

Māori Navigation

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“He tātai whetū ki te rangi, mau tonu, mau tonu, he tātai tāngata ki te whenua, ngaro noa,
ngaro noa”

*“As humans our time on earth is but fleeting, yet the star that hang in the sky, they will last
forever”*

Introduction

Māori astronomical knowledge is known as tātai arorangi. In pre-colonial times Māori people in general had a good understanding of the night sky, with more indepth knowledge residing with experts known as tohunga kokorangi and tohunga tātai arorangi. In a modern context only a few knowledgeable experts remain, however Māori have committed to the revitalization of their knowledge including tātai arorangi, Maori astronomical knowledge. The breadth and depth of Māori astronomical knowledge withthe expansive and complex relationships that occur between Māori, the stars and their practices is immense. Traditional star lore was infused through much of Maori knowledge and customs from their cosmological origins, waiata (songs), moteatea (chants), whakatauki (proverbs), food growing practices, house building practices and of course one of the most famous aspects of revitalization, Oceanic navigation.

Oceanic Navigation

Navigation across large bodies of water requires the observation and familiarity with the movement of the sun, stars, currents, cloud formations, wave patterns, and migrational behaviour of birds and sea life. The combination of these and knowledge internalized by experience and inherent knowing are necessary for the traveler to reach a final destination. For thousands of years Polynesians traversed the Pacific and as Percy Smith stated, “The great knowledge of the stars that they possessed enabled them to guide their vessels from end to end of the Pacific...”¹ It is thought that after arrival of the different migration groups to Aotearoa (New Zealand), voyaging would have slowly disappeared over a number of generations. The most likely reason being the eventual passing of knowledgeable experts in this field, and as time went on a change in focus of exploration to the new land. Thus the knowledge of waka navigation for Māori may have been dormant for maybe a thousand years.

¹ Best, E., *The Astronomical Knowledge of the Māori: Genuine and Empirical* (Wellington, New Zealand:Government Printer, 1922)

In order to reach Aotearoa new technologies and navigation techniques for ocean voyaging over long distances were refined which ensured their survival in the Pacific². Of those techniques celestial navigation is one of the most intriguing aspects of voyaging which has captured the interest of the general public and enthusiasts alike, thus it is this aspect for which this article focuses on.



Figure 1: Waka revitalisation in Auckland harbour with representatives from Māori and other Polynesian nations readying for a race weeks before embarking on a journey across the pacific(Image provided by Pauline Harris, 2011).

Revitalisation of Oceanic Navigation

The revitalisation of Oceanic navigation occurred in the 1980's in New Zealand. Spearheaded by Hector (Hekenukumai) Busby, this art was saved from the brink of extinction by Mau Pialug a master navigator from Satawal in the Caroline Islands. Mau was from a long line of navigators who passed their knowledge from generation to generation. When the Hawaiians, such as Nainoa Thompson embarked on revitalising their lost knowledge of voyaging, Mau Pialug, recognising endangerment of this tradition agreed to share his knowledge of wayfinding and traditional navigation with the Hawaiians and then with Māori. This broke the mould of his tikanga (cultural way) to teach outside of his family line.

Previous to this, waka revival in Aotearoa was seeded back in the 1920's with a large effort in the revitalization of arts and crafts by Sir Apirana Ngata and Sir Peter Buck. A decade on more revitalization followed with waka traditions lead by Princess Te Puea, with a canoe building project in the 1930s to celebrate the 100th anniversary of the signing of the Treaty of

² Howe, K.R., *Vaka Moana, Voyages of the Ancestors*. (Auckland, New Zealand:David Bateman Ltd, 2008).

Waitangi. Expert canoe builders, whom had a long lineage of canoe expertise, were sought to construct waka for the celebrations. In doing so this created a new generation of canoe builders whom were taught during the construction.

Hector (Hekenukumai) Busby, was a young child at the time, and was heavily influenced by the waka that was created in this celebration. Now 70 years on, Hector Busby is seen as the epitome of waka revival in this country, building many single and double hulled waka in New Zealand. One of the most important waka that he built, Te Aurere, acted as a significant platform in Oceanic navigation revitalization in Aotearoa, a platform which would enable the next generations to learn this ancient art form of navigation. Today this art form is taught to both young and old, by the likes of Stanley Conrad in Auckland, by Jack Thatcher in Tauranga and in Waikato Tainui by Hoturoa Kerr. The revitalization of the Oceanic Navigation has involved the training of hundreds of people, whom learn the various techniques needed for sailing long distances. Given that the journeys can take around 3 ½ weeks from Aotearoa to destinations such as the likes of Tahiti, a great amount of dedication is needed from those wanting to embark on this journey.

Since the inception of Waka Hourua revitalisation here in New Zealand with the building of Te Aurere by Hekenukumai Busby and its main voyage to Rarotonga in 1992, many subsequent voyages throughout the Pacific have been embarked upon. In 2011 and 2012 two significant voyages were carried out. The largest voyage included seven waka from various Pacific nations including the Ngāti Kahungunu waka from New Zealand, Te Matau a Maui, and the other Aotearoa based waka Haunui that had a pan pacific crew and is looked after by Te Toki Voyaging Trust. This voyage started from New Zealand and saw this fleet traverse the ocean to the Pacific nations of Tahiti, Cook Islands, Samoa as well as the United States of America. This voyage returned to Aotearoa via Mexico, Costa Rica, the Galapagos Islands and many Pacific Islands across to the Solomons and then home to Aotearoa. This was an epic journey which essentially was a mission of Pacific unification and environment awareness. Most recently another voyage was embarked upon, this one however to Rapanui (Easter Island) by the two waka Te Aurere and Ngahiraka Mai Tawhiti. This voyage was undertaken to retrace and revitalize the journey made by Maori across the Pacific, as well as to close the final corner of traversing the Polynesian Triangle by sailors of today. These kinds of voyages would not have been possible without the dedication of Waka Hourua organizations such as the Tai Tokerau Tarai Waka Trust, whoms goals are to promote and enhance the continued development of all aspects of Kaupapa Waka ensuring the continued voyaging and the production of waka and the ongoing training of new members.

Celestial Navigation

Celestial navigation is one of the most fascinating aspects of Oceanic navigation. An indepth and intrinsic knowledge and understanding of the sun, moon and stars are needed to guide the navigator to their final destinations. One of the tools navigators have in their inventory is called a star compass. The Hawaiians created a star compass based on the teachings of master navigator Mau Piailug, and this has been adapted throughout the Pacific by navigators in different islands who have used their own star names and terminologies. The star compass is based upon a view of the horizon that places the navigator or the waka at the centre of a circle, which is in fact the horizon out in the distance that surrounds the canoe. This circle is then divided into 32 segments. Each of these segments is called a house. These houses indicate the known rising and setting points of specific stars that can assist in direction

finding during a voyage. By knowing the rising and setting points of specific stars while a voyage is underway, the navigator is able to estimate the direction in which the canoe is sailing relative to the star or the house. This enables the navigator to keep the waka on track. This estimate of direction is made by understanding the intended direction that the waka should be travelling in relation to the rising and setting points of the stars within their houses of the star compass.

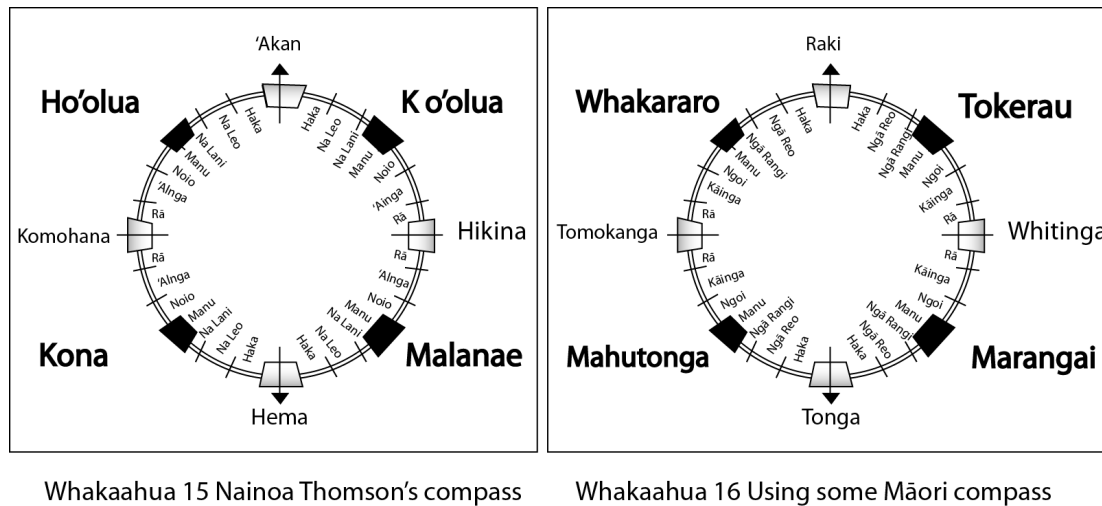


Figure 2: The Hawaiian and Maori star compass used in navigation (Image from Te Aurere Education Package, Rarotonga –Aotearoa 1995 Voyage).

When the sun rises it gives an estimate of true east regardless of most cloud cover, however over a month or two, the sun's movement can be one or two houses away from east. When the sun goes to the north he is going to his winter wife Hine Takurua (Sirius/Winter), and when he is going to his southern house he is going to his summer wife Hine Raumati. Estimates can be obtained similarly to the west with the setting sun.

The moon can also help determine direction. If the moon is in the first or last quarter phase and at the zenith point above you, depending on your location this can give you a north-south alignment³ by drawing a line from one tip of the crescent to the other and extending a line down to the horizon.

The reality of using the stars for celestial navigation is largely weather dependent. Unclear nights can number three or four on average due to cloud cover. Thus it is essential to understand and estimate your position using other techniques and observations. The stars, when they do become visible, can then be used to act as an absolute measure of your predictions of your position and to correct accordingly.

³ Hoturoa Kerr talks of a particular journey when the waka he was on was 4 degrees north heading into the doldrums. They required an indicator of north-south however cloud cover made visibility of the sky bad. The moon suddenly appeared directly above them in a crescent phase and drawing a line from the tips of the crescent they could obtain a north-south direction and realign the waka.

Stars that go directly above an observer are called zenith stars, and can identify an observer's latitude. In literature, these stars are mentioned as part of a technique for navigating, however due to the movement in a vessel and the lack of stable reference markers, it is difficult in reality to tell if a star is directly above you and to use them as latitude markers. An easier method is to measure the angle from the horizon to your known stars markers which indicate the South and North celestial poles. As the observer changes their position on the earth, moving in latitude for example from Aotearoa to Hawaii, different stars on the celestial sphere will become visible and others will no longer be seen.

To understand this if we look at the Pacific region and take a snap shot of the night sky at one time from four different positions on the earth going from New Zealand, Samoa, Tonga, and further north to Kiribati (these were chosen as they are approximately at the same longitude). We see that as we move up in latitude some stars to the north that were below the horizon are now visible. This is because as we shift over the curved surface of the Earth our horizon drops lower and new stars will appear. Also some stars will no longer be observable to the south. Figure 1 shows the snapshots of the stars for the 4 locations and Table 1 shows the coordinates of the islands these sky views are associated with. Mahutongo is shown in the figure which is the Southern Cross and Nga Whetu Matarau the Pointers. From A to D in Figure 3 the latitude is going further north and the Southern Cross is getting lower and lower to the horizon.

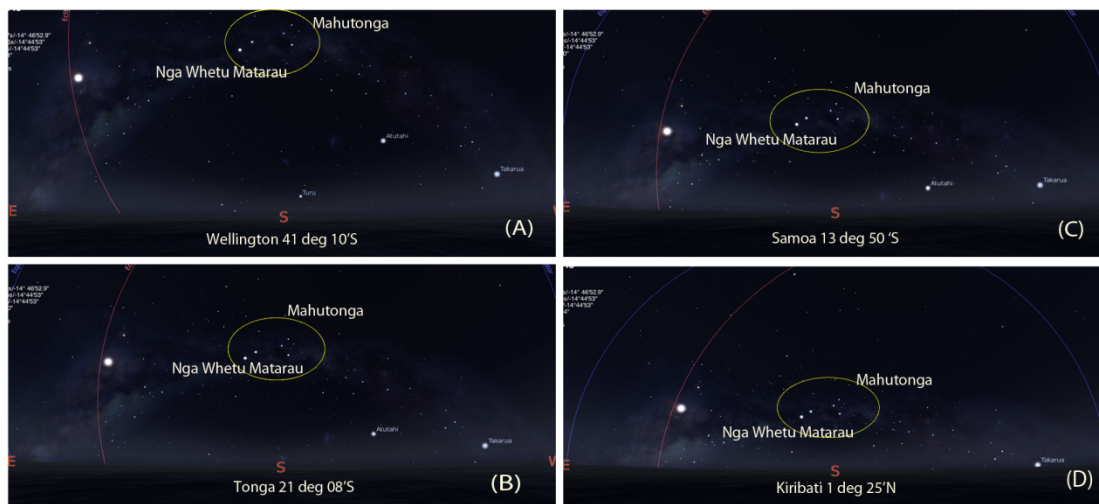


Figure 3: Shift in star positions with latitude. Stars to the south will be lower on the horizon as one travels north.

| Figure | Country | Latitude | Longitude |
|--------|-------------|----------|-----------|
| A | New Zealand | 41° 10'S | 174° 46'E |
| B | Tonga | 21° 08'S | 175° 12'W |
| C | Samoa | 13° 50'S | 170° 50'W |
| D | Kiribati | 1° 25'N | 173° 00'E |

Table 1: Latitude and longitude of islands in the pacific, which are represented in Figure 3.

When in Aotearoa the North Star is not visible, but as you travel up toward the equator the North Star or Polaris (known as Hokupa to Hawaiians) appears. The angle at which the North Star is above the horizon, gives an indication of your latitude. Similarly on can find South, by finding the South celestial pole using the Southern Cross and the Pointers and then dropping the point to the horizon. However if you are past the equator to the north, for example in Hawaii at a latitude of 21 degrees north, the south celestial pole lies

21 degrees below the horizon. Since you cannot see the south celestial pole you use a reference like the bottom of the Southern Cross when it is standing upright to obtain an estimate of South and your latitude. In this case in Hawaii the bottom of the Southern Cross is 6 degrees above the horizon, which happens to be the angular distance from the bottom to the top of the cross. You can use this angular measurement from the horizon to the bottom of the cross and calibrate accordingly to get your latitude or one can just remember that at the latitude of Hawaii, this star will be 6 degrees above the horizon. Even though our ancestors did not have the definition of latitude they still knew how far north or south one had travelled.

Conclusion

The above are just some of the navigational techniques applied by the ancestors of the Māori to traverse the Pacific Ocean. These same methods combined with detailed knowledge of the stars and the movements of the night sky allowed the Māori to discover and ultimately settle Aotearoa. Currently traditional Māori navigation is undergoing a renaissance, led by dedicated Māori, who not only study the theory of Māori navigation, but who also undertake epic journeys throughout the Pacific on double hulled waka. Using the same ancient navigation techniques, the modern Māori navigators are keeping alive much of the sacred Māori star lore, to be handed on once again from generation to generation.