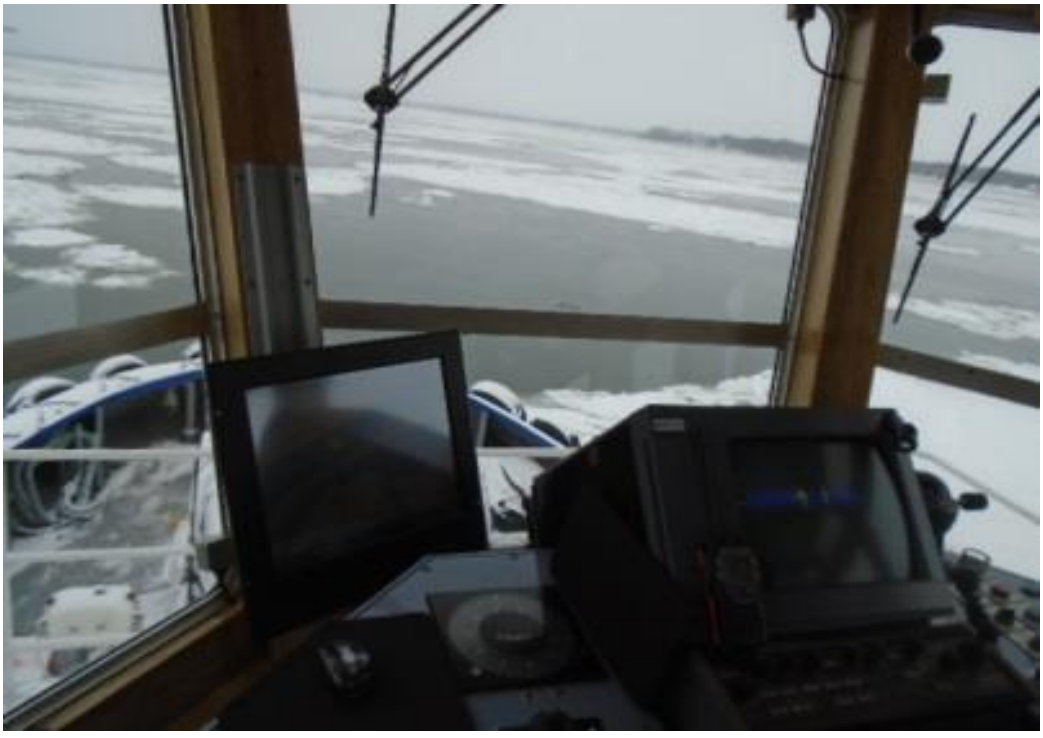
Ice Navigation

Thick Ice near berth/Passing St. Lawrence River with Tug



Ice Navigation

The first principle of passage through ice is to maintain freedom of manoeuvre. Once a ship becomes trapped, she goes wherever the ice goes. Operating in ice requires great patience and can be a tiring business with or without icebreaker escort. The long way round a difficult area whose limits are known, if often quickest and safest way. In ice concentrations three basic ship handling rules apply:

Keep moving, even if very slowly;

Try to work with the ice movement and not against it;

Excessive speed leads to ice damage.

Ice Identification

Before attempting any passage through ice it is essential to determine its type, thickness, hardness, floe size and concentration.

It is very easy and extremely dangerous to underestimate the harness of ice.

After a snow fall ice can be very difficult to identify. The utmost caution and experience is required then when making a passage through the ice.

Ice is seldom uniform. There can be different types of ice in drift ice.

Changes in ice conditions

Ice moves continually under the influence of wind and current, floating ice is much influenced by the wind. With a change of wind, ice condition can be completely change, sometimes within hours.

Ice fuses when the temperature falls below freezing. An area of separate ice floes and loose fragments can quickly turn into solid mass of ice and pose serious problem, even for ice breakers.

Consideration before entering ice

Ice should not be entered if alternative, although longer, route is available.

Before deciding to enter the ice the following factors need to be considered:

Type of ice;

Time of year, weather and temperature;

Area of operation;

Availability of icebreaker;

Vessel's ice class in relation to the type of ice expected;

State of hull, machinery and equipment, and quantity of bunkers and stores left;

Draft and depth of water over the propeller tips and the rudder;

Ice experience of the person in charge of the bridge.

Case Study # 1 Vessel in Inner Anchorage

Passage through ice

The ice should be entered from leeward, if possible. The windward edge of an icefield is more compact than the leeward edge and wave action is less on the leeward edge.

Ice should be entered at very low speed and at right angles to the ice edge to receive the initial impact, and once into the ice speed should be increased to maintain headway and control of the ship.

Astern Movement

It is recommended when vessel navigating on ice, not to order engine "Astern", either in loaded or ballast condition. Numerous vessel's propellers were damaged due to "Astern" maneuvering. The damage of the propeller creates endless operational and financial problems.

Vessel's Trim

Vessel to be trimmed by stern, so that the propeller is satisfactorily submerged.

Accumulation of Ice near the berth

Case Study 2: Vessel approaching berth, tug breaking ice

Case Study 2: Vessel approaching berth with Half Ahead facing 2.5 knot current, Ground Speed 0.3 km

Case Study 2: Vessel approaching berth, tug breaking ice

Case Study 2: Vessel approaching berth, tug breaking ice, 2nd tug pushing

Case Study 2: Vessel approaching berth 2nd tug pushing

Case Study 2: Vessel approaching berth, tug cleared ice

Case Study 2: Vessel finally came alongside, the whole operation took 3 hours

Vessel stuck in Ice

When vessel stuck in ice the following actions must be taken:

Inform the Owner/Operator;

Call Agent, Port Authorities in order to arrange Icebreaker assistance;

Endeavour to keep the main engine turning ahead slowly. The action will possibly keep the propeller and rudder area clear to ice accumulation;

Navigating in Ice Channel

When vessel moving in a convoy at a short distance between them, if the first vessel stuck in ice then the next vessel may collide with the first vessel. This situation is more likely in case the first vessel is small and has low propulsion whereas the second vessel has bigger propulsion.

The collision with icebreaker can occur with a short lead assistance if the icebreaker becomes stuck in ice. Damage may occur in towing and cutting situations if the icebreaker cuts the ship too close and if the ice intended to form a space between the vessel, either collapse or moves away.

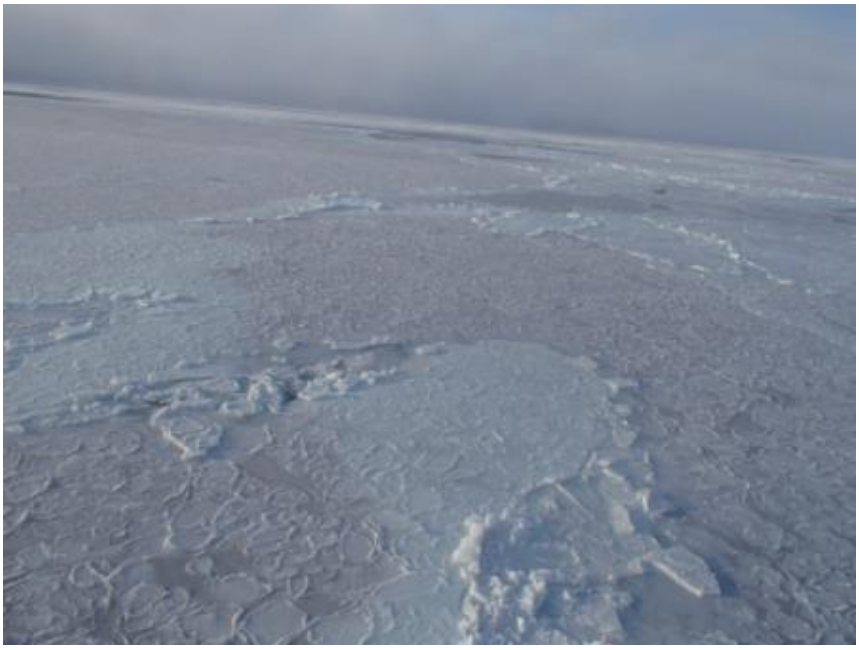
Shipboard Ice Accretion

Serious ice accretion adversely affects several areas of a ship's operation and safety such as; stability, strength, equipment, securing and closing arrangements.

Ships with containers stacked on a forward end and tankers are particularly vulnerable to ice accretion on the forcastle deck structure and adjacent areas. Large quantities of Ice accumulation may develop and remain unnoticed even during daylight hours, since observation of that part of the ship from the bridge is obstructed.

A very severe case has been documented. A 120m vessel left a European Port with a 0.2m trim by the stern and reached in Quebec City Port with a trim by the head of approximately 4.0m.

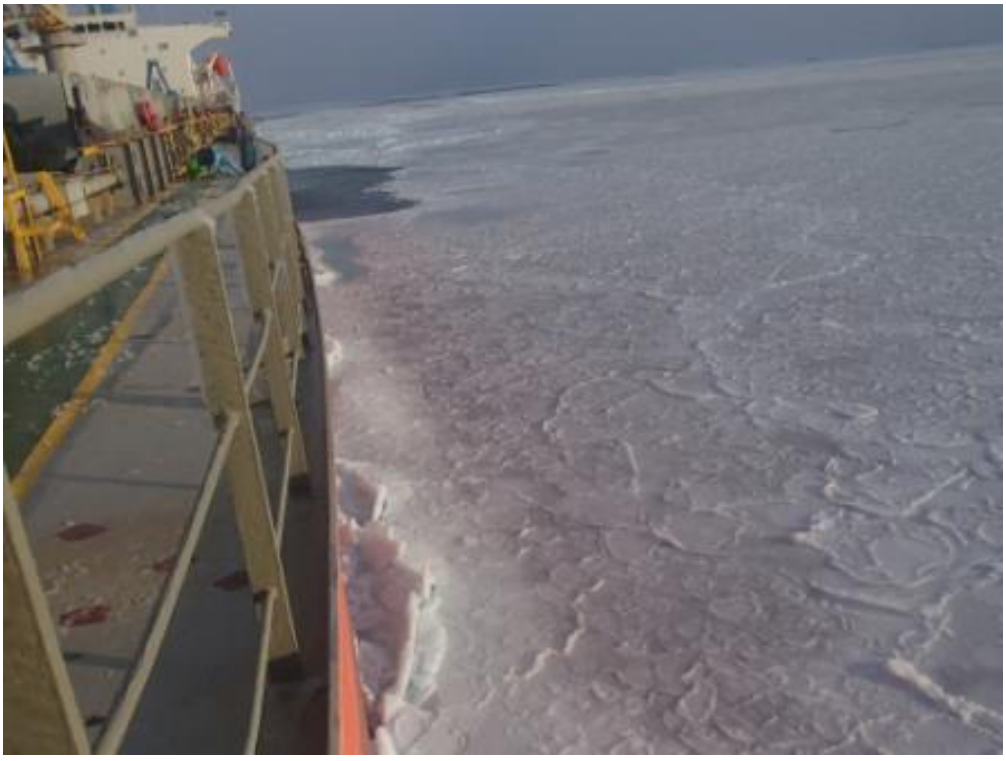
A list of 5 degrees developed and the vessel also become directionally unstable. The Master was totally unaware of the serious icing forward until a boarding pilot reported the developing condition.



Case Study # 3 Outer Anchorage

Case Study # 3 Bulbous Bow of a vessel stuck in Ice in outer anchorage

Case Study # 3 Vessel stuck in Ice, accumulation of Ice at Starboard Side



Case Study # 3 Vessel stuck in Ice, accumulation of Ice at Port Side

Case Study # 3 Vessel stuck in Ice, Propeller running continuously

Case Study # 3 Vessel stuck in Ice (2nd time on the next day), accumulation of Ice at Port Side

Case Study # 3 Vessel stuck in Ice (2nd time on the next day), accumulation of Ice at Starboard Side

Case Study # 3 Vessel stuck in Ice (2nd time/next day), Vessel received help from a container vessel which passed forward of vessel and cleared ice, she followed the container vessel

Case Study # Container vessel on the Starboard side

Source

The Mariners Handbook (NP 100)

Winter Navigation on the River and Gulf of St. Lawrence Practical Notebook for Marine Engineers and Deck Officers (TP14335/Edition 2011)

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15th Batch