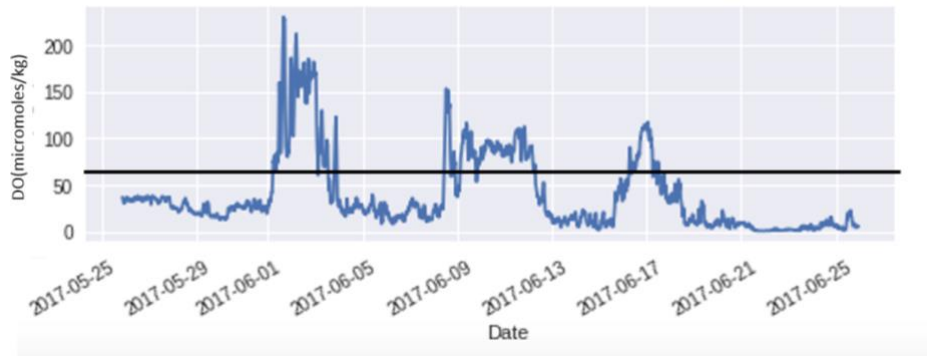


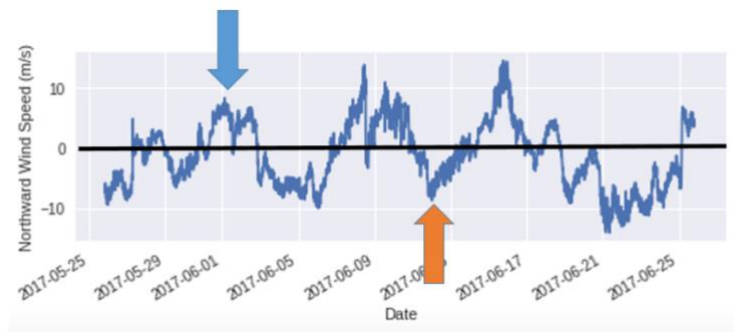
What is killing the crabs on the Oregon shelf?

1. The graph below shows oxygen concentration as the sea floor (depth of 25 m) on the Oregon shelf. For approximately how many days between May 25 and June 25, 2017 were dissolved oxygen concentrations low enough to stress organisms (the black line indicates hypoxic conditions)?

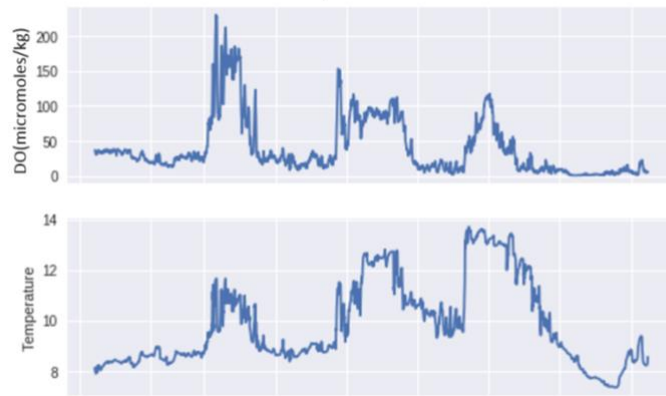


Does this seem like a serious situation?

2. The figure below shows the alongshore wind speed for the Oregon coast at the same time as the figure in question 1. The dark line indicates an alongshore wind speed of zero, i.e. either there is no wind or the wind blows on or offshore. What is the direction of the alongshore wind at each of the arrows, and the approximate speed (in other words, how do we read this graph)?

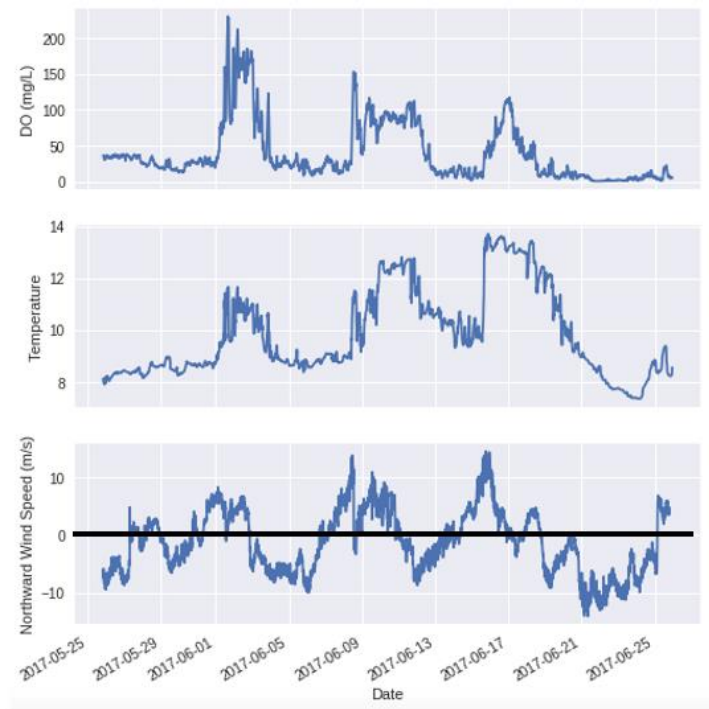


3. The graph below shows the dissolved oxygen for the same time period as in the previous questions, and the temperature data from the same time, location and depth. What relationship do you see between these two variables?



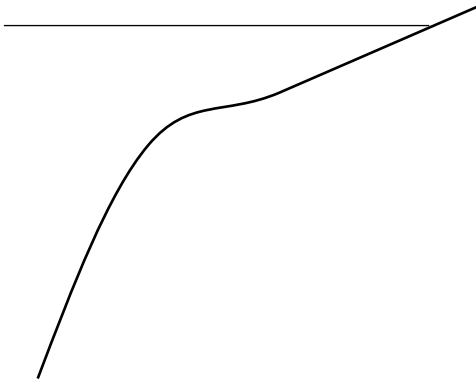
Think back to your chemistry class. What did you learn about gas concentrations in water as the temperature changes?

4. Let's look at all three data sets, dissolved oxygen, temperature and alongshore wind speed. Can you see any patterns between the three data sets? Don't be afraid to draw on the figures!

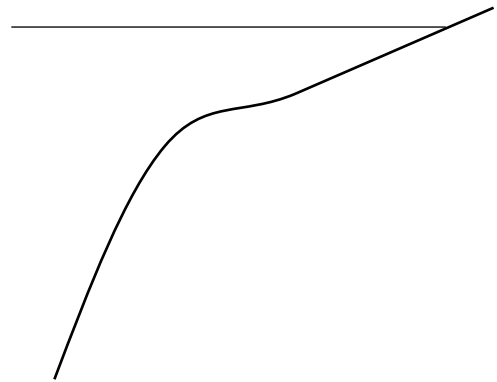


5. Let's apply something we already know, the effect of Ekman Transport on surface water. Below are two cross sections of the Oregon coast. For each put in a symbol showing the direction of the wind. Then sketch in arrows showing the movement of surface and deep water as Ekman transport occurs.

Wind blowing North (into the page)



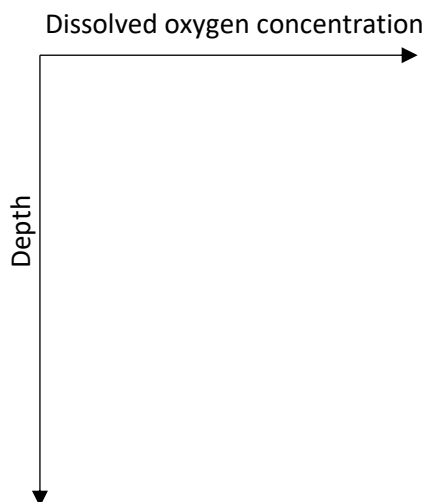
Wind blowing South (out of the page)



Which of the above conditions is associated with low oxygen conditions? Indicate that on your figure.

What do you think is causing the low oxygen?

6. Take a look at the oxygen concentrations in the deep ocean, off of the Oregon shelf. On the axes below make a profile of dissolved oxygen concentration (just get the maxima and minima in the right places, don't worry about actual values).



7. Where did the low dissolved oxygen water come from?

8. Early in the semester we looked at low oxygen conditions in the Gulf of Mexico. What was the cause of the low oxygen there? How is the Oregon hypoxia similar too and/or different from the case in the Gulf of Mexico?

9. Time permitting- Look at the vertical section of dissolved oxygen concentration in the deep ocean. Why are values high at the surface, relatively high at depth but low at about 1000m?