

Fresh Water Versus Salt Water

Noteworthy differences in make-up of solutes:

- salt water is “rich” in Na^+ , Cl^- , Mg^{2+} , SO_4^{2-}
- fresh water is “rich” in Ca^{2+} , HCO_3^- , and SO_4^{2-}

Solute loads of surface fresh waters reflect bedrock chemistry:

- water of limestone areas is “hard” with substantial Ca^{2+} and HCO_3^-
FELSIC GRANITE: very resistant to weathering; Si, Al, K (light elements) *MAFIC GRANITE*: Ca^{2+} so vulnerable to weathering; Mg, Fe, Ca, Na (heavy elements)
- water of granitic areas contains few mineral elements
- compare **felsic granite** group (Si, Al, K: light elements) versus the **mafic granite** group (Mg, Fe, Ca, Na: heavy elements).
“Felsic” and “mafic” are relative terms.

Oceanic waters are saturated with respect to Ca^{2+} but they continue to accumulate Na^+ . **WHY?** CaCO_3 is saturated at 14mg/l, as opposed to NaCl at 360g/l (360,000mg/l)

Waters differ in content of essential nutrients.

N and P are among the most important essential elements and are often **limiting**:

-in typical **fresh water**, N is 0.40 mg/l, while P is about 0.01 mg/l (**N>P**). Phosphate eutrophication.

-in typical **salt water**, N is less than 0.01 mg/l, while P is about 0.01-0.1 mg/l (**P>N**). Nitrogen is often the nutrient that limits oceanic productivity.

Take home messages: pH effects

(lots of solutes)

(few solutes due to presence of felsic granite)

Hard water vs **soft water: weathering**

Controls the availability of mineral nutrients

Limits sensitive organisms (clams) (fish)

Acid rain and buffered (limestone) vs. non-buffered (granitic) lakes

Loss of loon populations

Loss of amphibians(?)