WORLD METEOROLOGICAL ORGANIZATION

JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY (JCOMM)

EXPERT TEAM ON SEA ICE – FOURTH SESSION

STEERING GROUP FOR THE PROJECT GLOBAL DIGITAL SEA ICE DATA BANK (GDSIDB) – TWELTH SESSION

ST PETERSBURG, RUSSIAN FEDERATION

1 TO 5 MARCH 2010

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

ETSI-IV GDSIDB-XI/Doc. 2.6.2(6)

(10.II.2010)

ITEM 2.6.2

Original: ENGLISH

Proposed Additions and Amendments the WMO Sea Ice Nomenclature

(Submitted by the Secretariat)

Summary and Purpose of Document

This document contains a number of proposed additions and amendments to the WMO Sea Ice Nomenclature following recommendations from ETSI-III.

ACTION PROPOSED

The Expert Team on Sea Ice (ETSI) is invited to:

(a) Note and comment on the proposed additions and amendments to the WMO Publication No. 259 Sea Ice Nomenclature.

(b) Approve these proposed amendments separately or together.

Background

At the 3rd Session of the Expert Team on Sea Ice in March 2007 (Ref: Meeting Summary Paragraph 2.8.1.2), in addition to amendments to the Sea Ice Nomenclature required to harmonize with SIGRID and the ENC Ice Objects, the Expert Team "agreed to also consider under this discussion the "frost flowers" term (proposed by United Kingdom) and additional terms posted on the ASPeCt web site. The Team recommended that after the approval, these definitions should be available in English, French, Russian and Spanish (Action: ETSI members and Secretariat)."

The secretariat corresponded with the experts in the Antarctic Sea Ice Processes and Climate (ASPeCt) Scientific Steering Group (SSG) to arrive at the definitions proposed in Appendix I.

Attachments

Appendix I - Proposed Additions to the WMO Sea Ice Nomenclature

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Appendix I

Proposed Additions and Amendments to the

WMO Sea Ice Nomenclature

1) SNOW ICE

There is no definition for snow ice in the WMO Sea Ice Nomenclature even though it makes a significant contribution to the total mass of Antarctic sea ice. (Ref: ASPeCt – Antarctic Sea Ice Processes and Climate (http://www.aspect.aq/snowice.html)

It is recommended to adopt a definition for "snow ice", based on the ASPeCt description, to be included in Section 2 Development.

> "2.7 Snow Ice: Ice formed by refreezing flooded snow creating an ice layer that bonds firmly to the top surface of a floe."

The ASPeCt definition is appropriate to adopt since it has been use for many years in the Antarctic.

2) MARGINAL ICE ZONE (MIZ)

There is no definition of Marginal Ice Zone in the WMO Sea Ice Nomenclature even though the term has widespread use.

It is recommended to adopt a definition for Marginal Ice Zone to be included in Section 4.4 Arrangement of Floating Ice.

> "4.4.11 Marginal Ice Zone: The region of an ice cover which is affected by waves and swell penetrating into the ice from the open ocean."

The definition follows from Peter Wadhams, "Ice in the Ocean", 2000, Overseas Publishers Association, Chapter 6. Wadhams devotes an entire Chapter to the marginal ice zone arguing that there are only four true MIZs in the world – East Greenland Sea, Labrador Sea, Bering Sea and the circumpolar Antarctic ice edge. Wadhams qualifies his definition by saying that the MIZ is "close to an open ocean". Anthony Worby, chair of the ASPeCt SSG, advises that, around Antarctica, ocean swell can penetrate hundreds of kilometers into an ice field.

3) FLOE

The current definition of "floe" in the Sea Ice Nomenclature is:

> "4.3.2 Floe: Any relatively flat piece of sea ice 20 m or more across. Floes are subdivided according to horizontal extent as follows:"

The following sub-paragraphs 4.3.2.1 through 4.3.2.5 define floe sized from giant to small.

A following paragraph defined ice cake:

> "4.3.3 Ice cake: Any relatively flat piece of sea ice less than 20 m across."

The ASPeCt definition of "floe" is:

> "A floe is any contiguous piece of sea ice. Floes may be described in terms of several size categories:"

Five floe sizes from giant to small, identical to the Sea Ice Nomenclature, follow with the addition of a note that: "Floes less than 20m across are called cake ice."

Two differences stand out:

1) "contiguous piece" vs "relatively flat piece" – ASPeCt does not delineate floes by ridges and makes the point that large floes are usually formed by small floes freezing together and may be significantly ridged. On the other hand, "relatively flat" is correct in the sense that the vertical extent of any piece of sea ice is always much less than the horizontal extent.
2) Difference in treatment of floes/cakes less than 20m. Under the Sea Ice Nomenclature, an "ice cake" is not a "floe" (although it has the same root definition). ASPeCt is ambiguous – floes less than 20m are still floes but are called "cake ice".

It is recommended that:

(a) The definition of "floe" be amended to read:

> "4.3.2 Floe: Any contiguous piece of sea ice. Floes are sub-divided according to horizontal extent as follows:"

(b) The definition of "ice cake" be renumbered from 4.3.3 to 4.3.2.6 and amended to read:

> "4.3.2.6 Ice cake: Less than 20 m across."

(c) The definition of "small ice cake" be renumbered from 4.3.3.1 to 4.3.2.7 and amended to read:

> "4.3.2.7 Small ice cake: Less than 2 m across."

4) CAKE ICE

There is no definition for Cake Ice in the WMO Sea Ice Nomenclature even though it is commonly used in Antarctica.

It is recommended to adopt a definition for cake ice as follows:

> "4.3.3.1 Cake Ice is commonly used in Antarctica to refer to a collection of ice cakes. This should not to be confused with "pancake ice". Cake ice is older and thicker than pancake ice."

This definition has been proposed by Anthony Worby, chair of the ASPeCt SSG.

If the definitions for ice cake and small ice cake are re-numbered as proposed in 3) above, then Cake Ice should be numbered as paragraph 4.3.3

5) FROST FLOWERS

This term was proposed a long time ago but was not included because it was not used in common practice. With the advance of microwave remote sensing, it has become an important surface feature of sea ice.

The ETSI-II Session (2004) discussed the inclusion of a definition for "frost flowers" which coincides with the Russian national nomenclature, originally proposed to the WMO Commission for Marine Meteorology in 1980. It was agreed that this term be included in a larger update of the Sea Ice Nomenclature, which has not yet been implemented.

It is recommended that the following definition be included in the Sea Ice Nomenclature:

"8.7 Frost flowers: A growth of ice crystals by condensation from the atmosphere at points on the surface of young ice. After formation, sea water may be drawn through the ice into the flowers. These delicate, highly saline crystals effectively roughen the surface, often dramatically altering the appearance of sea ice in microwave remote sensing imagery."