SEE THE WINDS

PRACTICAL DIMENSIONS OF WEATHER FORECASTING IN A JAPANESE COASTAL COMMUNITY

The article examines how folk methodologies for weather prediction influence small-scale agricultural and fishing activities of a Japanese coastal community. Specifically, the article addresses some anthropological questions on how local fishermen predict the weather by developing two different forecasting practices: *takayama*, a practical weather observation technique that combines the observation of the clouds with a traditional nautical technique for orientation at sea and, *okite*, a model-based weather prognostication used to forecast long-term weather trends for the following year.

Keywords: Japan, Weather Forecasting, Local Knowledge, Environmental Anthropology, Ethno-Metereology.

Introduction[1]

In recent years, a renewed interest has been expanding in the anthropological exploration of historical and contemporary ideas and practices about how climate and atmospheric processes have a decisive influence on human activies within the context of everyday life[2]. Fitting alongside other long-standing branches of ethnoscience, the main purpose of ethno-meteorology[3] is the anthropological analysis of «people's observation of the weather, what they perceive to be the causes of the weather and, more generally, the place in the life and belief system of a society»[4]. Traditional metereological knowledge still represents in many areas of the world «a skillful art of observing the natural environment as expressed in the timing or flowering of plants, hatching of insects, arrival of migratory birds, etc., which enables farmers to make adjustments in farming calendar and crop selection types in any given season»[5].

There is a dominant theoretical tenet focusing on the multiple dimensions of this heterogeneous body of knowledge which makes «people perceive, understand, experience and respond to key elements of

the world which they live in»[6], including also the selection or rejection of scientific meteorological forecasting data[7]. Yet, Jankovic and Barboza state that «it […] remains to be seen whether meteorological expertise can provide sufficient information for runnung life on daily basis» wondering if «the local climate is always ready embedded in praxis and for that reason inacessible, at some level, for analysis»[8]. According to Rayner recent studies in social sciences seem to converge on two different aproaches to the research on practial dimensions of weather forecasting: on one hand, «people in a wide diversity of climatological and cultural circumstances exhibit some degree of ethnometeorological or climatological competence derived from a combination of experience of past weather patterns, occupational or survival skills, and social organization»[9]. On the other hand, anthropological research has reported that

> […] these existing levels of competence lead to the operation of a collective analogue of what is known to psychologists as the "confirmation bias". Put simply, this states that we tend to incorporate new information that is compatible with our existing views and reject that which is irrelevant to or in conflict with them[10].

Observing and anticipating meteorological phenomena in various ways that serve own needs better than outside forecasts constitute typical examples of those local sciences that interface with dominant global science[11] playing a complementary role in the production of climate information[12] or, in other cases, becoming a counter-narrative to the knowledge incorporated within other sources of scientific understanding[13]. As Sillitoe has observed

> it is necessary to point out that while there is a single global science […], there are large number of local sciences, illustrating the richness of human inventiveness; to suppose that they reflect different cognitive processes is fallacious, although they do reveal varying preoccupations in life and differing bodies of knowledge[14]

concluding that «the real issue is dealing with the diversity and dynamism that characterises human understanding»[15].

Studies have documented different cultural strategies in which local communities have intimately developed different «sub-cultures of the atmosphere»[16]: for example, among the Kenyah Badeng rice farmers of Sarawak (Malaysia) sensory knowledge is associated to weather forecasting to gather information on wind, temperature, rain or humidity

in order to schedule daily agricultural activies and responding to the extreme climatic events[17]. elsewhere, recent studies on African farmers have shown that traditional weather forecasting is a critical resource for local farmers to reduce the vulnerability to extreme climate events or drought[18], while rainfall forecasts allow farmers to maximize economic opportunities[19]. In Australia, Aboriginal people consider the ancestors and spirits as weather-makers, asserting that meteorological knowledge is enshrined in myths and expressed in songs through which they are able to forecast the cyclic patterns of seasonal changes after having observed the atmospheric phenomena, such as, wind direction, temperature change, or rainfall[20]. Similarly, the traditional Tibetan meteorological knowledge was based on a «system of local, qualitative interrlationships of humans and spirit powers»[21], where

> ritual specialists experienced in the weather observed local conditions and, by "reading" the shape and movement of clouds, the directions from which wind or thunder might come, the spreading of fog or the sunset colours in the clouds, they could determine which of these spirit powers might be active at any one time[22].

In light of the foregoing insights, it must be noted that in most cases traditional weather forecasting is often considered as a «cultural capital»[23] deprived of prestige compared to other hegemonic knowledge systems[24] and confined in special ecological niches or in rural economic contexts. However, such residual knowledge does not seem to have completely disappeared even in Western society, but it is manifested still today in certain cultural and economic contexts through sophisticated popular epistemologies. According to Ellen and Harris

> western folk knowledge […] is arguably just as important as it ever has been, though different, informed by science where appropriate and located in different contexts […]. Moreover, in parts of Europe urbane folk actively seek out the authoritative knowledge still regarded as being present in their own paesant traditions, as in truffle-hunting, geese-rearing or the preservatgion of rare breeds of sheep[25].

Strauss has noted, for example, that weather lore encapsulated in proverbs and folk sayings in Leukerbad shows that «farmers, sailors, mountain guides, and others who make their living by their skills at navigating nature's complex rhythms and random disturbances, know that to trust the weather's forecast alone is to cast one's lot to the wind – there is no substitute, no matter how sophisticated, for being there»[26].

Being there, in other words, denotes an empirical knowledge that is tacit, intuitive, informal or uncoded and it «continues to inform the practical engagement of ordinary skilled people»[27].

Contemporary understandings of the natural world can also be found in the context of industrialized Asian societies such as Japan, where traditional metereological knowledge continues to coexist with the most sophisticated meteorological forecasts[28]. The climate of Japan is characterized primarily by monsoonal air masses which affect the weather conditions throughout southeastern Asia, a marked seasonal rhythm in precipitation and numerous fronts with associated typhoons[29], which occur in late summer and early fall[30]. Consequently, due to the enormous influence of these climatic factors on the Japanese archipelago, fishermen and farmers still continue nowadays to use meteorological classifications, interpretative systems on the interactions and effects of atmospheric agents influencing small-scale economies, which represent some examples of reflexive negotiations of meteorological risk[31].

Starting from these preliminary reflections, the article offers an ethnographic examination of the traditional weather forecasting systems used by fishermen and farmers of Sajima (Kanagawa Prefecture), a coastal community located on the west coast of Miura Peninsula (fig. 1). As will be seen, traditional forecasting is based on practices of direct observation of the territory and weather: by observing, from the beach, the shape and the movement of the clouds, the different types of movements of sea currents and *waves*, the direction of local winds, rain intensity including also the observation of the islands over the sea during winter season. This series of weather forecasting methods is locally called *see the winds* (*kaze wo miru*), a dialectal expression that indicates that local winds, clouds and currents at the sea surface are intimately interwoven with fishermen through complex relational processes.

The main hypothesis of this article is that Sajima fishermen's traditional weather forecasting is still based on a logic of sensible qualities defined in terms of capacity for social action in a particular environmental context. Given the general scarcity of literature on how traditional weather forecasting influences decision-making processes among fishermen in industrialized societies[32], the contribution of the article is to show how Sajima fishermen and farmers still continue to critically evaluate folk meteorological data. Avoiding also interpretations that relegate this type of knowledge to a declining folk tradition[33],

this article intends to offer a key to critical reflection on a system of knowledge that continues to have a certain impact on the small-scale economies.

The article is divided in two main sections. In the first section it will be discussed how this forecasting practice is characterized by a strategical combination of nautical orientantion and weather prediction: the traditional nautical technique for orientation at sea called *yama ate* (mountain addressing) and the *takayama*, that is, a short term forecasting knowledge of the local weather parameters, based on the observation of the movements of clouds and winds. In particular, *takayama* provides a set of complex cloud observation practices that provide important information on short term weather conditions and is closely linked, according to Sajima fishermen, to specific metereological behaviors of the winds. In the second section, it will be discussed a traditional form of weather prognostication called *okite* used by the inhabitants of Sajima to forecast long-term weather trends. The article also examines how okite includes a complex set of strategies for risk-based management approaches to the potential meteorological threats, such as typhoons and violent local winds, which may have detrimental impacts on small-scale agriculture. In the conclusion, the overall argument of the article is that *takayama* and *okite* converge within a body-mediated performative knowledge system based on practical skills developed by local fishermen and farmers in an given environment.

Mapping the clouds

Sajima is located at Miura Peninsula (*Miura hantō*), which divides the Tōkyō Bay (*Tōkyō wan*), to the east, from Sagami Bay (*Sagami wan*) to the west. This coastal community overlooks the Sagami Bay which geographically contained within the scope of the Miura Peninsula (Kanagawa prefecture) to the east, the Izu Peninsula (Shizuoka prefecture) to the west, and the Shōnan coastline to the north, while the inhabited volcanic island of Izu Ōshima marks the southern limit of the bay. The geographical settlements of Sajima creates therefore an isolated seascape surrounded by mountains and dotted by small islands.

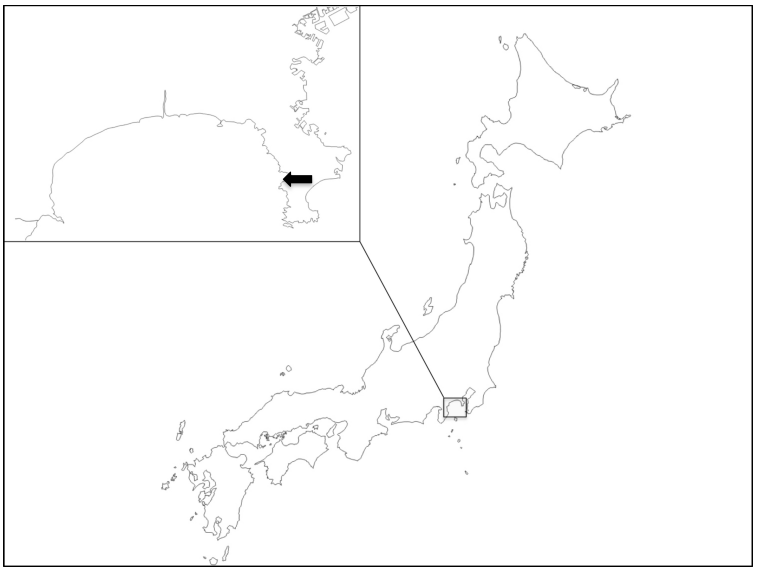

FIG. 1. The Sagami Bay and the geographical position of Sajima in the coastal area of Miura peninsula.

In this geographical context, the seascape in which local fishermen daily operate is generally classified according to two spatial categories: starting from the coast, the adjacent maritime space (including the shoreline and beachline) is defined as *kiwa*, while the remaining maritime space of the Sagami bay is called *oki*. Both *kiwa* and *oki* are considered the productive areas in which fishermen operate, while the outermost area, considered unproductive, is subdivided between *dainan* (which borders with *oki*), and the most outer maritime area called with the general term of *umi* (sea). *Kiwa* and *oki*, as well as delimiting the productive area where local fishermen do the *koshoku* or small jobs (a term to indicate the main local fishing activities: *mizuki*, or spear fishery by water glass and *moguri*, a diving technique), respectively indicate the east and west of Sajima Bay[34]. Sajima fishermen use the expression *higashika nishika okika kiwaka* (east or west, *oki* or *kiwa*) to describe the geographic orientation at sea, as Sagami Bay is facing south and it is surrounded by mountains to the north[35].

Such orientation system also implies detailed observations of marine currents by identifying the *nishiccho* (west tide) and *higashishiccho* (east tide), while, along with the north-flowing ocean current Kuroshio (black current), Sajima fishermen further classify local currents as *uwattecho*

(upper tide) and *shitaccho* (down tide), that, respectively, refer to the tide that flows to the land, and to the tide that flows from the shore to the ocean[36]. Finally, it should be noted that the observation of the currents and the division of the seabed are determined by the already mentioned local fishing activities: *mizuki* is a fishing technique that uses a water glass to locate the seafood that are harvested with a spear, so that the fishing ground is limited by the length of the fishing rod (7-8 m), while *moguri* is a diving technique limited to a depth of water of 20-23 m[37]. It can be stated that the boundaries between *oki* and *kiwa* are therefore determined by the fishermen's practical perception and calculation tecniques of the depth of the sea.

The classification of the maritime territory and of the sea currents are directly related to *yama ate* (mountain adressing or allocating the mountain) that is, a traditional nautical technique for orientation at sea through the identification of visible landmarks on the sea surface and other factor evaluations (such as, current direction, current velocity and fish target)[38]. Igarashi outlines the basic principles of this cognitive grid[39]:

> [a fisherman] watches a fixed landmark or a pair of landmarks which are familiar to him and observes how the landmarks look from his boat to enable him to know his present position. With the help of two pairs of landmarks, if available, he can bring his boat, with considerable accuracy, to a given spot, where the two position lines intersect as a result of lining up one landmark behind the other[40].

Generally, *yama ate* can be distinguished in two main categories: a rough positioning method of nautical orientation and a method that defines with accuracy fishing spots exploiting visible elements of the surrounding maritime area, such as rocks, islets and capes[41]. Again, Igarashi, based on a case study on the Tokara islands, has identified three main types of *yama ate*: *nihō ate*, the most ordinary method «of seeking for an intersection by crossing up two position lines, each of which is determined by a pair made of a fore landmark and a hinder one»[42]; the position-line method or *ippō ate*, in which fishermen use «only a pair of landmarks to determine a single position line»[43], and, finally one landmark method, a nautical method that is «the most inferior in accuracy […] that is used in the fishing spots for the "inshore drifting" type of hand-line fishing always in association with scrutinizingly plumbing»[44].

Similarly, Sajima fishermen have developed different types of *yama ate* for locating fishing spots in Sagami Bay: the two position-lines

method, which consists in locating two mountain peaks from the sea placing the fishing boat perpendicularly to the highest summit or, its variant, the localization of two mountain peaks where the fishing boat is placed instead perpendicularly to the slope that separates the two mountain peaks; finally, the observation of mountains, rock and small islands that appear on the sea horizon. Consequently, the highest mountains surrounding the Sagami Bay play a strategic role for the *yama ate*: some of the most important mountains that serve as landmarks for Sajima fishermen are Mount Fuji (the highest mountain in Japan: fig. 2) and mount Mihara (an active volcano on the Japanese isle of Izu Ōshima) which dominate the seascape of Sagami Bay, while Mount Ogusu (the highest point on Miura Peninsula) and Mount Take are located 20 km far away from the coasts of Sajima.

In Sajima, the observation of mountains, small islands or sea currents are linked to a complex system of weather forecasting, which constitutes an example of bi-dimensional interaction between meteorology and fishing culture. The ability to forecast weather is called takayama (high mountain, a term commonly used in *yama ate* to locate a far landmark) and persists as an long established folk tradition of meteorological forecasting throughouth Japan. The practice of weather watching is generally called *hiyorimi* (watching the weather) and refers to methods of forecast through the observation of clouds movements, the flow of the sea currents and the direction and strengh of local winds[45]. Since Edo period (1603-1868) *hiyorimi* was a strategical forecasting method for sea transport since «Japanese ship was not constructed to resist heavy seas, and since nearly half of the inshore water around Japan are very rough, ships normally found themselves separated from any nearby harbor»[46]. In addition, it is important to note that «The Japanese archipelago is affected by intersecting warm and cold sea currents that result in unique meterological conditions in each local area, making the weather forecasting extremely difficult» so that «the custom to maintain a system whereby constant observations were made of weather conditions, and the persons who made these observations accumulated long experience in their respective locales»[47]. For these reasons, weather watchers (*hiyorimi*) climbed the summits of the mountains (*yori yama*, or, weather hills)[48] around the harbors to observe the color of the sea[49], or the shape of clouds and waves[50]. These specialists were often called *uomi yaku* (fish watcher) because they were able to observe both daily weather phenomena and the movement of large schools of fish[51].

Unlike the *hiyorimi* weather forecasting practice, which generally took place on the top of a mountain, *takayama* consists in going to the

Sajima's beach during the winter period to watch the western islands that are located beyond the Sagami Bay in order to forecast the weather trends by observing sea currents and waves and other atmospheric phenomena such as rain and winds. As previously mentioned, Mount Fuji and Mount Mihara are important for *takayama* as being also important landmarks for the *yama ate*. In particular, Sajima fishermen constantly keep an eye on meteorological phenomenona linked of Mount Fuji, because the top of the mountain is often shrouded in clouds, due to the very cold temperatures at the summit mixing with the moisture in the prevailing winds, thus creating a specific weatherscape to be observed. As a metheorological rubric to browse, fishermen carefully observe the so-called *kasa gumo* (umbrella clouds: see fig. 3), the stationary lenticular clouds which are normally in perpendicular alignment to the wind direction, and *tsurushi gumo* (hunging clouds, when the cloud moves away from mountains), which are interpreted as a sign of changing stormy weather.

Takayama is associated with the practices of sailing and fishing activities, which assign to the maritime territory and its relative meteorological conditions cultural meanings that depend both on the way fishermen live the sea and the way they perceive their environment. It follows that *takayama* is intimately related to the cultural processes of signification of the territory: the classification of maritime space according to cultural criteria based on the level of productivity, the practices of orientation at sea and the intimate knowledge of a territorial grammar of the landscape are all interrelated elements that define the landscape as a socially produced space constituted in relation to human agency[52]. It follows that, watching clouds movements or studying the direction of the winds or the sea currents must be connected to the anthropological idea that landscape is essentially «a fabric of interactions between perceptions and practices»[53]. *Takayama* provides thus a critical reflection on a forecasting system based on a rich variety of sensory knowledge that, as we will see in the next section, continues to have some influence on the seasonal and inter-annual activities of this coastal community.

FIG. 2. Mount Fuji seen from Sagami Bay.

FIG. 3. The meteorological phenomenon of *kasa gumo*, the lenticular clouds on the summint of Mount Fuji[54].

Folk predictive models

A further insight into these traditional weather forecasting practices is about the fishermen's ability to formulate a predictive model that is based on direct observation of weather phenomena, using similar modalities of the *takayama* forecasting system, with the difference that it is more static in order to offer long-term weather forecasts. In this context, *okite* is an example of model-based predictive knowledge of local weather that is very popular among the fishing communities on

the west area of Miura Peninsula and consists in the ability of *seeing the winds*, that is, to recognize local wind patterns, the strenght and the direction of the winds, including the observation of the variation of temperature and rain, in order to create a meteorological calendar for the following year.

Okite is embedded into a typical example of a local knowledge system, coded by folk taxonomy[55] and gained by empirical observation. Such «practice of anticipation»[56] is characterised by a culture of prediction epistemically legitimated, which ideally shares similar configurations of scientific meteorological knowledge. The main reasons for this legitimacy can be summed up in two ways: the prediction practice of *okite* follows a universal model of weather forecast modelling and, secondly, it still has a strategic role as a source of alternative weather knowledge in managing local meteorological hazards.

With regard to the first point, according to Kirsten Hastrup the different processes of forecast modelling basically rely upon five similar components: observation, formalization, experimentation, projection and action[57]. Observation is about pay attention in «holy mountains, ice cores, cyclones, or atmospheric turbulence, but wherever the observational or experiential material is produced the implicit point is an acknowledgement of the agency of matter»[58]. Formalization is about «an establishment of rules and regularities implicit in the material. Such regularities may be established on the basis of diverse mechanism, such as enumeration or mapping, leading tostatistical correlations or (mental) diagrams»[59]. Experimentaion implies testing «some of the regularities and possibly to revise the rules»[60] thorugh manipulating some forms according to a computational or experiental perspective. Projection is the result of the experimentation which «in some cases are expressions of probability, in other of well-established rules»[61]. Finally, action «is a possible outcome of the projections, whether in terms of everyday or political action; but it is also a function of one's understanding of the plot in which one takes part, including its temporal and spatial extension»[62]. Such modelling processes are influenced by specific «cultural blueprints»[63] and shaped by mechanisms for cultural internalization (rituals, ceremonies, worldview and cultural values).

Following this perspective, the five universal components that consistute the processes of forecast modelling could be ideally present in the *okite*. Such traditional form of weather prognostication is based indeed on measurement and observations of local winds and rain (observation) made during the month of November. By recognizing signals such as wind direction and velocity, Sajima fishermen are able to forecast long-term weather trends establishing metereological pat-

terns (formalization), eventually renegotiating the established meteorolgical regularities (experimentation) and formulatin of folk meteorological bulletins (action) that can offer an important complement to the risk-assessment process in local economy such as, for example, the critical assessment of the harmful effect of local winds on crops and plants.

Undoubtedly, the forecasting practice of *okite* historically reflected the need of generations of fishermen and farmers to have a sense of what the local weather will bring during the following year that lead to the creation of a weather prognostication system. *Okite* still represents a recognized normative calendar for the cyclical manifestations of local meteorological phenomena, which has also some strategic value for the «folk conceptual frameworks» of metereological hazard management system. In Sajima coastal fisheries and small-agriculture are essential components of the local economy and weather observations and interpretation of meteorological phenomena have guided seasonal and inter-annual activites. Indeed, this coastal community is commonly called *oka hama* in the western areas of the Miura peninsula, a term that literally means «agriculture (*oka*) fishery (*hama*)», while the inhabitants of Sajima call themselves *hyakushō ryōshi* (farmer-fisherman)[64]. It follows that, the cultural authority of *okite* is precisely due to the economic context in which it is produced: elaborated by fishermen, usually old fishermen who play a similar role to the already mentioned *hiyorimi* and *uomi yaku* (weather watchers)[65], the weather information contained in the *okite* is therefore sold in the form of meteorological bulletins to local farmers, who use them to negotiate scientific weather reports.

Okite is especially important for the issue of managing meteorological risks and, in particular, for the management of the problem of crop damage caused by violent local winds. Generally, in Japanese archipelago strong winds occur under given meteorological conditions. According to the basic principles of agricultural meteorology, crops are susceptible to wind damage and wind abrasion: when winds exceed 1 m/sec or when strong stormy winds exceed over 20 m/sec, typical agricultural damages are broken branches and dried cultivated fields (this phenomenon is known as white ear, *shiraho*)[66]. *Okite* represents therefore an important source of empirical information of cyclical manifestation of meteorological events for small-scale agriculture, because Sajima farmers generally cultivate fields on a plateu that directly faces to the Sagami Bay (particularly in the western coastal areas of the Miura Peninsula), so that the cultivated lands are exposed as much as possible in the sunlight. However, if these cultivated fields can benefit the sun,

on the other side, they are also more exposed to the strong local winds and, in particular, to the *inasa* wind (*inasa muki*, or, field facing the *inasa*, is a local expression to indicate the vulnerability of the fields exposed to the gusts of this wind)[67]. In other words, knowing when *inasa* will blow during the next year will allow the farmers to locate the fragile fields in a more protected area.

Okite is therefore able to establish specific weather rules, especially regarding the behavior of winds. According to Sajima fishermen, when winds blow for more than a day, they will continue to blow for three days; if they continue to blow over three days, they will blow for five days; finally, when winds persist to blow over five days, they will blow for seven days or more[68]. Although there is obviously no scientific confirmation of the veracity of this «seven-days rule», somehow, this traditional method of prediction of the meteorological behaviour of local winds has its own epistemological validity and it is used for *okite*. As mentioned before, *okite* is based on the direct observation of the local winds in the month of November, during which the meteorological observations are carried out from the first to the twenty-fourth day according to the traditional lunar calendar[69]. This predictive method divides the twenty-four days into twelve parts, which corresponds to the twelve months of the following year. For instance, the weather trends observed during the first two days of the month will indicate the weather conditions of January, the third and fourth days will be instead describe the weather trends of February, while the fifth and sixth will be used to indicate the month of March, and so on (fig. 4).

«It becomes cold when *okite* starts» is a Sajima's folk saying that describes how the month of November is considered a critical period, because some weather-climate variables consolidate and affect the events of winter season. For Sajima fishermen, in fact, this month represents a period of meteorological transition from the summer season to the winter season, where autumn weather changes occur suddenly. This meteorological instability, determined by the change in direction and intensity of local winds, low-pressure systems, *typhoons* or temperature change, allows fishermen to *see the winds*, that results in the production of a meteorolgical calender. In addition, temperature measurements in November also contribute to determine predictions for the following year: in the first part of the month, temperatures are perceived as cold, while in the middle of the month temperatures tend to become warmer. This division of the month in cold and warm periods therefore allows fishermen to predict what the weather conditions will be for the following year: the cold period corresponds to the months of January and

February, while the warmer period corresponds instead to the months of August and September[70].

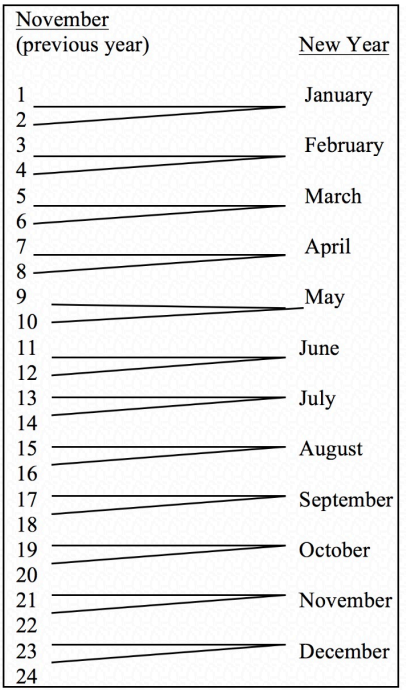

Fig. 4. *Okite* forecasting model.

The perception of the wind in *okite* is an example of the «physical experience of the weather»[71], which provides a common focal point on the practices of mapping and representing a cultural weatherscape. In this context, it is also important to note how wind perception is also linguistically expressed as a practical way of systematizing local metereological knowledge and, indirectly, meteorological risk management[72]. Sajima fishermen have then developed a system of classification of local winds, grouping them into two macro categories: the so-called «good winds» (*yoi kaze*) and «bad winds» (*warui kaze*)[73]. This meteorological classification is due to the fact that the «bad winds» are considered dangerous southwest winds blowing from the offshore, while the «good winds» are northeast winds blowing from the inland which are not considered a real threat for the small-scale fishing activities.

In addition to this classification of winds, Sajima fishermen have been using another different meteorological classification in order to

summarize what make these winds so salient for local activities. As fig. 5 shows, many local winds from east-south and west-north have a name, while there are no names for other local winds as they do not directly affect the small-scale fishing activities. It is interesting to note that this similar linguistic phenomenon is also found in other coastal areas, such as, the nomenclature of winds elaborated by fishermen operating in the east and west coastal areas of Shizuoka Peninsula (located to the south of the Miura peninsula). As seen in fig. 6 and 7, the wind rose of the western coasts of the peninsula gives a complete view of how winds are typically distributed, while in the eastern area, different names of northern winds are mainly indicated in the rose wind, as they are considered the most dangerous winds, along with *kochi* (east wind) and *inasa* (southeast wind)[74].

Finally, the forecasting method of *okite* seems to be also linked to the ways of coping with extreme environmental conditions and to the local understandings of metereological projections in Sagami Bay. An example is the cognitive mapping of the movements of a typhoon made by Sajima fishermen through the use of the folk taxonomies of local winds. Although many typhoons approach from the southwestern part of Japanese archipelago, most of them generally turn northward to northeastward moving parallel to the islands[75]. According to local fishermen, when a typhoon moves northward above Sagami Bay, it generally moves to the west coastal area of Sajima and it can be forecasted by observing the meteorological behavior of local winds that change their direction on clock wise. Once again, the fishermen have created a specific predictive model to find the position and the distance of the typhoon approaching the coasts of Miura penisula: the first wind that is *seen* is the *naree*, becoming almost immediately *inasa*, one of the most violent winds blowing on Sagami Bay. Then, *inasa* changes to *minami,* and when typhoon passes to the west coasts of Sajima, *bettō* begins to blow violently.

As seen previously, these examples show that meteorological knowledge can have a decisive influence on the determination of particular aspects of a landscape, through which Sajima fishermen intimately give shape and structure *to* the forces of the atmosphere. Again, – likewise for *takayama* and *okite* – these forecasting methods combine with local understanding of weather within a framework of sensory perception. If we consider that «in [folk] epistemologies, seeing and knowing are understood as closely related»[76], the interpretation of the movement of a typhon by *seeing the winds* provide how the landscape perceived by Sajima fishermen could be an example of «perceptual space»[77], which is «intricately interlinked with existential space or the lived space as

it is constructed in the concrete experiences of individuals socialized within a group»[78].

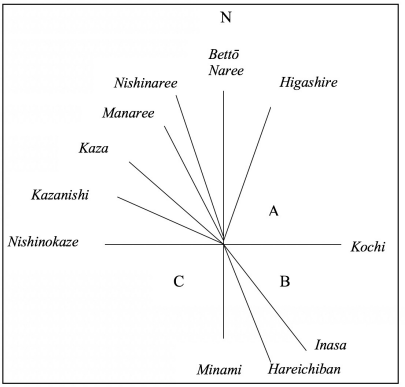

FIG. 5. The rose wind of Sajima community[79]. The geographical directions indicated by the letters A (north-east), B (south-east) and C (south-west) are without the nomenclature of the winds.

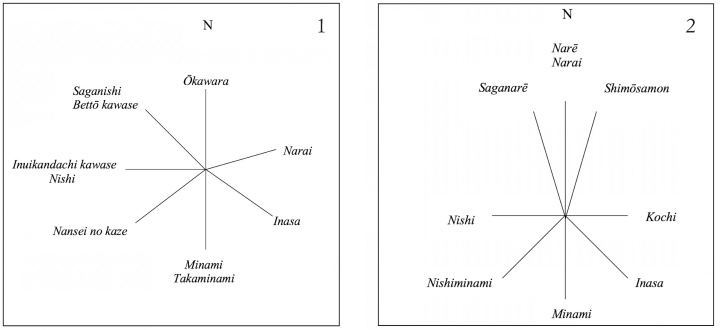

FIG. 6a and 6b. Local wind nomenclatures in west and east coastal areas of Shizuoka peninsula. *Nishi* (or *nishikaze*), a wind blowing in the winter, and *inasa*, a southerly wind blowing in September and October, are among the most feared winds in the coastal areas of Shizuoka Peninsula, as both are extremely violent and difficult to forecast[80] .

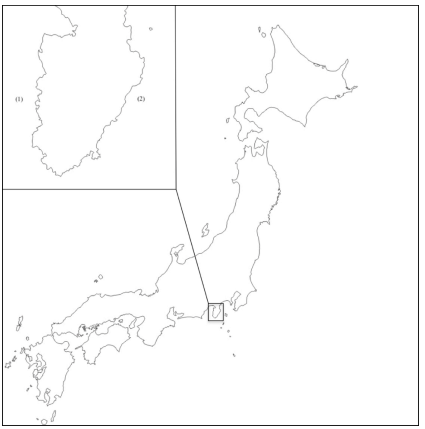

Fig. 7. Shizuoka peninsula. Numbers 1 and 2 indicate the the west and east coastal areas of the peninsula where local winds blow (see fig. 6a and 6b).

Conclusion

Focusing on the practical dimension of traditional forecasting knowledge in a Japanese coastal community, the article has tried to *show the* cultural centrality of meteorological information in decision-making processes, which constitute a negotiated tension between local knowledge and scientific knowledge. The article has also shown how these forecasting methods highlight «how different scales of engament inform one's aim at thinking, controlling and representing atmospheric realities»[81]. It is possible to assume that both *okite* and *takayama* constitute then a form of «environmental situated experience»[82], through which it could be possible *to see* the weather «as lived rather than theorized»[83]. *Takayama* and *okite* are typical examples of «performative knowledge»[84], which «involves having some skill or competence in order to be able to do something – it is to know how rather than to know or to know that»[85]. What distinguishes therefore this kind of knowledge is that it involves «some kind of performance – it goes beyond knowledge in a purely conceptual sense»[86].

Finally, the article has also addressed the question of *how* the inhabitants of Sajima have ascribed different sensorial meanings to their environment exhibiting a highly nuanced ecological sophistication. As seen, weather perception in *takayama* and *okite* undoubtedly offers a culturally mediated sensory experience that is connected to practical engagement in everyday life. Such set of different forecasting prac-

tices construct authoritative knowledge about local weather involving a process of making sense of experience-based practices. Based on this perspective, predictive models, practical strategies used by fishermen and farmers to avoid potential economic damages and, in general, the cultural heritage consisting of proverbs, meteorological classifications and folk terms related to weather trends, highlight a mix of culturally mediated sensory perception, skills, and place-based experiences which become also crucial to understand the cognitive and cultural reverberations to a people's sense of place[87].

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Notes

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