

## **June Report: Outlook Based on May Data**

**By Todd Arbetter, Sean Helfrich, Pablo Clemente-Colon (Science and Applied Technology Dept)  
Chris Szorc (Operations Dept)**

### **NIC Provisional Outlook for September Minimum**

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National/Naval Ice Center, Suitland, MD

**Best Guess: 4.736 million km<sup>2</sup>**

**Method: Statistical/Heuristic**

#### **Overview:**

For this outlook we use a heuristic approach based on the National Ice Center (NIC) ice charts and statistics spanning 1972-2008. This outlook was prepared by considering a NIC chart of Ice Conditions for May 25, 2008, the most recent NIC hemispheric chart. Any ice containing multiyear ice (MYI) was identified and classified by the partial amount (1/10, 2/10, etc.). All other ice was considered first year ice (FYI). In 2008, much of the central Arctic was devoid of MYI, a situation not observed prior in the satellite era. Because NIC and CIS make no distinction between second year ice and MYI, the ice in the central basin is once again MYI. However, we note that it is likely to be thinner and weaker than “traditional” MYI.

Analysis of previous summers indicates that much of the FYI will melt. Even with the central pack, only 13% of FYI remained from its March maximum. For this summer, we remove any parcel containing only FYI will melt out regardless of location. Once again, we present 4 outlook levels of severity: Conservative, Moderate, Aggressive, and Extreme. Conservative represent the cautious end of the spectrum, while Extreme would be the case of a warm Arctic summer combined with the “Transpolar Express” of 2007.

The summer minimum will depend on how much ice is lost during the melt season (July-September). It should be noted that the primary ice type represents the final stage of development of the ice (based on a theoretical ice thickness model using cumulative freezing-degree days). For example, ice classified as thick FYI may not necessarily be thicker than 120 cm at present. Thus, the actual ice thickness may be much thinner than the primary ice type would indicate. This is especially true of the second-year MYI.

The primary question about summer 2009 continues to be the fate of the FYI in the central Arctic, but for this outlook we have tied it to the presence of MYI.

The current conditions (figure 1):

Ice extent 11.842 million km<sup>2</sup>

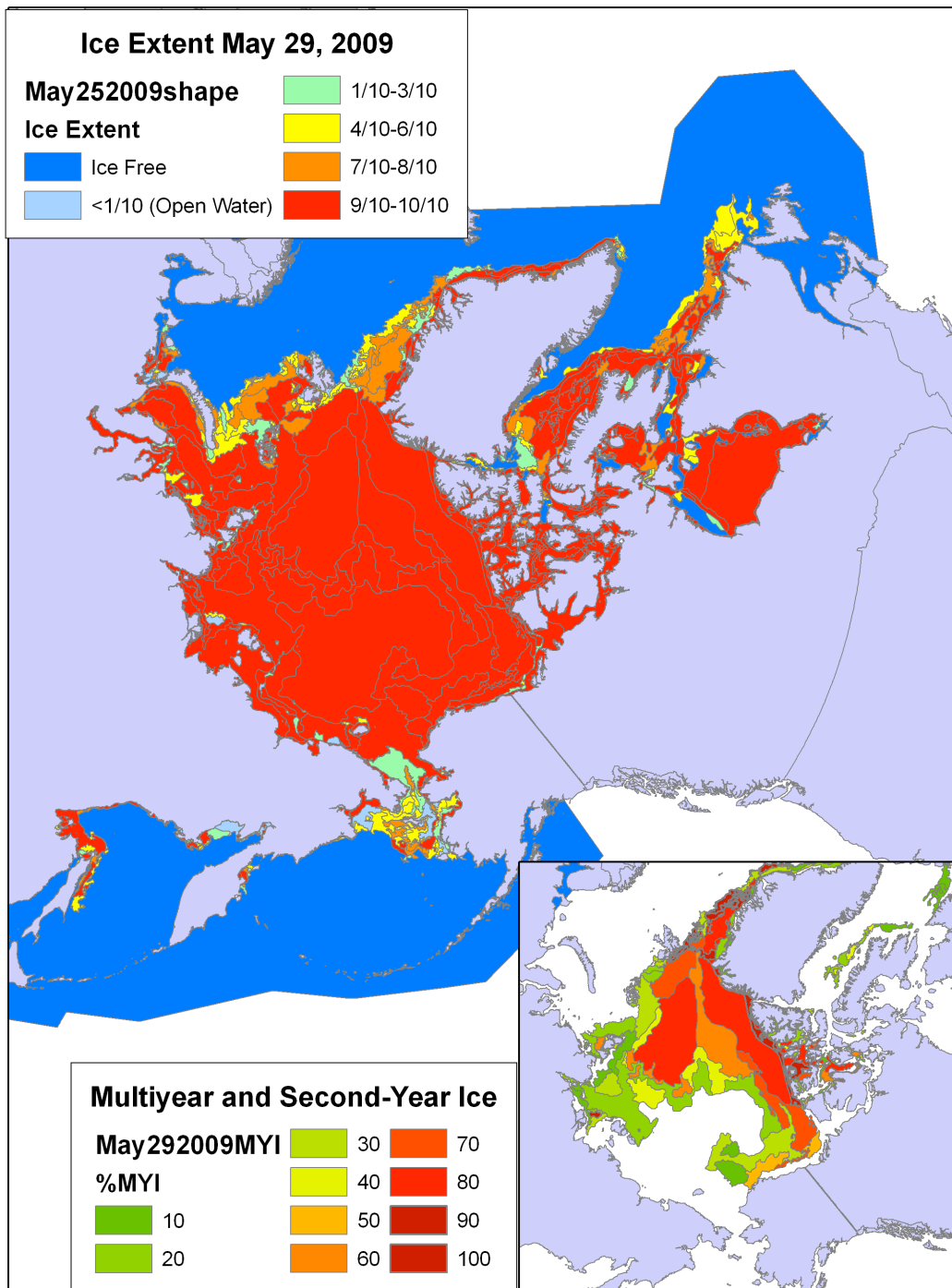
Ice Area 10.527 million km<sup>2</sup>,

Avg concentration 88.9%

Multiyear ice extent 5.224 million km<sup>2</sup>

Multiyear ice area 2.600 million km<sup>2</sup>

Avg concentration: 49.8%



**Figure 1:** Sea ice conditions for May 29, 2009, and multiyear ice by percentage (inset).

## **Methodology:**

Using the most current hemispheric ice chart and ArcGIS, the map is edited to select all parcels with MYI as the primary ice type. All other parcels are discarded. The remaining ice is edited following the assumptions below. A senior ice analyst (Mr. Szorc) examines and approves the outlooks.

## **The Seasonal Outlooks:**

Conservative: Any area with MYI survives

Ice extent: 5.224 million km<sup>2</sup>

Ice area: 4.832 million km<sup>2</sup>

Avg concentration: 92.5%

MYI extent: 5.224 million km<sup>2</sup> (includes all parcels containing MYI)

MYI area: 2.600 million km<sup>2</sup>

Avg concentration: 49.8%

Moderate: Any area with 20% or more MYI survives

Ice extent: 4.763 million km<sup>2</sup>

Ice area: 4.400 million km<sup>2</sup>

Avg concentration: 92.4%

MYI extent: 4.763 million km<sup>2</sup>

MYI area: 2.553 million km<sup>2</sup>

Avg concentration: 53.6%

Aggressive: Any area with 40% or more MYI survives

Ice extent: 3.440 million km<sup>2</sup>

Ice area: 3.253 million km<sup>2</sup>

Avg concentration: 94.6%

MYI extent: 3.440 million km<sup>2</sup>

MYI area: 2.150 million km<sup>2</sup>

Avg concentration: 62.5%

Extreme: Any area with 70% or more MYI survives

Ice extent: 1.920 million km<sup>2</sup>

Ice area: 1.825 million km<sup>2</sup>

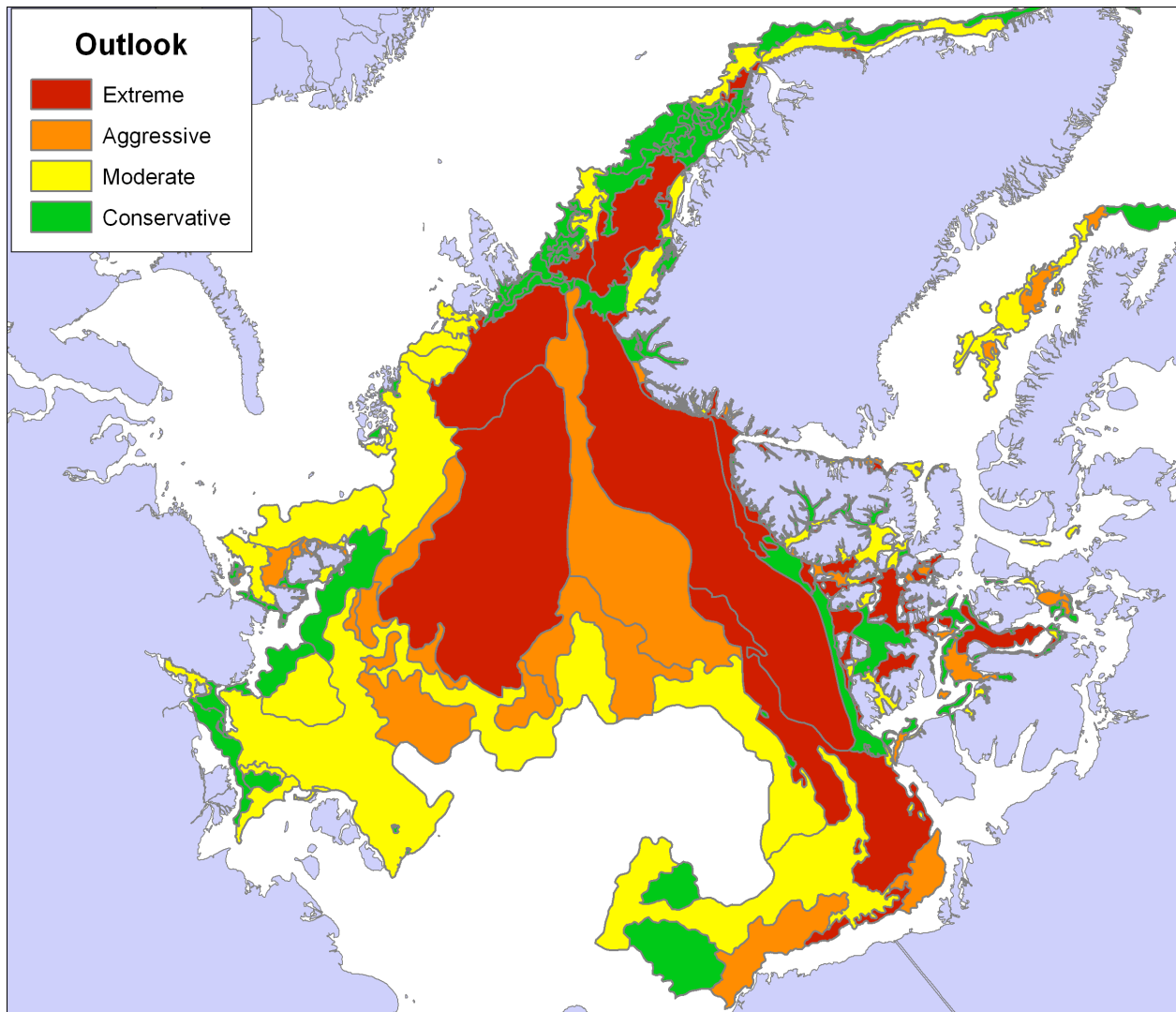
Avg concentration: 95.1%

MYI Extent: 1.920 million km<sup>2</sup>

MYI Area: 1.493 million km<sup>2</sup>

Avg concentration: 77.8%

As was the case last year, the charts represent the *parcels* of ice that we believe will survive the summer. However it *does not* represent their final location. Drift due to wind and water will transport along the Beaufort Gyre out of the Beaufort and Chukchi Seas. Some ice in the Amundsen Basin will be transported out into the Barents Sea. The picture of the ice in September 2009 will be somewhat different than the current (May 29) conditions.



**Figure 2:** Surviving ice parcels. Extreme = red, Aggressive= red + orange, Moderate= red + orange + yellow, Conservative=red + orange + yellow + green.

From the spread of prognostications, we believe the Moderate case (4.763 million km<sup>2</sup>) is the most likely, although at this point it is too early to tell. NIC is also working on an Arctic minimum sea ice outlook index which should strengthen the confidence we have in a particular outlook. Preliminary results of the index favor the Conservative estimate, but further refinement is required before the index will be considered in our outlook.