

Report on Carolinian Traditional Navigation Course Documentation, Yap State in the Federated States of Micronesia



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1. Introduction

On a limited number of small coral atolls in the Central Caroline Islands, in Yap and Chuuk States in the Federated States of Micronesia, traditional navigation has been still actively practiced.¹ This technology was transplanted to, first, Hawaii and subsequently many other Polynesian islands, through the renowned Hokule'a in conjunction with a Satawalese master navigator, the late Mau Piailug, and his successors' efforts. This tradition, however, which has been succeeded by their ancestors for hundreds if not thousands of years, is sadly disappearing due to a lack of interest among the current generations of islanders.

This project aimed to document Master Navigator Ali Haleyalur's knowledge on Carolinian traditional navigation through the use of video recordings. Haleyalur is one of the few remaining navigators who utilize the ancient knowledge of non-instrument wayfinding to travel long distances on the ocean in traditional voyaging canoes and has been keen to teach this art to younger generations and has so far held three innovative courses designed to help pass on this valuable element of Carolinian heritage. The videos of his lectures will be shared on the internet to be used as teaching material for local Micronesian people and other interested individuals. The project was funded by UNESCO's Participation Programme 2018-2019, through the FSM Office of Archives, Culture and Historic Preservation which supported the Principal Investigator (Takuya Nagaoka).

2. Carolinian Traditional Navigation

The Central Caroline Island region is one of the last few areas in the Pacific that still hold traditional navigation technology. This tradition has been mainly studied by American and Japanese anthropologists on different islands; most intensively the two islands of Polowat (Gladwin 1970, Lewis 1972, Riesenbergs 1972:91-128) and Satawal (Akimichi 1980a, 1980b, 1981, 1984, 1985, 1986, 1987, 1988, 1994, McCoy 1976:129-138, Sauchoman 2018:30-47), where this art is most actively practiced. Additional research has also been conducted on Lamotrek (Alkire 1965, Metzgar 1991), Woleai (Alkire 1970:1-73), and Ifalik (Burrows and Spiro 1957).

A variety of the navigational and other forms of knowledge and skills must be learned to become a master navigator. These include learning the star compass (Topics 1, 2, 3 and 4 in Table 1), sea-lanes (Topic 11), island directions and navigational clues (Topic 5), schematic mapping of islands (Topic 17), route maps (Topics 8, 9, 10 and 18), estimating location during voyage between islands (Topic 7), weather prediction (Topics 12 and 16), and a host of other forms of vital information (Topics 6, 13, 14, 15 and 19). The most basic knowledge of traditional navigation on the star compass (Topics 1, 2, 3 and 4) is common knowledge shared to all male members of the community, while more advanced knowledge necessary for long-distance voyaging (Topic 5, 8, 9, 10 and 17) is more esoteric and passed along to only close relatives.

¹ According to Metzgar (2006:296), those are Satawal, Lamotrek, Woleai and Ifalik in Yap State and Polowat, Pollap, Pulusuk and Tamatam in Chuuk State.

Except for recent attempts by Haleyalur (the Instructor in this project) to teach interested individuals freely (see below), teaching navigation has been only occasionally carried out in a traditional small-scale manner on individual islands.

3. Project

3.1. Aims

There are numerous ethnographic studies on Carolinian traditional navigation (see the previous section), yet there are only a limited number of learning resources on this topic readily available for the locals and others on the internet or in other forms (see, for example, UNESCO 2018) and none are written in a local language. This project aims to produce a series of lecture videos which would be shared on the internet to be used as educational tools for local stakeholders and other Pacific Islanders and others interested in safeguarding this important element of Pacific Islander cultural heritage.

In addition, this project would provide young men with an opportunity to learn this art and to become apprentice navigators in the future. It also would promote the community's and other Pacific Islanders' awareness of the importance of cultural heritage and foster cultural pride.

Further, the detailed information of Carolinian traditional navigation documented through this project will add valuable knowledge on this topic, especially for Lamotrek, where the ethnographic information is largely limited (see the previous section). And finally, the project will contribute to the FSM's efforts to inscribe this heritage on the UNESCO Intangible Cultural Heritage List in the future.

3.2. Instructor and Students

The instructor was the Master Navigator Ali Haleyalur, who was born into a well-known navigator's family in 1957 on Lamotrek Atoll and belongs to the Werieng school of navigation, one of two existing schools. His father, Jesus Urupiy, was the *Paliuw* Grand Master Navigator from Satawal (with Polowatese ancestry), who is known for reviving the long-lost *pwo* ceremony in 1990 after not having been conducted for almost 40 years (Metzgar 2006:297). Haleyalur started learning traditional navigation under the supervision of his father when he was 10 years old and continued until adulthood. He was initiated at the *pwo* navigator initiation ceremony conducted by Urupiy in 1995.

He left Outer Island High School in 1974, and worked for the Yap State Department of Public Safety from 1985 to 2007. After resigning from his job, he began to participate in an NGO called the Yap Traditional Navigation Society (TNS). He served as a TNS instructor of traditional navigation in 2009-2010, 2010-2011, 2014-2015, 2016-2017 and 2018-(ongoing) in Yap, and also occasionally taught it on Lamotrek since the 1990s.

Haleyalur became a *Paliuw* Grand Master Navigator in 2009. After becoming a *Tau Pwo* (Master of Ceremony for the *pwo*) in 2010, he conducted a *pwo* for his graduated students of his

navigation schools in Yap in 2015 and was also invited to conduct two ceremonies in Palau and Saipan in 2019. His major long distance voyages include: Yap-Palau return in 2009, Lamotrek-Guam return in 2010, Lamotrek-Guam-Palau-Yap in 2016, and Saipan-Pagan in 2018.

He is known for his willingness and openness to teach traditional navigation to interested individuals (Krause 2016). Thus, I approached him about a possibility of documenting his course and sharing videos on the internet. I also sought the necessary funding needed to implement the project.

We took five students for his course due to budget constraints. Haleyalur recruited them from his village. Four students are from his island, Lamotrek Atoll: Johannes Hashigluw (36 years old), Quincy Yairegir (26 years old), Lester Malesiugmwai (28 years old) and Oscar Yanneluw (29 years old). Another is from Ettal Atoll in Chuuk, Kes Kintin (28 years old), and is Haleyalur's son-in-law. Hashigluw took Haleyalur's course in 2014-2015 and participated in Haleyalur's long distance voyages three times (Yap-Palau in 2009, Lamotrek-Guam in 2010 and Lamotrek-Guam return in 2016). Thus, this course was an occasion for him to refresh his knowledge. For other students, it was their first time to learn about traditional navigation.



Figure 1. The instructor and students of the Carolinian Traditional Navigation Course (Oscar Yanneluw, Johannes Hashigluw, Ali Haleyalur, Lester Malesiugmwai, Quincy Yairegir, Kes Kintin and Takuya Nagaoka, from left to right).

3.3. Course

The classes were held in an open space beside Haleyalur's house in the Outer Islanders' settlement, Ablul, in Tamil municipality, Monday through Friday starting at 8:30 am and lasting 30-90 minutes (photo on the cover page).

When raining, they took place at Haleyalur's cook house nearby. The course was conducted 23 times, starting on May 22, 2019 and concluding on June 25 (see Appendix B for the schedule of the course). Most students attended all the classes while a few students could not attend only a few classes due to other obligations.

The instructor lectured on the given topic of the day. The students took notes on what they learned (e.g., Tu 2017:138-139) and were required to memorize them at home (Figure 2). The following day there was a verbal quiz on the topic discussed the previous day to ensure their learning. As all students are fluent in the local Lamotrek language, it was used by Haleyalur in the classes in addition to the introductory remarks told in English.

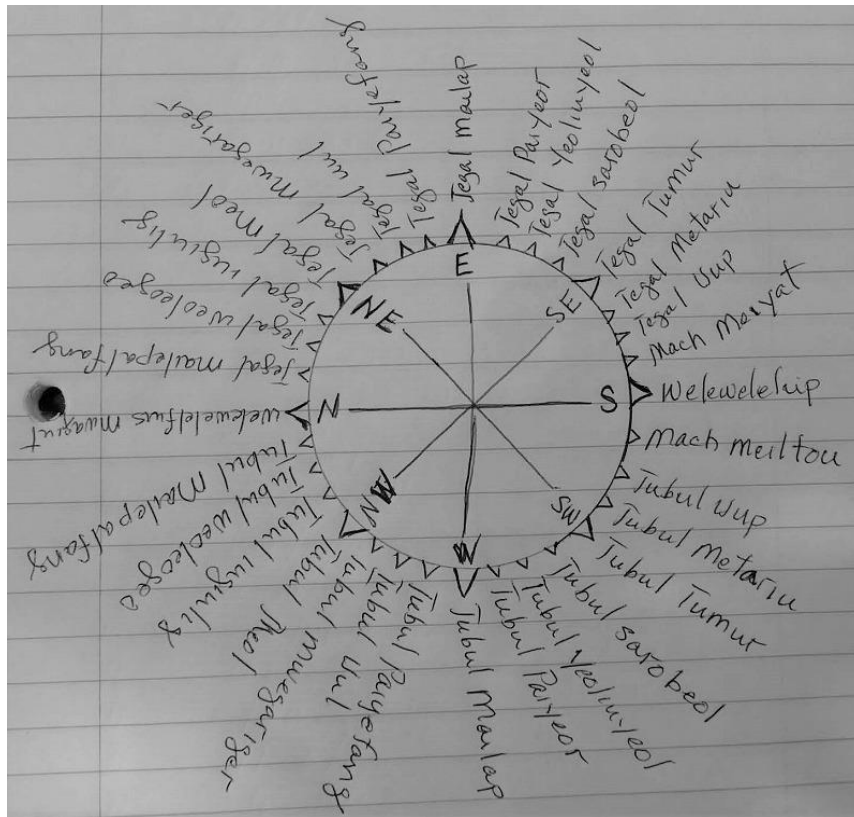


Figure 2. Example of a student's notebook (sketch of the star compass).

During an early stage of the project, an opportunity to train utilizing a double-hull canoe owned by Okeanos Waab² was discussed. Haleyalur serves as an advisor to the Okeanos Waab

² This is a Yap-based branch of the non-profit organization, Okeanos Foundation for the Sea which implements sustainable sea transportation, using traditionally designed double hulled sailing canoes,

organization and a trip to a nearby outer island, for practical trainings, such as stargazing at night, weather prediction in the morning, and current and wave identification during the daytime appeared to be possible. This opportunity, however, was not possible due to the timing of availability of the vessel.

Due to Principal Investigator's time constraint, the project period was limited to two months. Haleyalur generally teaches the course for lengths of eight months to a year (Appendix A). This longer period provides ample time for students to fully memorize his teaching. Thus, although the whole course was completed, the memorization of all the navigational information was left to the students.

3.4 Course Content

The course content for this project was largely adopted from Haleyalur's previous courses, which were originally designed in the following manner:

“He [Haleyalur] designed his course to adapt as many of the traditional instruction methods as possible into a tailored, updated format that respects and honors protocols and restrictions connected with the sacred aspects of Carolinian navigation. This was no easy task as it required complex determinations of what needed to be taught and what needed to remain private. The goal was to ensure the survival of both traditional navigation and, more importantly, the lives of his students who would rely upon what they have been taught to survive on the open ocean (Krause 2016:22).”

The topics of Carolinian traditional navigation covered in the current course and an English summary video (see below) during this project are listed in Table 1, which also compares the curriculum with the ones Haleyalur taught in 2015-2016 (see Appendix A for the curriculum developed by Haleyalur in 2015).

3.5. Videos

The whole process of 23 classes, which include both Haleyalur's lectures on the topics and verbal quizzes, were filmed to produce videos of individual class days. The length of the videos varies from 30 to 90 minutes.

In addition, since the classes were conducted in the local Lamotrek language (see above), the same contents of classes done by Haleyalur in English were filmed five times from June 28 to July 15, 2019 to produce a two-hour English summary version video for a wider audience, especially those interested from other Pacific Islanders. This English addition was completed after the course was conducted. Details of particular topics (Topics 8, 10, 17 and 18 in Table 1) were not included in this

to address a range of Pacific issues, including cultural decline, economic sustainability, isolation and climate change (<http://www.oceanos-foundation.org>).

video due to the secretive nature of advanced navigational information (Krause 2016:22). The topics covered in this video are listed in Table 1.

Table 1. Topics of Carolinian traditional navigation covered in the current course, the English summary video and the 2015-1016 course.

Topic No.	Topic name	Brief description	The current course	English summary	The 2015-2016 course	Appendix in this report
1	<i>Pafius</i>	Basic star compass that consists of navigation stars.	✓	✓	✓	C
2	<i>Gashoum sepeig</i>	The raising and setting of the stars on the star compass.	✓	✓	✓	D
3	<i>Gashoum ruepeig</i>	The pairing of stars on the star compass in twos.	✓	✓	✓	E
4	<i>Gemat</i>	The naming of stars on the star compass, which the four principal parts of the canoe are pointing toward.	✓	✓	✓	
5	<i>Ofaliue</i> and <i>bugoff</i>	The use of the star compass on each island to navigate to other islands.	✓	✓	✓	F
6	<i>Bugloa</i>	Wave and current identification.	✓	✓	✓	
7	<i>Etag</i> and <i>liupengag</i>	Units of measurement when at sea and understanding use of reference island.	✓	✓	✓	
8	<i>Reo galiye</i>	Navigation technique using lapu-lapu fish.	✓	✓	✓	
9	<i>Gariuwau</i>	Navigation technique using parrotfish.	✓		✓	H
10	<i>Feo iyat</i>	Naming islands that are in line all under one star.	✓	✓	✓	G
11	<i>Itemetaw</i>	Naming of sea-lanes.	✓	✓	✓	I
12	<i>Gemanne</i>	Weather prediction.	✓	✓	✓	
13	<i>Gabweshil terag</i>	Navigator chants: pre, on, and post voyage chants.	✓	✓	✓	
14	<i>Bwangil wa</i>	Canoe component identification and canoe techniques.	✓		✓	
15	<i>Teragi</i>	The sailing of an outrigger canoe.	✓		✓	
16	<i>Mworal fius</i>	Predicting stormy weather using fighting stars.	✓	✓		J
17	<i>Buub lapalaap</i>	Navigational technique using triggerfish.	✓	✓		K
18	<i>Terag we yal mateccha</i>	Navigational technique using red snapper.		✓		
19	<i>Tafei</i>	Navigator's medicine for everything.			✓	
20	<i>Pwo</i>	Navigator initiation ceremony.		✓		

The 23 videos of all the classes and one English language summary video will be uploaded in a playlist “Carolinian Traditional Navigation Course Documentation” on NGO Pasifika Renaissance’s YouTube page (https://www.youtube.com/playlist?list=PL7c_0z1tMBDruMxRRoL5jdzhbSQnHqoOt) in April 2020.

4. Conclusion

This Carolinian traditional navigation course documentation project proved to be a very valuable effort. The main purpose of the project, documenting the navigation course and producing educational videos, was achieved. The videos are vital learning resources for local language speakers and are freely accessible online. Due to time constraints, which made the period of the course shorter, memorizing the navigational knowledge was left to individual students. For these students, it is necessary to continue to develop their knowledge in order to fully acquire the advanced knowledge needed to become a master navigator. One especially positive development is that four former students now work on Okeanos Waab’s double-hull sailing canoes after the course, which will enable them to develop their seafaring skills, including traditional navigation.

Carolinian traditional navigation has been actively passed down to younger generations in a traditional manner on a very few certain islands. However, the decline of young people’s interest, as well as a trend of outmigration have placed it under threat on most other islands. Thus, governmental and other institutional support for projects such as this one seems to be crucial for sustaining this important cultural heritage.

In the period of modernization and a more land-oriented lifestyle in many parts of Oceania today, the Carolinian navigational knowledge is still very important not only for local islanders but for all Pacific Island cultures. One important reason why it remains so valuable is that it reminds all of the legacy of Pacific Islanders’ ancestors who were great voyagers that bravely traversed vast regions of the Pacific. Due largely to growing outmigration in the region (i.e., outer islands to the main islands and U.S. territories), however, the survival of this art faces serious threats. It is hopeful that this project will assist in promoting not only the transmission of this valuable art but also in the support of Pacific Islanders’ pride as seafarers and their seafaring heritage.

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Appendix A: Carolinian Traditional Navigation Curriculum Developed by Ali Haleyalur in 2015

Carolinian Traditional Navigation

“As Micronesians, we have a very unique knowledge that few in the world possess. For me this knowledge was passed down to me by my father, I am afraid that too few of us possess the knowledge anymore and we will see our culture fade in front of our eyes. We should be proud of our knowledge! We are seafarers who sail open oceans to face giant waves and storms, rain or shine. We are on our canoes in the face of those challenges to prevail; I hope we will prevail off the canoe as well in preserving this knowledge.” – Ali Haleyalur

Starting date: *August 3, 2015*

Class location: *Men’s House in Living History Museum. Colonia, Yap*

Meeting time: *Monday – Friday 10am-3pm*

Instructor: Ali Haleyalur

Phone: 952-8305

Email:

I. General Course:

The course is designed to teach Carolinian traditional navigation and sailing, an art that was developed and perfected by navigators of Yap and its outer islands. These navigators were said to have traveled great distances between islands, and even be able to locate objects such as submerged reefs in the open ocean. They were able to complete these journeys of extraordinary distances by their knowledge of the stars, wind, ocean currents, and wave identification.

II. Specific Learning Outcomes:

Upon completion of the course, students will be able to incorporate traditional knowledge and skills with modern science such as oceanography, meteorology, astronomy, and navigation. They will also demonstrate proficiency in geographical, historical, and cultural literacy of the Micronesian region.

Navigators will be able to use the star compass to sail throughout the Caroline Islands of Micronesia. They will know the star compass and the pairings of the navigational stars associated with numerous islands. From any island of origin, they will be able to sail to all other islands in Micronesia using this star compass. Using the star compass, navigators will be name islands, sea creatures, birds, flocks of birds, groups of fish, or insects from any geographical point or island.

Navigators will also learn to predict weather based on cloud formation and the color of the sky in the early morning, midday, sunset, and midnight. This will provide them with a basic forecast of the day and the knowledge of whether it would be a worthwhile day to sail.

Navigators will be able to identify certain types of currents and waves to determine their location in route. They will demonstrate proficiency in determining general direction of ocean wave moves, which will allow the navigator to be aware of his location while sailing. This skill will be practiced on land with a variety of teaching methods, including model canoes and woven mats. This is to ensure understanding before the skill is practiced in the open ocean.

Navigators will be able to identify sea-lanes between each island in the Pacific. The islands span from Papua New Guinea and Philippines to Tarawa including the Marianas.

Navigators will also know a variety of chants that can be used pre-voyage, mid-voyage, and post-voyage, They will be chants of protection, cleansing, offering for a good voyage, fighting against storms, of welcome, of thanks, and of a good voyage.

Navigators will be able to identify all the parts of the traditional outrigger canoe. This includes but will not be limited to the mast, the sail, the platforms, and all the small details found aboard the canoe. Navigators will also have a wealth of experience sailing these canoes. This includes a variety of techniques to be used in certain winds and when sail in a specific direction.

III. Format and Procedures:

The course will meet Monday-Friday from 10am-3pm. The instructor will lecture on the given topic of the day. The following day there will be a verbal quiz on the topic discussed the previous day. Most of the lectures will occur at the living history museum, but will not be limited to this location. Nights of stargazing, mornings of weather prediction, and days of canoe identification may possibly occur at a different location.

IV. Grading Procedures:

Assessments will include verbal quizzes and exams. These assessments will cover all material covered throughout the course: stars, star pairings, star-island pairing, etc. The student is responsible for knowing all course material and can be quizzed on any number of items from the course on any given day. The instructor will often quiz on prior topics to ensure understanding and consistent grasp of all the material.

V. Tentative Course Schedule [based on a course that meets every Monday-Friday from 10am-3pm spanning from August 3rd to December 18, and continues January 4 to May 30: (*Subject to change by instructor due to student needs or conflict*)

Stages of Navigation	Topics covered	Time
Topic 1 <i>Pa Fius</i>	Basic star compass that consists of navigation stars.	Aug. 3-7 (1wk)
Topic 2 <i>Hashoum Sepeig</i>	The raising and setting of the stars on the star compass.	Aug. 10-14 (1wk)
Topic 3 <i>Hashoum Ruepeig</i>	The pairing of stars on the star compass in twos.	Aug. 17-28 (1wk)
Topic 4 <i>Gemat</i>	The naming of stars on the star compass, which the four principal parts of the canoe are pointing toward.	Aug 31-Sept. 11 (2wk)
Topic 5 <i>Ofaliue & Bugof</i>	The use of the star compass on each island to navigate to other islands.	Sept. 14-Dec 1 (2-3months)
Topic 6 <i>Bugloa</i>	Wave and current identification.	Jan.4-15 (2wks)
Topic 7 <i>Etag & Liupengag</i>	Units of measurement when at sea and understanding use of reference island.	Jan 18-22 (1wk)
Topic 8 <i>Reo Galiye</i>	Navigation technique using lapu lapu.	Jan 22-29 (1wk)
Topic 9 <i>Gariuwau</i>	Navigation technique using parrot fish.	Dec.1 –11 (1wk)
Topic 10 <i>Feo Iyat</i>	Naming islands that are in line all under one star.	Dec. 14-18 (1wk)
Topic 11 <i>Itemetaw</i>	Naming of sea-lanes.	Jan 4-15 (2wks)
Topic 12 <i>Gemanne</i>	Weather prediction.	Jan 18-Feb 15 (1month)
Topic 13 <i>Gabweshil Teraagi</i>	Navigator chants: pre, on, and post voyage chants.	Feb 15-29 (2wk)
Topic 14 <i>Bwangil waa</i>	Canoe component identification and Canoe techniques.	Feb 29-March11 (3-4months) (Graduation is set late May)
Topic 15 <i>Teraagi</i>	The sailing of an outrigger canoe.	March 14-May20 (3-4months) (Graduation is set late May)
Topic 16 <i>Tafei</i>	Navigator's medicine for everything.	Mar 14-Mar21 (1wk)

For further information on this class and more, please contact

Email-

Ali - 952-8305

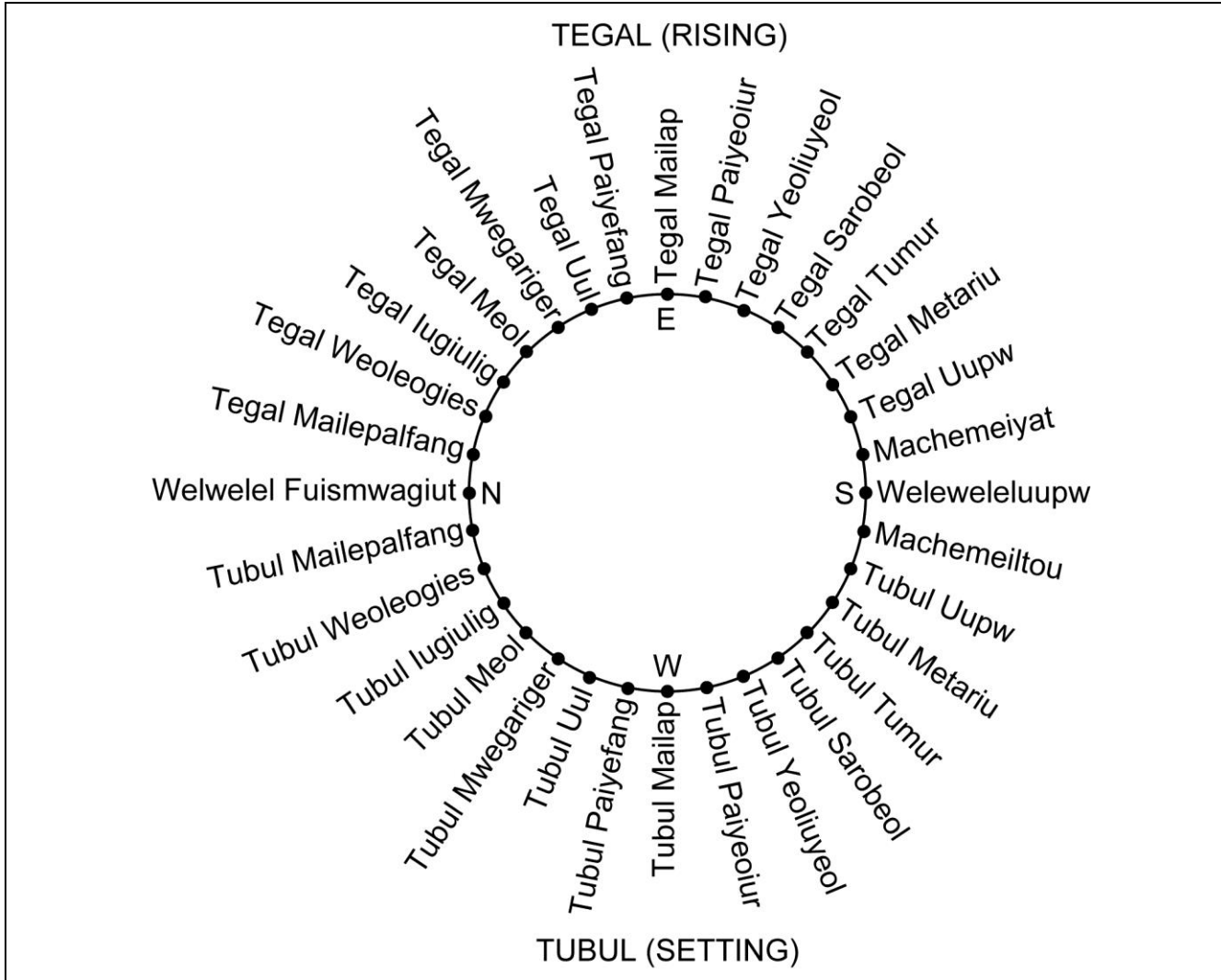
Appendix B: The Class Schedule

The topics were covered on the following dates, which correspond to the dates for the videos uploaded on NGO Pasifika Renaissance's YouTube page (https://www.youtube.com/playlist?list=PL7c_0z1tMBDruMxRRoL5jdzhbSQnHqoOt).

- Topic 1. *Pafius*: May 21, 2019.
- Topic 2. *Gashoum sepeig*: May 21, 2019.
- Topic 3. *Gashoum ruepeig*: May 22, 2019.
- Topic 4. *Gemat*: May 23, 2019.
- Topic 5. *Ofaliue* and *bugoff*: May 27-31, June 3-7, 12, 2019.
- Topic 6. *Bugloa*: June 6, 2019, 2019.
- Topic 7. *Etag* and *liupengag*: June 13, 2019.
- Topic 8. *Reo galiye*: June 25, 2019.
- Topic 9. *Gariuwau*: June 12, 2019.
- Topic 10. *Feo iyat*: June 14, 2019.
- Topic 11. *Itemetaw*: May 27-31, June 3, 2019.
- Topic 12. *Gemanne*: June 10, 2019.
- Topic 13. *Gabweshil terag*: June 21, 25, 2019.
- Topic 14. *Bwangil wa*: June 19-20, 2019.
- Topic 15. *Teragi*: June 20, 2019.
- Topic 16. *Mworal fius*: June 19, 2019.
- Topic 17. *Buub lapalaap*: June 10, 2019.

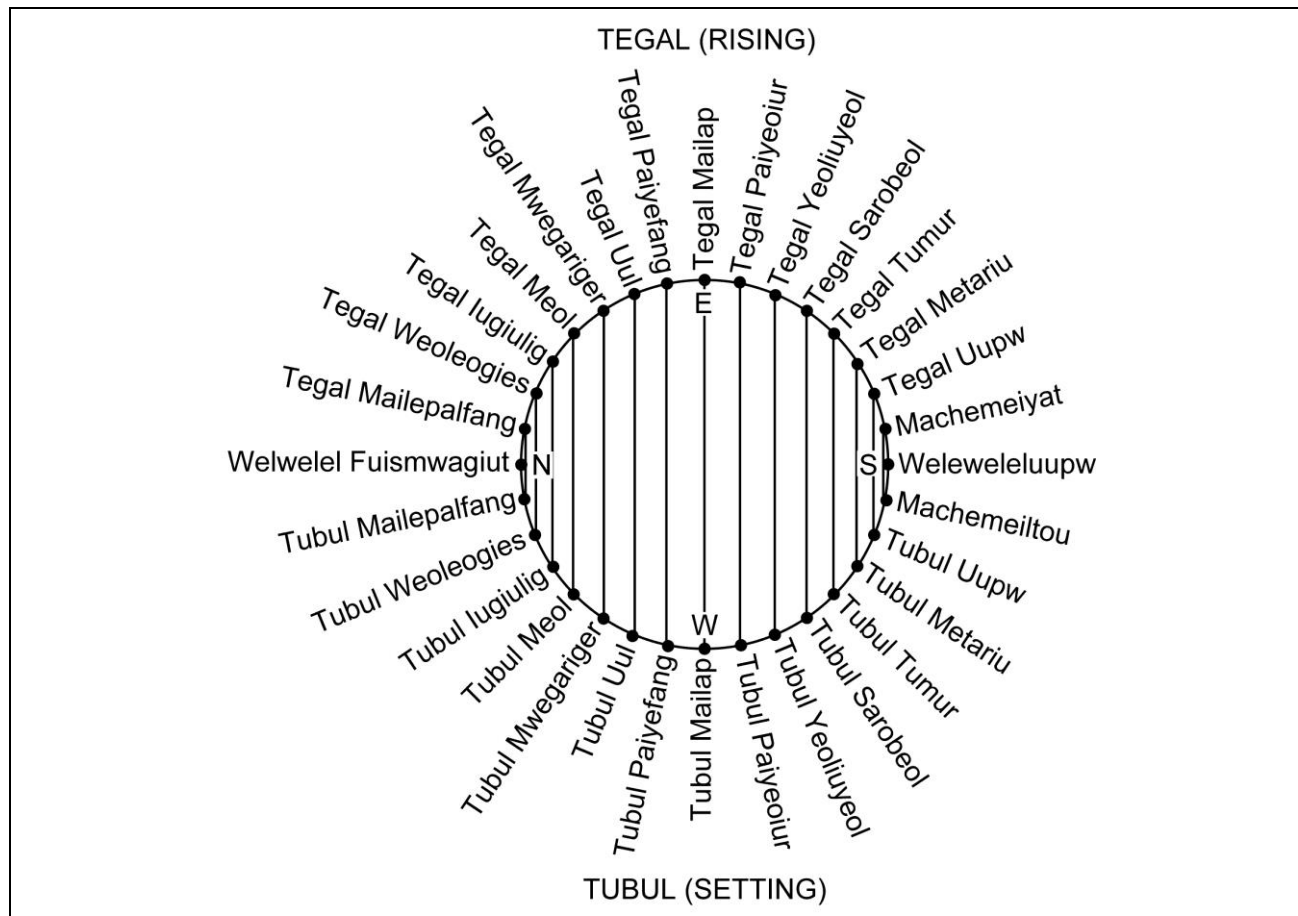
Appendix C: *Pafius*

Welwelel Fuismwagiut: North Star (Polaris)
Tegal Mailepalfang: Rising Little Dipper
Tegal Weoleogies: Rising Big Dipper
Tegal Iugiulig: Rising Cassiopeia
Tegal Meol: Rising Vega
Tegal Mwegariger: Rising Pleiades
Tegal Uul: Rising Aldebaran
Tegal Paiyefang: Rising Gamma Aquilae
Tegal Mailap: Rising Altair
Tegal Paiyeoiur: Rising Beta Aquilae
Tegal Yeoliuyeol: Rising Orion's Belt
Tegal Sarobeol: Rising Corvus
Tegal Tumor: Rising Antares
Tegal Metariu: Rising Shaula
Tegal Uupw: Rising Southern Cross
Machemeiyat: Rising Southern Cross at 45°
Weleweleluupw: Southern Cross upright
Machemeiltou: Setting Southern Cross at 45°
Tubul Uupw: Setting Southern Cross
Tubul Metariu: Setting Shaula
Tubul Tumor: Setting Antares
Tubul Sarobeol: Setting Corvus
Tubul Yeoliuyeol: Setting Orion's Belt
Tubul Paiyeoiur: Setting Beta Aquilae
Tubul Mailap: Setting Altair
Tubul Paiyefang: Setting Gamma Aquilae
Tubul Uul: Setting Aldebaran
Tubul Mwegariger: Setting Pleiades
Tubul Meol: Setting Vega
Tubul Iugiulig: Setting Cassiopeia
Tubul Weoleogies: Setting Big Dipper
Tubul Mailepalfang: Setting Little Dipper



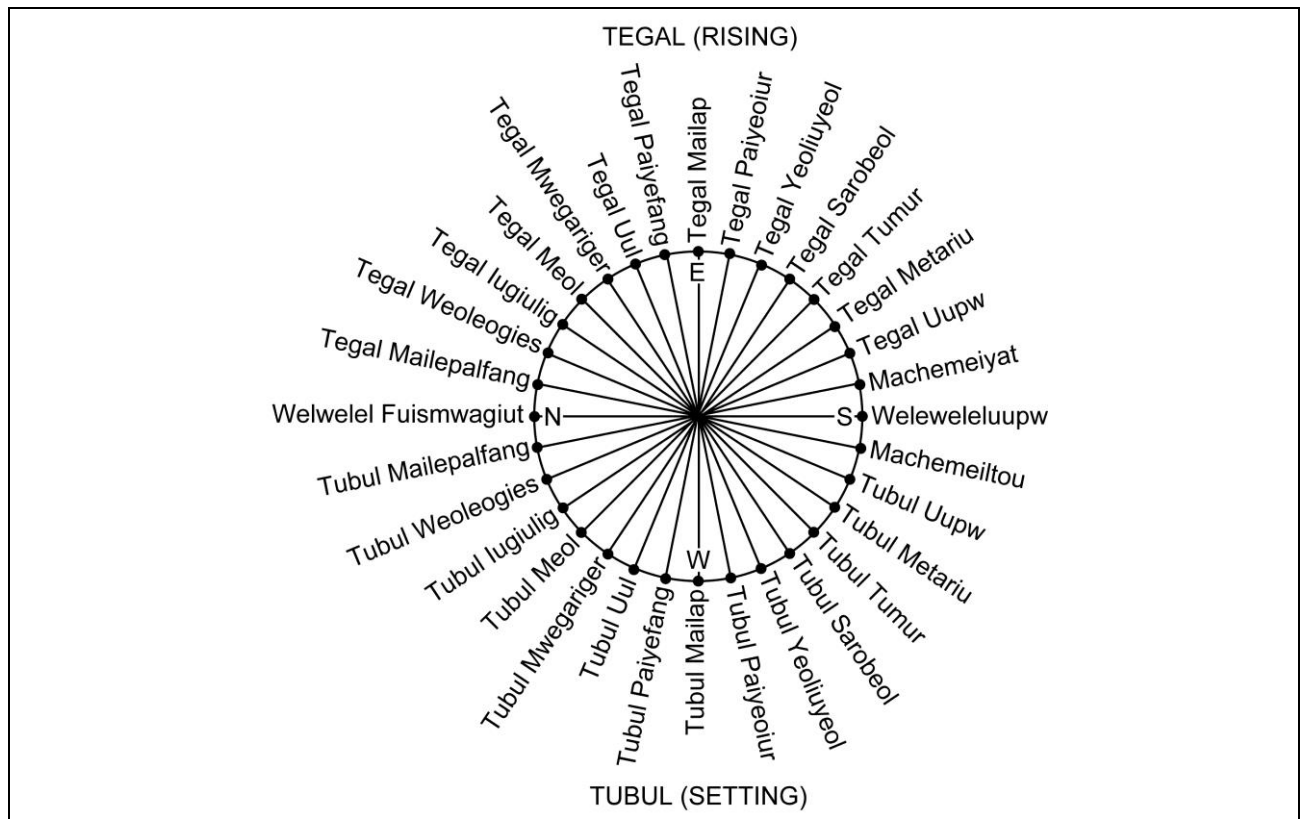
Appendix D: *Gashoum sepeig*

- Tegal Mailepalfang – Tubul Mailepalfang
- Tegal Weoleogies – Tubul Weoleogies
- Tegal Iugiulig – Tubul Iugiulig
- Tegal Meol – Tubul Meol
- Tegal Mwegariger – Tubul Mwegariger
- Tegal Uul – Tubul Uul
- Tegal Paiyefang – Tubul Paiyefang
- Tegal Mailap – Tubul Mailap
- Tegal Paiyeoiur – Tubul Paiyeoiur
- Tegal Yeoliuyeol – Tubul Yeoliuyeol
- Tegal Sarobeol – Tubul Sarobeol
- Tegal Tumur – Tubul Tumur
- Tegal Metariu – Tubul Metariu
- Tegal Uupw – Tubul Uupw
- Machemeiyat – Machemeiltou

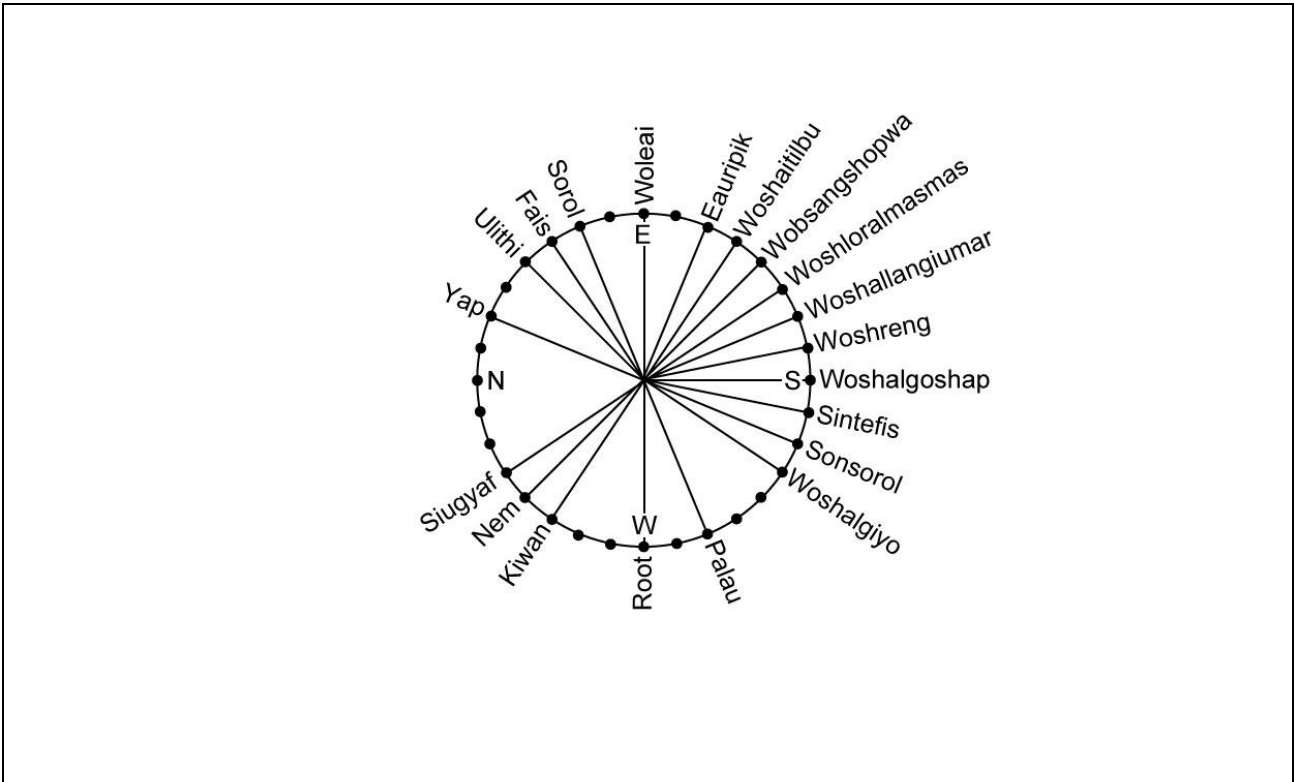


Appendix E: *Gashum ruepeig*

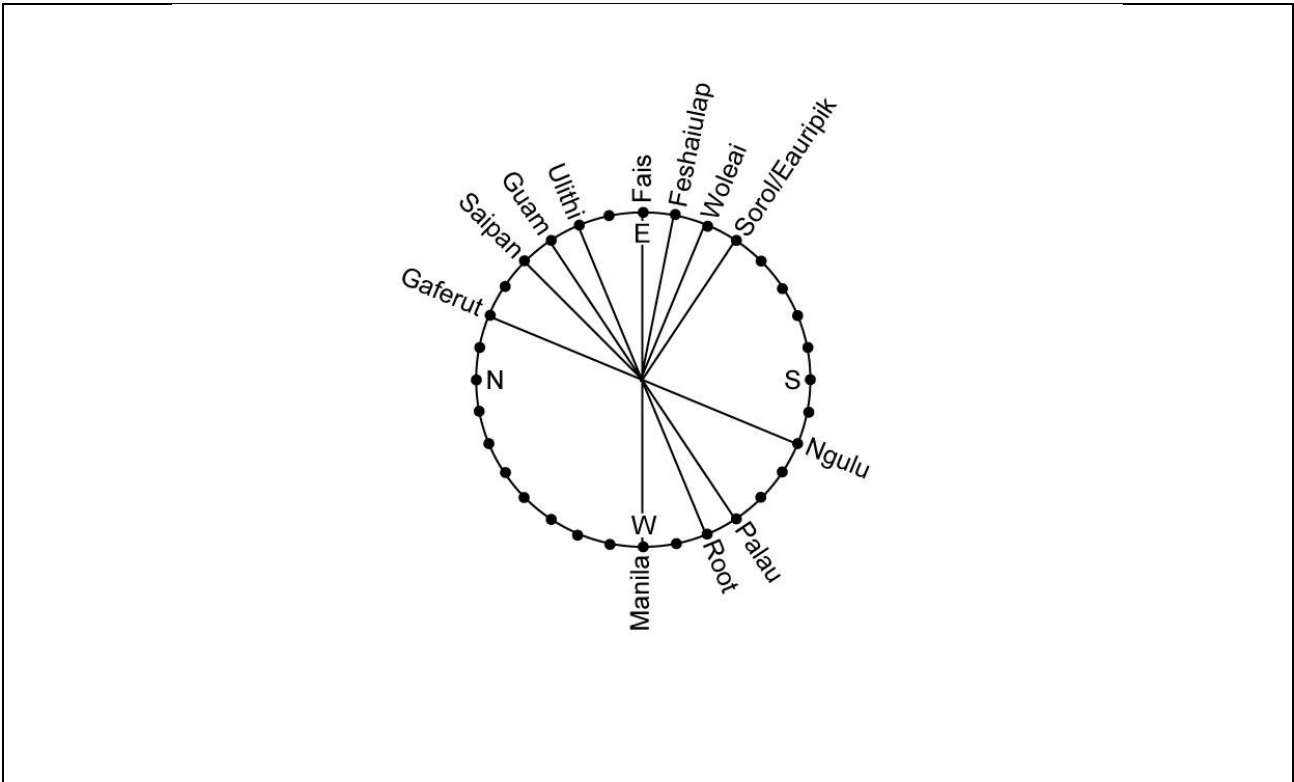
- Welwelel Fuismwagiut – Weleweleluupw
- Tegal Mailepalfang – Machemeiltou
- Tegal Weoleogies – Tubul Uupw
- Tegal Iugiulig – Tubul Metariu
- Tegal Meol – Tubul Tumur
- Tegal Mwegariger – Tubul Sarobeol
- Tegal Uul – Tubul Yeoliuyeol
- Tegal Paiyefang – Tubul Paiyeoiur
- Tegal Mailap – Tubul Mailap
- Tegal Paiyeoiur – Tubul Paiyefang
- Tegal Yeoliuyeol – Tubul Uul
- Tegal Sarobeol – Tubul Mwegariger
- Tegal Tumur – Tubul Meol
- Tegal Metariu – Tubul Iugiulig
- Tegal Uupw – Tubul Weoleogies
- Machemeyat – Tubul Mailepalfang



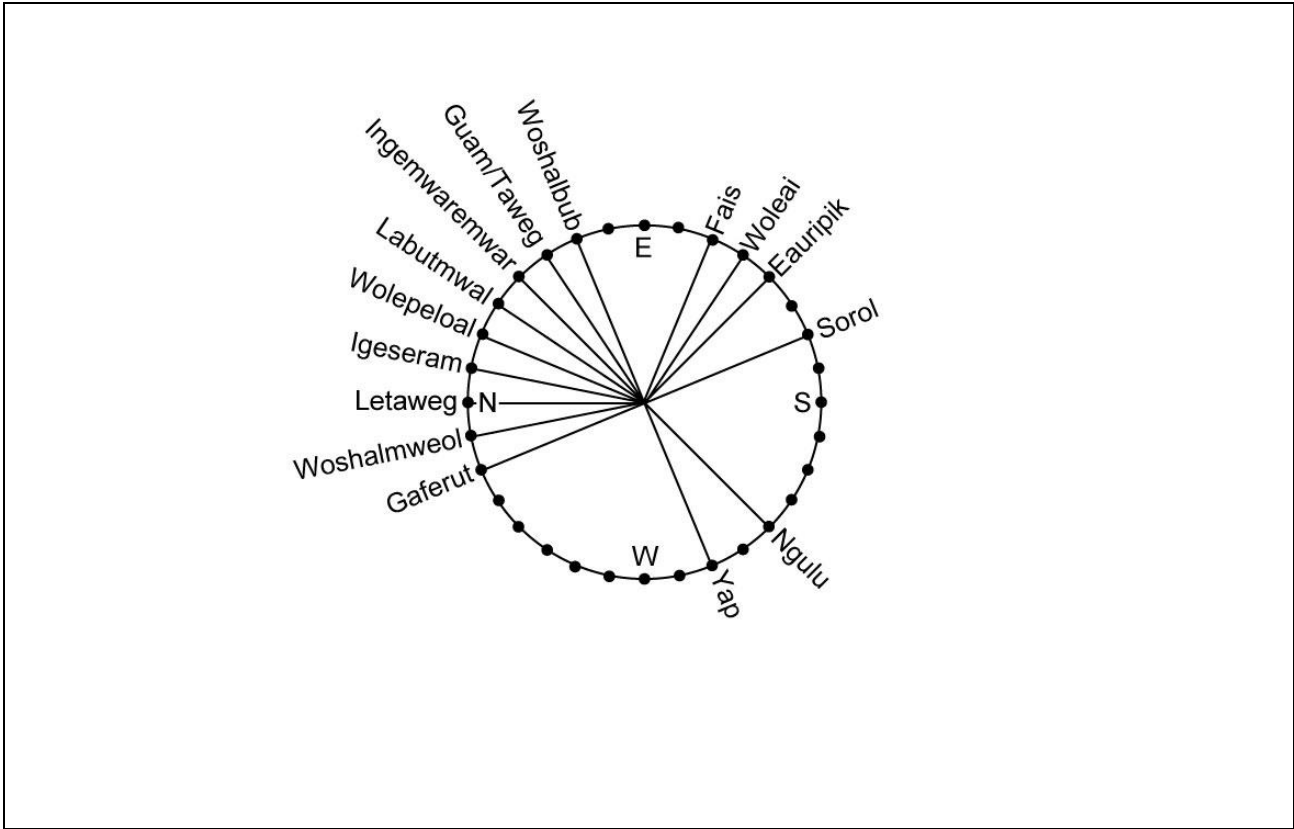
Appendix F: *Ofaliue* and *bugoff*



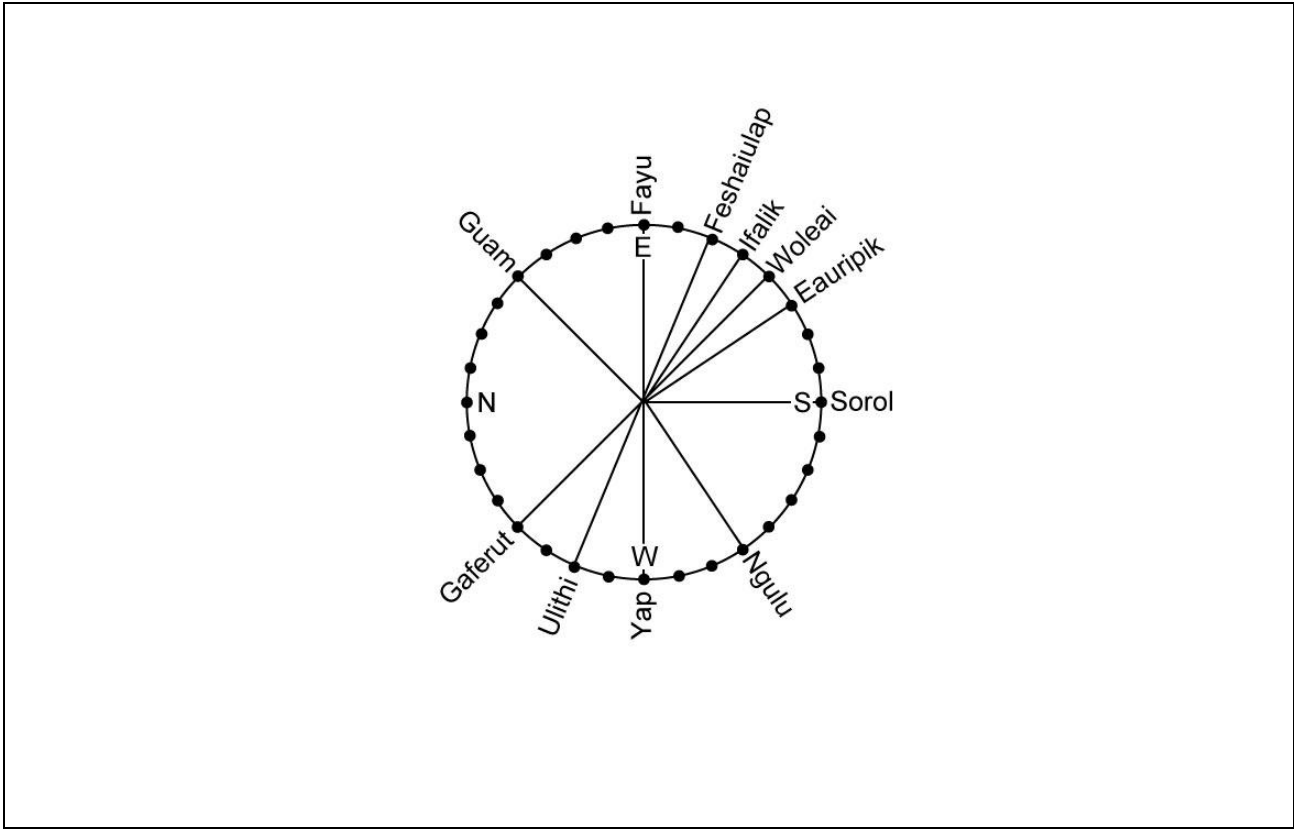
Ngulu



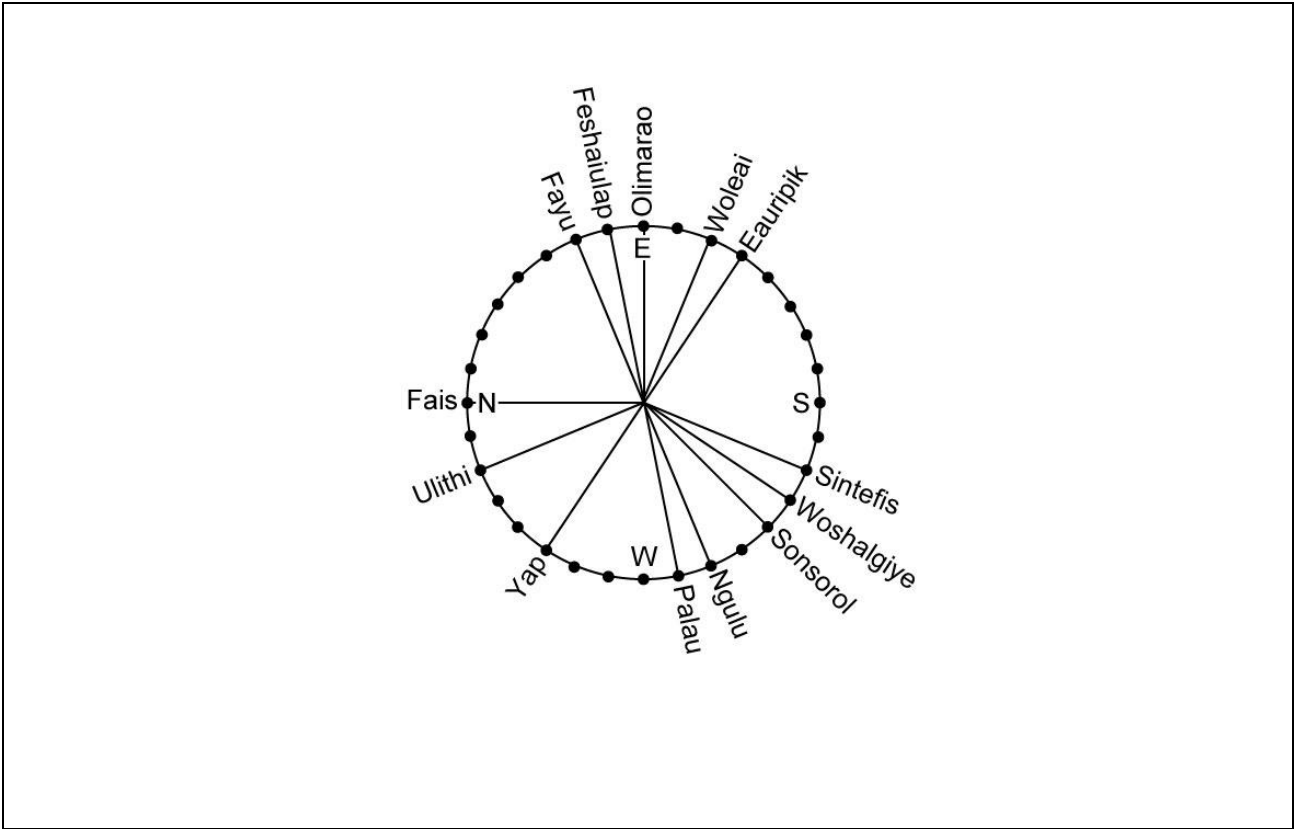
Yap



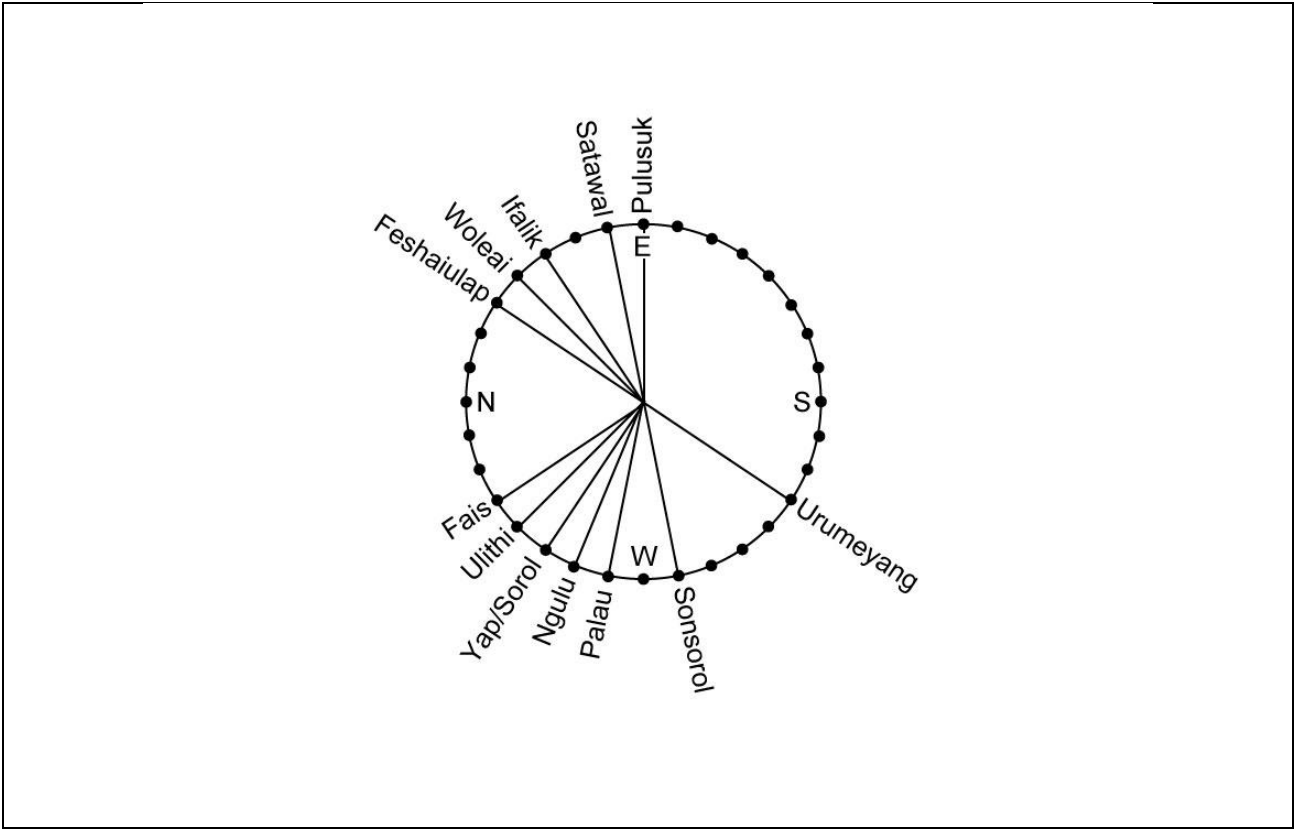
Ulithi



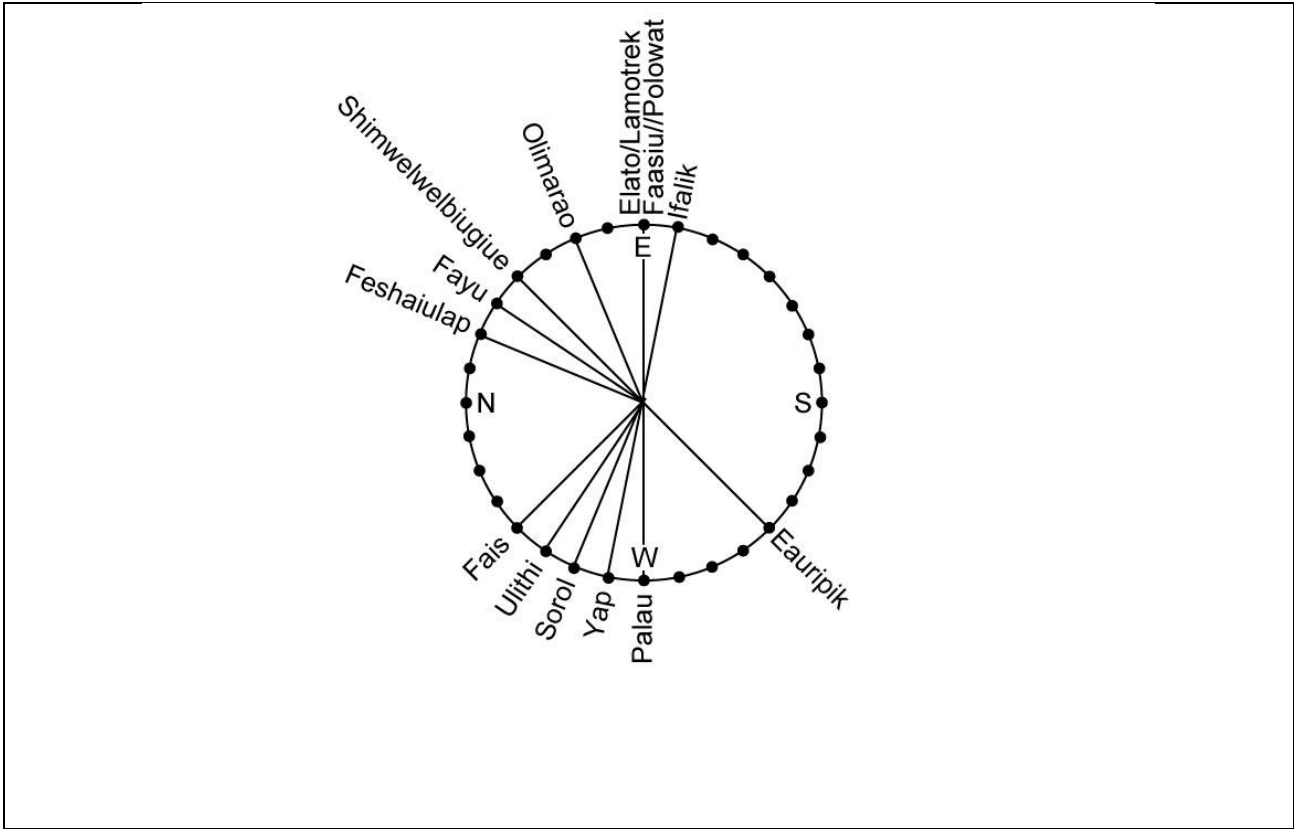
Fais



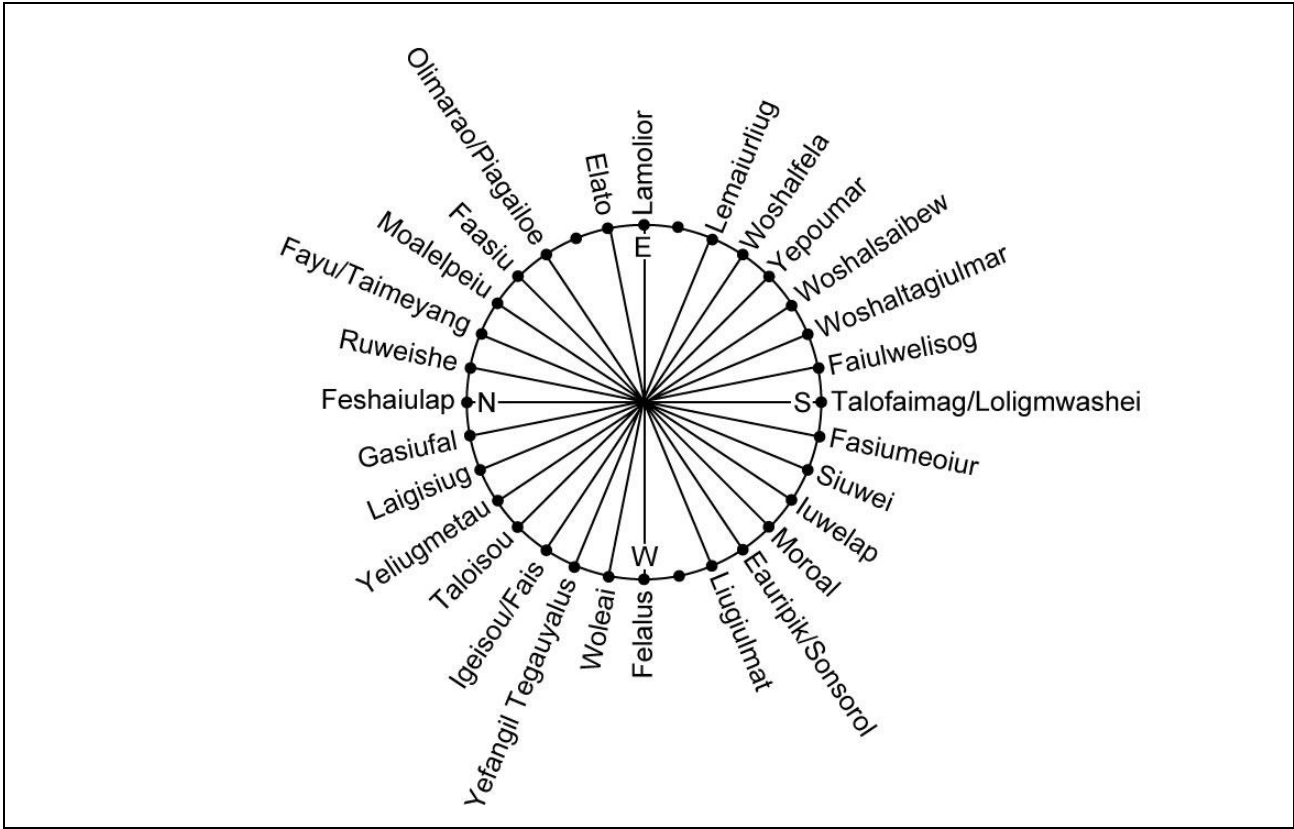
Sorol



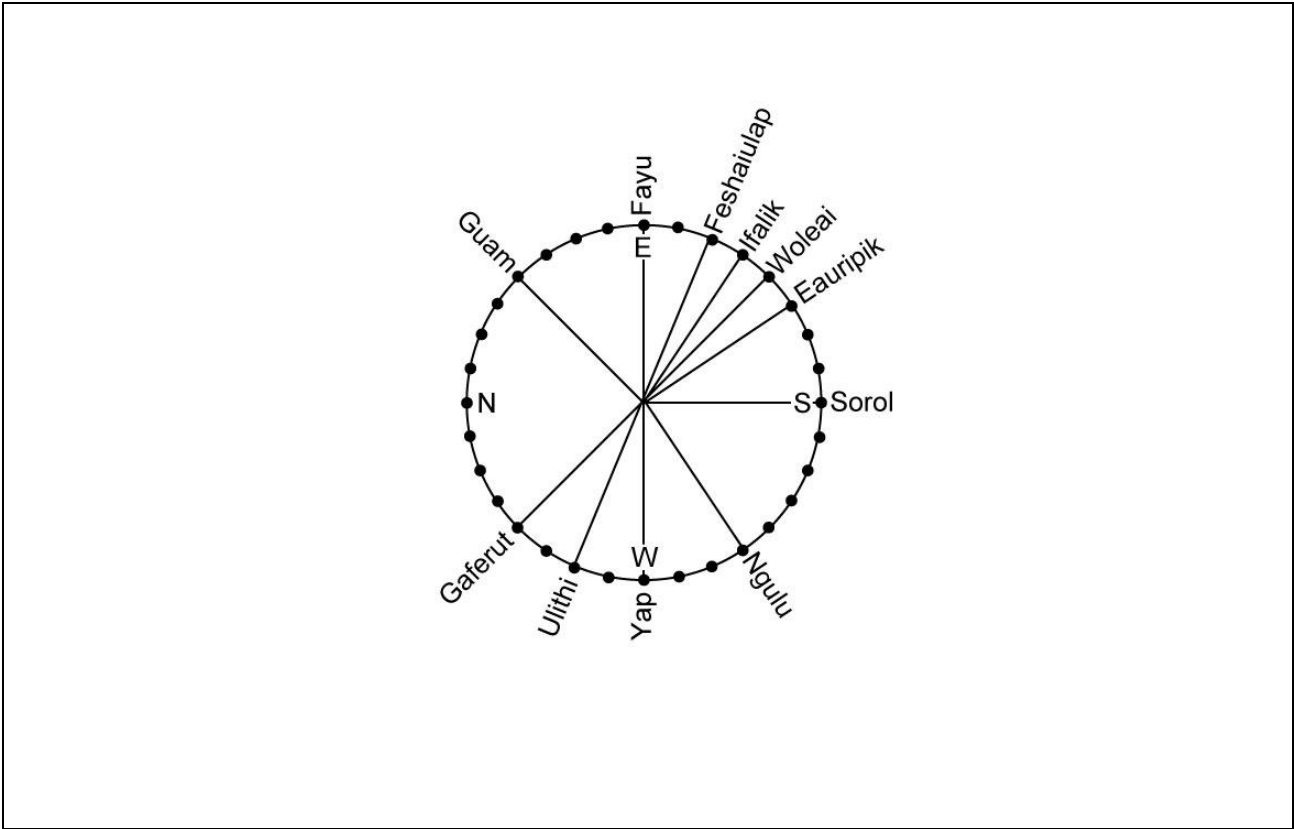
Eauripik



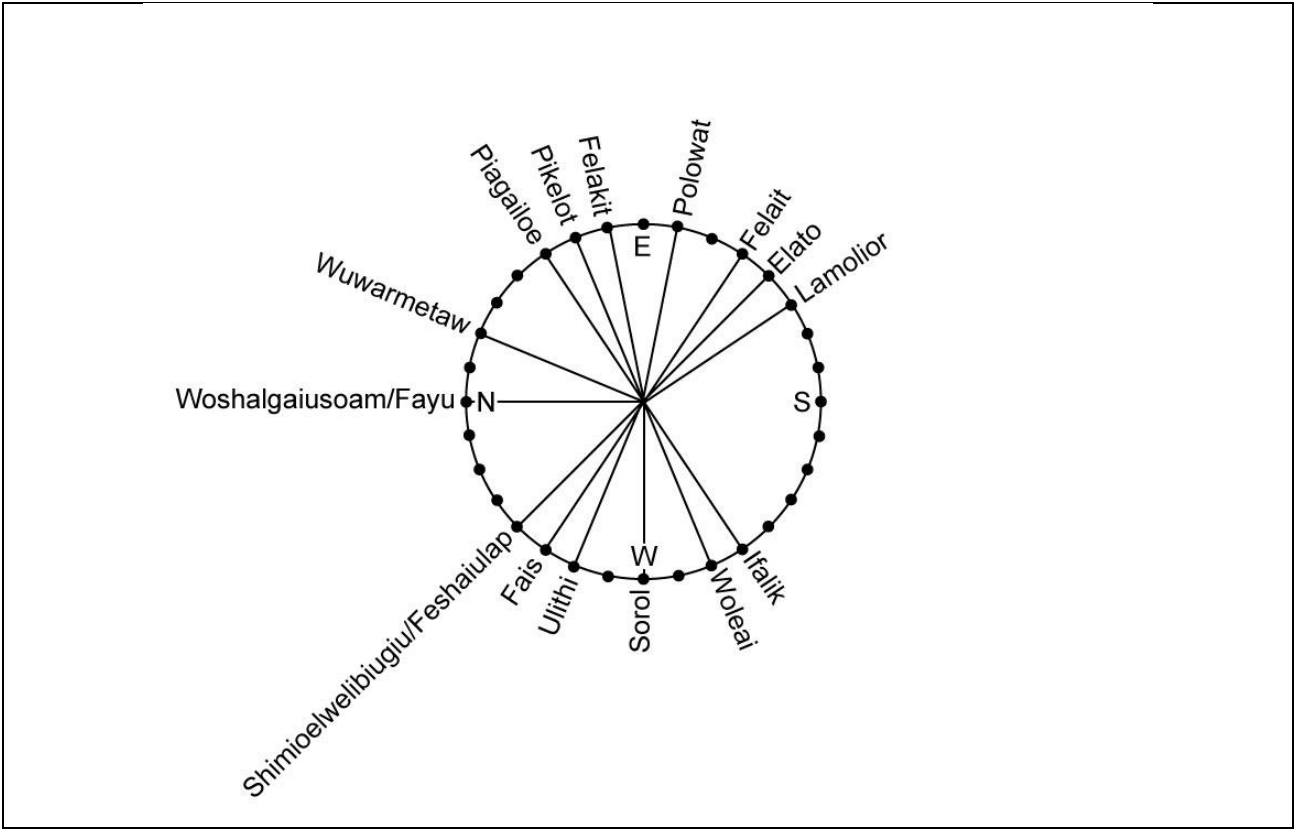
Woleai



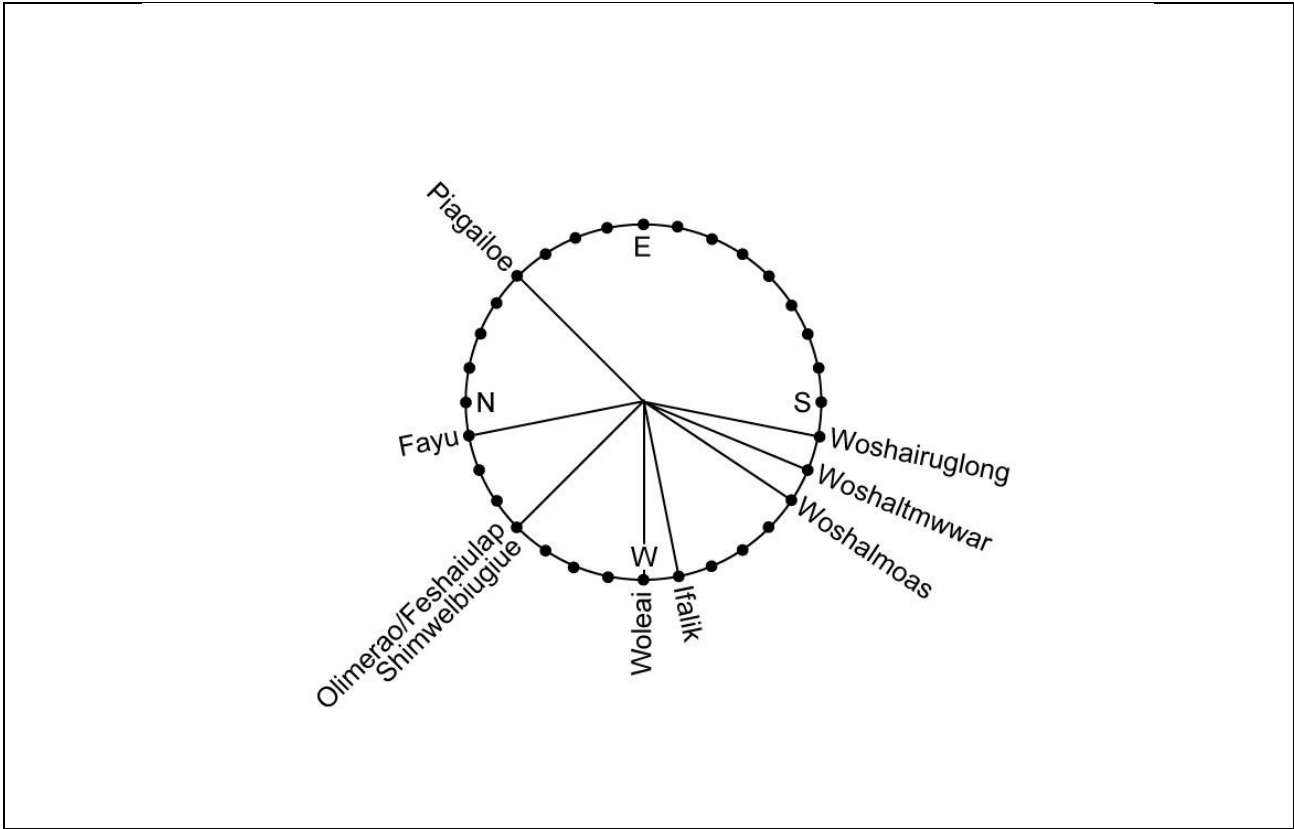
Ifalik



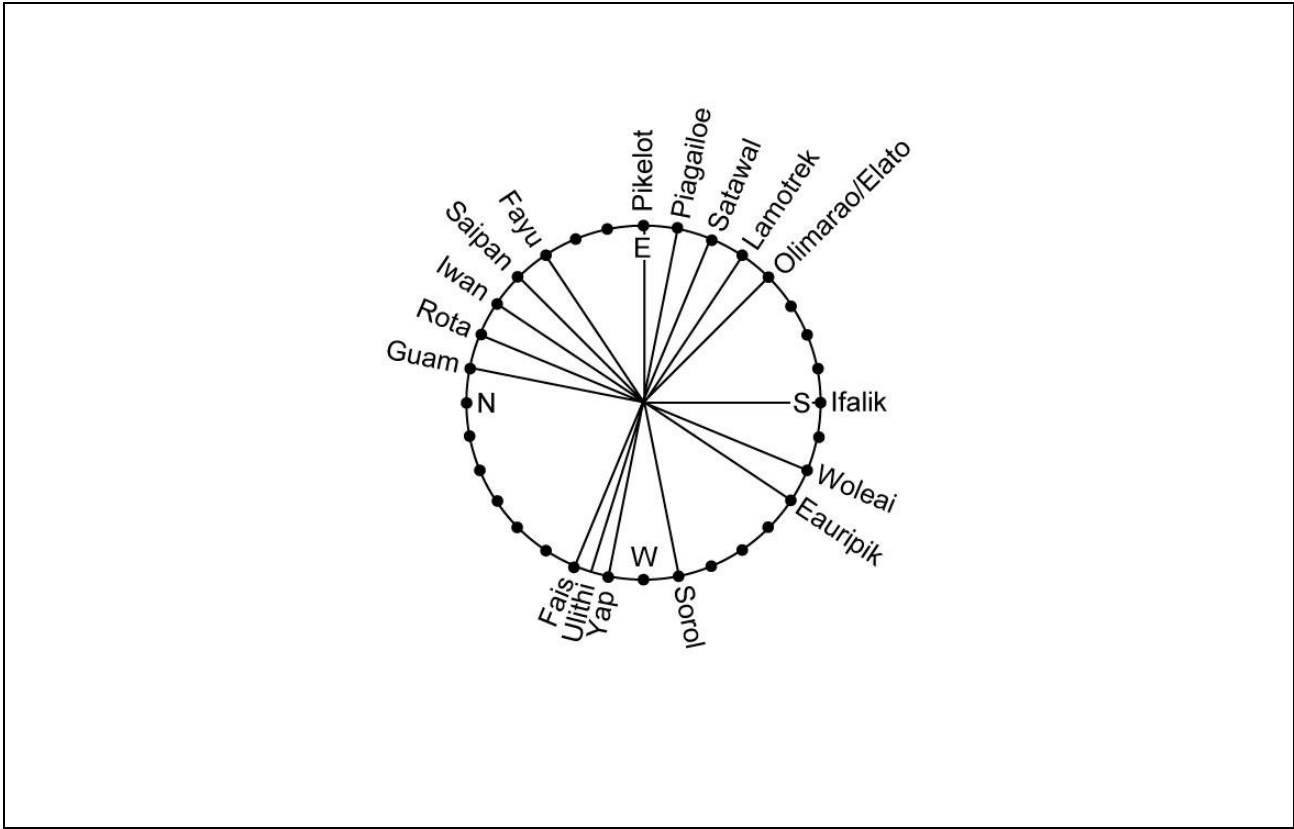
Fayu



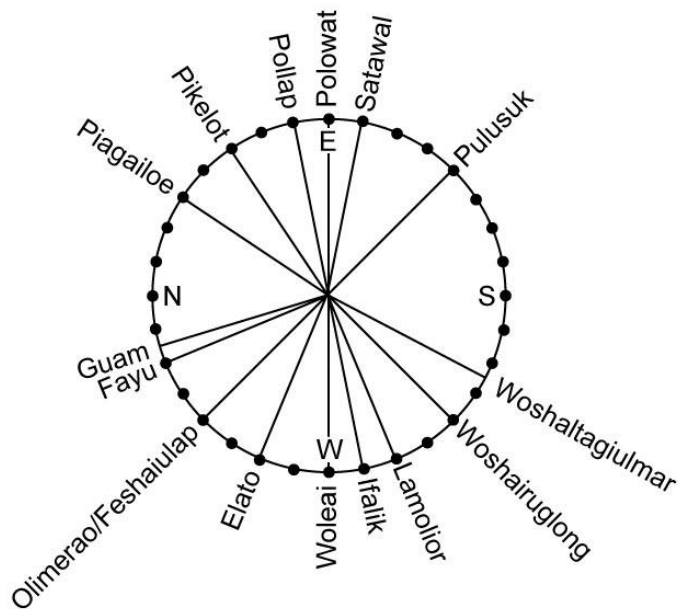
Olimarao



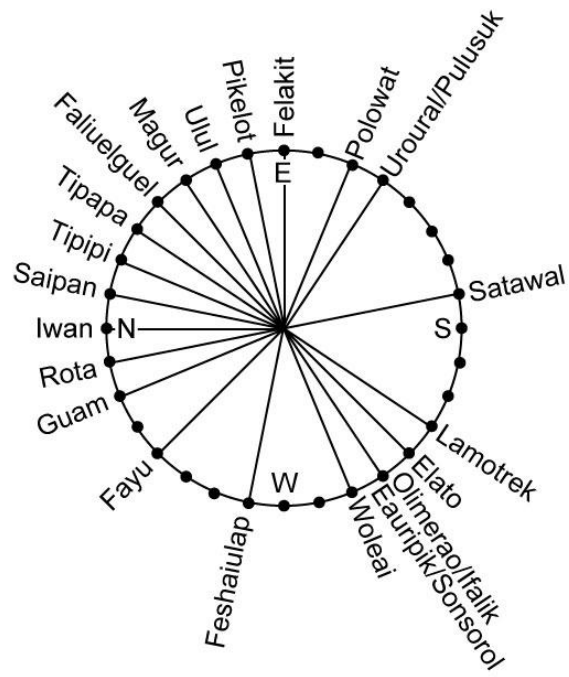
Elato



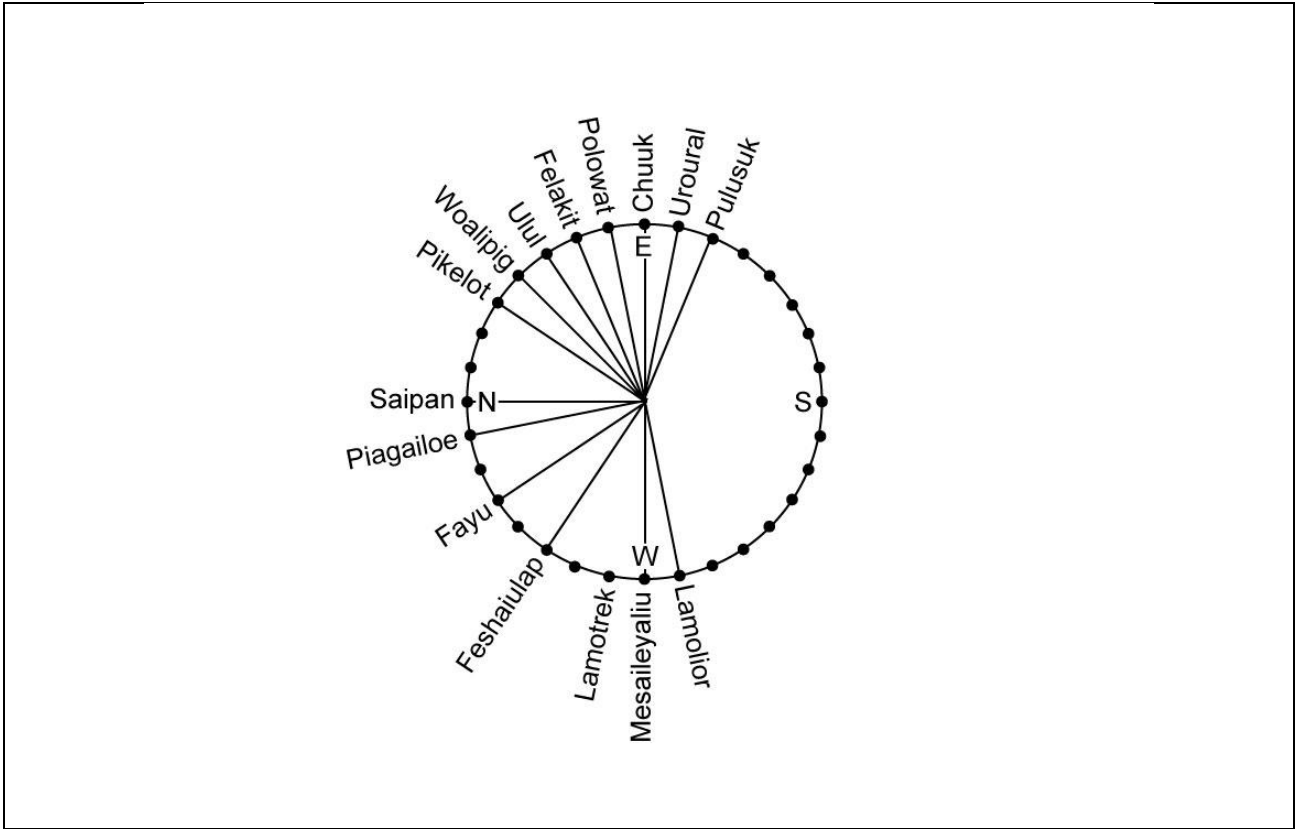
Feshaiulap



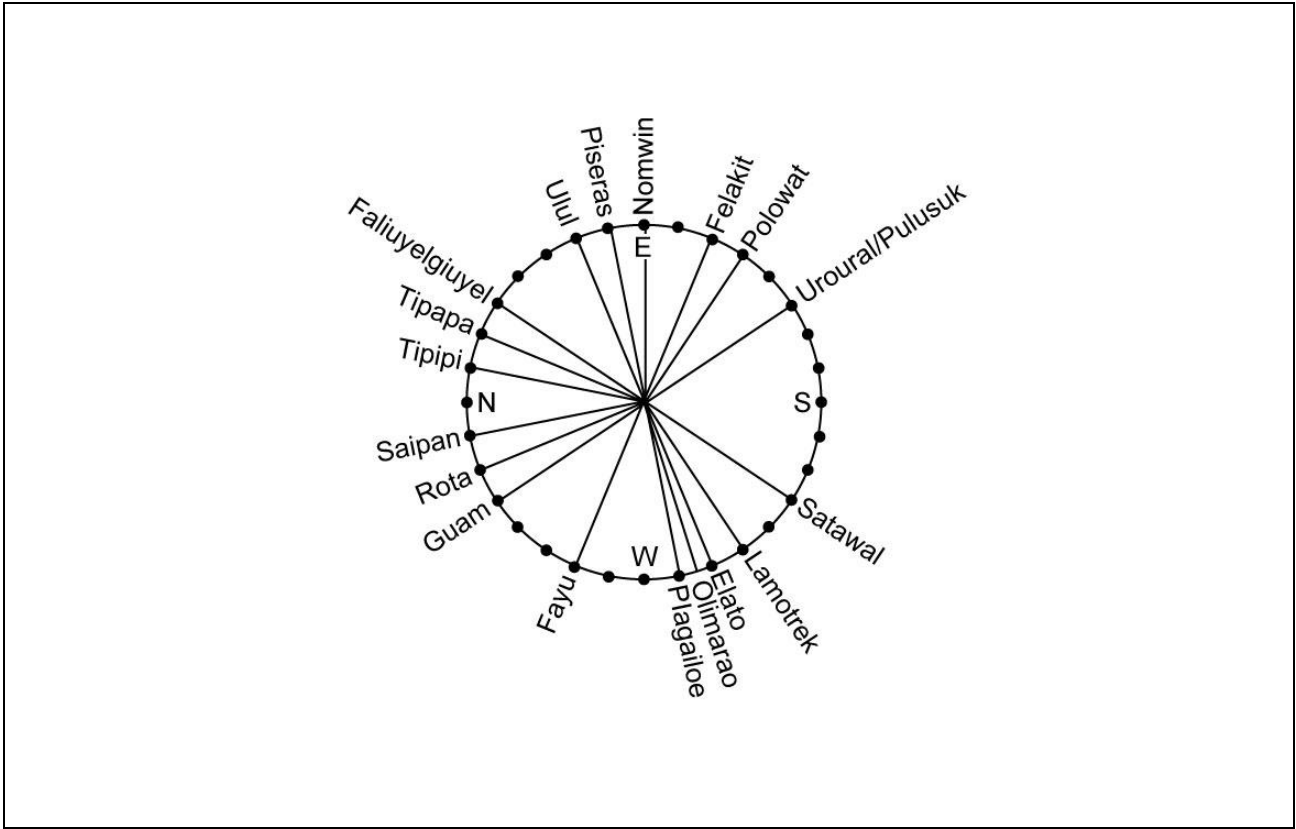
Lamotrek



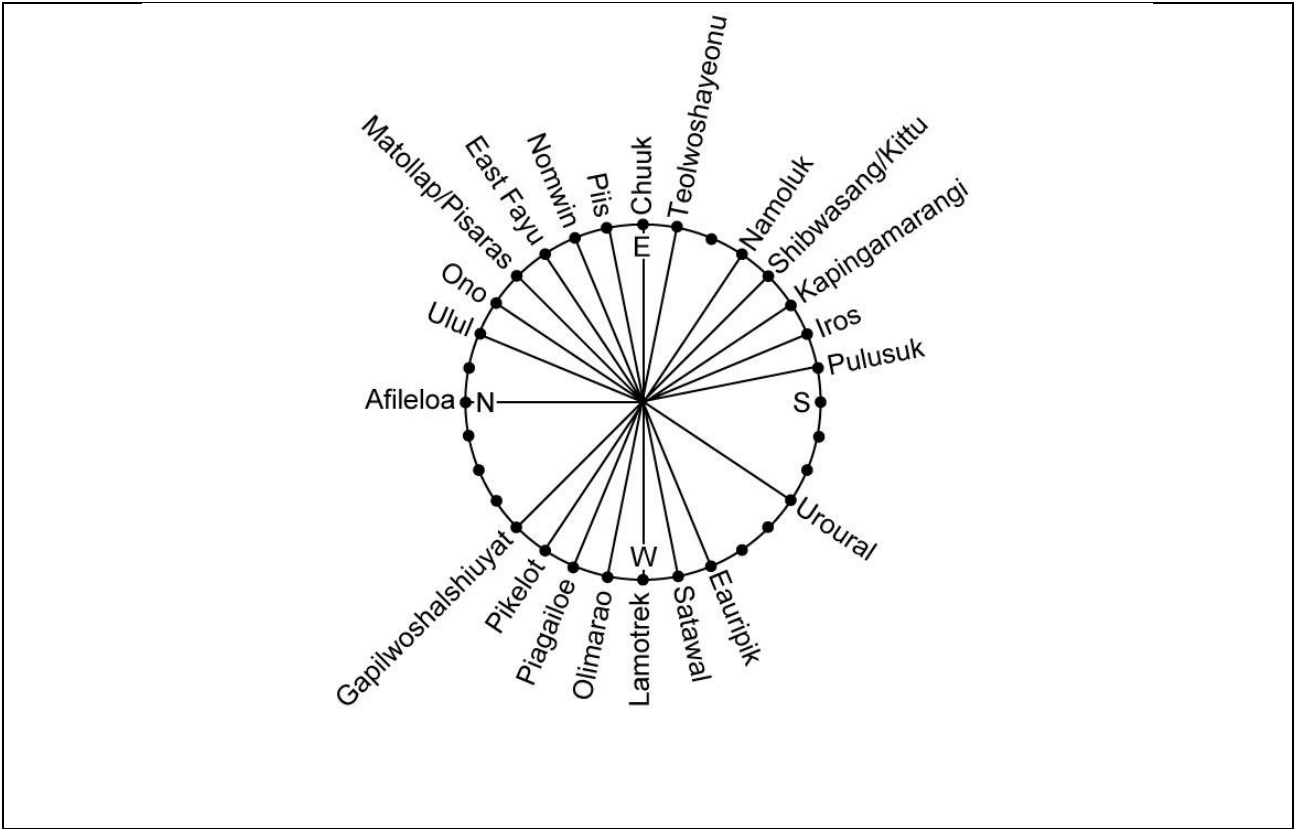
Piagailoe



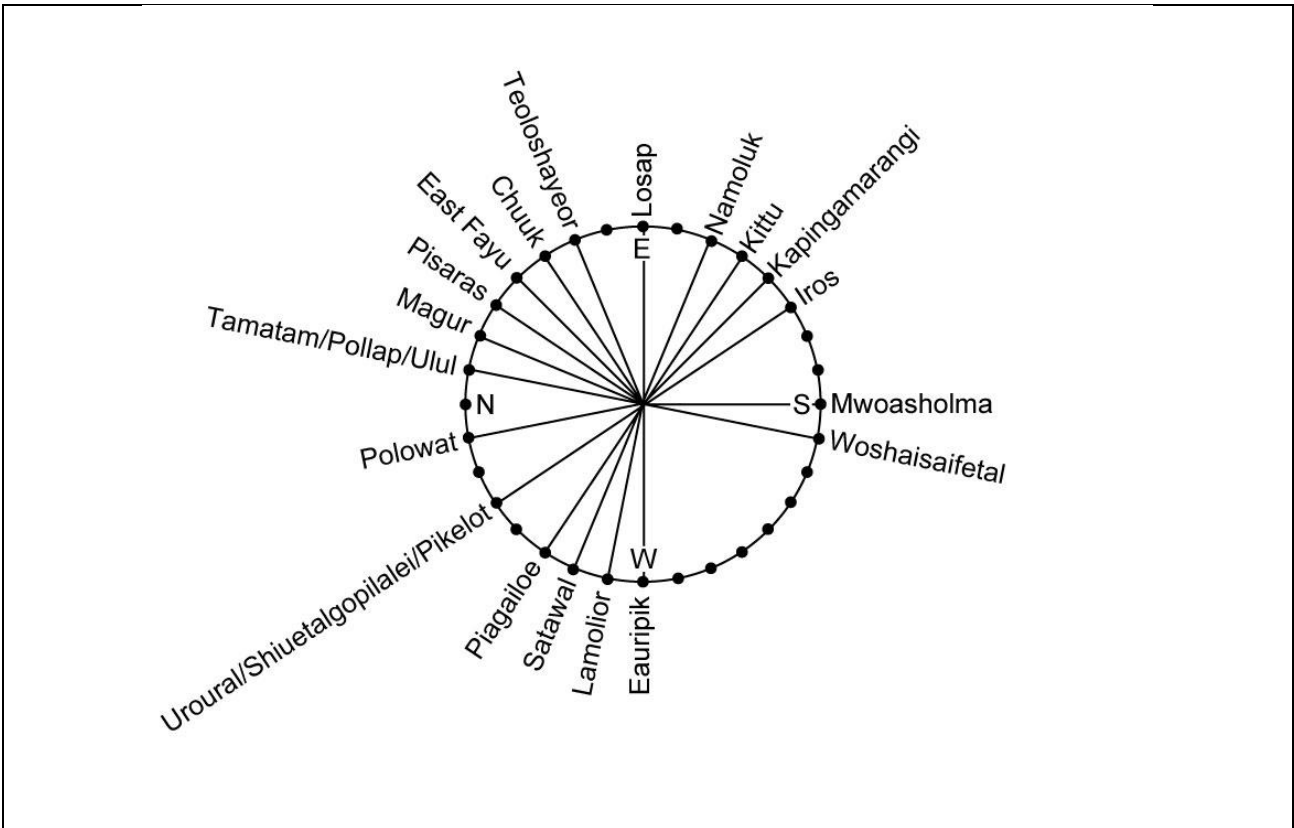
Satawal



Pikelot



Polowat



Pulusuk

Appendix G: *Feo iyat*

1:

(Toward the direction of Tegal Saroboel)

Polowat – Gasfairosh – Lemalifa – Lateomweoiu – Sigoalsoam – Peilmwar – Laigiulmwar – Lemagireng – Namoluk – Sew Pagou – Lebwayou – Ngatik – Lapwouilug – Ligosiu – Yarang – Yamwar – Piungitengag - Aniuniulamera

(Toward the direction of Tegal Mwegariger)

– Itengaglap – Piyelalomal – Faiutaroab – Piyeluryalo – Piyelwoayalo – Yanen

(Toward the direction of Tubul Mailap)

– Rachayalo – Igeluram – Woraiyoal – Rasouyalo – Ratag – Bwulmash – Mwigiloashosh – Mwigil Bwangbwang – Pohnpei – Woshalbwelilmweol – Igemwoal – Paiyiulwa – Raiugiuyalo – Soaroal – Yebeshmwar – Mwarugrug – Chuuk – Lalingeishug – Peoiusheo – Fishimwtag – Lugeilowmo – Fashimtiu – Lamwelilmwoash – Yeserwoash - Polowat

2;

(Toward the direction of Tubul Saroboel)

Piagailoe – Olimerao – Ifalik – Eauripik – Osheba – Urmiyarig – Tawalpiye – Tawalpiyolwa – Melilyeng – Pausongshol – Sonsorol

(Toward the direction of Tegal Mwegariger)

– Palau

(Toward the direction of Tegal Paiyefang)

– Ngulu

(Toward the direction of Tegal Mailap)

– Tilfamwar – Rapouta – Woleai – Elato – Lamotrek

(Toward the direction of Ttegal Iugiulig)

– Piagailoe

3:

(Toward the direction of Tubul Uupw)

Yanen – Yengilug – Aniuniul iuyel wal paliuelap – Faiutashabo

(Toward the direction of Tubul Mwegariger)

– Ligosu – Lapouilug – Yarang – Yamwar – Kosrae – Ngatik – Namoluk – Yagimwoa – Polowat – Lemwaisoamw – Woshafish – Pikelot

(Toward the direction of Tubul Saroboel)

– Wilaliut – Piagailoe – Lamotrek

Appendix H: *Gariuwau*

Name of reef trench (*gariuwau* fish's hiding place)/Island (direction of next movement)

1. Waulaugariu/Polowat (toward the direction of Machemeiyat)
2. Waulgoabur/Pulusuk (toward the direction of Machemeiyat)
3. Waumwal/Tamatam (toward the direction of Tegal Mailepalfang)
4. Waufafil/Pollap (toward the direction of Tegal Mailepalfang)
5. Waulma/ULul (toward the direction of Tegal Mailepalfang)
6. Waulmaiyas/Magur (toward the direction of Tegal Iugiulig)
7. Waulmaliu/Ono (toward the direction of Tegal Metariu)
8. Waumashmash/Onari (toward the direction of Tegal Metariu)
9. Waul Laariu/Piserash (toward the direction of Tegal Metariu)
10. Waul Labut/East Fayu (toward the direction of Tegal Mailepalfang)
11. Waulap/Nomwin (toward the direction of Tegal Yeoliuyeol)
12. Wahlmaliur/Fananu (toward the direction of Tegal Meol)
13. Waulrug/Chuuk (toward the direction of Tubul Uupw)
14. Waumwair/Oroluk (toward the direction of Tegal Mailap)
15. Waulapgo/Pohnpei toward the direction of (Tegal Yeoliuyeol)
16. Waulsaugeshou/Kosrae (toward the direction of Tegal Yeoliuyeol)
17. Waubeshbesh/Ngatik (toward the direction of Tubul Sarobeol)
18. Yeopau/Namoluk (toward the direction of Tubul Metariu)
19. Wauliugariu/Polowat (toward the direction of Tubul Metariu)

Appendix I: *Itemetaw*

1. Yap – Manila : Matewal Yatinga
2. Yap – Palau : Metaw Mwaal
3. Yap – Ngulu : Matewal Yap
4. Ngulu – Sorol : Falimwar
5. Sorol – Yap : Wolimwar
6. Yap – Ulithi : Matewal Rupal
7. Yap – Guam / Saipan : Matewal Wol
8. Ulithi – Fais : Matewal Mwarefash
9. Fais – Sorol : Metaw Pengag
10. Sorol – Ulithi : Matawliul
11. Sorol – Eauripik : Matewalgilmwar
12. Fais – Eauripik : Falmwegol
13. Fais – Woleai : Hapilmogol
14. Fais – Feshaiulap : Wolmogol
15. Eauripik – Woleai : Matewalbul
16. Woleai – Ifalik : Falyaroma
17. Woleai – Feshaiulap : Faligmwatur
18. Ifalik – Feshaiulap : Metaw Pengag
19. Feshaiulap – Fayu : Matewalmeol
20. Fayu – Ifalik : Wolyaroma
21. Feshaiulap – Olimarao : Hapilmetaw
22. Olimarao – Lamotrek : Matewalgaiusa
23. Olimarao – Fayu : Falgerag
24. Lamotrek – Piagailoe : Legerag
25. Piagailoe – Fayu : Liugiulgerag
26. Ifalik – Elato : Hapilerub
27. Fayu – Olimarao : Faliyash
28. Lamotrek – Satawal : Woireg
29. Satawal – Piagailoe : Matewalgamwamw
30. Satawal – Pikelot : Matewaluwemwar
31. Pikelot – Polowat : Matewalmel
32. Polowat – Pulusuk : Metaw Pengag
33. Pikelot – Piagailoe : Matewaishim
34. Satawal – Pulusuk : Faliwan
35. Satawal – Polowat : Hapilalei

36. Polowat – Pollap : Faisoab

37. Fayu – Polowat / Pollap : Lemurelyeng

Appendix J: *Mworol fius*

November: *Yaromwoi* (Arcturus). The bad weather begins in November and the wind, which shifts to the northeast, is called *mworal niyefang*.

December: *Shoau*

January: *Tumur* (Antares), *Metariu* (Shaula), *Meol* (Vega) and *Mailap* (Altair). These stars are called *mwor gefaitoa*, which means the stars that “fight” frequently with no period of good weather between them. It is a period of frequent stormy weather as these stars have very short distance in between them.

February: *Tapiye* (Delphinus), *Seota* (Equuleus)

March: *Pingenag*, *Laag*

April: *Igenap* (a fish-shaped constellation consisting of Pisces, Cassiopeia and Andromeda), *Yalimateo* (Andromeda)

Lecheg (summer)

May, June and July: *Gashoul Mwegariger* (‘rain from Pleiades’) and *Gashou waral Uul* (‘rain for Aldebaran’), no strong winds only rain

August: *Maaliu*, *Iich*, *Ilelgeg* (the wind shifts to the west)

September: *Buub* (Crux)

October: *Sarobeol* (Corvus), *Gopal Saroboel*

Appendix K: *Buub lapalaap*

Buub 1:

Head – Faliuel Giuyel

North (ventral) fin – Saipan

South (dorsal) fin – Olimerao

Tail – Fayu

Center – Loawe titil Saipan

Buub 2:

Head – Magil

North (ventral) fin – Fayu

South (dorsal) fin – Olimerao

Tail – Feshaiulap

Center – Fayu

Buub 3:

Head – Pikelot

North (ventral) fin – Fayu

South (dorsal) fin – Woshalgaiusoam

Tail – Feshaiulap

Center – Olimerao

Buub 4:

Head – Lamotrek

North (ventral) fin – Olimerau

South (dorsal) fin – Woshalmoas

Tail – Woleai

Center – Woshalmoas

Buub 5:

Head – Pulusuk

North (ventral) fin – Woshalgaiusoam

South (dorsal) fin – Faliuel Liutetel

Tail – Eauripik

Center – Woshalmoas

