No.1/2006

Marine Accident Inquiry Agency

MAIA DIGEST

Message for the prevention of marine accidents due to typhoons

Every year Japan is struck by many typhoons. A number of serious marine accidents occurred due to typhoons, bringing about loss of human life, ships and cargo. In 1954, Japan experienced the worst marine accident in our country's history, when 1,155 lives were lost or missing from the Toya-maru that wrecked during a typhoon, while crossing the Tsugaru channel in northern Japan. Fifty years later, in 2004, a record number of typhoons raged across the archipelago and caused serious damage to a remarkable number of ships.

We have learned important lessons from our experience with typhoons, and are trying to make good use of this knowledge to prevent the recurrence of similar kinds of accidents. In recent years, however, more and more foreign seafarers who lack knowledge, experience and appropriate skills of typhoons in Japanese waters have been involved in very serious casualties.

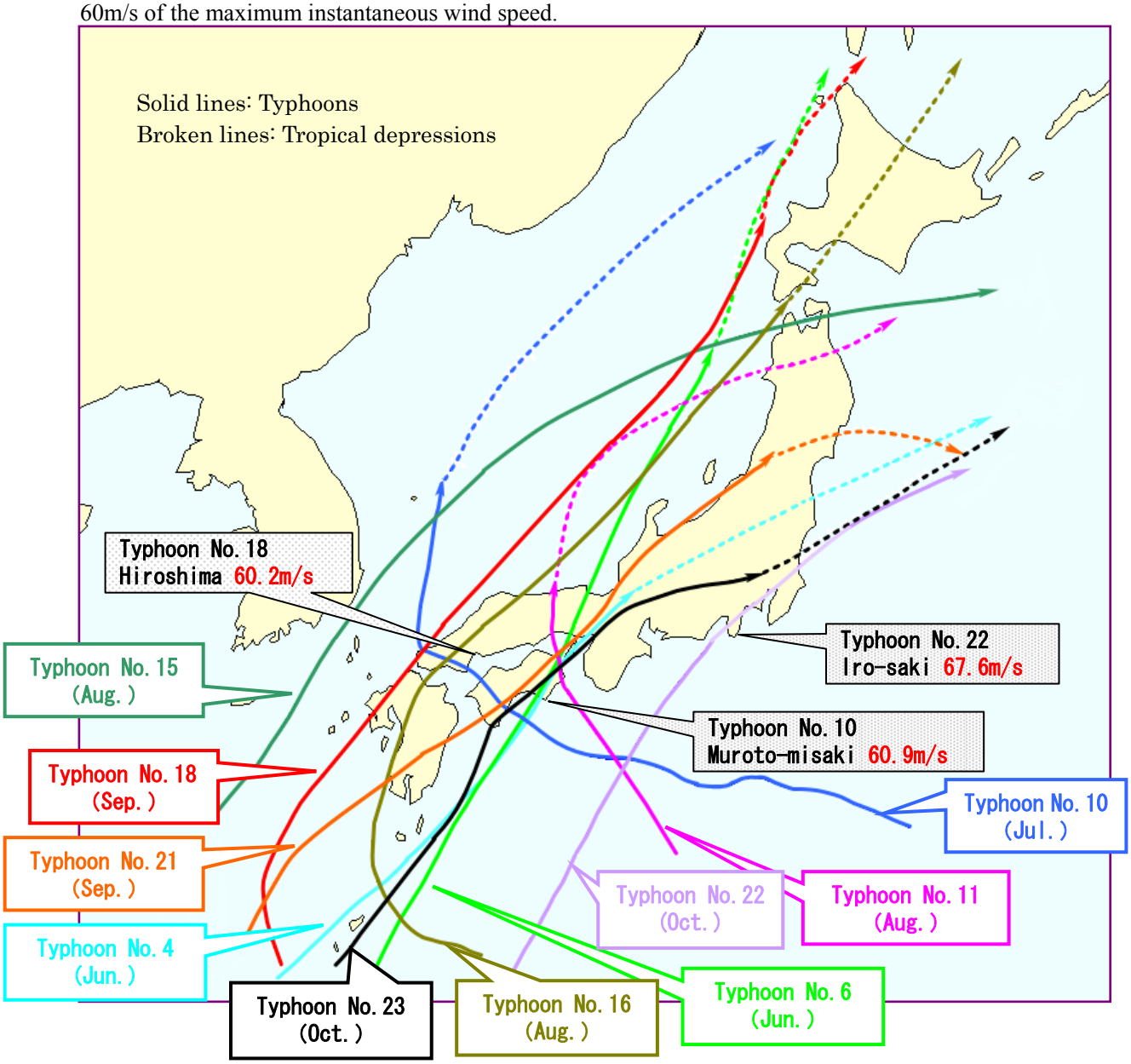
This edition of "MAIA DIGEST" has been published to provide explanation of the character of typhoons, a detailed analysis of casualties and case studies, the lessons learned from these examples. We do hope that this easy to read newsletter will contribute to the future prevention of marine accidents due to typhoons.

CONTENTS

1. Situation of Marine Accidents due to Typhoons

1.1 Tracks and wind speeds of typhoons in 2004

Every year the Japanese archipelago is hit by 2.6 typhoons on average. But, in 2004, a record number of 10 typhoons struck Japan, seven of which passed through the Seto Inland Sea and caused windstorms in many parts of Japan. The weather office at Muroto-misaki, Hiroshima and Iro-saki recorded winds of over 60m/s of the maximum instantaneous wind speed.

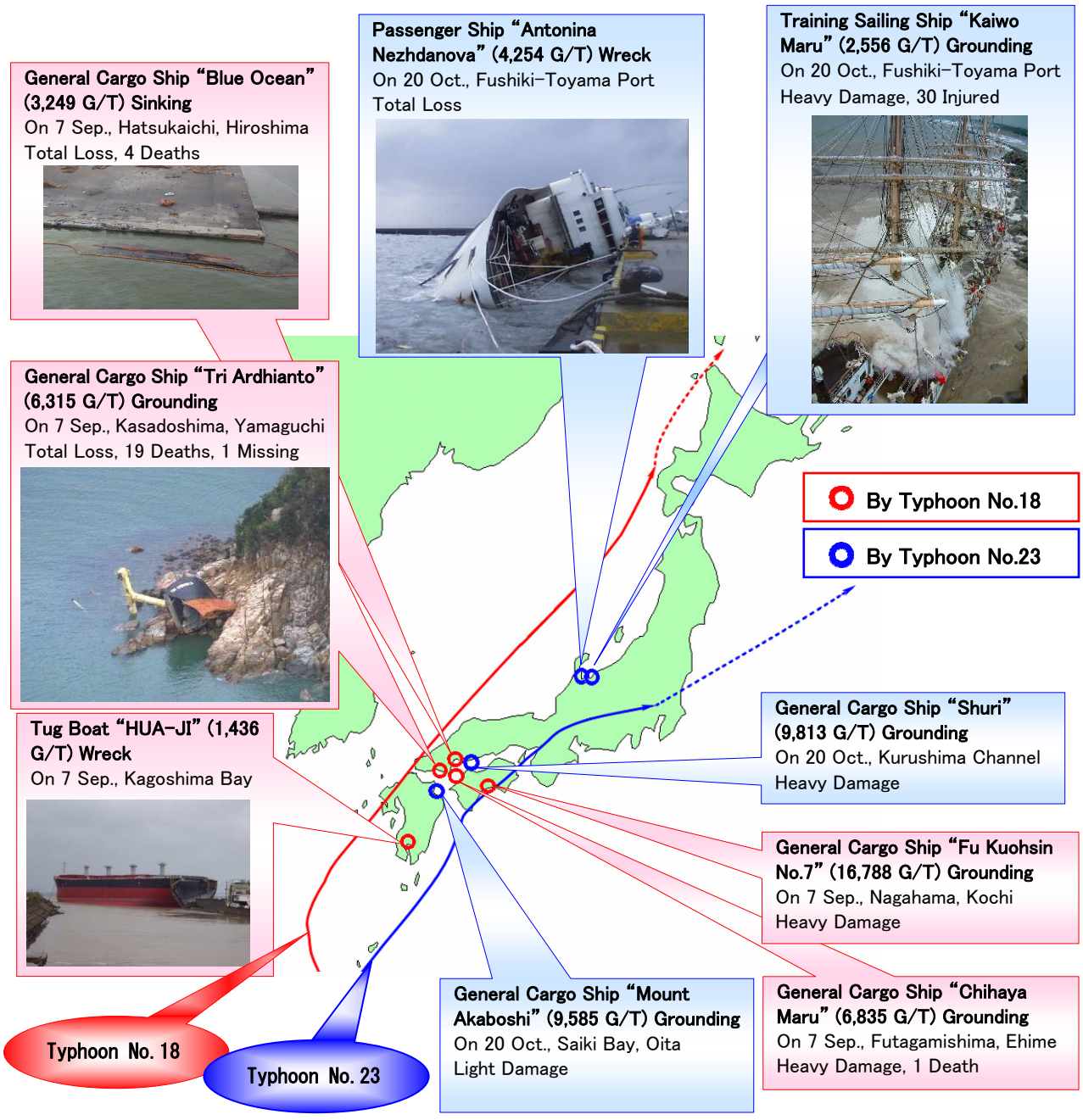


Typhoon No.	Date	Max. wind(m/s)	Max. instantaneous wind(m/s)	Observatory
No.4	Jun.11～11	29.2	51.5	Miyako-shima
No.6	Jun.21～22	43.7	57.1	Muroto-misaki
No.10	Jul.31～Aug.2	47.7	60.9	Muroto-misaki
No.11	Aug.4～5	20.3	29.8	Shiono-misaki
No.15	Aug.20～20	27.1	48.7	Izuhara
No.16	Aug.30～31	46.8	58.3	Muroto-misaki
No.18	Sep.7～8	33.3	60.2	Hiroshima
No.21	Sep.29～30	31.5	52.7	Kagoshima
No.22	Oct.9～10	39.4	67.6	Iro-saki
No.23	Oct.20～21	44.9	59.0	Muroto-misaki

1.2 Major marine accidents due to Typhoon No.18 and Typhoon No.23

The right (dangerous) semicircle zone of Typhoon No.18 passed through Kyushu, Chugoku and Shikoku regions, causing extraordinary storms in the Seto Inland Sea which lasted for many hours. The General Cargo Ship "Tri Ardhianto" anchoring off Kasadoshima, Yamaguchi prefecture ran aground, and all of the 20 crew members were either killed or missing. The General Cargo Ship "Blue Ocean" mooring at the wharf in Hiroshima Port sank and 4 crew members died.

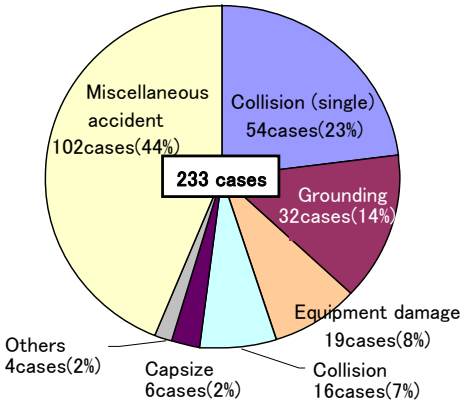
Due to Typhoon No.23, the Training Sailing Ship "Kaiwo Maru" anchoring off Toyama Bay ran aground after dragging her anchor, and 30 crew members sustained injuries. In the same typhoon, the Passenger Ship "Antonina Nezhdanova" mooring at the quay in Fushiki-Toyama Port was capsized and wrecked before it left the quay for sheltering.



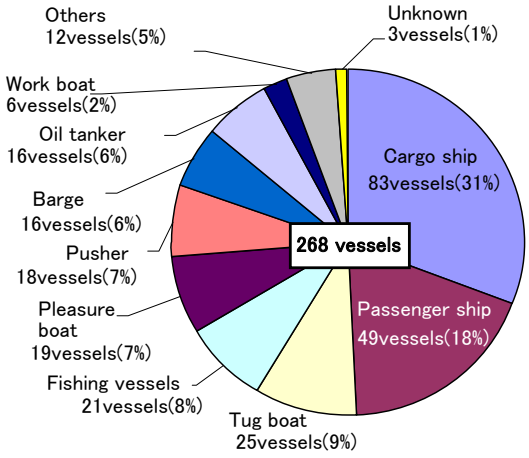
1.3 Situation of marine accidents by type of accident and type of vessel

The following two figures show the character of marine accidents due to typhoons in 2004. When we see the types of accidents, 23% of them were collisions with quays and other objects other than ships, which is followed by grounding (14%), equipment damage (8%), collisions between ships (7%), and so on. Other miscellaneous accidents include such cases as the contact with drifting wood washed by heavy rain.

When we see the types of vessels involved, Cargo ships (83 vessels, 31%) and Passenger ships (49 vessels, 18%) accounted for half of the total.



By type of accident

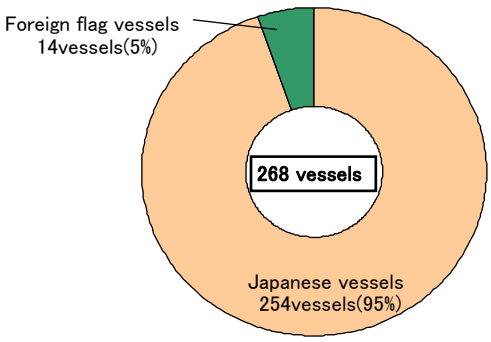


By type of vessel

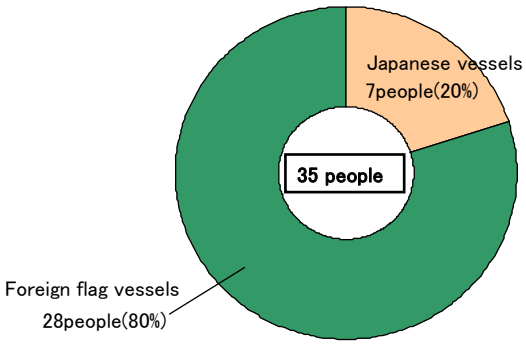
1.4 Situation of marine accidents due to typhoons involving foreign flag vessels

The number of foreign flag vessels involved in accidents due to typhoons around Japan is no more than 5% of the total. However, the number of deaths or missing crew from foreign flag vessels accounted for 80% (28 persons) of the total. This is because the accidents involving foreign vessels tend to be total loss of the ship causing many deaths and missing crew.

Of the 14 foreign flag vessels, four belonged to Panama, followed by Korea and Russia (2 vessels each). When we see the nationality of their masters, four of them were Russians. This may be attributed to their unfamiliarity with the tendency of typhoons in tropical and subtropical climates.



Nationality of vessels



Number of deaths or missing

2. Case Study of Marine Accidents Caused by Typhoons

Case1 Grounding of a foreign flag ship which was sheltering from a typhoon storm on the dangerous (= right hand) side of the typhoon

The ship "C": Bulk carrier (Panamax type) G/T: 36,080 Crew: 19 (4 Indian and 15 Filipino)
Cargo: 40,280 Mt. of corn
New Orleans, USA → Shibushi Port, Kagoshima Pref. → Shibushi Bay (under shelter)
Master: Age 44 (Indian) Experience at sea: 27 years As master: 7 years
No experience of entering Shibushi Bay
Time and Date: 21:15 JST (UTC＋9h) 25 Jul., 2002 Place: Shibushi Bay, Kagoshima Pref.
Weather: Rain, ENE wind with force 10
Wave height: 5m Tide: Beginning term of ebbing
Damage & Casualty: Broken in the midship and totally lost, fuel oil flowed out, 4 crew died

Summary

The ship suspended cargo work and decided to sail to Kagoshima Bay for sheltering, when it was informed that Typhoon No.9 was approaching. The ship anchored with 6 shackles in Shibushi Bay and watched the movement of the typhoon. The ship thought that the typhoon would subside soon based on navtex and other information, and continued anchoring there. But the typhoon did not weaken and the ship entered its storm zone, the right (dangerous) semicircle of the typhoon, and started dragging anchor due to storm and big waves and then ran aground.

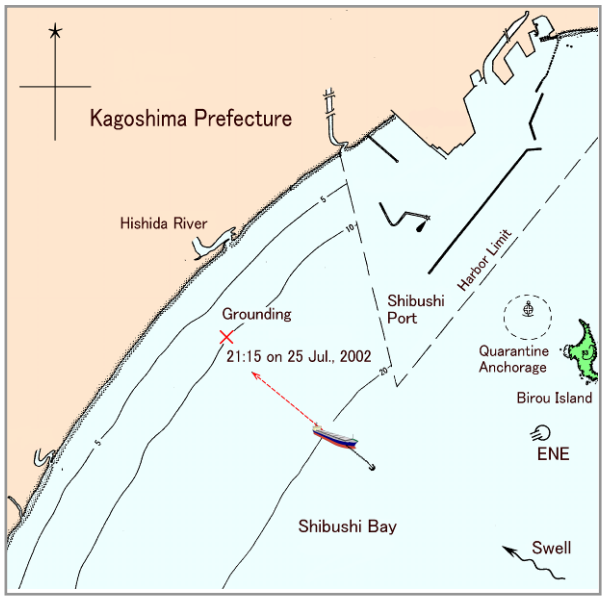
22ND 07:36 The ship arrived at Shibushi Port and started discharging.

23RD There was a meeting with the local agent.
The ship got the information that evacuation was recommended by the authority.

Master: Where should the ship shelter when the typhoon passes through the south side of Shibushi Bay?

Local Agent: Shibushi Bay is not an appropriate place for sheltering. Huge ships normally shelter in Kagoshima Bay.

→→ **Decided to shelter in Kagoshima Bay, but it was the first call.**



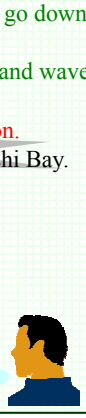
24TH 10:40 The ship suspended cargo work and left Shibushi Bay.
11:30 The ship did not go to Kagoshima Bay and anchored in Shibushi Bay to watch the movement of the typhoon.
【Depth: 25m, Bottom: Sand, Right anchor chain: 6 shackles】
Another ship of the same type anchored at the north part of Shibushi Bay in the evening.

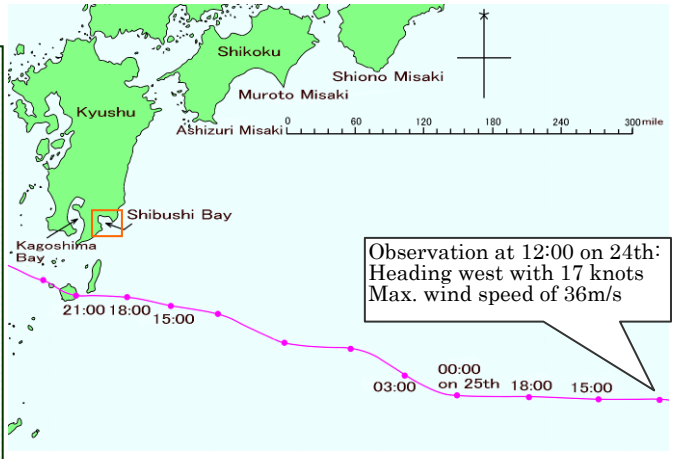
25TH 06:00 Shibushi Bay entered the gale zone.
09:00 It was forecasted that Shibushi Bay would enter the storm zone, the right (dangerous) semicircle of the typhoon.

★The master

Wrote in the nautical chart just the position, heading and speed of the typhoon, but did not draw the gale zone and the storm zone.
! The typhoon was downgraded from T to STS (*).
! The weather forecast predicted that the wind speed would go down to 28m/s in 24 hours.
! In Shibushi Bay, the wind speed was still less than 10m/s and wave height was 2m.
→The master judged that the typhoon would subside soon.
→→The master decided to continue anchoring in Shibushi Bay.

It takes 11 hours to go to Kagoshima Bay・・・
My first time in Kagoshima Bay・・・
Another ship of the same type is also anchoring in Shibushi Bay・・・
I would be able to manage by using engine and rudder.





12:00 **Contrary to the master's expectation, the typhoon kept its power and headed WNW.**

＊Grade of typhoons
33m/s≦ T (typhoon)
25m/s≦ STS (severe tropical storm) ＜33m/s
17m/s≦ TS (tropical storm) ＜25m/s

16:00 North wind increased suddenly and exceeded 15m/s. Wave height also increased.
→ Anchor watch was reinforced, but the ship did not evacuate to open sea.
16:24 **The ship started using engine. Anchor chain was still 6 shackles.**
16:30 Shibushi Bay entered the storm zone, the right semicircle of the typhoon.
17:00 **Wind direction changed to NE.** Wave height: 3m
19:30 The typhoon reached the closest and wind direction changed to ENE.
Wind speed: 17m/s Max. instantaneous wind speed: 28m/s Wave height: 5m
20:30 **The anchor started to drag.** Wind speed: 25m/s
Max. instantaneous wind speed: 35～41m/s Max. wave height: 8m
20:40 The radar detected that the anchor was dragging.
The ship started heaving the anchor → The ship hove in 2 shackles, but was unable to heave any more remaining 4 shackles in water due to its extreme tension.
21:15 The ship ran aground in depth of 10m.

The ship broke in two from midship and all crew took to a life boat with helmets and life jackets. The life boat was damaged when it hit the ship hull hard due to the wave while lowering. All crew evacuated from the life boat. 15 crew members reached the shore but 4 were drowned.

Why did the ship not leave Shibushi Bay?

1. The ship did not have enough knowledge about typhoons.

After un-berthing, the ship could not get typhoon information through the Internet that had been delivered from the local agent. The ship got typhoon information only by navtex, meteological fax and inmarsat-c.

Officer of the watch (OOW) wrote down the position, heading and speed of the typhoon based on navtex but did not draw the storm zone and the strong wind zone.

→The ship had an optimistic expectation based on navtex information that the typhoon would subside.
→The ship did not recognize the risk of entering into the storm zone, the change of wind direction and high waves coming over ship.
→The master and deck officers did not have enough knowledge about the risk of typhoons.

2. The ship did not have enough information about where they should shelter.

When the master had a talk with the local agent, he asked where the ship should shelter from the typhoon. The local agent replied that Shibushi Bay was not good for sheltering and that large ships normally shelter in Kagoshima Bay. So, the master decided to go to Kagoshima Bay.

→The ship was substantially owned by a Japanese company, but its managing operator was a foreign company.
→The master was reluctant to move because he had no experience of entering Kagoshima Bay.
→It takes about 11 hours to go to Kagoshima Bay under the rough weather. And the ship needed to return to Shibushi Bay for cargo work again after the typhoon passed.

3. Another ship of the same type was in Shibushi Bay, which made the crew feel at ease.

The same type (The ship “M”; 38,567 t) was in the NE part of Shibushi Bay.

A pilot had advised the ship “M” that the NE part of Shibushi Bay would be a good place for sheltering against east wind. She anchored there with 9-10 shackles of anchor chain. The anchor dragged, but the ship did not ground.

Foreign flag vessels need support!

◆**Foreign flag vessels are vulnerable to marine accidents due to typhoons. Optimistic recognition of typhoons, little experience of sheltering, and lack of information prevent them from taking prompt action and choosing an appropriate shelter.**

→Vessels whose managing operators are foreign companies have some difficulty in obtaining information about typhoons and sheltering areas.
→Especially, after un-berthing, the source of information is very limited.

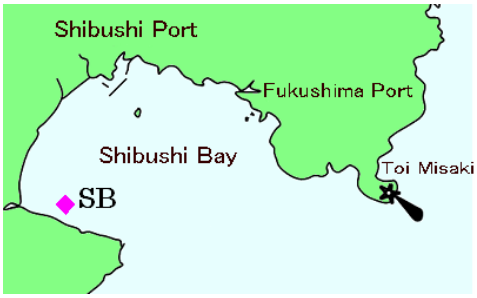
Foreign flag vessels should be supplied with more detailed information. Masters should keep good contact with their local agents and request the information they need.

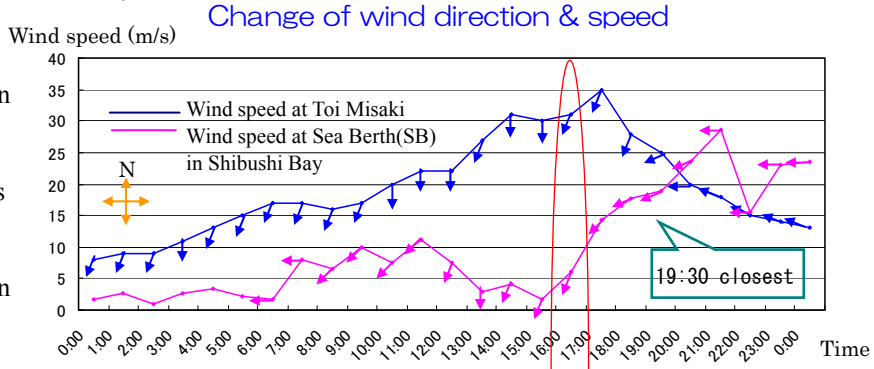
Beware of the change of wind direction!

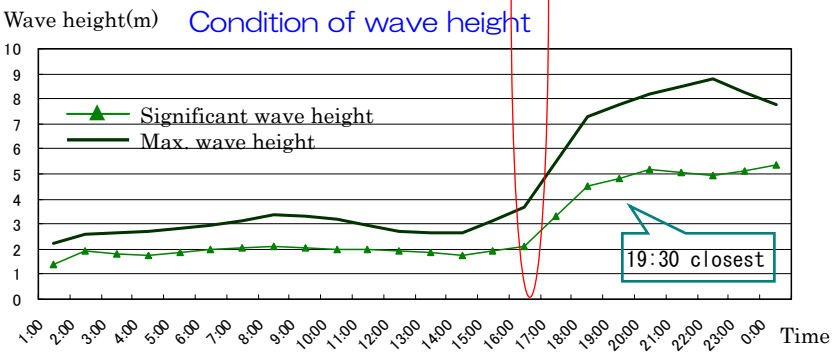
The diagrams indicate the changes of wind direction, speed and wave height in Shibushi Bay on 25 Jul., 2002.

Before the typhoon approached most closely to this area, the wind changed its direction, and suddenly increased its speed.

At the same time as the wind direction changed, a big swell came into the bay.



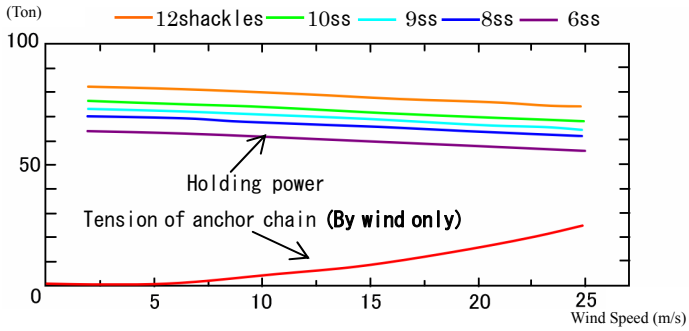


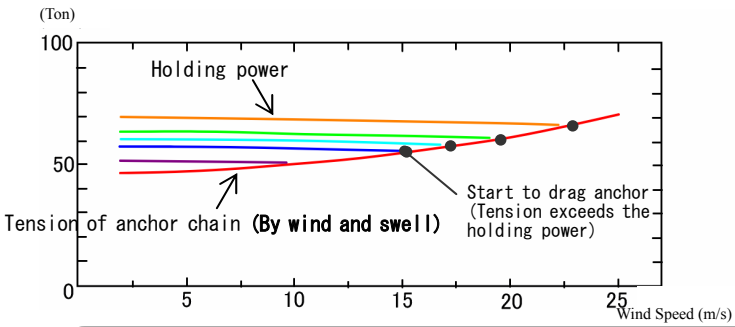


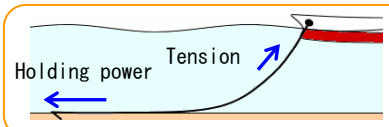
Beware of the serious effect of waves! You need to avoid the risk of swell in choosing your anchorage spot!

Let's see the results of a simulation to know the difference of limitations for anchoring between a ship that receives only the effect of wind and a ship that receives the effect of both wind and wave.

Depth: 25m Bottom: Sand Engine: No use







When tension exceeds holding power, the ship starts to drag anchor.

In case the ship receives only the effect of head wind

The holding power of the anchor decreases as the wind gets strong, because the contacting area to the bottom gets smaller. But the ship does not drag its anchor because holding power is always bigger than the tension.

In case the ship receives the effect of both head wind and wave (Wave height: 5m, Wave length: 200m)

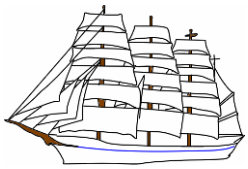
When wave drifting power is added to the wind, the tension of anchor chain considerably increases. It exceeds the holding power at the wind speed of 10m/s when the chain length is 6 shackles. When the speed is 15m/s, the ship drags anchor with 8 shackles. When speed is 25m/s, the ship drags anchor with 12 shackles. Waves have a great influence on dragging anchor.

POINT! Wind & Wave

- ◆You should pay attention to the change of wind direction when typhoons approach. **You should estimate that the max. INSTANTANEOUS wind speed would be 1.5-2.0 times stronger than the average wind speed** at sea where there is no shelter against wind.
- ◆When waves swell, the risk of dragging anchor increases significantly. You should avoid anchoring in areas where waves would enter. **The max. wave height could be sometimes 1.5-2.0 times higher than the significant wave height**.

Case2 Grounding of a training sailing ship while anchoring in a bay, though it was in the safe (= left hand) side of the typhoon

The ship "K": Training sailing ship G/T: 2,556 Crew: 63 Cadets and others: 104
Muroran Port → Fushiki-Toyama Port
Master: Age 48 Certificate: First Class (Deck)
Experience at sea: 26 years As master: 3 years
Time and Date: 22:47 JST (UTC+9h) 20 Oct., 2004
Place: Fushiki-Toyama Port (while anchoring to evacuate the typhoon)
Weather: Rain, North wind with wind force 12 Wave height: 6 m Tide: Middle term of flowing
Damage & Casualty: Holes with dents in the bottom, 30 crew injured



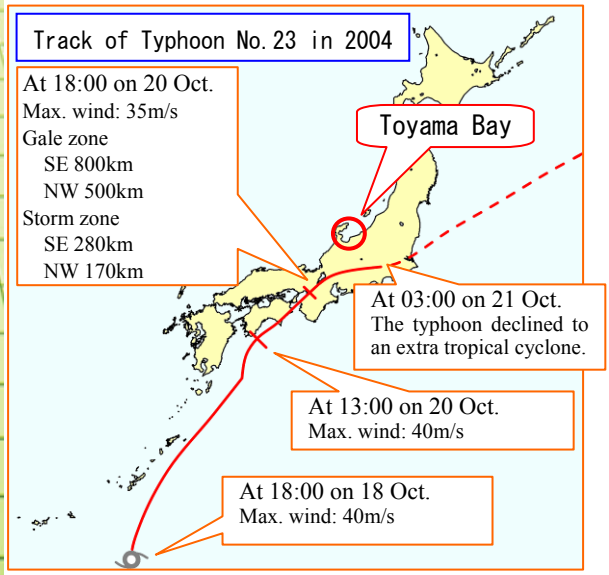
Summary

"K", managed by an educational organization for seamen, sailed for Fushiki-Toyama Port from Muroran Port for training and started anchoring inside Fushiki-Toyama Port for the purpose of sheltering from the typhoon.

While anchoring in Toyama Bay under the condition that Typhoon No.23 was approaching, "K" dragged her anchor due to NE wind and high swell, ran aground to shallow waters and was pushed to breakwater despite the use of the engine.

Narrative

14:00 on 18 Oct. Departed from Muroran Port.
07:15 on 20 Anchored inside Fushiki-Toyama Bay.
Starboard anchor chain: 7 shackles in the water
Depth: 17m, Bottom: Sand
The typhoon was proceeding to NE with 45 km/h around 60 km east of Tanegashima.
09:50 Gale advisory in Eastern Toyama Prefecture was issued, announcing that the max. wind would be 25m/s and swell 5m in the sea between midday on 20 and midday on 21.
10:30 "K" received a message from a pilot through her agent that she should enter Nanao Bay because her position was not good for anchoring.
12:00 The master expected the typhoon would approach the closest at around 23:00, and reinforced the anchor watch adding one officer to an able seaman.
13:00 The typhoon landed near Tosa-shimizu, Kochi Prefecture, with the max. wind of 40m/s.
13:30 Wind changed its direction to NE, and suddenly became stronger.
14:30 NE wind reached 15-20 m/s on average.
Extended starboard anchor chain from 7 to 9 shackles and used port anchor chain with 3 shackles to avoid swinging.
15:20 Gale advisory changed to storm warning and swell of 6m was announced.
17:00 Wind force exceeded 25m/s on average.
17:30 Stand by engine.
18:00 The master went up to the bridge.
19:00 Started using her engine with dead slow ahead while deploying chief officer on her bow.
Wind became NNE with 25-30m/s on average and swell 4-5m.
The wind reached 35m/s later.
19:40 Started dragging anchor.
19:52 The master recognized the dragging.
20:00 Started heaving up anchors from her port.
20:10 **Winch became out of use remaining 2 shackles of port anchor chain due to over load.**
After that, she used her engine to prevent drift. The wind was 30m/s on average.
21:00 Swell reached 6m, and she continued drifting despite full ahead and approached outer breakwater from near quarantine anchorage.
~~22:25 Touched sea ground after being severely shaken.~~
22:30 Engine stopped and "K" started flooding from engine room in the bottom, and the master ordered all crew to wear life jackets and asked JCG for help by VHF.
~~22:47 Ran aground on wave absorbing block in the base of outer breakwater.~~



Schedule for the following day

An open to public event of the ship was scheduled in Fushiki-Toyama Port on the following day. In addition, 20 students were scheduled to land there.

Criteria for anchorage

The master felt all right as he followed a witten manual for ship manoeuvring. The guideline read, "When the wind is over 25m/s, use the anchor with 9 shackles of chain and another with 3 shackles to prevent swinging, and stand by the rudder and engine."

Wisdom of the local people

Pilot advised the master to move to Nanao Bay because the ship was in a vulnerable position. However, the master expected that Nanao Bay might be crowded with evacuating ships, and did not follow the advice.

Communication with the land-side management

The management left the maneuvering to the master and did not check and advise how to anchor. None of the crew objected to the master's idea to stay in Toyama Bay.

Case2

Characteristics of Toyama Bay

The bay is vulnerable to wave swells because its mouth is widely open from north to north east. Swells easily come into the bay especially when NE wind blows from offing for a long time.

Swells become even higher in the heart of the bay because of its shallowness.

15 hours and 32 minutes before grounding
Started anchoring. (starboard anchor chain: 7 shackles)
Obtained weather information from TV and the Internet.
(−)10 hours 47 minutes
Increased the anchor watch to two persons.
(−)8 hours 17 minutes
Because NE wind became strong,
"K" paid out starboard anchor chain to 9 shackles and used port anchor chain with 3 shackles to prevent swinging.

Harbor Limit

Anchor Position
Depth: 17m, Bottom: Sand

Toyama Passage

Fushiki-Toyama Port
Outer Harbor

(−)3 hours 7 minutes
Started to drag anchor.

(−)2 hours 55 minutes
Captain recognized the dragging of the anchor.

(−)2 hours 37 minutes
Winch became out of use remaining 2 shackles of port anchor chain due to over load.
Started to use engine to prevent drift.

(−)2 hours 47 minutes
Started heaving up anchor from port.

Grounding on wave absorbing blocks in the base of outer breakwater
(22:47 on 20 October)

Quarantine Anchorage

The power of wave swell is enormous !

(−)1 hour 47 minutes
Swell: 6m high
Continued being drifted despite full ahead.

22 minutes before grounding
Touched sea ground.

Toyama Section

Iwase-tenjin, Toyama-city

Anchor: 3.24 ton, Type AC14
Anchor chain: 10 shackles respectively on both sides
(27.5m / shackle)

100 0 500 1000 1500m

POINT

Be careful even when you are in the left hand (safe) side of a typhoon !

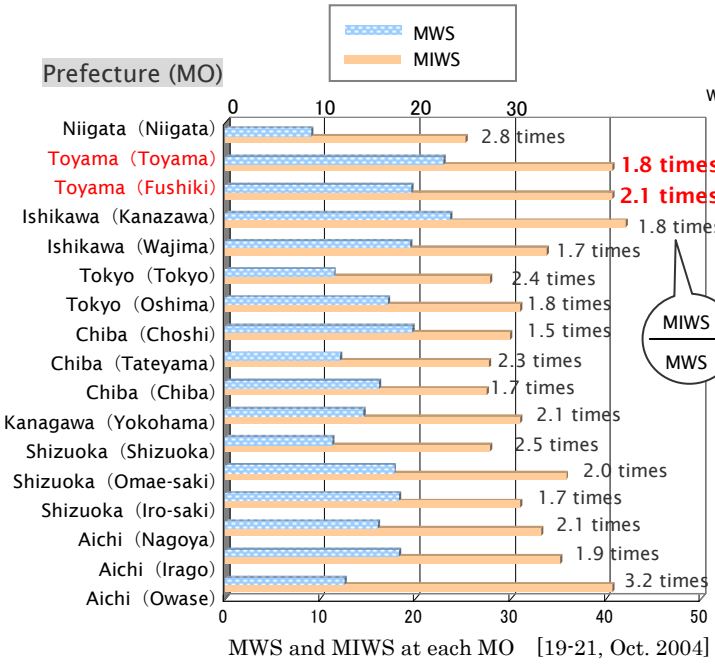
Generally, it is said that the left semicircle zone of a typhoon is relatively safe. However, the wind can be very strong even in the left semicircle zone depending on the pressure pattern and temperature. In the case of Typhoon No.23, strong NE wind seems to have blown around Toyama Bay area due to combination of the influence of the typhoon and a high pressure.

While anchoring, it is important to be careful of the effect of swells as well as the wind.

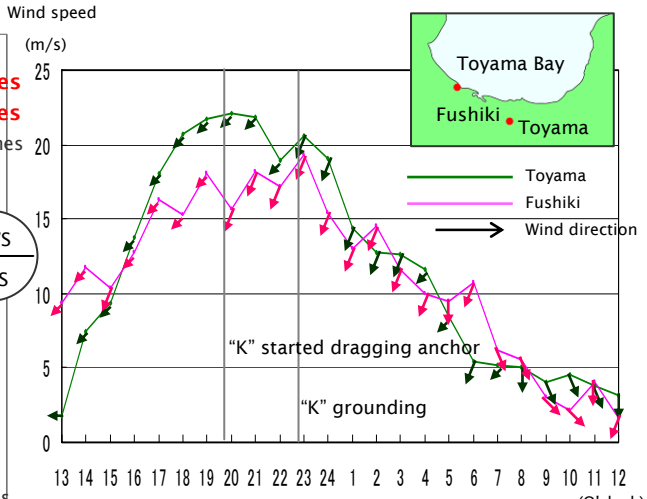
Column

Beware of "the Maximum INSTANTANEOUS Wind Speed"! It's much grater than "the Maximum Wind Speed" of the typhoon.

The following bar chart shows the comparison of the Maximum Wind Speed (MWS: the maximum of average wind speed in 10 minutes) and the Maximum Instantaneous Wind Speed (MIWS: the maximum of instantaneous wind speed), which were observed by meteorological observatories (MO) at the time of Typhoon No.23 in 2004.



MWS and MIWS at each MO [19-21, Oct. 2004]



Wind direction and speed observed at Toyama and Fushiki (surface) [20-21, Oct. 2004]

The MIWS is twice as strong as the MWS on average. Especially, on the sea with little shield against wind, you need to anticipate that the MIWS would be at least 1.5-2.0 times stronger than the MWS.

What is the appropriate length of the anchor chain?

Quote from "Navigation Manual" which was used by old Japanese navy.

(A) Anchoring in normal conditions [Wind Speed: Under 20m/s]

Length of anchor chain (m)= **3D + 90**

* *Provided that ship is anchoring at a sheltered place from unexpected wind.*

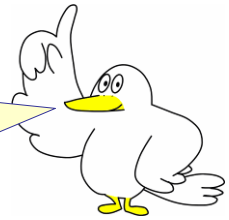
(B) Anchoring in rough conditions [Wind Speed: Under 30m/s]

Length of anchor chain (m)= **4D + 145**

* *The most dangerous areas for anchorage in rough conditions are berths facing open sea and those with strong tides. The former is vulnerable to pitching due to waves and the latter is vulnerable to swaying in large angle caused by the difference between the direction of the tide and wind. Therefore, it is important to weigh anchor immediately and wait in open sea, if you are in such berths.*

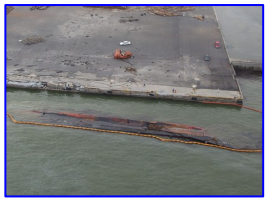
D: Depth at High Water (m)

The above explanation is just for your reference. You need to know the position of the typhoon, direction/speed of the wind, location of other ships, depth of the water, character of the seabed, etc. to decide the anchoring position and the length of the chain.



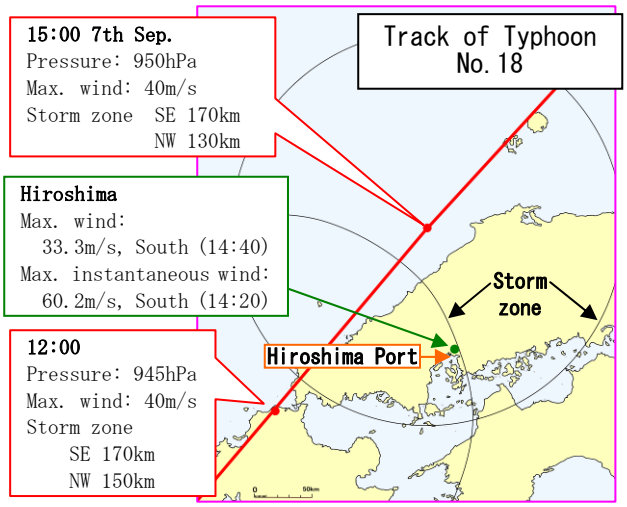
Case3 Sinking of a foreign flag vessel hit by a typhoon at berth

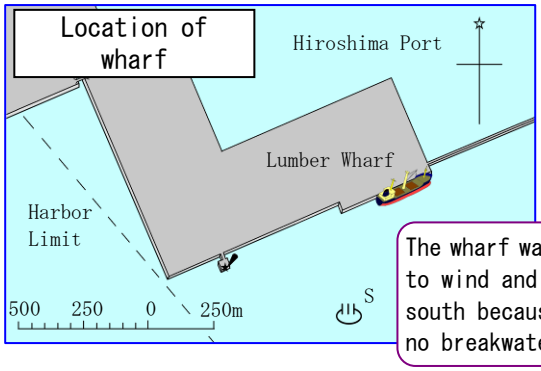
The ship "B": Log carrier G/T: 3,249 Crew: 18 (Russian) Cargo: Log of 3,217 m³
Master: Age 56
Experience at sea: 33 years As master: 8 months
No experience of entering Hiroshima Port
Time and Date: 15:00 JST (UTC＋9h) 7 Sep., 2004
Place: Hiroshima Port No.3 Section (at the berth)
Weather: Rain, South wind with force 11 Wave height: 3m Tide: High
Casualty: 4 crew died (drowning)



Summary

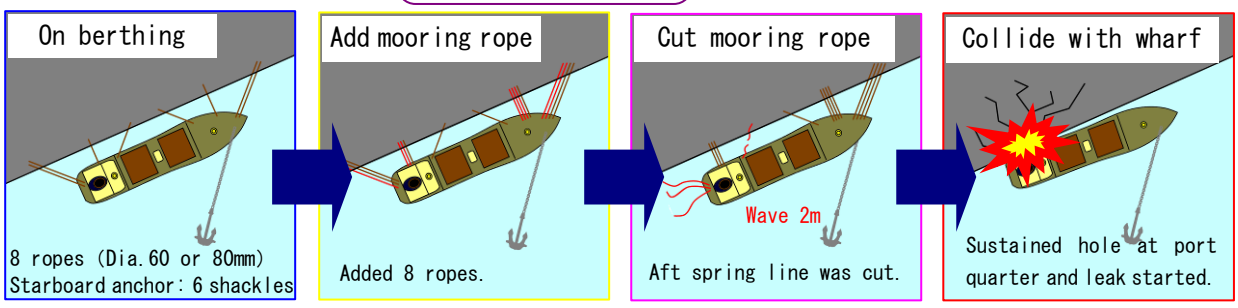
Although "B" **received a recommendation from the harbor master to shelter while at berth in Hirosima Port**, she did not take any immediate action. The mooring rope was cut by strong wind and heavy waves. She collided with the berth, sustained a hole in her shell and sank.





The wharf was vulnerable to wind and wave from south because there was no breakwater.

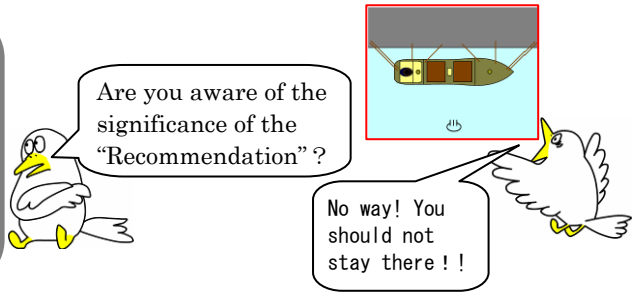
21 hrs before sinking	**First alert. (Preparing to shelter)**
(－)10 hrs	**Second alert. (Recommendation to shelter)**
(－)6 hrs 15 min.	**Storm, wave warning and heavy rain, flood, high water warning.** (By Hiroshima local meteorological observatory)
(－)6 hrs	**Received the recommendation through agent**, but the master didn't take any action because he thought the typhoon would pass away soon and it would be safer to stay.
(－)4 hrs 55 min.	**Typhoon No.18 landed at Nagasaki City.** The same warnings were maintained.
(－)4 hrs	**Remained at berth.** Being strongly advised to shelter by the agent, the master requested to place tug boats for assistance. But tug boat could not approach due to rough seas.
(－)1 hrs	When wave height reached 2m, aft spring line was cut and stern line came out from bit. **Collided with the wharf** at port quarter and leak started in engine room. Evacuation from vessel became difficult due to oscillation.
19 min. before sinking	**Distress message was dispatched by VHF** when listed to 35 degree.



What is "Recommendation"?

Harbor masters issue "Recommendation to shelter" at an early stage.

Act immediately when you are advised to move to shelter. Otherwise maneuvering can be highly difficult as the typhoon approaches.



Case4 Sinking of a passenger vessel unable to leave berth due to a typhoon

The ship "A": Passenger ship G/T: 4,254 Crew: 62 (Russian) Passenger: 44 Car: 87
Vladivostok Port → Fushiki-Toyama Port
Master: Age 57 Experience at sea: 30 years As master: 20 years
Time and Date: 21:10 JST (UTC＋9h) 20 Oct., 2004
Place: Manyo Quay No.1 of Fushiki-Toyama Port (at the berth)
Weather: Rain, NNE wind with force 11 Tide: Middle term of flowing

Summary

"A" was loading cars at Manyo Quay alongside with port side. The master knew Typhoon No.23 was approaching to the port, but he did not shelter at an early stage because he expected that the loading would finish before the wind became strong. However, when the cargo work finished, the winds were too strong and waves too high to get assistance of tug boats for leaving the berth. The master inevitably decided to endure the typhoon staying at the berth with increased mooring lines. Before long, as the wind speed exceeded 20m/s, the ship's port shell started to be beaten against the quay and sea water leaked from the damage. Finally, the ship keeled over and sank.

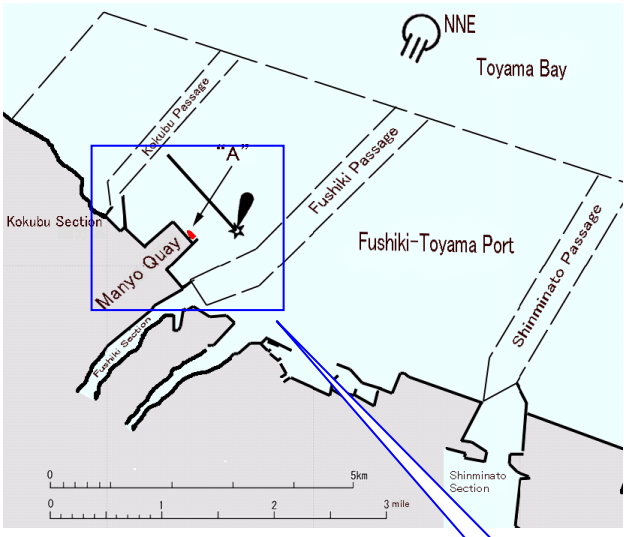
Narrative

08:30 18th Made fast to Manyo Quay alongside with port side with starboard anchor of 5 shackles.

15:00 19th As the master had weather information that the port would enter the storm zone, he asked the agent to get permission for berth at Fushiki Section to shelter the wind.

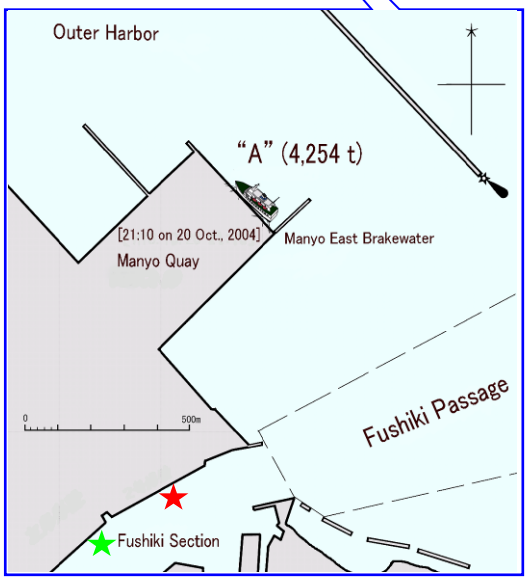
06:00 20th Another vessel which was in the next berth sheltered at Fushiki Section at an early stage and endured successfully. (★)

09:00 The Master got permission through the agent for a berth at Fushiki Section. (★)
Meanwhile, it was forecasted the typhoon would head to NE with increasing speed. It was also forecasted that the wind speed would increase before noon.



but The master did not shelter at an early stage because the wind was not very strong around the berth and he thought he would be able to complete loading by noon.

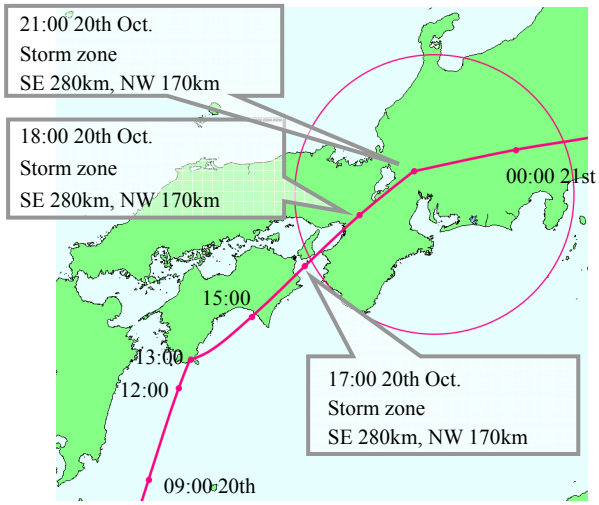
and Although the agent staff knew the quay where "A" was berthing was vulnerable to the wind, they did not advise to the master because they thought that decision for shelter should be left to the master.

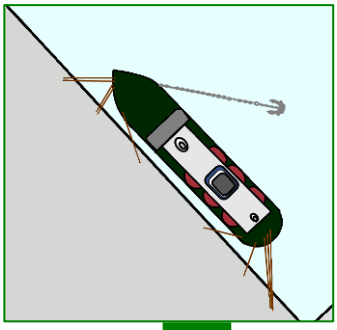


▲"A" had visited Fushiki-Toyama Port about 50 times every year.
▲The master knew the features of the port well because of frequent calls. He also had knowledge that the assistance by tug boats would be difficult when the weather becomes rough.
▲The master was notified about Typhoon No.23 since its emergence.

Case4

～Track of Typhoon No.23～

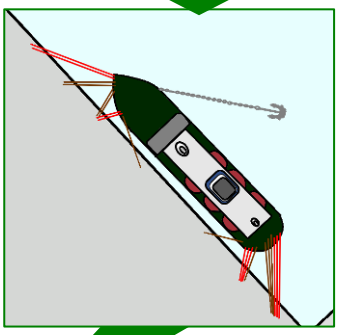




08:30 18th

On berthing

10 mooring ropes (Dia.80mm)



13:20 20th

Added 10 mooring ropes (Dia.120mm)

11:40 NNE wind, **10** m/s. Completed loading, and the master requested tug boats from the agent.

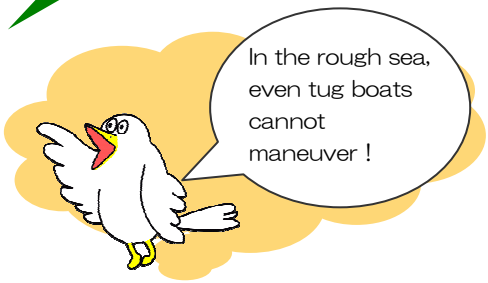
11:45 Tug boats could not approach Manyo Quay due to rough seas.

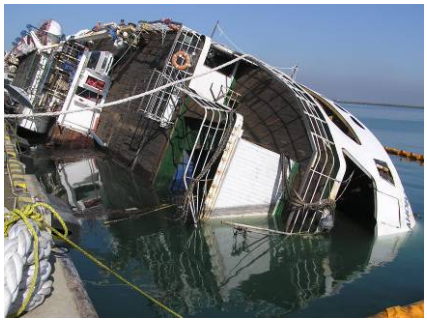
13:20 Without any assistance of tug boats, "A" could not leave the berth. Wind speed exceeded **15** m/s from NNE and the master decided to endure the typhoon staying at the berth with increased mooring lines.

17:00 NNE wind, **20** m/s. Shell plate of her port side started to beat against quay frequently.

19:30 A crack opened around scuttle in the room of port side mid-ship of tween deck and she was flooded with sea water.

21:10 "A" listed to port by 30 degree. All crew members and passengers evacuated and nobody was injured.





POINT！！

- As is shown by the example of another Russian vessel at next berth which endured successfully, if "A" had sheltered at an early stage with assistance of tug boats, the accident could have been avoided.
  → Master should anticipate the worst case scenario and take prompt action !
- Even skillful masters with frequent visits to Japan may have limited experience with typhoons. Lack of knowledge and information about typhoons can lead to serious casualties.
  → Agent should offer sufficient information to master and confirm his plan for sheltering. Positive and timely advice is indispensable for the master.

Case5 Grounding of a pure car carrier becoming uncontrollable under rough sea conditions

The ship "F": Pure car carrier (PCC) G/T: 56,835 Crew: 24 (Filipino) Car: 3,885
Yokohama Section, Keihin Port → Suruga Bay (while proceeding toward shelter area)
Master: Age 55
Experience at sea: 32 years As master: 7 years About 100 calls to Japanese port
Time and Date: 19:00 JST (UTC+9h) 1 Oct., 2002
Place: Near Ryuosaki, Oshima, Izu Islands
Weather: Rain, ESE wind with force 12 Wave height: 10m

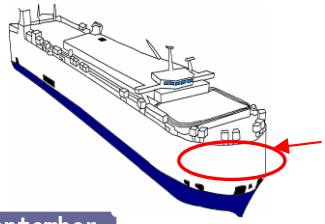
Summary

While Typhoon No.21 in 2002 was approaching Tokyo Bay, she was loading at berth in Yokohama Section, Keihin Port. The typhoon speeded up and the decision to evacuate was delayed. While sailing to a sheltering spot in Suruga Bay, she entered the storm zone, the dangerous (right) semicircle of the typhoon, and became uncontrollable off east coast of Oshima Island. Consequently, she was pushed towards the seashore and ran aground.

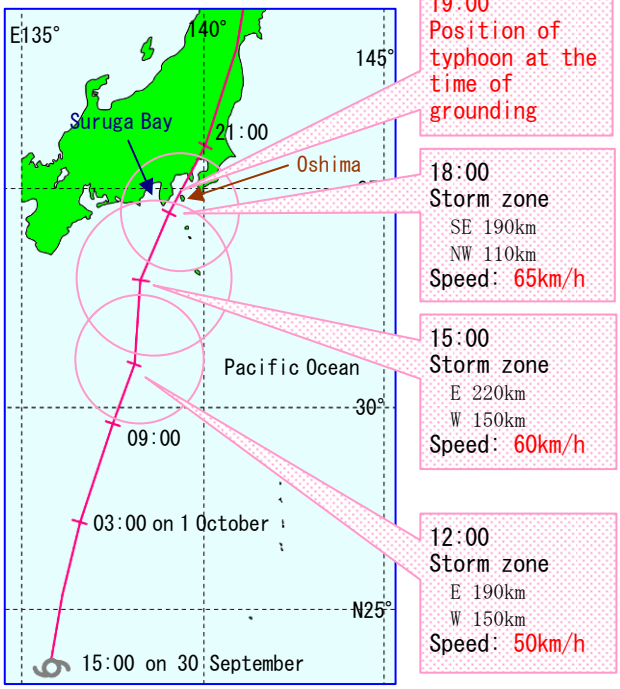
～Particulars of the Pure Car Carrier～

- High depth and shallow draft make the ship vulnerable to wind pressure.
  →The ship has a large area above the waterline, and is easily affected by wind.
- Very extensive bow flare.
  →When the ship receives big waves from ahead, she starts to pitch easily and loses its speed.
  →The ship is easy to suffer "racing" and engine trip in rough sea conditions, which decreases her speed.

"Racing" means that engine revolution becomes very high when propeller is above the waterline in rough sea.



～Track of Typhoon No.21 in 2002～



30 September

09:00 Reached outside the Keihin Port.
Started anchoring to wait for loading.
The master thought there was enough time to evacuate if she departed at 17:00 on the following day as scheduled.
But the master neglected to follow the typhoon information, and he didn't know that the typhoon was gaining speed. Consequently, his decision to head for Suruga Bay for sheltering was delayed.

The typhoon was proceeding north while speeding up gradually.

1 October

08:42 Berthed on Daikoku Wharf.
The master received the information from the agent that **a recommendation by the harbor master** in Keihin Port would be announced to evacuate from the port by 14:00. He decided to depart at 14:00. The master did not notice the typhoon was gaining speed.
13:30 Loading was suspended.
14:06 Sailed for Suruga Bay.
But, it was too late for "F" to avoid the storm zone on its way.

Change of expected position of typhoon

Forecast at 09:00 and 15:00 on 30 Sep. said,
"24:00 on 1st Oct.: Near Izu Peninsula"
Forecast at 21:00 said,
"24:00 on 1st Oct.: Near Miura Peninsula"
Forecast at 03:00 on 1st Oct. said,
"22:00 on 1st Oct.: Landed on Miura Peninsula"

Time lag of Information obtained by foreign ships

We should always bear in mind that foreign vessels have greater difficulty in obtaining typhoon information than Japanese ships. Real time information on TV may not be very helpful because of the language barrier.

Positive and continuous availability of detailed information through agents is indispensable.

Master should seek advice at the earliest stage on the typhoon and safe sheltering spots.

Narrative

Case5

2 months later, total loss by fire

Tokyo Bay

Kanagawa Prefecture

Miura Peninsula

Uraga Suido

Oshima

Ryuosaki Lighthouse

Tsurugisaki

After grounding, she was pushed to northward counterclockwise due to swell.

150

100 0 500m

Sagami Nada

Boso Peninsula

An old Japanese proverb goes,
"Autumn typhoons are fast and heavy runners."
Typhoons in autumn move faster than those in summer, and the wind is also stronger due to the westerlies.

14.8kn 205

200

7.9kn 211

ESE

240 2.5kn

Oshima

Ryuosaki Lighthouse

1 0 5 10 15 mile

0 10 30km

3 hours before grounding: Watch-keeping arrangement

Master: Commanding maneuvering
Chief officer: Assisting the master
Able seaman: Steering by manual control
Ordinary seaman and a person：Lookout
Second Engineer and 2 persons：Engine watch

(－)2 hours 33 minutes: Setting her course and being drifted

Set her course 200 degrees and carrying helm 5-15 degrees.

Proceeded while being drifted 5 degrees to starboard due to east wind with force 9 and wave height 7m.

The master noticed for the first time that the typhoon was gaining speed.

(－)2 hours: Listing to starboard

Entered the storm zone, the right (dangerous) semicircle, and wind force became 25-40 m/s along with sometimes 50 m/s blast.

Wave height: 9m

She continued proceeding while listing to starboard due to strong wind.

(－)1 hour 30 minutes: Decreased her speed due to wind and swell

She was pitching and rolling in continuous 40 m/s wind, and engine revolution decreased.

Proceeded to 211 degrees while being drifted to starboard with 7.9 knots on average.

(－)50 minutes: Lost her headway

Engine stopped due to excessive over-speeding by racing.

Engine was reset and restarted soon but its revolution did not rise and so lost her headway.

She became uncontrollable despite taking port 35 degrees and started drifting towards 240 degrees at 2.5 knots.

30 minutes before grounding: Speed 0 knot

Engine revolution became 65 rpm, and she could not make headway and was pushed with heading course 150 degrees.

Grounding

Her stern ran aground in shallow waters, depth 8m.

"There is a tendency that typhoons approaching Japan in September or October speed up rapidly at around 30 degrees of north latitude."

There are a lot of words of wisdom among Japanese seamen to cope with typhoons. But we should realize that even basic information is hard to be obtained by foreign seamen. The role of the people on the Japanese side is not limited to the offering of information on demand. It is imperative to confirm the concrete sheltering plan and to provide necessary support so that the ship can evacuate in time.

For the Prevention of Marine Accidents due to Typhoons

Be prepared for the risk of typhoons!

Recently, a considerable number of foreign flag vessels have been involved in accidents in Japan during typhoon season. These accidents are characterized by their seriousness. In most cases ships are totally lost, resulting in a significant number of deaths and missing crew. The main reasons for this are as follows:

(1) Many foreign mariners are not sufficiently aware of the risk of typhoons.
(2) They have little experience of sheltering from typhoons in Japanese waters.
(3) Foreign mariners have more difficulty in obtaining real time information about typhoons and sheltering areas than Japanese mariners.

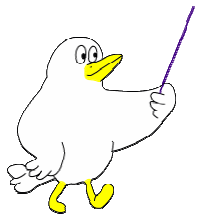
Typical and frequent cases of accidents are collision and sinking of ships at berth. Underestimation of the risk and lack of information led to delay in taking necessary action.

It is important for foreign flag vessels to properly understand the risk of typhoons, and collect sufficient information on typhoons and sheltering areas through their managing companies and local agents. It's also important to be provided with real time information when typhoons change their course and speed.

Be informed and predict the wind!

What is essential for the prevention of marine casualties due to typhoons is to collect as much information as possible and to act as quickly as possible.

The weather forecast will help you to predict the wind direction and power of the typhoon and to decide when and where you should shelter. But the geographical features and wind conditions in case of a typhoon vary greatly from one port to another. You are strongly advised to obtain detailed information about the possible maximum wind speed, the wind direction, the height of waves, the location of desirable sheltering spots, etc. for the specific ports you are calling.



International Affairs Section
Japan Marine Accident Inquiry Agency
2-1-2, Kasumigaseki, Chiyoda-ku, Tokyo, 100-8918
TEL: 03-5253-8821
FAX: 03-5253-1680
e-mail: maia@mlit.go.jp
URL: http://www.mlit.go.jp/maia/12english/english_top.htm