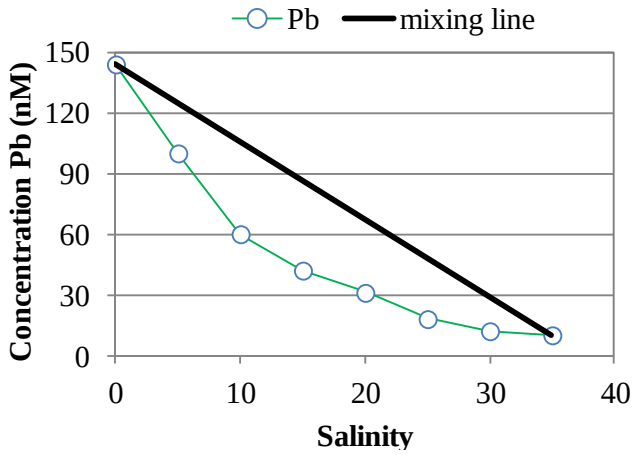
Round: 14B

Figure 1: Concentration of Pb^{2+}



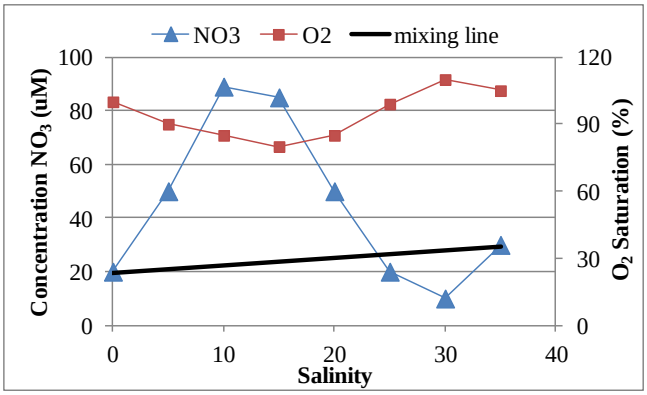
1. What type of Pb^{2+} mixing is occurring in the estuary?

   The mixing curve of Pb^{2+} presents non-conservative mixing (2 pts) with lead removal from the water column.

2. What two (2) possible processes are causing this distribution of Pb^{2+} in the estuary?

   Lower lead concentration compared to the conservative mixing line indicates processes of eliminating of the Pb^{2+} from the system. Possible processes include Pb^{2+} precipitation (2pt) and/or scavenging on particles (2pts).

Figure 2: Concentration of NO^{3-} and O_2



3. a. Determine the type of mixing of NO_3^- in the estuary.

   This is non-conservative (1 pt) mixing with both addition/production (1 pt) (at the low salinity interval) and removal/consumption (1 pt) (at higher salinity interval) of nitrate.

b. What are most likely the processes driving this distribution?

There are two different processes affecting the shape of the nitrate distribution in the estuary:

1: The increase of the nitrate concentration above the conservative mixing line is an indication for additional source/production of nitrate to the system, while the lower concentrations of nitrate at the high range of salinities is indication for removal/sink (1 pt). The first might be due to organic matter remineralization and oxidation of NO_2^- and NH_4^+ to NO_3^-. (2 pts)

2: The decrease of nitrate concentration is due to mixing with low nitrate seawater OR denitrification is occurring (2 pts).

4. Explain the coupled behavior of percent saturated level of O_2 in the water and the NO_3^- concentration?

The decrease of O_2 is due to its consumption for the oxidation of NO_2^- and NH_4^+ (2 pts) to NO_3^- (2 pts). Estuarine systems are very dynamic and oxygen is supplied constantly and thus its concentration was recovered in the water after all the NO_2^- and NH_4^+ was oxydized to NO_3^-–OR denitrification was occurring (2 pts).