In class exercice:

1) Nutrient cycling in lakes

a) What are the nutrient inputs into the lake epilimnion?

b) What are the nutrient outputs from the lake epilimnion?

c) Which additional process do you need to take into account for nitrogen?

d) What is the main difference between the external and internal nutrients inputs?

1

1

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1) Nutrient cycling in lakes

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a) Rivers, atmospheric deposition, internal loading (nutrient from hypolimnion)

b) outflow, gross sedimentation (net ecosystem production), net sedimentation

c) Nitrogen fixation and denitrification

2

2

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b) What are the nutrient outputs from the lake epilimnion?

c) Which additional process do you need to take into account for nitrogen?

d) What is the main difference between the external and internal nutrients inputs?

d) The external nutrients comes from rivers and atmospheric deposition → new nutrients added to the system

The internal nutrients comes from the hypolimnion → recycled nutrients

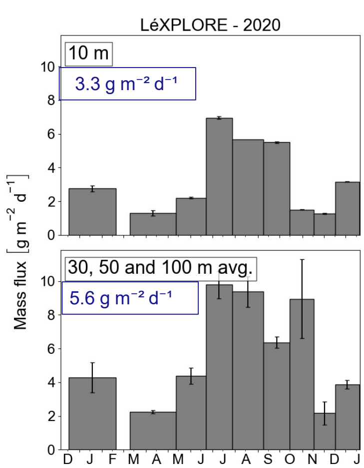
In class exercice:

2) Sedimentation in Lake Geneva

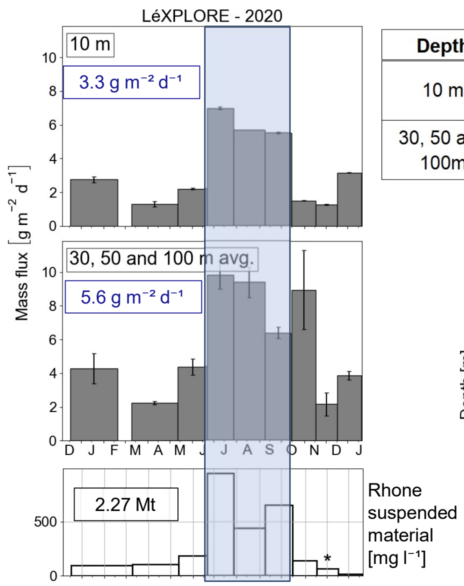
In the figure below, the flux of the total mass of settling particles in Lake Geneva were measured at a depth of 10 m, and averaged at depths of 30, 50 and 100 m, using sediment traps.

a. How do these fluxes vary seasonally? How can you explain these seasonal variations?

b. How would you explain the higher flux below 30 m (mean 5.6 g m^{-2} d^{-1}) compared to the flux at 10 m (mean 3.3 g m^{-2} d^{-1})?

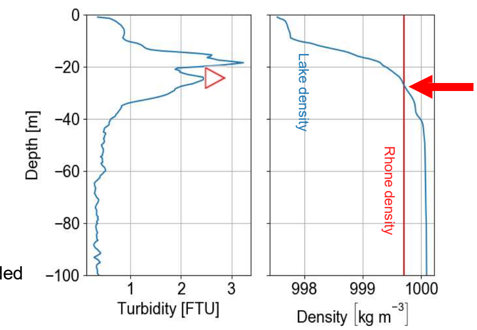


In class exercice:



Depth	*biomass*	*CaCO$_3$*	*metals*
10 m	0.44 ± 0.22 [2] 13.4%	1.20 ± 1.02 [1] 36.4%	0.88 ± 0.80 26.8%
30, 50 and 100m	0.47 ± 0.15 [5] 8.4%	1.30 ± 0.68 [4] 23.3%	1.56 ± 1.10 27.8%

External particles (Rhone)



Rhone intrusion depth
~ 25 to 30 m in summer

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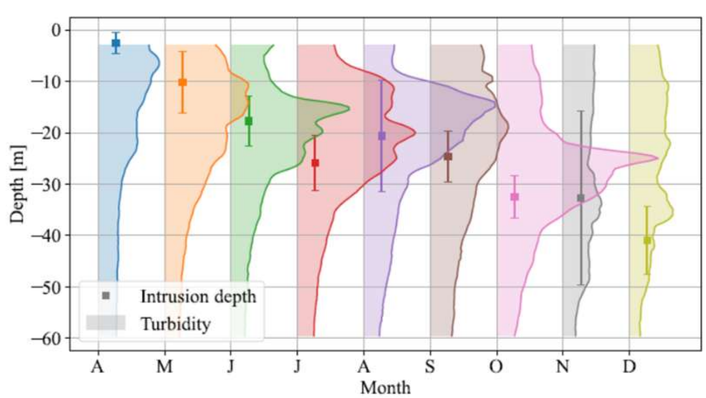
In class exercice:

Average turbidity profiles at LéXPLORE in 2020 for each stratified month and density calculated intrusion depth



→ Rhône Intrusion between 10 and 30 m from June to September

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In class exercice:

3) Oxygen depletion and net ecosystem production in Lake Geneva

a) Estimate AHM of Lake Geneva in 1985. The stratification started on 22.04 with 10.09 $gO_2\ m^{-3}$ and ended on 4.11 with 9.08 $gO_2\ m^{-3}$. The mean hypolimnion depth is 151 m.

b) Estimate the NEP of Lake Geneva in 1985. The net sedimentation over the productive season is 5.5 $gC\ m^{-2}$

In class exercice:

3) Oxygen depletion and net ecosystem production in Lake Geneva

a) Estimate AHM of Lake Geneva in 1985. The stratification started on 22.04 with 10.09 $gO_2\ m^{-3}$ and ended on 4.11 with 9.08 $gO_2\ m^{-3}$. The mean hypolimnion depth is 151 m.

$$AHM_{1985} = \frac{151\ m}{196\ Tage} \times (10.09\ g\ O_2\ m^{-3} - 9.08\ g\ O_2\ m^{-3}) = 0.78\ g\ O_2\ m^{-2} Tag^{-1}$$

(Gl. 4)

In class exercice:

3) Oxygen depletion and net ecosystem production in Lake Geneva

b) Estimate the NEP of Lake Geneva in 1985. The net sedimentation over the productive season is 5.5 gC m^{-2}

$$NEP_{1985} = \left[0.78\ g\ O_2\ m^{-2}\ Tag^{-1} \times \frac{106}{138} \times \frac{12\ g\ C\ mol^{-1}}{32\ g\ O_2\ mol^{-1}} \times 180\ Tage\right] + 5.5\ g\ C\ m^{-2} (180\ Tage)^{-1} = 46\ g\ C\ m^{-2}\ (180\ Tage)^{-1}$$

(Gl. 5)

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