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Interactive comment on "Alaskan Stream flow in the eastern subarctic Pacific and the eastern Bering Sea and its impact on biological productivity" *by* Sergey Prants et al.

Anonymous Referee #1

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This manuscript seems problematic to me in terms of being appropriate to publish in Biogeosciences. It is primarily a physical oceanographic treatment of the relationship between wind stress curl and eddy formation, and how that affects the transport of waters through the key Aleutian passes into the Bering Sea. Chlorophyll data are used and an attempt is made to tie wind stress to oceanographic productivity in following seasons, but the chlorophyll data are largely limited to near surface waters by the satellite platform used. Some bottle data are used from oceanographic sampling, although the figures and text do not make it clear what the seasonal coverage is or the density of sampling is for the nutrient and chlorophyll data that were collected in this manner. Fisheries catch data tend to show that annual salmon landings were associated with

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prior seasonal windier conditions, which makes a certain amount of sense, but there was no attempt to consider the several year lifespan of salmon in waters of the north Pacific and how that would affect lag time analyses, and the presentation of these linkages is not rigorous. For a paper in Biogeosciences, I think better connections need to be made with the large body of data that are available for nutrients, chlorophyll and fisheries practices in the north Pacific and Bering Sea.The manuscript is reasonably well written, but could benefit from some light Native English language editing. I provide some of those editing suggestions in my line comments below, although I did not edit the manuscript comprehensively.

Page 2, Line 11. Forcing pattern should be forcing patterns

Line 12. change contributes to contribute

Line 15, change basins to basin

Line 21, delete “a” before mesoscale

Line 23, change “a penetration” to the penetration; also change “an impact” to impacts

Page 3, Line 8, change “to study” to “for studying”

Lines 8-11. Given the widespread use of Lagrangian analyses in oceanography, citations should be to a review or limited citations, not just a number of citations to only the authors of this paper.

Line 13. “origim” should be origin

Line 24. Strictly speaking, this is about particle analysis rather than identification of three water masses.

Line 31-32, change “They are called in theory of dynamical systems as elliptic and hyperbolic stagnation points which” to “In the theory of dynamical systems, these can be termed elliptic and hyperbolic stagnation points that”

Line 33, change “are those ones around which motion of water is stable and circular” to “are those points around which the motion of water is stable and circular”

Line 34, change “downward oriented red mark cyclones” to downward oriented triangles in red indicate cyclones.

The next to final sentence of this section at the bottom of the page is not understandable.

Page 4, line 12 remove “the” before mesoscale anticyclonic and cyclonic activity.

Line 20, this is the first mention of the Alaska Coastal Current, which should be mentioned initially in the introduction.

Line 21, remove “by”

Line 24, remove “flow”

Line 26, change “We focused at the mesoscale anticyclonic eddies originated in the northern part of the Gulf of Alaska and advected then by the AS along the ocean side of the eastern Aleutian Islands” to “We focused on the mesoscale anticyclonic eddies originating in the northern part of the Gulf of Alaska and advected by the AS along the Pacific Ocean side of the eastern Aleutian Islands.”

Line 28-29. Change “was born” to “originated”

Page 6, line 5. Delete “a” before supply

Page 6, line 4. Delete “the” before buoys

Line 14, change “in Celsium” to °C

Line 17, change “the second anticyclonic eddy” to a second anticyclonic eddy.

Line 20, change off to of

Line 26. Change “has been observed” to was observed. Also Pribilof has only one “f”

at its end

Line 30-31. Change “During its staying in the Bering Slope Current region the Pribiloff mesoscale anticyclonic eddy 2004 trapped the “blue” BS shelf water and wound it around itself (Fig. 3b).” to During its stay in the Bering Slope Current region, the Pribilof mesoscale anticyclonic eddy 2004 trapped the “blue” BS shelf water and wound around it (Fig. 3b)

Figure 2 caption. Add information on the x symbols following the description of the triangles and describe differences between the inverted and upwards pointing triangles. I know this is in the methods, but it would be helpful to repeat here.

Figure 3e, f. It is not clear to me what the sources of the salinity and nitrate data are, and this should be included in the caption. Also the density of the station locations should also be shown on the figures themselves, so the reader can evaluate the contouring.

Page 9, first line of text. Insert “the” before main factors

Line 7, change “were” to are

Line 8. In the text it is stated that the correlation coefficients range from 0.75 to 0.9, but on the figure, the stated range is 0.60 to 0.9.

Line 10, change “that is in” to “, which is”

Line 13, insert “a” between “for two”

Lines 15-17. How do we know this isn’t just a casual correlation that really represents the predominant wind stress over the whole year and is not necessarily linked to the wind stress months earlier?

Line 19. Delete panhandle. Alaska Peninsula is sufficient. Alaska Panhandle usually refers to southeast Alaska, not southwest Alaska.

Line 29. Again Pribilof has only one f at the end.

Page 10, starting at line 20, change “The chlorophyll a pool southward of the Alaska Peninsula in summer 2005 and of the eastern Aleutian Islands in summer 2006 has been affected by the mesoscale anticyclonic eddies centered” to “The chlorophyll a pool south of the Alaska Peninsula in summer 2005 and south of the eastern Aleutian Islands in summer 2006 was affected by the mesoscale anticyclonic eddies centered. . .”

Page 12, line 26-27. The subsurface chlorophyll maximum is one of the key uncertainties in this paper, since according to the methods (and Figure 6), surface chlorophyll from the MODIS satellite sensors was used to determine spatial chlorophyll distributions, so the deep chlorophyll maximum was typically not observed, and it is challenging to know what can be validly said about chlorophyll concentrations over the whole euphotic zone relative to wind stress.

Page 14, first line makes reference to the chlorophyll maximum being shallower and leading to higher chlorophyll estimates from the MODIS sensors, but the immediately previous text at the end of page 12 doesn’t seem to indicate that the chlorophyll maximum would have been recorded by the satellite sensors because it was too deep.

Top half of page 14. There is a relationship between nitrate and salinity, with more saline waters holding more nutrients, but it is also sensitive to biological utilization. Depending upon the degree of stratification, seasonal use of the nutrients and wind mixing, these are pretty speculative arguments to make, especially given the limited nature of the chlorophyll data available, primarily from satellite sensors.

Page 14, line 27. Creates should be create

Page 16, first line of discussion, change “The altimetry-based 10 daily computed Lagrangian maps allow to track origin and transport pathways of the AS waters in the northern North Pacific and the BS and visualize mesoscale eddies in the study area” to “The altimetry-based 10 daily computed Lagrangian maps allow tracking of the origin

and transport pathways of the AS waters in the northern North Pacific and the BS and facilitate visualization of mesoscale eddies in the study area."

Change next sentence: "An intensification of the AS flow has been observed in November – March when the Aleutian Low was developed in the northern North Pacific, and strong positive WSC appeared in the subarctic North Pacific and the BS." Change to: "An intensification of the AS flow was observed in November – March when the Aleutian Low developed in the northern North Pacific, and strong positive WSC appeared in the subarctic North Pacific and the BS."

Next sentence. Change "have been caused by a mesoscale eddy activity" to "were caused by mesoscale eddy activity"

Page 17, second sentence of second paragraph. Change concentration to concentrations

2nd paragraph, last sentence. Change "considered as preferred sites" to considered to be preferred sites.

Last paragraph of the discussion. This introduces discussion of other distant eddies such as those off Sitka and Yakutat, as well as observations from the western Bering Sea. This is poorly linked to the observations reported in the paper and need to be better integrated, if kept.

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