

ICE Group

The ICE observation data is encoded in five digits; each is explained briefly below. Further information may be found in **The Book**.

When doing an ice observation it will be necessary to find a point where you have good all around visibility. You will also have to make certain approximations about the conditions of the ice. Generally speaking, for the sea ice you are characterizing the area of Arthur Harbor and out to about Torgersen Island, but not deep into Hero Inlet, say beyond the trolley line. For land ice (bergs) you should consider everything that you can see, even south of Bonaparte Point. If your vision is restricted by poor conditions but you know from previous observations that there are many icebergs that you cannot see, take them into account in your coding.

All codes are written with ships in mind so it is necessary to make approximations in some cases.

The ICE code is **ICE c_iS_ib_iD_iz_i**. This describes the prevailing ice conditions.

If **c_i = 0** (no sea ice in sight), then **S_i** and **D_i** will both be /, and **z_i** will be 0, leaving only **b_i** to be determined.

Sea ice is formed when sea water freezes; it is usually substantially flatter than ice of land origin, which comes (dominantly) from calving glaciers or ice shelves.

c_i = Concentration or arrangement of sea ice

- 0 - No sea ice in sight. If there is any sea ice in the observing area, this code may not be used.
- 1 - Ship in open lead > 1nm wide, or ship in fast ice with boundary beyond limit of visibility. If the former (lead), code **D_i** = 0; if the latter (fast ice), code **D_i** = 9.
- 2 - Sea ice present in concentrations < 3/10, open water, or very open pack ice.
- 3 - 4/10 to 6/10 open pack ice.
- 4 - 7/10 to 8/10 close pack ice.
- 5 - 9/10 or more, but not 10/10, very close pack ice.
- 6 - Strips and patches of pack ice with open water between.
- 7 - Strips or patches of close or very close pack ice with areas of lesser concentrations between.
- 8 - Fast ice with open water, very open or open pack ice to seaward of the ice boundary.
- 9 - Fast ice with close or very close pack ice to sea of the ice boundary.
- / - Unable to report, due to darkness, lack of visibility, or ship is more than 0.5 nm away from the ice edge.

This is NOT a continuum of conditions, e.g., **c_i = 1** does not fall between 0 and 2 in “pack intensity”. 0 and 1 are distinct codes, while 2 through 5 do represent a continuum, intended to represent conditions in which the ice is evenly distributed. 6 through 9 represent conditions in which the ice is unevenly distributed. Wind and current will frequently cause ice to “pile up” against the shore; any such pile-up should be imagined to be evenly distributed over the area of observation.

Open Water – Freely navigable water in which sea ice is present in concentrations less than 1/10.

Open Pack Ice - Composed of floes seldom in contact and with many leads.

Close Pack Ice - Composed of floes mostly in contact.

Fast Ice - Sea ice which remains fast along the coast, where it is attached to the shore.

S_i = Stage of Development

- 0 - New ice only (frazil ice, grease ice, slush, shuga).
- 1 - Nilas or ice rind, less than 10 cm thick.
- 2 - Young ice (gray ice, gray-white ice), 10-30 cm thick.
- 3 - Predominantly new and/or young ice with some first year ice.
- 4 - Predominantly thin first year ice with some new and/or young ice.
- 5 - All thin first year ice (30-70 cm thick).
- 6 - Predominantly medium first year ice (70-120 cm thick) and thick first year ice (>120 cm thick) with some thinner (younger) first year ice.
- 7 - All medium and thick first year ice.
- 8 - Predominantly medium and thick first year ice with some old ice (usually more than 2 meters thick).
- 9 - Predominantly old ice.
- / - Unable to report, because of darkness, lack of visibility, or because only ice of land origin is visible, or because ship is more than 0.5 nm from the ice edge.

For ice less than 10 cm thick, the question of whether to use code figure 0 or 1 is essentially a question of structural integrity. If you were to reach under the ice and lift upward, new ice would leave you with (at most) a handful of mush, while nilas or ice rind would hold together better, allowing for a piece larger than your hand to be retrieved.

Frazil Ice - Fine spicules or plates of ice in suspension in the water.

Grease Ice - A later stage of freezing than frazil ice, when the spicules and plates of ice have coagulated to form a thick soupy layer on the surface of the water. Grease ice reflects very little light giving it a matte appearance.

Slush - Snow which is saturated and mixed with water.

Shuga - An accumulation of spongy white ice lumps, a few cms across, formed from grease ice or slush.

New Ice - A general term for floating ice recently formed. It includes frazil ice, grease ice, slush, and shuga.

Nilas - A thin elastic crust of floating ice, easily bending on waves and rafting under pressure. It has a matte surface and is up to 10 cm thick.

Ice Rind - A brittle shiny crust of floating ice, formed on a quiet surface by direct freezing or from grease ice.

Young Ice - Floating ice in the transition stage from new ice and first year ice.

First Year Ice – Sea ice of not more than one winter's growth, developing from young ice; thickness 30 cm – 2+ m. May be divided into thin (30-70 cm), medium (70-120 cm), and thick (120+ cm) classifications.

Old Ice - Floating ice more than two years old, up 3 meters or more thick.

Pancake Ice – A term more indicative of horizontal structure than of stage of development, pancake ice is typically 0.3 to 3.0 meters wide, generally circular in shape, with raised rims due to the pieces striking against one another. New ice, nilas, ice rind, and young ice may all come in pancake form.

b_i = Ice of Land Origin

0 - No ice of land origin.

1 - 1-5 icebergs, no growlers or bergy bits.

2 - 6-10 icebergs, no growlers or bergy bits.

3 - 11-20 icebergs, no growlers or bergy bits.

4 - Up to and including 10 growlers and bergy bits - no bergs.

5 - More than 10 growlers and bergy bits - no bergs.

6 - 1-5 bergs, with growlers and bergy bits.

7 - 6-10 bergs, with growlers and bergy bits.

8 - 11-20 bergs with growlers and bergy bits.

9 - More than 20 bergs, with growlers and bergy bits - a major hazard to navigation.

/ - Unable to report, because of darkness, lack of visibility or because only sea ice is visible.

Berg – A massive piece of floating glacier ice, protruding more than five meters above sea level.

Bergy Bit - A piece of floating glacier ice, showing one to five meters above sea level.

Growler - A smaller piece of ice than a bergy bit, extending less than one meter above the sea surface, often almost awash.

D_i - True Bearing of Principal Ice Edge

0 - Ship in shore or flaw lead.

1 - Principal ice edge towards the NE.

2 - Principal ice edge towards E.

3 - Principal ice edge towards SE.

4 - Principal ice edge towards S.

5 - Principal ice edge towards SW.

6 - Principal ice edge towards W.

7 - Principal ice edge towards NW.

8 - Principal ice edge towards N.

9 - Not determined.

/ - Unable to report, because of darkness, lack of visibility or because only ice of land origin is visible.

Usually we use / for this group as we seldom have anything that distinct.

z_i - Present Ice Situation and Trend of Conditions Over Preceding 3 hours

0 - Ship in open water with floating ice in sight.

1 - Ship in easily penetrable ice : conditions improving.

2 - Ship in easily penetrable ice : conditions not changing.

3 - Ship in easily penetrable ice : conditions worsening.

4 - Ship in ice difficult to penetrate : conditions improving.

5 - Ship in ice difficult to penetrate : conditions not changing.

6 - Ice forming and floes freezing together.

7 - Ice under slight pressure.

8 - Ice under moderate or severe pressure.

9 - Ship beset.

/ - Unable to report, because of darkness or lack of visibility.