

## ***Interactive comment on “Influence of timing of sea ice retreat on phytoplankton size during marginal ice zone bloom period in the Chukchi and Bering shelves” by A. Fujiwara et al.***

### **Anonymous Referee #1**

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**General Comments** The manuscript presents the response of the phytoplankton size structure related to timing of sea ice retreat in the Chukchi and Bering Shelves, based on satellite remote sensing data. This contains very valuable data to understand how phytoplankton size composition has changed under the rapidly changing environmental conditions in the region of the Arctic Ocean. The revised version of the manuscript was much improved. It is recommended that the manuscript be published after the minor corrections.

**Specific Comments**

**Abstract**

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Page 12613, Line 1-4: This sentence needs to be revised. How TSR plays crucial roles under seasonally ice-covered environments? You clearly have to mention one of expectable reasons. For example, TSR plays crucial roles in controlling distribution of phytoplankton community size structure in the seasonally ice-covered marine ecosystem (or) in affecting food-web structure (You mentioned that TSR is crucial to understand to evaluate bottom-up effects of PP on the food web: in line 13-15, page 12616).

**Introduction**

Page 12615-12616, Line 29-Line 1-2: Change “ecosystem changes” to “phytoplankton community changes”. Application of these regional ocean color algorithms is expected to contribute to comprehension of phytoplankton community changes (not ecosystem changes) in Arctic ecosystems.

**Materials and methods**

Page 12617, Line 19-20: I agree that the development of thermal stratification is an important controlling factor of nutrient supply into the upper layer. In the section 4.3, you supposed that the nutrient conditions in the surface are mainly related to the thermal stratification. However, the local wind field could be important for affecting the nutrient vertical distribution as well as horizontal distribution in the Bering and Chukchi Sea.

Page 12622, Line 6-7: How did you measure in situ primary production? Using 13C or 14C? You have to mention the used method at the end of the sentence.

**Results**

Page 12622, Line 18-20: Based on relationships between in situ FL and satellite FL, you found a slight overestimation in the low FL and underestimation in the high FL range. Could you explain the reason for it?

Page 12624, Line 17: How did you determine the open water period? Is this meant SIC reach zero? Define the open water period in the materials and methods section.

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## Discussion

Page 12626, Line 19-25: You found that the timing of the MIZ bloom occurrence was not tightly coupled with the TSR in the western side of the Bering Strait and coastal Alaska. Plausible reasons (nutrient conditions or CDOM effects) are suggested for explaining it. However, the coastal Alaska is the region affected by nutrient-poor Alaska Coastal Waters not nutrient-rich Anadyr Water.

Page 12629, Line 5: Change “phytoplankton cell size composition” to “phytoplankton community size composition”

Page 12629, Line 7-9: Could be different food quality depending on phytoplankton size composition? If so, you have to mention reference. For example, since the food quality as food source could be related to phytoplankton size composition (reference), these results provide important information to help understand food quality~~. I think that the changes in phytoplankton species composition might be related to food quality change.

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