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Overview of Juno's journey in 2007

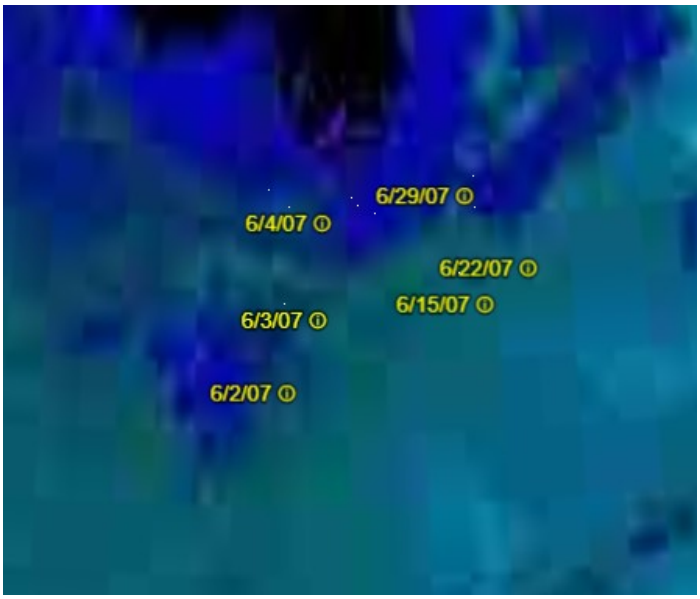
Observations:

Juno, the Hooded Seal, traveled approximately 2200 miles between March 23rd – July 30th 2007. Juno began her journey off the Coast of Maine in Mid-March of 2007.

In May 2007 Juno traveled approximately 1150 miles in nearly a straight line up north. In June by contrast Juno only traveled about 500 miles but mostly in a circular fashion. During June of 2007, Juno swam approximately 500 miles– or 16-17 miles a day on average.

Justification:

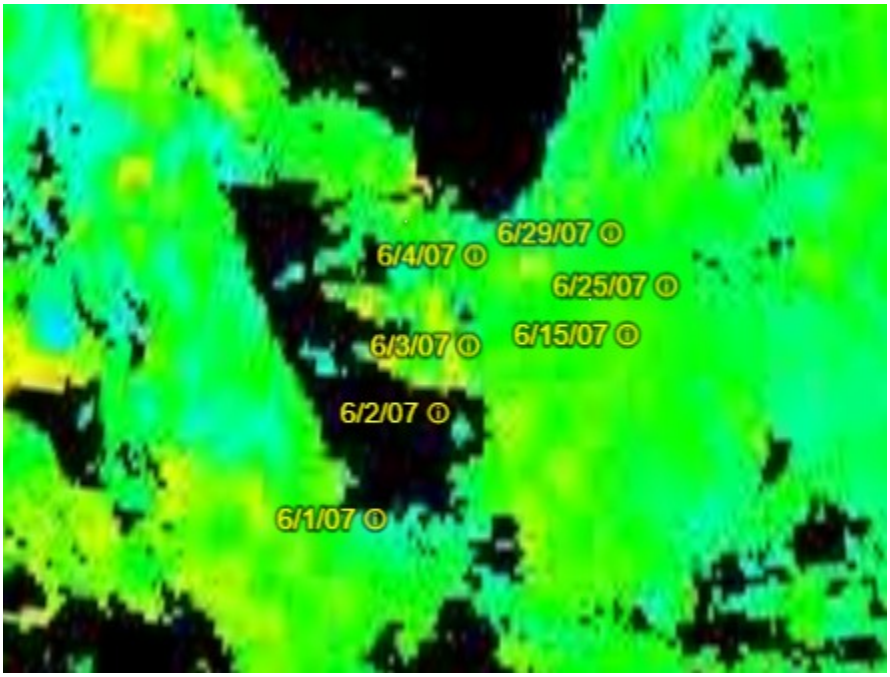
Sea surface temperature appears to be a strong predictor of phytoplankton abundance. The relationship is typically inverse; lower sea surface temperatures are associated with higher concentrations of phytoplankton. This suggests that Juno would travel north as the temperature increased in the North American continent but stayed colder during the summer months. As suspected, Juno was going to the colder waters as that would be the locations where the food supply would be most abundant, as determined by the overall phytoplankton abundance. As temperature is a predictor of phytoplankton abundance we anticipate that Juno was traveling along with the food.



Given that Hooded Seals are able to sleep in water and on land there is less of a need for Hooded seals to directly follow a coastline. This would explain why Juno does not seem to spend time near any major landmass. It is possible of course that Juno spent time on some iceberg or other small landmass that is not visible on the map but it is likely that Juno mostly slept in the water.

Analysis:

When we look at changes in phytoplankton abundance we see that the phytoplankton abundance decreases along the North American coastline and stays relatively high near Greenland during the month of June.



Following the monthly mean phytoplankton data for June 2007 we can see that Juno's traveling closely correlated with changes in phytoplankton along the north Atlantic. The phytoplankton levels were highest in March near the Maine Coast. As the months progressed the phytoplankton grew in greater quantities closer to the Hooded Seal breeding grounds.

Since the Hooded seal diet consists of crustaceans and other fish that consume phytoplankton it is likely that the phytoplankton is a confounder for overall food abundance (1). So as food abundance increases throughout the north Atlantic Juno and other Hooded Seals followed along. The relatively straight path of Juno's journey, coupled with the circumnavigation that we see in the summer months suggests that she simply was following the food.

Assuming that Juno, a female hooded seal, weighs the average of 160-300 kilograms, or 352-660 pounds. Seals require a tremendous amount of food in order to sustain themselves; some sources estimate that Hooded seals consume about 6% of their body weight per day (2) – so Juno would likely need to consume about 20-40 pounds of food per day to sustain herself. This volume of food would make following the phytoplankton, which enables the growth of fish, absolutely necessary during the summer months.

References

(1) https://www.fisheries.noaa.gov/species/hooded-seal
(2) Tore Haug, Kjell Tormod Nilssen, Lotta Lindblom & Ulf Lindstrøm (2007) Diets of hooded seals (*Cystophora cristata*) in coastal waters and drift ice waters along the east coast of Greenland, Marine Biology Research, 3:3, 123-133, DOI: 10.1080/17451000701358531