

## Wave piloting in the Marshall Islands

An inter-disciplinary study to the art of using wave information for navigation purposes in the Marshall Islands

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In this presentation I will tell about his recent journey to the Marshall islands to document and preserve the secrets of wave navigation by the seafarers of the Marshall islands for future generations. These seafarers are able to use only natural means to travel between remote islands. They not only use the sun, moon and storms, but also waves on the ocean.

A summary will be given of the history and culture of the Marshall Islands. It will be explained why navigation is important for life in the Marshall Islands and also why ocean wave information is important in this part of Micronesia. The Marshallese navigators are able to 'read' the sea surface by interpreting the movements of their outrigger canoes. In this way they keep course with astounding accuracy. More remarkably is that they can detect the presence of islands, even when they are still behind the horizon. Scientific research has explained many of their secrets, but there are still a number of issues requiring further explanation. Cultural differences hamper this research; not only one needs to speak their language, but also to put words in the proper context.

An overview will be given of the wind-sea and swell climate of the Marshall islands using wave hindcasts of the Wavewatch III and SWAN wave models. Spectral partitioning is applied to unravel the multi-modal swell systems. Local island-wave interaction is studied using the non-hydrostatic wave model SWASH. Attention is paid to the resulting wave patterns due to sheltering, refraction, diffraction and reflection. Scientific explanations are confronted with their local knowledge.



In June 2015 an expedition to the Marshall islands was organized by the University of Hawaii. A return trip was made between the Majuro and the Aur atolls. Three scientists participated in this trip; Joe Genz, anthropologist from Hawaii University; John Huth, physicist and navigation expert from Harvard University, and Gerbrant van Vledder, oceanographer and wave modeller from Delft University of Technology.

***This talk bridges various disciplines; geography, history, oceanography, anthropology, navigation, astronomy, and wave mechanics.***