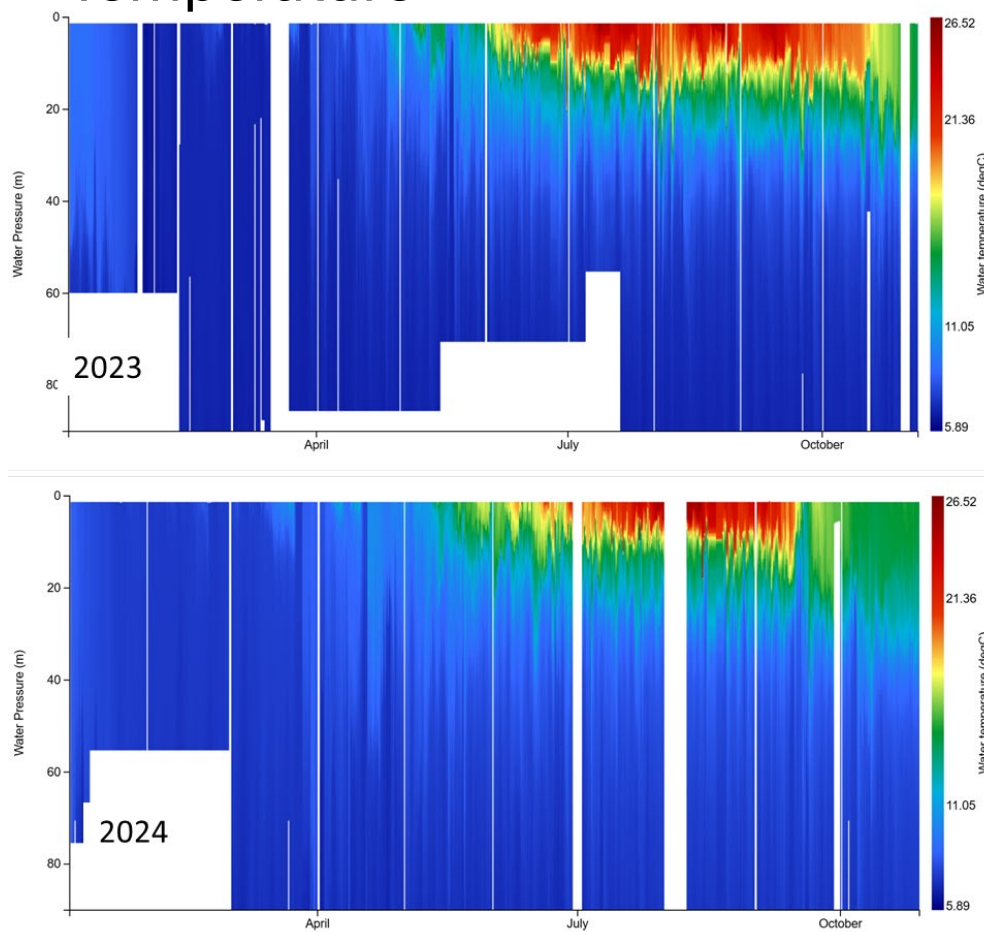


# Solution to Exercise in Case Study I

## Temperature



2023 was a bit warmer than 2024.  $p\text{CO}_2$  in the lake is lower under warm conditions (e.g., summer) than under colder ones (e.g., winter). So the lake was likely more undersaturated in 2023 and therefore had a lower net emission of  $\text{CO}_2$  compared to 2024.

Even though lakes are net emitters of  $\text{CO}_2$  and are oversaturated during large parts of the year, they will still acidify if atmospheric  $p\text{CO}_2$  increases. This is because a smaller gradient in  $p\text{CO}_2$  between water and atmosphere will lead to less emission. Especially in the winter, when  $\text{CO}_2$  lakes are oversaturated,  $\text{CO}_2$  levels in the atmosphere are high. So the lakes cannot emit as much  $\text{CO}_2$  anymore.