National Weather Service
Alaska Region
Sea Ice Program

3rd Symposium on the Impacts of an Ice-Diminishing Arctic on Naval and Maritime Operations

Wednesday 10 June 2009
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Environmental and Scientific Services Division
NOAA/NWS Alaska Region Headquarters
ALASKA SEA ICE PROGRAM

Products aid ships navigating in and near the ice-covered waters surrounding Alaska and coastal communities existing with the annual presence of sea ice.
Local ice program is vital to NOAA and NWS missions in Alaska

Maritime and coastal hazards often require 24 hour access to changing sea ice conditions

Alaska Ice Program is well respected and appreciated by a wide range of customers in governments, industries and local communities
Alaska Sea Ice Customers

- Native Communities
- Fishing Fleets
- Oil Industry
- Shipping
- Transportation
- Tourism
- US Coast Guard
- NWS Forecasters
- Homeland Security
- State of Alaska
- AK Fish & Wildlife
- Decision Support
Alaska Native Communities

- Subsistence hunts along the ice edge and off shorefast ice
- Alaska Ice Program is consulted for timing of hunts and safety of hunting groups
- Previous Ice Forecaster provided vital information on ice location and movement essential to rescue of lost hunting party
Alaska Fishing Fleets

- Bering Sea Fishery ($4 Billion)
- Ship Captains often consult the ice forecaster for immediate data on ice position and movement...including weekends and through the night
- Most ships have Internet access
Shipping & Transportation

- Cook Inlet, Bering, Beaufort & Chukchi Seas
- Anchorage Port depends on Cook Inlet Ice Analysis for safe and efficient container and barge traffic through the ice season
- Alaska Coastal communities rely on Ice Forecasts for summer restocking barges
- Red Dog mine near Kotzebue needs ice information for start and end of shipments
Oil/Gas Industry

- Cook Inlet, Chukchi and Beaufort Seas
- Ice Program touches oil and gas interests at the development stage through production and product delivery
- Ice location and movement are critical to safe oil and gas operations in environmentally sensitive ecosystems.
Seabulk Pride
Feb 2, 2006
5 million gallons of oil
Decision Support

Ex. Managers Concerned With Climate Change On Marine Mammals
2006, 07, 08 Spring Breakup

MODIS 250m Resolution
Late Summer Ice Extent
ALASKA SEA ICE PRODUCTS

Issued Monday, Wednesday and Friday

- **Sea Ice Advisory** - text product
- **Ice Analysis** - graphic
- **5 Day Sea Ice Forecast** - graphic
- **Monthly Year Group Analysis and Outlook** – year group text product appended to ice analysis the first week of each month and carried for 3 ice days. Outlooks prepared quarterly.

A graphical **Sea Surface Temperature Analysis** produced Tuesday and Thursday.
FORECAST VALID SATURDAY JULY 21 2007
CONFIDENCE...HIGH.

SYNOPSIS...HIGH PRESSURE NORTHWEST OF BANKS ISLAND WILL WEAKEN THROUGH THURSDAY THEN REMAIN STATIONARY NORTH OF ALASKA THROUGH SATURDAY. A TROFF OF LOW PRESSURE WILL EXTEND FROM EASTERN RUSSIA ACROSS CENTRAL ALASKA BY THE END OF THE WEEK.

-ARCTIC OCEAN-
-BEAUFORT SEA-
-CHUKCHI SEA-
PKZ230-CAPE BEAUFORT TO POINT FRANKLIN-
PKZ235-POINT FRANKLIN TO CAPE HALKETT-
PKZ240-CAPE HALKETT TO FLAXMAN ISLAND-
PKZ245-FLAXMAN ISLAND TO DEMARCATION POINT-

THE ICE EDGE LIES FROM NEAR POINT BARROW TO 71.9N 156.1W TO 71.9N 163.9W TO 70.9N 160.5W TO 71N 165.8W TO 71.5N 168.9W TO 70N 169W TO 69.9N 170.4W TO 70.7N 172.6W TO 72N 174W TO 72.8N 176W TO 71.4N 175.1W TO 70.8N 176W TO 70.7N 175.5E AND CONTINUES TO THE WEST. THE EDGE IN ALASKAN WATERS IS MAINLY 3 TO 8 TENTHS FIRST YEAR THIN... FIRST YEAR MEDIUM AND YOUNG ICE. AN AREA OF OPEN WATER VERY ROUGHLY 50 TO 100 NM WIDE LIES OFF THE COAST EAST OF 146W.

FORECAST THROUGH SATURDAY...OPEN WATER WILL EXTEND ACROSS THE ALASKA NORTH COAST BY SATURDAY. ICE IN THE CHUKCHI SEA WILL MOVE TO THE NORTH NORTHWEST 15 TO 25 NM.

KCOLE JULY 2007
The year groups for July are 1993...2003...1997 and 2001 in that order. 1993 is also the year group from June. 2001 was the second choice in June but shows much less conformity than previously. All four years were compared to 2007 on the basis of ice position at the first of July...sea surface temperatures at the first of July...one and three month averages of sea level pressure...500 mb heights and 850 mb temperatures. These comparisons were taken into account for final year group selection. After choosing 1993 as the year group for July the atmospheric comparisons were also used to adjust the 2007 summer outlook. The main difference between 1993 and 2007 is the position of the Arctic high pressure. In 1993 the surface high and upper level ridge were centered near Banks Island while in 2007 the high has been more to the west holding an average position just off the Alaska North Coast between 150W and 155W. This could be the reason for the faster clearing of the ice off the Northwest Alaska Coast as the warmer air moves north to the west of the high. For this reason the opening outlook dates listed below have been adjusted a few days earlier. The outlook for ice returning to the Alaska North Coast will remain early in the third week of October. Comparing 2007 and 1993 sea surface temperatures this year are trending cooler temperatures than in 1993. This agrees with NOAA Climate Prediction Center/S prediction of a La Nina...or cooling water temperatures.

**2007 Summer Season Ice Outlook...**

<table>
<thead>
<tr>
<th>Event</th>
<th>2007</th>
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<tbody>
<tr>
<td>Coast open Barrow to Prudhoe Bay</td>
<td>7/15</td>
</tr>
<tr>
<td>The last area to open will be between 150W and 155W</td>
<td></td>
</tr>
<tr>
<td>Coast open to Canada</td>
<td>7/15</td>
</tr>
<tr>
<td>Main ice edge between 160W and 170W north of 70N</td>
<td>7/7</td>
</tr>
<tr>
<td></td>
<td>71N</td>
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<tr>
<td></td>
<td>72N</td>
</tr>
<tr>
<td></td>
<td>73N</td>
</tr>
<tr>
<td>Ice return to North Coast</td>
<td>10/20</td>
</tr>
</tbody>
</table>

Kcole July 2007
Digital Ice Products

Geo-spatially enabled (shapefiles) graphical products using ESRI ArcMap Software

Geodatabase design for ice products allows easier access to data for research and climatology.

GIS GoogleEarth kmz images will be available…soon.
SEA SURFACE TEMPERATURE ANALYSIS
DEGREES CELSIUS (C)
NATIONAL WEATHER SERVICE
ANCHORAGE, ALASKA
A - 220

TUESDAY 3 JUNE 2008

TEMPERATURE CONVERSION
-20 = 22.4F  50 = 120.0F  120 = 360.8F  190 = 368.2F
-10 = 27.2F  60 = 140.0F  130 = 350.8F  200 = 360.0F
-5 = 30.2F  70 = 160.0F  140 = 372.2F  210 = 380.0F
0 = 32.0F  80 = 180.0F  150 = 392.2F  220 = 416.0F
5 = 35.6F  90 = 200.0F  160 = 410.0F  230 = 454.0F
10 = 38.6F  100 = 220.0F  170 = 428.0F  240 = 492.0F
15 = 41.6F  110 = 240.0F  180 = 446.0F  250 = 530.0F
20 = 44.6F  120 = 260.0F  190 = 464.0F  260 = 568.0F
25 = 47.6F  130 = 280.0F  200 = 482.0F  270 = 606.0F
30 = 50.6F  140 = 300.0F  210 = 500.0F  280 = 644.0F
35 = 53.6F  150 = 320.0F  220 = 518.0F  290 = 682.0F
40 = 56.6F  160 = 340.0F  230 = 536.0F  300 = 720.0F
45 = 59.6F  170 = 360.0F  240 = 554.0F  310 = 758.0F
50 = 62.6F  180 = 380.0F  250 = 572.0F  320 = 796.0F
55 = 65.6F  190 = 400.0F  260 = 590.0F  330 = 834.0F
60 = 68.6F  200 = 420.0F  270 = 608.0F  340 = 872.0F
65 = 71.6F  210 = 440.0F  280 = 626.0F  350 = 910.0F
70 = 74.6F  220 = 460.0F  290 = 644.0F  360 = 948.0F
75 = 77.6F  230 = 480.0F  300 = 662.0F  370 = 986.0F
80 = 80.6F  240 = 500.0F  310 = 680.0F  380 = 1024.0F
85 = 83.6F  250 = 520.0F  320 = 698.0F  390 = 1062.0F
90 = 86.6F  260 = 540.0F  330 = 716.0F  400 = 1100.0F
95 = 89.6F  270 = 560.0F  340 = 734.0F  410 = 1138.0F
100 = 92.6F  280 = 580.0F  350 = 752.0F  420 = 1176.0F
105 = 95.6F  290 = 600.0F  360 = 770.0F  430 = 1214.0F
110 = 98.6F  300 = 620.0F  370 = 788.0F  440 = 1252.0F
115 = 101.6F  310 = 640.0F  380 = 806.0F  450 = 1290.0F
120 = 104.6F  320 = 660.0F  390 = 824.0F  460 = 1328.0F
125 = 107.6F  330 = 680.0F  400 = 842.0F  470 = 1366.0F
130 = 110.6F  340 = 700.0F  410 = 860.0F  480 = 1404.0F
135 = 113.6F  350 = 720.0F  420 = 878.0F  490 = 1442.0F
140 = 116.6F  360 = 740.0F  430 = 896.0F  500 = 1480.0F
145 = 119.6F  370 = 760.0F  440 = 914.0F
150 = 122.6F  380 = 780.0F
155 = 125.6F  390 = 800.0F
160 = 128.6F  400 = 820.0F
Types of Analysis Data

- SAR – Synthetic Aperture Radar
- POES Satellite
- MODIS Satellite – high resolution
- Ice Observations & digital photos
- Over Flights – USCG and others
MODIS
High Resolution Satellite
250m Color Composite Imagery

2 Polar Orbiting Satellites
Terra
Aqua
POES

Polar Orbiter Satellite

Visible and IR – dependent on cloud cover
SAR IMAGERY

Synthetic Aperture Radar

Combined project of
NOAA
NESDIS
NIC
ASF

SAR products drastically reduced in availability with loss of RADARSAT-1 data in May, 2008.
11 SAR Images available 8 May 2008
Ice Observations & Pictures

Ships
Barges
Oil Platforms
Over Flights
Coastal Areas
February 2006  Cook Inlet
Future Plans

- GoogleEarth ice analysis files later this year
- Color coded charts and shapefiles to be available on the Internet
- Old Alaska ice graphics to be digitized and added to the database
- Tidal movements of ice in Cook Inlet
- Support Climate Change Affects