BP; simple downwind sailing and downwind sailing during eastward spells are viable navigation strategies for reaching islands to the east; seasonality of eastward winds would facilitate voyage planning and increase chances of success; knowledge of annual and interannual variability, particularly the effects of El Niño, would further increase chances of success; it is significantly easier to reach Micronesia from Maluku than from the central or southern Philippines; ENSO related interannual wind and precipitation variability could have played a role in motivating and/or permitting eastward migration into and within Micronesia.