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UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION

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H4.SMR/222 - 18

SECOND AUTUMN WORKSHOP ON

CLOUD PHYSICS AND CLIMATE

(23 November - 18 December 1987)

METEOROLOGY AND NAVIGATION

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METEOROLOGY AND NAVIGATION

It seems important to me - as a professor of Navigation and Nautical Meteorology at the Nautical Institute in Trie= ste- to draw your attention, as professional meteorologists, on the practical concern and responsability of Meteorolo= gy to a kind of workers : the seafarers .-
Farmers , mountaineers , fishers have always created des= criptive models of their environment , including meteorolo= gical phenomena as well .- It goes without saying that these "popular" descriptions have no scientific bases , neverthe= less they represent a kind of inconscious statistical filter handed down verbally .- Their principal limits consist in their validity , strongly limited in time and space .-
High-sea officers certainly needed a better information, but what was enough accurate before the 2. World War has becume fully insufficient now owing to the quantity and quality of new work requested of seaferers .-
The recent freight-war , due to an excess of hold supply (compared to its demand),imposes to masters a very thourough planning of their voyages .- E.g. , as soon as a ship leaves its port of departure , its master must send the estimated time of arrival (ETA) to the final port , in order to book free quay and loading cargo at once .- Any considerable de= lay has a negative economic effect , which may become ve= ry dangerous during periods of keen competition .-
Keeping in mind these events is very important since they, being also associated with :

-- the drastic reduction of the crew : up to now 40 members were required, today only 15 members are suf= ficient on board and studies are considering the pos= sibility of reducing the crew to 5 members only
-- the modern means of cargo handling (which prevent sai= lors from having any rest or recreation when their ships are moored alongside a pier) ,

represent true critical human limits, that have to be borne in mind when anything involving seafarers is planned .-

It' s so clear that meteorological factors are very impor= tant for a good management of navigation that it is necessary only to remember the strong correlation between weather and ship-upkeeping, cargo maintenance and people welfare .-
On the other hand , focalizing :

- the "need of information" of seaferers
- the "form" of these information (to be useful)
- the "positive contribution" on data-collection, which can be given by seafarers
- the "basic background" needed by a seafarer to com= municate and understand messages

is very important as well .-
Furthermore two reasons at least justify the employment of trained seafarers into Port Meteorological Services :

- only a seafarer can really communicate with other seafarers thanks to their common special background of experiences , which very hardly can be fully un= derstood by a "land operator"
- doing so we give some opportunities of leaving the ca= reer on sea .- These opportunities are very important socially because :
  *) they recognize abilities and don't waste talents
  *) they psychologically stimulate motivations for a continuous in-service up-dating .-

A seafarer certainly "needs information" .- He expects land offices to be acquainted with meteorological phenomena concerning him .- For this reason he is normally up-dated with all the bulletins and facs-maps he can receive on board But - even if he had been trained to a thourough reading of the information included into the a.m. sources (and this concerns his scientific background) - the received infor= mations can sometimes be not fully satisfactory .-
For example , a ship may meet a tropical cyclone first .- After having identified it , a message is sent to land-of= fices and the whole organization springs up with all its observational and helping potentialities , but .... what happens to the first ship? A few years ago I tried to under= stand the reason of this occurrence: the answer, I was gi= ven, referred to the great number of phenomena daily detec= table into the tropical belt .... and the fact that " not all of them develop into tropical cyclones" .- Which means that the probability of not identifying a tropical cyclone

is not at all negligible in its very first stage .-
What have we to do then ? A ship certainly isn't a scientific laboratory , and seafarers are all but scientists .- We must therefore give them rules of thumb (colours and shapes of clouds , state of the sea , hygrometric state of the air, barograph profiles, etc.), accurate enough to "read the surroundings and take the best decisions" .-
When a cyclone is identified , its path is of the greatest concern to seaferers.- Many times I was asked some rules of thumb on the subject , preferably concerning the pre-existing pressure field .- The mean-geostrophic-wind model, based on the mean pressure field in a sufficiently large surrounding area (WMO-No 528), may be enough accurate , but I would like to read it (or something better) on the nautical books existing on board .-
Wrong estimations can have very bad consequences : I have seen a ship just arrived from Japan, after having met a tropical cyclone in the Indian Ocean .- Its cargo was fully destroyed and the ship had been heavily damaged .- Its master has been called to answer of his decisions ..... .-
Another phenomenon of very difficult forecasting is the phenomenon of the "abnormal waves".These waves can be described as wave-packets originated by interference of many normal wave trains.- There are very definite sea and air situations which make this phenomenon more probable , but a lot of details are still unknown , while numerous damage reports call the attention to the abnormal waves as (one of) the reason(s) of averages .-
Abnormal waves have a very short life : 10 sec. about , but in this short time they grow, building a sort of water-wall up to 30 meters high , able to collapse on board of an unlucky ship with hundred and hundred tons of sea-water .- A tanker, where a student of mine was an officer, met with an abnormal wave and -in 10 seconds- had its forecastle lowered by 1.5 meters about .- We must remember that the foreward side is a carefully reinforced part of a ship.
The only document I had the opportunity to study is a report on abnormal waves issued by the South African Hydrographic Office.- In this document people could read many interesting results , as the following :

- the need of "deep water" to let the phenomenon develop. No abnormal wave has been observed in waters less then 100 fathoms deep

- the weather evolution resulting in an improvement of the probability of observing the phenomenon
- sea currents - and their interaction with wind-waves - able to improve their frequence and intensity .-

All these results are probabilistic , and their reliability must be checked because they are founded on a very small number of observations .- Furthermore , their validity is limited to the area roughly included between the African Continent and Madagascar Island .- Nevertheless , navigation has improved in safety since the document has been issued .-
Having new results on these waves would be very useful for seafarers , even if reaching rules of thumb having the aim to avoid abnormal waves , or to reduce damages caused by them , is clearly very difficult, if not impossible .-
"Local phenomena" are frequently a problem for seafarers, and , correctly, coastal radio stations send detailed information on them .- Let's express a remark only : those who live in a region necessarily become specialists for that region .- Their language can then appear quite difficult for people coming from distant Countries .-
To prevent such problems , it's necessary to clearly list all the facts involving seafarers , even if they may sound banal remarks .- In other words : do not be afraid of being over-understood .-
Local phenomena also include the history of the cargo, which has to be loaded on board of a ship.- Cargo damages, due to the so-called "cargo-" and/or "hold-sweat", can be prevented rationally using the type of ventilation provided on board.- It's necessary to underline how frequently informations are vacant about this , and how critical can result the use of ventilation, particularly the forced ventilation,in relation to the care of cargo .-
Another kind of information needed sometimes on board and accurately elaborated by few specialized Offices is known as ' Weather Routeing " .-
It's easy to understand what it is : if we know a reliable weather forecasting , the validity of which includes many days, it's possible to plan least-time- or least-stress--trajectories .-
To reach this end , very powerful computers are needed: this fact explains the relative youth of the method .- As results have to be read statistically , seafarers and owners

have met some troubles in understanding and accepting both the used methods and the obtained results,at the beginning.- But the strength with which seafarers resisted against these methods must be read in another key .-
At the beginning , two hypothesis had been explored :
- the first one considered the ship as the decisional office.- Land Meteorological Offices were called to transmit as many information as necessary to decide for the best .-
  The basic idea was : who knows the needs of the ship better than people living on board ?
- the second one considered the Meteorological Offices as the natural sites where meteorological decisions can be taken .-

The second hypothesis was the valid one.- The scientific background and the quality of available information at land offices were so powerful that any other reasoning has been overcome .- But its success meant , for seafarers , a loss of independence .- It was another signal of evolution of an old profession , that has seen the master of a ship as "second after God" , and it is now changing in the direction of less freedom and more subordination , which is,obviously,not well accepted by seafarers. It must be told that Meteorological Offices never"order" anything to a ship. They advise , but culture and competence transform an advice into a moral order !
Seafarers have been trained and have been used to mantain contacts with ships, and to go and draw out, from ships' logs, the needed data to create a satisfactory mathematical ship' s behaviour model.- This is a new way to use (at home) former professional experiences. From this point of view , routeing may become very appetible for seafarers , and seafarers can be very useful to weather routeing .-

It's necessary to add now something about the "form"we must use to make information useful .- It must be " E A S Y " : the easier it is , the more useful it will be .-
Years ago I had a voyage on board of a ship with the aim of focalizing rules and methods useful on board .- Deck dept. officers and I succeeded in listing a few rules of thumb and in identifying their limits .- We tested their practical validity , but other seafarers , sailors who didn't follow the work we have done on board , judged these rules too complicated.-

There are reasons to think that time doesn't work for an improvement of meteorological performances.- One of these reasons is the trend - in all the most important maritime Countries-to cancel the dichotomy between deck- and engineering- dept. and to create a new professional figure : the dual purpose officer.- These new officers must be trained in the whole management of the ship.-
They must be efficient on the deck and in the engine room, both in the conduction and the maintenance of all the instruments : it's a very difficult job calling for an encyclopaedic knowledge .- Electronically aided self-up--dating methods have been devised to help them in their most difficult interventions .- A very basic description of a particular solution,applied to Meteorology but applicable from Mechanics to Medicine, follows later .-
In this contest , it is not a wonder if these real hermits (think of a 300.000 tons ship with only 15 - or 5 - crew members) need special help in Meteorology , too .-
There is another field where something similar has happened: the Maritime English .- It' s quite clear how important is a common language for ships of all flags .- In fact , many accidents have occured due to a lack of communications due to difficult understanding of the English Language spoken by people coming from different Countries .-
What to do ?
Maritime Countries tried - generally - to improve the level of English spoken by their seafarers.- On the contrary, many English-speaking Countries have organized courses to teach "how to lower the level of spoken English down to the levels easily understandable by the majority of seafarers".-
It' s the same trouble that meteorologists have to face .- They must take same care both of simplicity and scientific correctness .-
The information must therefore be "complete", "easily understandable" and "open" to all the additions people can get by local observations .-

As far as completeness of available informations at the Meteorological Offices is concerned , seafarers can act as true sources of information through their bulletins (SHIP or SHRED).- Their observations , even if not complete , testify of the weather in a given place , and this can be of

paramount importance if the place is far from areas covered by the usual net of meteorological observatories .-
It' s only necessary that meteorologists know the reliability of these observations .- It's also necessary not to ask what can't be done. We cannot ask, e.g.,the height of clouds: if we are physiologically unable to give founded estimates of distance looking horizontally, as any seafarer "knows" , we are also unable to estimate vertical distances because we are not trained, in our everyday life , to do these evaluations .-Thus, we can only ask the seafarers to recognize clouds by their shapes: using the correlation between shape and height is not a seafarer' s affair .-
I know cases where only O N E strategic ship message gave the possibility of forecasting very serious events: it' s up to the instinct of the meteorologist to "accept" data coming from a ship , particularly when they do N O T agree with the rest of information , that is when the carried informations are relevant .-
Calling for co-operation by seafarers can sometimes produce negative answers.- In my opinion,the main reasons of it are:

- sailors are contacted , by Port Met. Officers, when they are working or resting : both these moments are untouchable if not for very serious reasons
- they are "afraid" of not being able to answer like people wait by them .-

A Port Officer can overcome both these difficulties clearly explaining them why their intervention is important, how important it is and its complete nature .-

Nevertheless nothing can be done if seafarers' s cultural and technical backgrounds don't satisfy very clearly definite standards .-
While "what must be known" is listed on the a.m. STCW '78 Convention and developed in many texts-books (among which I remember the METEOROLOGY FOR MARINERS, edited by the British Met. Office), educational and training techniques are in a stage of very quick development .- Recently an italian firm has designed an Interactive Videodisc Learning Programme , that is based on the "compact disk techniques" to communicate with the trainee .- I had the opportunity to follow one of its demonstrative exibitions: I was fascinated by the didaptical efficiency of the living diagrams associated with true photoes , called on video by an easy command , with the

possibility to detect and enlarge details till the trainee is put in the possibility of identifying the same detail on the object he is studying .-
As far as interactivity is concerned , I tried to give the "right answer" without taking up "all the needed informations" : the computer invited me "not to guess" the result.-
The method , tested by the greatest italian industries , has the merit of :

- adapting itself to the trainee
- judging the trainee,thus helping him to understand better himself,and assuring common minimum standards,which is very important,particularly when safety is concerned
- helping the self-in-service-up-dating : this could be of particular concern for ships, when the dramatic port activities are substituted by watchkeeping intervals separated by long boring free-of-duty intervals .-
- changing its performances through software : the same hardware can then be used for an up-dating program of all ship's dept.s , taking care of the developments of the ship's instruments .-
- requesting only limited work by an instructor , which means less recurring expenses and the possibility of a more rational work organization .-

Such a solution can reveal its utility everytime descriptive explanations must be done : words are only sounds if not associated with the corresponding ideas.- The use of photographic techniques of representation can help people to overcome not only problems concerning special ships (oil- , gas- and chemical-tankers) , but also those concerning a correct reading of the sky .- In fact it can be highly improved , particularly if new sets of cloud pictures/films are collected and explained, taking care of all the opportunities offered by modern teaching/training techniques .-

To conclude , I don't know whether there is enough room to differentiate between "NAUTICAL METEOROLOGY": the seaferers' meteorology, and "MARITIME METEOROLOGY" : the science describing the meteo-marine surroundings , or whether it is more logic to consider the former as included in the latter, but I certainly know that there exists a category of workers , called by somebody as "THIRD , AFTER LIVING AND DEAD PEOPLE" , who needs special attentions .-
Keeping in mind their silent sacrifice on board ships, farer

and farer from human measure , I ask for them enough consideration to let them know that they are not alone, even if they are travelling on the highest seas .-
It' s what I really meant to say .-

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Trieste, novembre 1987