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Damage of Typhoon in Vietnam - Typhoon Actives on the East Sea under Influence of Cold Air

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Abstract: We will analyze Effects of Cold Air on Structure of Thermal Fields in Typhoons over the Vietnam East Sea. Also our study goal aims to analyze **Damage of Typhoon in Vietnam - Typhoon Actives on the East Sea under Influence of Cold Air.** The study showed that: the temperature heterogeneity in the directions around the center of the storm, and the degree of heterogeneity also depends on each storm.

Keywords: Damage of Typhoon, Effects of Cold Air on Structure, Vietnam East Sea.

INTRODUCTION

Thanh *et al.* (2021) addressed Characteristics and changes of the temperature field during storms operating in the East Sea under the influence of cold air over time. At the center of the storm, after the cold air entered, the temperature was even lower in the eastern and southern parts of the storm.

Zhong *et al.* (2020) pointed The frequency and location distribution of tropical depressions (TDs) from 1979 to 2017 in the South China Sea (SCS) are statistically analyzed based on the best track data of tropical cyclones (TCs) from the Shanghai Typhoon Institute, China Meteorological Administration (CMA-STI). ECMWF interim reanalysis data (ERA-Interim) are used to investigate the reasons for the weakening of TDs in this study. The results show that there are 4.8 TDs formed in the SCS per year, and these TDs can be separated into 3.2 developing cases (DTDs) and 1.6 non developing cases (NTDs) according to whether they intensify into tropical storms. Further objective classification by the multivariable-time empirical orthogonal function (MVT-EOF) method finds that the weakening cases in the positive-PC1 (the first principle component) mode occur in May–September, with the reason for weakening being a shortage of moisture. The decrease of westerly wind south of the NTDs reduces the water vapor transportation from the Indian Ocean. Binary TCs in the northwestern Pacific acquire water vapor from the eastern boundary of the SCS NTDs. Meanwhile, the weak high-level divergence and low-level convergence are not enough for the accumulation of local moisture and maintaining local convections inside the NTDs. The weakening cases in negative-PC1 mode occur in October–December with the reason for weakening being the invasion of cold air from the north. Strong cold air advection in the lower troposphere increases the vertical wind shear in front of the NTDs, and sharply reduce sensible and latent heat flux as well. Seasonal dependence exists in the causes of the SCS NTDs weakening.

Li *et al.* (2020) introduce a novel method to accurately evaluate the satellite-observed sea surface temperature (SST) cooling induced by typhoons with complex tracks, which is widely used but only roughly calculated in previous studies. This method first records the typhoon forcing period and the SST response grid by grid, then evaluates the SST cooling in each grid by choosing the maximum decrease in SST within this time period. The cold wakes induced by storms have been studied using infrared observations of the SST (Tinh *et al.*, 2021; & Huy *et al.*, 2022), but the analysis has been hampered by the extensive cloud cover associated with these storms

Hence We Choose This Topic

Damage of Typhoon in Vietnam - Typhoon Actives on the East Sea under Influence of Cold Air

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METHODS

The study used analysis and evaluation of the evolution of the 24-hour sea level barometric value in the region of 20-250N; 105-1150E. Then, cold surge is considered to affect the area when the 24-hour transformer has a value greater than 1hPa

MAIN FINDINGS

Typhoon Durian (or typhoon No. 9 in Vietnam) was a super typhoon that formed in late November 2006, causing great damage to the Philippines and Vietnam. The name "Durian" means durian fruit.

The storm caused a large number of deaths when it made landfall in the Philippines at the end of November when it brought mud and buried a number of villages at Mayon Volcano. After causing a disaster in the Philippines, the storm entered the South China Sea and weakened slightly before continuing to strengthen and make landfall in Vietnam near Ho Chi Minh City on December 4, 2006, causing more than 400 damage. million dollars.

Typhoon Durian swept through the provinces of Ba Ria - Vung Tau, Ben Tre, Tien Giang, Vinh Long, Bac Lieu, Ca Mau, Tra Vinh, Kien Giang, and Ho Chi Minh City.

Typhoon Durian formed as a tropical depression on November 24, 2006 near Chuuk. Located to the south of the high pressure area, this low pressure is moving in a northwesterly direction, passing through an area of low wind strength and high divergence. Late on the 26th, the low pressure strengthened into a tropical storm and was named Durian by the Japan Meteorological Agency (JMA). Over the next two days, the storm strengthened as it approached the Philippines. After reaching super typhoon status on November 29, (Duc *et al.*, 2022) Durian experienced a period of rapid strengthening, with 10-minute wind speeds of 195 km/h. The storm swept across the southern coast of the Catanduanes at this intensity on November 30, with record gusts of up to 320 km/h.

On the other hand, Typhoon Vamco, known in the Philippines as Typhoon Ulysses or in Vietnam as Typhoon No. 13 in 2020, is the first strong Category 4 storm in the middle of the South China Sea from the Paracel Islands since Typhoon Xangsane of the year. 2006 reached this magnitude, having previously made a devastating landfall in the Philippines. As the 22nd named storm and tenth hurricane of the 2020 Pacific hurricane season, Vamco originated as a tropical depression northwest of Palau, where it slowly continued to move northwest. Until landing in Quezon. The storm threatens South China and Vietnam.

As of November 14, 2020, the Philippine government has confirmed 67 deaths and 12 missing due to the typhoon. Several other agencies reported up to 43 deaths, with at least 20 missing. In Vietnam, there have been no reports of this casualty.

On November 8, the Japan Meteorological Agency (JMA) began monitoring a new tropical depression north-northwest of Palau, 132 nautical miles (244 km; 152 mi) from the island. At 12:00 UTC that same day, PAGASA declared the system a tropical depression within the Philippine Area of Responsibility and named it Ulysses.The next day at 7:15 UTC, the system strengthened into a tropical storm, named Vamco by the JMA, (Gray, 1968) with the Joint Typhoon Warning Center subsequently issuing the first warning on the system as is a tropical depression. As the system moved closer to southern Luzon, both PAGASA and JMA upgraded Vamco to a severe tropical storm.Vamco was subsequently upgraded to typhoon status (typhoon) by the JMA on November 11, followed by JTWC and PAGASA shortly thereafter. At 22:30 PHT (14:30 UTC), Vamco made its first landfall on the island town of Patnanungan, Quezon. Then, surrounded by conditions favorable for intensification, Vamco continued to strengthen and reached initial peak intensity, with 10-minute sustained winds at 130 km/h (81 mph).), 1-minute sustained winds of 176 km/h (109 mph) and a pressure of 970 mbar, making Vamco a peak Category 2 equivalent storm. At 23:20 PHT (15:20 UTC) and at 1:40 PHT the next day (17:40 UTC), Vamco made two further landings in Quezon via Burdeos (on Polillo Island) and General Nakar. (In the Luzon island region). After that, Vamco fell below hurricane intensity inland. At 00:00 UTC, Vamco entered the South China Sea. The storm left CCCC at 01:30 UTC and PAGASA re-declared the system a hurricane. Vamco gradually strengthened over the South China Sea, before rapidly strengthening to a Category 4 equivalent storm on November 13.

On November 13, at least 135,000 families and households were evacuated by the government. On the morning of November 14, all flights at five airports of Da Nang, Chu Lai, Phu Bai, Dong Hoi and Vinh were ordered to be suspended or delayed.

On the morning of November 14, news from the People's Committee of Thua Thien Hue said that because storm number 13 moved faster than expected, the province had a new notice banning people from going out from 12 noon on November 14 instead of 4pm on the same day as before. . Provincial Department of Education and Training, Hue University also announced to students and students to leave school on November 14 and 15. (Source: Wikipedia.org)

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Figure 1: Fishing Boats Of Hon Rom Fishermen Were Sunk In The Storm.
Source: vnexpres

Figure 2: First Damage of Vamco in Military hospital in Hue city
Source: haduongtv.com

Next we see:

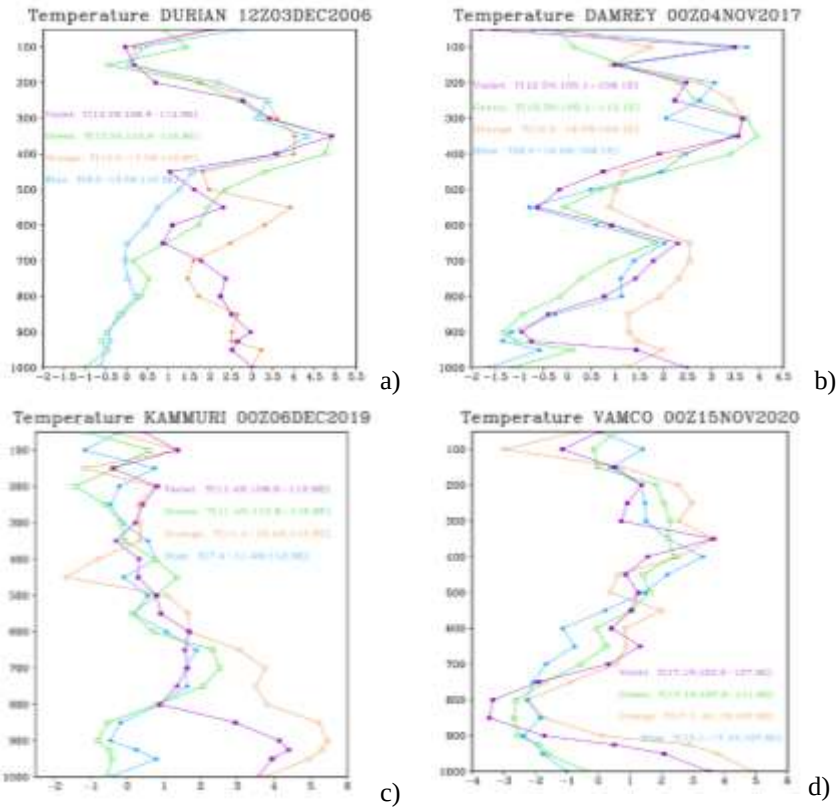

Figure 2. Similar to Figure 3 but after the impact of Cold air
Source: authors

DISCUSSION AND CONCLUSION

Therefore we see that the temperature heterogeneity in the directions around the center of the storm, and the degree of heterogeneity also depends on each storm.

Annika & Emma (2004) pointed although tropical storms can cause severe damage to the country and especially to the people living in the coastal areas, we have limited our study to concern typhoons only. This means that storms with wind speed lower than 32.7 m/s will not be taken into account in our calculations.

Author's Contribution
Developing ideas and choosing research methods: Huong C.T.T.; Data analysis and processing: Huong C.T.T.; Linh T.D..; Writing the manuscript: Huong C.T.T.; Linh T.D.; Revised: Dinh, T.N.H

Editing of the article
Huong C.T.T.

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Conflicts of Interest

The authors declare no conflict of interest.

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