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Wave Navigation in The Marshall Islands: Comparing Indigenous and Western Scientific Knowledge of the Ocean

[Authors](#) | [Abstract](#) | [Full Article](#) | [Citation](#) | [References](#)

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[Top](#)

Abstract

Pacific seafarers developed indigenous navigational techniques to voyage between islands. In the Marshall Islands, navigators remotely sense land by detecting how islands disrupt swells. A recent project to revitalize Marshallese voyaging aimed to understand the science of wave navigation. Local wave concepts are described based on anthropological fieldwork with surviving navigators, including interviews and experience sailing with them. The wave transformation processes that give rise to these patterns are examined using navigators' demonstrations at sea, wave buoy measurements, satellite imagery, and wave model simulations. The scientific data account for one signal used by navigators to remotely detect land. Crossing wave trains extend tens of kilometers in the leas of islands, which can be simulated as refraction of the easterly trade wind swell. Navigators identified a superposition of incident swells with reflected waves 40 km upstream of islands. These reflected waves were too weak to be detected by the wave buoy, but they are conceptualized similarly within indigenous and scientific frameworks. Navigators described another pattern as a wayfaring link between distant atolls. This pattern does not clearly relate to a wave transformation process, suggesting that Marshallese navigators also use concepts of the ocean that do not easily translate into oceanographic terms.

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[Top](#)

References

Agrawal, A. 1990. Dismantling the divide between indigenous and scientific knowledge. *Development and Change* 26:413–439.

Alessio, D., and A. Kelen. 2004. Waan Aelon in Majol, canoes of the Marshall Islands. Pp. 192-225 in *Life in the Republic of the Marshall Islands*. A.L. Loeak, V.C. Kiluwe, and L. Crowl, eds, University of the South Pacific Centre, Majuro, Republic of the Marshall Islands, and Institute of Pacific Studies, Suva, Fiji.

Ascher, M. 1995. Models and maps from the Marshall Islands: A case in ethnomathematics. *Historia Mathematica* 22:347–70.

Bascom, W. 1964. *Waves and Beaches: The Dynamics of the Ocean Surface*. Anchor Books, Garden City, 267 pp.

Booij, N., R.C. Ris, and L.H. Holthuijsen. 1999. A third-generation model for coastal regions. Part I: Model description

Chawla, A., and H.L. Tolman. 2008. Obstruction grids for spectral wave models. *Ocean Modelling* 1–2:12–25.

Davenport, W. 1960. Marshall Island navigational charts. *Imago Mundi* 15:19–26.

Earth Reference Data and Models, Seamount Catalog. 2008. Available online at: <http://earthref.org/SBN/> (accessed February 1, 2008). (Data obtained from this Web site was used to model the wave refraction in Figure 8 and to display the bathymetry in Figure 9).

ECMWF (European Centre for Medium-Range Weather Forecasts). 2008. *ECMWF 40 Year Re-analysis (ERA-40) Global Wave Analysis Data Set*. Available online at: http://www.ecmwf.int/products/data/archive/descriptions/e4/era40_lto2.html (accessed February 1, 2008). (Data obtained from this Web site was used to model the swell climatology in Figure 7).

Feinberg, R. 1988. *Polynesian Seafaring and Navigation: Ocean Travel in Anutan Culture and Society*. Kent State University Press, Kent, OH, 210 pp.

Finney, B. 1977. Voyaging canoes and the settlement of Polynesia. *Science* 196(4296):1,277–1,285.

Finney, B. 1979. *Hokule'a: The Way to Tahiti*. Dodd, Mead & Company, New York, 310 pp.

Finney, B. 1994. *Voyage of Rediscovery*. University of California Press, Berkeley, 401 pp.

Finney, B. 1998. Traditional navigation and nautical cartography in Oceania. Pp. 443–492 in *The History of Cartography, Vol.3, Part 2: Cartography in the Traditional African, American, Arctic, Australian, and Pacific Societies*. D. Woodward and G.M. Lewis, eds, University of Chicago Press, Chicago and London.

Finney, B. 2003. *Sailing in the Wake of the Ancestors: Reviving Polynesian Voyaging*. Bishop Museum Press, Honolulu, 168 pp.

Finney, B. 2007. Renaissance. Pp. 288–333 in *Vaka Moana: Voyages of the Ancestors: The Discovery and Settlement of the Pacific*. K.R. Howe, ed., University of Hawai'i Press, Honolulu.

Genz, J. 2008. Marshallese navigation and voyaging: Re-learning and reviving indigenous knowledge of the ocean. Ph.D. Dissertation, University of Hawai'i.

Genz, J., and B. Finney. 2006. Preservation and revitalization of intangible cultural heritage: A perspective from cultural anthropological research on indigenous navigation in the Republic of the Marshall Islands. *Micronesian Journal of the Humanities and Social Sciences* 5(1/2):306–313.

Gladwin, T. 1970. *East is a Big Bird: Navigation and Logic on Puluwat Atoll*. Harvard University Press, Cambridge, 241 pp.

Gulick, L.H. 1862. Micronesia of the Pacific Ocean. *Nautical Magazine and Naval Chronicle* 31:169–182, 237–245, 298–308, 408–417.

Hambruch, P. 1912. Die Schifffahrt auf den Karolinen- und Marshallinseln. *Meereskunde Sammlung Volkstumlicher Vortrage zum Verstandis der Nationalen Bedeutung von Meer und Seewesen* 66:1–40.

Kirch, P.V. 2000. *On the Road of the Winds: An Archaeological History of the Pacific Islands Before European Contact*. University of California Press, Berkeley, 424 pp.

Krämer, A., and H. Nevermann. 1938. Ralik-Ratak (Marshall-Inseln). Pp. 215-232 in *Ergebnisse der Südsee-Expedition, 1908–1910, II. Ethnographie, B: Mikronesien*, G. Thilenius, ed., Friedrichsen & de Gruyter, Hamburg.

Lagerloef, G.S.E., G.T. Mitchum, R.B. Lukas, and P.P. Niiler. 1999. Tropical Pacific near-surface currents estimated from altimeter, wind, and drifter data. *Journal of Geophysical Research* 104(C10):23,313–23,326.

Laubenfels, M.W. 1950. Native navigators. Pp. 7–12 in *Naval Research Reviews*. US Office of Naval Research.

Lewis, D. 1972. *We, the Navigators: The Ancient Art of Landfinding in the Pacific*. University of Hawai'i Press, Honolulu, 345 pp.

Massel, S.R. 1996. *Ocean Surface Waves: Their Physics and Prediction*. World Scientific, Singapore, New Jersey, London, Hong Kong, 508 pp.

Meinicke, D. 1863. *Die Gilbert- und Marshall-Inseln*. Zeitschrift für Allgemeine Erkunde, Mit Unterstützung der Gesellschaft für Erkunde, Berlin 2:369–417.

Ris, R.C., N. Booij, and L.H. Holthuijsen. 1999. A third-generation wave model for coastal regions. Part II: Verification. *Journal of Geophysical Research* 104(C4):7,667–7,682.

Schück, A. 1902. *Die Stabkarten der Marshall-Insulaner*. Kommissionsverlag von H.O. Persiehl, Hamburg, 37 pp.

Thomas, S. 1987. *The Last Navigator*. Henry Holt and Company, New York, 308 pp.

Winkler, C. 1898. Über die früheren Zeiten in den Marshall-Inseln gebrauchten Seekarten, mit einigen Notizen über die Seefahrt der Marshall-Insulaner im Allgemeinen. *Marine Rundschau* 10:1,418–1,439.

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