Southeast Asian Fisheries Development Center

Climatological Regime and Weather Condition Occurred on the Cruise Expedition (May 1999) on Vietnam Continental Shelf

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ABSTRACT

The report is considered in two parts as climatological regime in which the most of meteorological parameters are summarized in its climatological conditions based on long time series of data and the exact weather phenomenon occurred on the area during the time of the expedition. In doing such study we have used two kinds of data, one is climatological data collected during the recent 30 years on the stations located along the Vietnam coast and islands, another is data collected during the time of present cruise expedition. The final consideration will reveal the variation of the weather condition in comparison with the climatological characteristics of each meteorological parameters.

The cruise crossing expedition comprises 58 points expanding throughout on Vietnam continental shelf. The study area can be divided into 6 areas depending on the geographical and hydro- meteorological features of each region. We try to describe the climatological regime in each region in particular and the weather condition of the whole area during the time of cruise exploitation.

Key words: Climatological regime: The average conditions of the weather
Meteorological features: The Atmospheric Characters, Areas: Zoning regions

Introduction

During 30 April-29 May 1999 the Cruise of Southeast Asian Fisheries Development Center carried out an joint expedition on continental shelf of Vietnam. In doing description of weather conditions occurred on the area of expedition, we therefore have some comparisons with the basic climatological data. 58 oceanographic survey stations cover almost Vietnam continental shelf from latitude 6^0 N to 20^0 N and 103^0 E to 112^0 E. The mention area is characterized by coastal climate regime. In general the climate features of Vietnam are dominated by monsoon regime and typhoon that occurred in average 6 times in the year. Based on climatological data with number of norms, the coastal area is zoning into 6 regions, each region brings itself with specific climate regime. We do not hope to describe all the characters in term of climate mention. The characters are composed with air temperature, humidity, wind and typhoon frequency .

Materials and Methods

Data are collected from the meteorological stations located along coast and islands of Vietnam. The figures are quoted from time series of 30 years. The climate state here is determined over an agreed time interval computed for the areas. Some of the parameters are computed by higher statistics such as variance that can often be more useful in characterizing a climatic state than the mean.

A. Main climatological features of the cruise expedition area

1. Area 1 comprises 1-3 Cruise expedition stations:

In side the area there are 4 national fixed meteorological stations namely, CuaOng, HongGai, HonDau and CoTo.

Air temperature

The area located on the north Vietnam suffering by two seasonal monsoons: Northeast monsoon with cold dried air and Southwest Monsoon with hot humid air. Air temperature is presented in the Table 1.

Table 1. The air temperature (^{0}C) representative for the 1-3 Cruise expedition stations.

Station	Average					Maximum	Minimum
	January	April	July	October	Year		
Cuaong	15.1	22.8	28.6	24.1	22.5	38.8 (July)	4.6 (Jan.)
Coto	15.1	21.8	28.6	25.1	22.7	36.2 (July)	4.4 (Jan.)
Honggai	15.8	22.9	28.5	24.5	22.9	37.9 (Aug.)	5.0 (Jan.)
Hondau	16.8	22.8	29.0	25.8	23.6	38.6 (Aug.)	6.5 (Jan.)

The humidity.

Table 2. The relative humidity (%).

Station	Average					Maximum	Minimum
	January	April	July	October	Year		
Coto	84	90	86	79	84	90(Apr.)	20(Jan.)
Honggai	82	87	83	80	84	88 (Mar.)	18(Jan.)
Hondau	83	90	85	84	85	91(Mar.)	19 (Jan.)

The annual average air temperature varies from 22.5 ^{0}C to 23.6 ^{0}C. In winter time air temperature dropped in an interval from 15.0 ^{0}C to 17.0 ^{0}C . At the same time of winter the minimum air temperature is 4.4 ^{0}C observed at Coto station. The maximum air temperature 38.6 ^{0}C is observed in summer time at HonDau station.

In the area of stations 1,2 and 3 of the cruise expedition the relative humidity gets maximum value of 90- 91% in February and March and minimum value of 73- 77% in December and January of next year (Table 2).

Wind

Table 3. The wind speed (m/s).

Station	Average					Maximum
	January	April	July	October	Year	
Cuaong	3.4	2.5	3.2	3.6	3.1	40 N,NE (July, Sept)
Coto	4.5	3.2	4.7	4.9	4.2	40* (Aug.,Sept)
Honggai	2.8	2.3	3.2	3.5	2.8	45sw (July)
Hondau	4.8	4.7	6.0	5.0	5.0	40* (July,Aug.)

(*) That occurs in various time and directions

In the area wind speed is not strong due to existing in the area a system of small islands, along coast the average wind speed is about 3 m/s, while in the offshore this value gets up to 4-5 m/s. As it is shown in the Table 3 the maximum wind speed is 45 m/s occurred at Hongai station.

Fig. 1-4 presented wind roses of representative months for seasons.

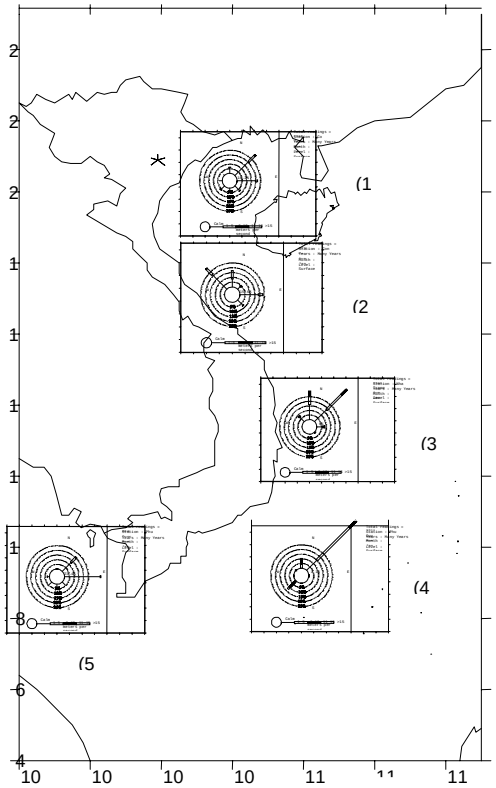

Fig. 1. Wind Rose January (1)Coto, (2)Conco (3)Nhatrang, (4)Phuquy, (5)Phuquoc.

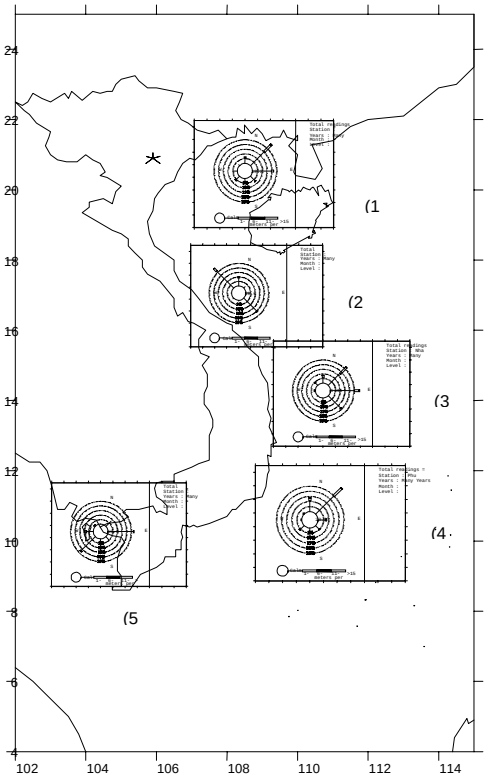

Fig. 2. Wind Rose April (1)Coto, (2)Conco (3)Nhatrang, (4)Phuquy, (5)Phuquoc.

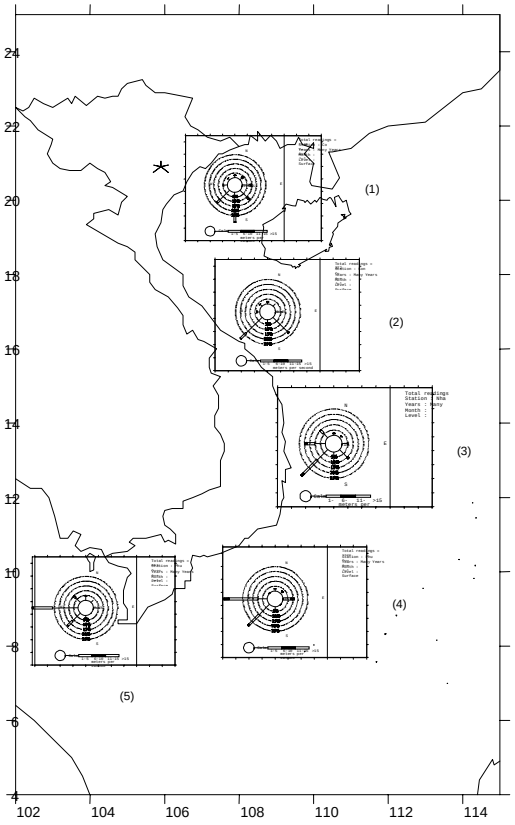

Fig. 3. Wind Rose July (1)Coto, (2)Conco (3)Nhatrang, (4)Phuquy, (5)Phuquoc.

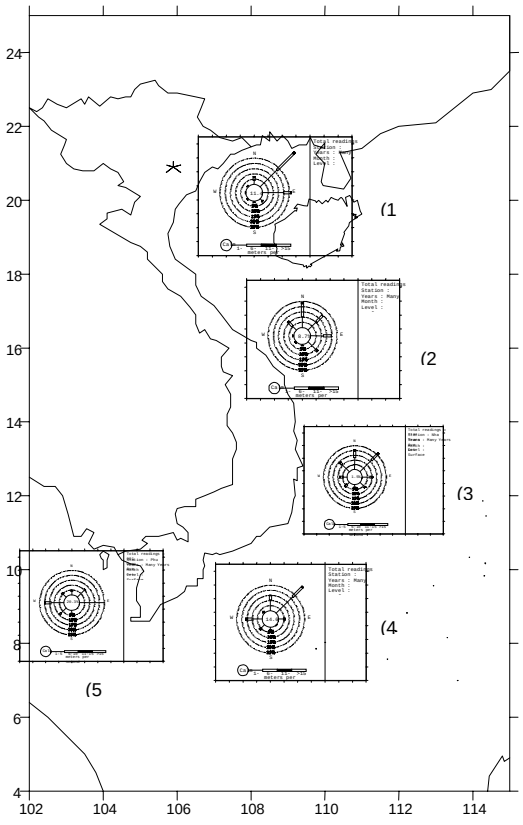

Fig. 4. Wind Rose October (1)Coto, (2)Conco (3)Nhatrang, (4)Phuquy, (5)Phuquoc.

Typhoon

Table 4. The typhoon activity in the whole expedition area.

Latitudes ^{0} N	Total number of Typhoon	Frequency	Annual average (number of Typhoon)
21-22	33	13.2	.82
20-21	33	13.2	.82
19-20	27	10.8	.67
18-19	21	8.4	.52
17-18	32	12.8	.80
16-17	21	8.4	.52
15-16	12	4.8	.30
1-15	14	5.6	.35
13-14	15	6.0	.37
12-13	16	6.4	.40
11-12	13	5.2	.32
10-11	1	0.4	.02
9-10	4	1.6	.10
8-9	7	2.8	.17
Total	250	100	6.25

The typhoon data is collected for 40 years (1954- 1993). The number typhoon landfalling in to this area is about 14 % and every year the area is suffering by 6 typhoons occurred here.

2. Area 2 comprises stations 4, 5, 6 and 7:

Air temperature

Table 5. Air temperature (^{0}C) representative for the stations 4,5, 6 and 7 Cruise expedition.

Station	Average					Maximum	Minimum
	January	April	July	October	Year		
Hongu	16.8	23.0	29.1	24.1	23.2	39.9 (Aug.)	6.9 (Jan.)
Kyanh	18.1	24.5	29.6	24.4	24.1	39.5 (May)	7.5 (Jan.)

Humidity

Table 6. Relative humidity (%) of the stations 4,5,6 and 7.

Station	Average					Maximum	Minimum
	January	April	July	October	Year		
Vinh	90.0	89.0	73.0	89.0	85.0	93.0 (Feb.)	33.0 (Dec.)
Ky anh	91.0	88.0	72.0	90.0	85.0	96.0 (Feb.)	30.0 (Mar.)
Honngu	83.4	89.9	82.2	81.3	84.2	97.0 (Feb.)	19.1 (Apr.)

As it is shown in the Table 6 that the humidity gets highest value in comparison with other coastal areas.

Wind

Table 7. The wind speed (m/s) of stations 4, 5,6 and 7.

Station	Average					Maximum
	January	April	July	October	Year	
Vanly	4.0	4.1	5.3	4.2	4.4	48*
Honngu	4.0	3.2	4.2	4.6	3.9	56*
Kyanh	2.1	1.8	3.3	2.4	2.3	54 NE (Aug.)

(*)That occurs in various time and directions

The area comprising stations 4, 5, 6, and 7 belongs to the area of monsoons and typhoon activities. The average wind speed (about 4m/s) is not so high but the strong wind speed is often observed during the time of typhoon with maximum wind speed of 56 m/ s (Table 7). Typhoon occupied about 32 % of the total typhoon number occurs in this area every year.

3. Area 3 comprises stations 8,9,10

Temperature

Table 8. The air temperature (^{0}C) representative for the 8-10 Cruise expedition stations.

Station	Average					Maximum	Minimum
	January	April	July	October	Year		
Conco	20.5	24.6	29.6	26.6	25.3	38.6 (May)	11.1 (Dec.)
Sontra	21.3	26.2	29.1	25.7	25.7	40.9 (May)	10.2 (Jan.)

The annual average air temperature in this area is changing in an interval 25^{0}C - 26^0 C. The lowest air temperature was observed at Sontra station in January with the value of 10.2 ^{0}C, while the maximum air temperature was also occurred at the same place in May with the value of 40.9 ^{0}C. (Table 8).

Humidity

Table 9. The relative humidity (%) representative for the 8-10 Cruise expedition stations.

Station	Average					Maximum	Minimum
	January	April	July	October	Year		
Conco	88	91	81	82	85	94 (Feb.)	37 (Dec.)
Danang	84	82	75	84	81	85 (Dec.)	18 (Apr.)

As it is shown in the Table 9 that there are differences by the values of humidity between the two parts in the area. In the north (Conco Station) the humidity is higher than the south part (Danang Station).

Wind

Table 10. The wind speed (m/s) representative for the 8-10 Cruise expedition stations.

Station	Average					Maximum
	January	April	July	October	Year	
Conco	4.6	2.7	3.7	4.6	3.9	38 (Oct.)
Cua tung	3.4	2.4	3.1	3.1	3.0	40 *
Sontra	1.8	1.9	1.5	1.9	1.8	31 (Oct.)

(*) That occurs in various time or directions

According to the Fig. 1-4 and the above table it is recognized that the northeast wind is dominated in the winter in the area with frequency of 85 - 90% (Conco Station) while in the summer the southwest wind occupied only 60% (Sontra Station) (Table 10).

Typhoon

The number of typhoon occurred in the area occupied 26 % of the total landfalling on Vietnam coast every year. In other word every year there are 1.5 typhoons landfalling in this area.

4. Area 4 comprises 11- 32 Cruise expedition stations

Temperature

Table 11. The air temperature (^{0}C) representative for the 11-32 Cruise expedition stations.

Station	Average					Maximum	Minimum
	January	April	July	October	Year		
Quynhon	23.3	27.4	30.0	27.0	26.8	39.9 (May)	21.8 (Jan.)
Nha trang	23.5	27.2	28.3	26.5	26.5	37.4 (June)	22.7 (Jan.)
Phuqui	24.6	28.3	28.8	27.3	27.1	34.3 (June)	20.7 (Mar.)
Phanthiet	24.6	28.3	27.1	26.9	26.7	37.2 (May)	23.5 (Jan.)

The air temperature in the north and south part of the expedition area is almost identical. Phu qui station is representative for the offshore area (Table 11).

Humidity (Table 12).

Table 12. The relative humidity (%) representative for the 11-32 Cruise expedition stations.

Station	Average					Maximum	Minimum
	January	April	July	October	Year		
Quinhon	84	83	71	82	80	84 (Feb.)	36 (May)
Nhatrang	79	80	77	83	79	83 (Oct.)	37 (July)
Phathiet	75	77	83	84	79	84 (Oct.)	35 (Dec)

Wind

Table 13. The wind speed (m/s) representative for the 11-32 Cruise expedition stations.

Station	Average					Maximum
	January	April	July	October	Year	
Quynhon	3.2	3.5	3.5	3.5	3.4	40* (Nov.)
Nhatrang	4.1	3.1	2.3	3.3	3.2	30* (Nov.)
Phuqui	8.6	3.3	7.2	4.3	6.2	34* (Nov.)

The north and northeast wind 11 - 15 m/s occupied only 10% in the winter (Fig. 1- 4) while the weak north and northeast occupied 50- 60 % at the same time. In the summer time the southwest and west wind 11- 15 m/s occupied about 20%. It is emphasized that during the time of summer the number of calm is dominant (37%) (Table 13).

Typhoon

The number of typhoon occurred in the area occupied 23.2 % of the total landfalling on Vietnam coast every year.

5. Area 5 comprises 33- 50 Cruise expedition stations

Air temperature

Table 14. The air temperature (^{0}C) representative for the 11- 32 Cruise expedition stations.

Station	Average					Maximum	Minimum
	January	April	July	October	Year		
Vungtau	25.2	28.9	27.4	27.1	27.2	35.8 (Apr.)	15.0 (Dec.)
Condao	25.2	28.2	27.5	26.9	27.0	36.0 (Apr.)	17.7 (Feb.)

The air temperature distribution shows an identical character from the coastal to the offshore stations. The maximum air temperature was observed in the April appeared to be not looked like as usual in other areas (Table 14).

Humidity

Table 15. The relative humidity (%) representative for the 11- 32 Cruise expedition stations.

Station	Average					Maximum	Minimum
	January	April	July	October	Year		
Vungtau	76	76	81	83	79	84 (Sept.)	42 (Jan.)
Camau	81	80	86	88	84	88 (Oct.)	35 (Mar.)

In general the humidity of Vungtau station is lower than it is observed in Camau station while the minimum value of Camau station is lower 7% in comparison with its value in Vungtau station (Table 15).

Wind

Table 16. The wind speed (m/s) representative for the 33- 50 Cruise expedition stations.

Station	Average					Maximum
	January	April	July	October	Year	
Vungtau	3.2	3.8	2.8	2.0	3.1	26* (Apr.)
Condao	3.7	1.6	2.5	1.7	2.6	42* (Apr.)

(*) That occurs in various time or directions.

The east wind is dominated at Vungtau area in the winter with 60% in frequency while the number of calm occupied 24% here at the same time. In the offshore the northeast wind is prominent during the winter time. In the summer the system of west and southwest wind is prevailing with frequency of 80%(Condao station) and 70% (Vungtau station). The number of calm in summer is less than its number occurred in winter time at the same area (Fig.1-4) (Table 16).

Typhoon

Typhoon v5 The number of typhoon occurred in the area occupied 4.8 % of the total landfalling on Vietnam coast every year (Table 4).

6. Area 6 comprises 52- 57 Cruise expedition stations

Air Temperature

Table 17. Air temperature (^{0}C) representative for 52- 57 Cruise expedition stations.

Station	Average					Maximum	Minimum
	January	April	July	October	Year		
Rachgia	27.7	28.9	28.0	27.5	27.4	37.9 (Apr.)	24.9 (Jan.)
Phuquoc	25.6	28.6	27.4	26.8	27.2	38.1 (July)	16.0 (Jan.)

The temperature in this area is warm almost a whole year (Table 17). The season time is not identified.

Humidity

Table 18. Relative humidity (%) representative for 52-57 Cruise expedition stations.

Station	Average					Maximum	Minimum
	January	April	July	October	Year		
Rachgia	78	78	84	84	81	85 (Aug.)	38 (Feb.)
Phuquoc	76	80	86	88	82	88 (Oct.)	34 (Jan.)

The humidity in this area is not high. The highest humidity value is observed in October at Phuquoc station with the value of 88% (Table18) .

Wind

Table 19. The wind speed (m/s) representative for 52- 57 Cruise expedition stations.

Station	Average					Maximum
	January	April	July	October	Year	
Rachgia	1.6	2.6	4.0	1.7	2.6	20 (June)
Phuquoc	1.8	2.2	4.2	2.2	2.9	40 (Oct.)

The wind is light for the whole year. The maximum wind speed is occurred in October with the value of 40 m/s at Phquoc station (Table 19).

Typhoon

The number of typhoon occurred in the area occupied 5 % of the total landfalling on Vietnam coast every year (Table 4).

B. Main weather conditions occurred on the Cruise expedition area during the time of May 1999

During the time of May 1999 the whole Vietnam territory was effected by the internal tropical convergence zone (ITCZ) in joining with north cold front going down to the south. This situation causes rainfall in may places, especially in the north and central part coastal of Vietnam the precipitation gets values higher than climatological data for these regions. The small late flood originated from upper rivers and rainfall do not change so much the coastal hydrological regime, in general saying the weather condition covered whole expedition area was in favorite for the sea activities.

1. The mass of cold air

During the time of May there were 3 times emerging mass of cold air at 4, 18 and 26 May 1999. The mass of cold air brought rainfall along coastal and offshore areas of the South China Sea. The mass of cold air occurred on 18 May was strongest causing low air temperature down to 9- 12 ^{0}C and northeast wind gearing up to 17 m/s offshore.

2. Typhoon and low tropical depression

During the time of expedition only one typhoon occurred on the area. The typhoon named Leo-9902 appearing on 27 April at north of South China sea. The 1 May 1999 center of the typhoon was at 19^0 9N and 115 ^{0} 4 E, the strongest wind speed was measured with 36 m/s. The next day the typhoon was merging into low depression and landfalling on Quangdong coastal area (China). The next 3 days after typhoon Leo-9902 the expedition area was dominated by large swell with S and SW directions and wave high of 3 m at Vungtau, Condao and Spratley islands.

3. Air temperature

The air temperature at the time of expedition was lower 0.3 - 2.0 ^{0}C in comparison with climatological data.

4. Rainfall

The monthly average total precipitation taken for May 1999 in the expedition area is lower than climatological data for the same area. During the time of May 1999 the maximum total precipitation gets value of 203 mm occurred 21 May 1999 at north area of the South China Sea. At Nha trang station the precipitation gets minimum value of 18 mm which is lower 27 mm in comparison with climatological data.

Acknowledgments

I would like to thank Dr. B.D.Chung and Dr. D.M.Son for their giving me a chance to join SEAFDEC working. Thank you many people, who help me in data collecting and reviewing this article.

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The SEAFDEC Navigation Logsheet: Vessel name M.V. SEAFDEC, Cruise No: 57-3 1999: Collaborative) . Research Survey Vietnam.