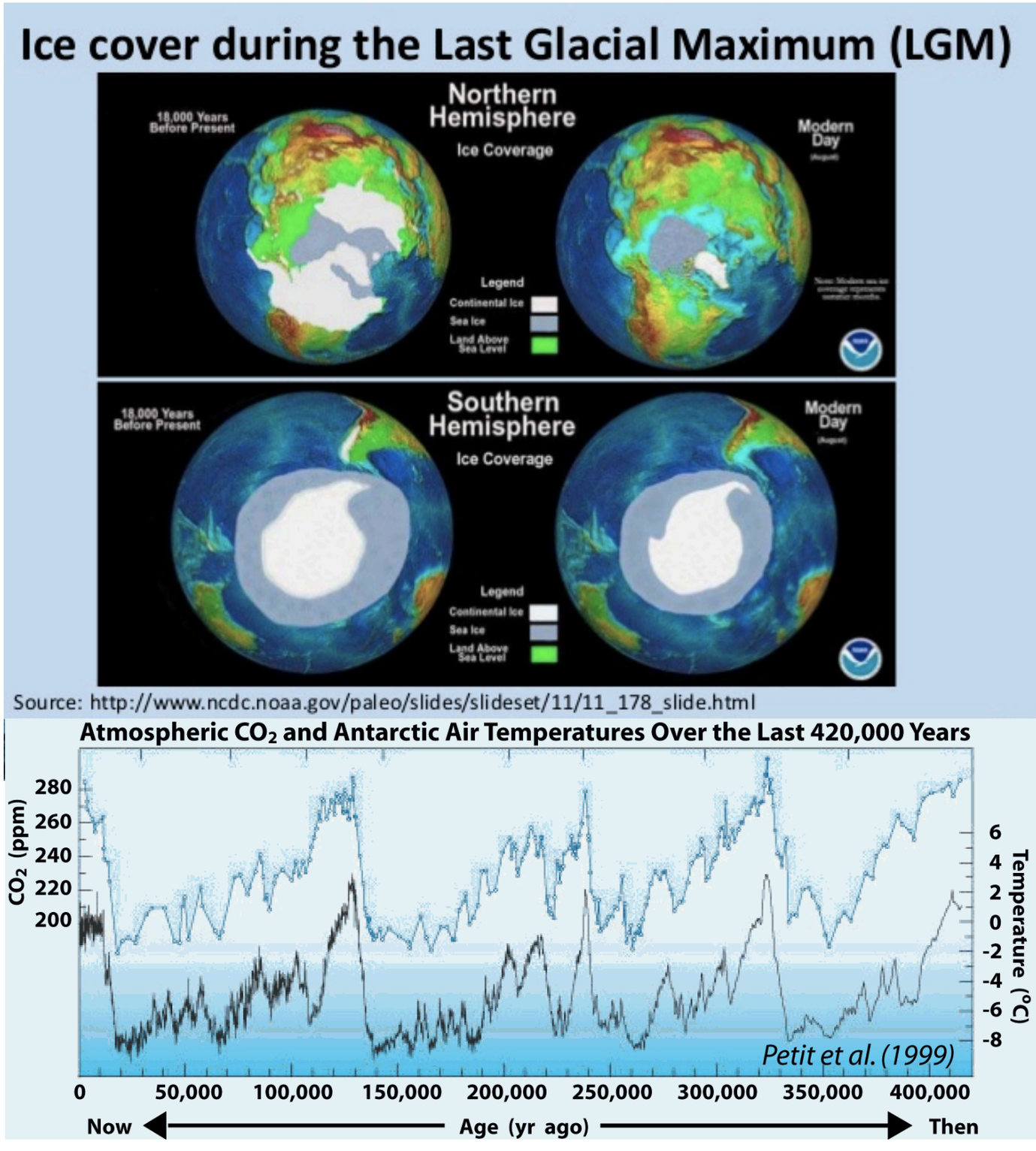
# Climatic Implications

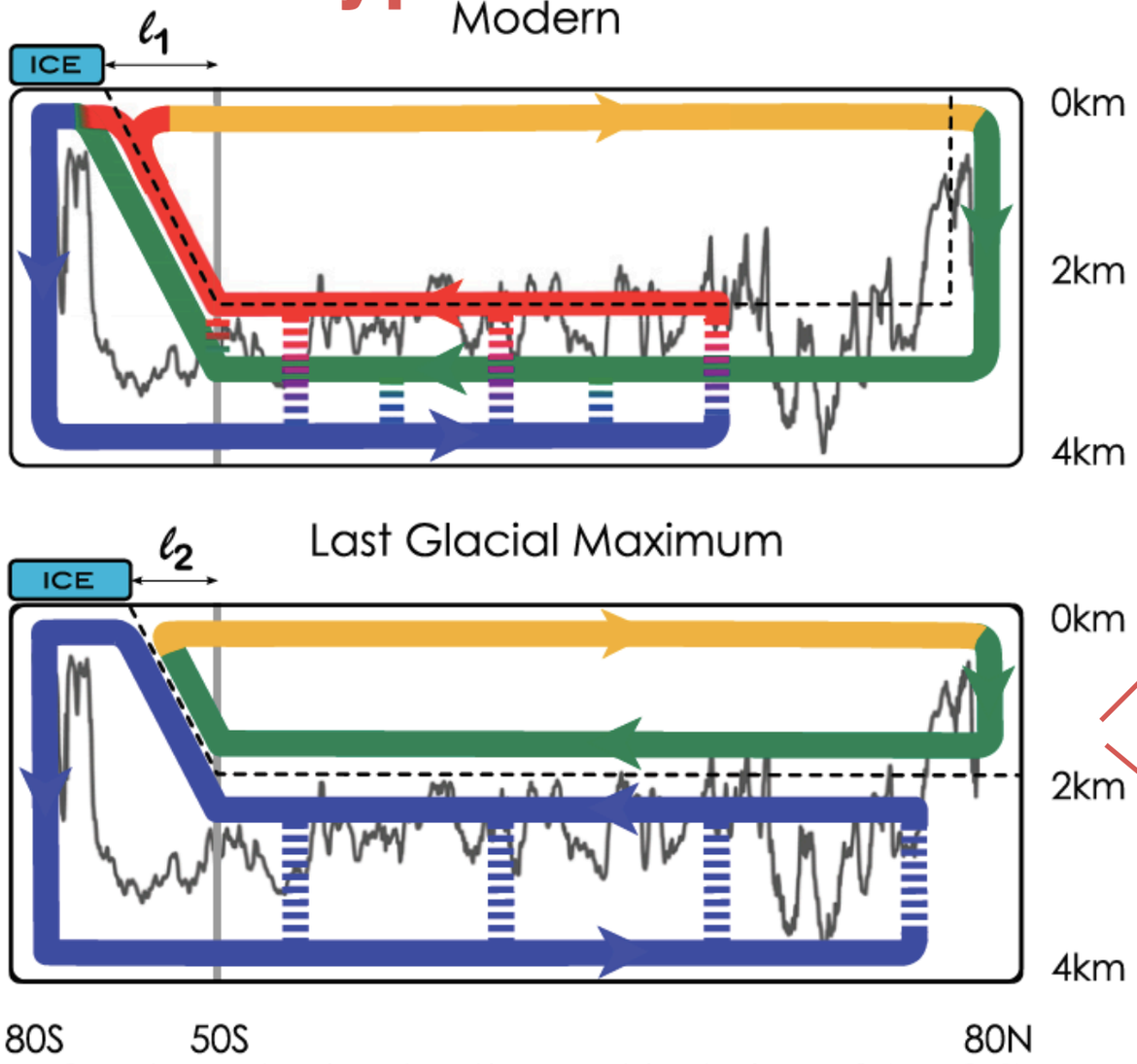
# Case study: glacial vs interglacial MOC

- An open question baffling the oceanographic community over the decades has been the whereabouts of carbon dioxide missing from the atmosphere (as compared to present day climate) during glacial periods. There are suggestions that changes to the ocean circulation could be responsible
- We know that sea level was lower by ~120m during the last glacial maximum (LGM)
- The lower sea level implies stronger tide field and larger deep ocean mixing (Schmittner et al)
- It is also known that the land and sea ice extents around Antarctica were larger during the LGM
- This project aims at changing the drivers of MOC according to the above-mentioned criteria and explore the implication for MOC and the climate system



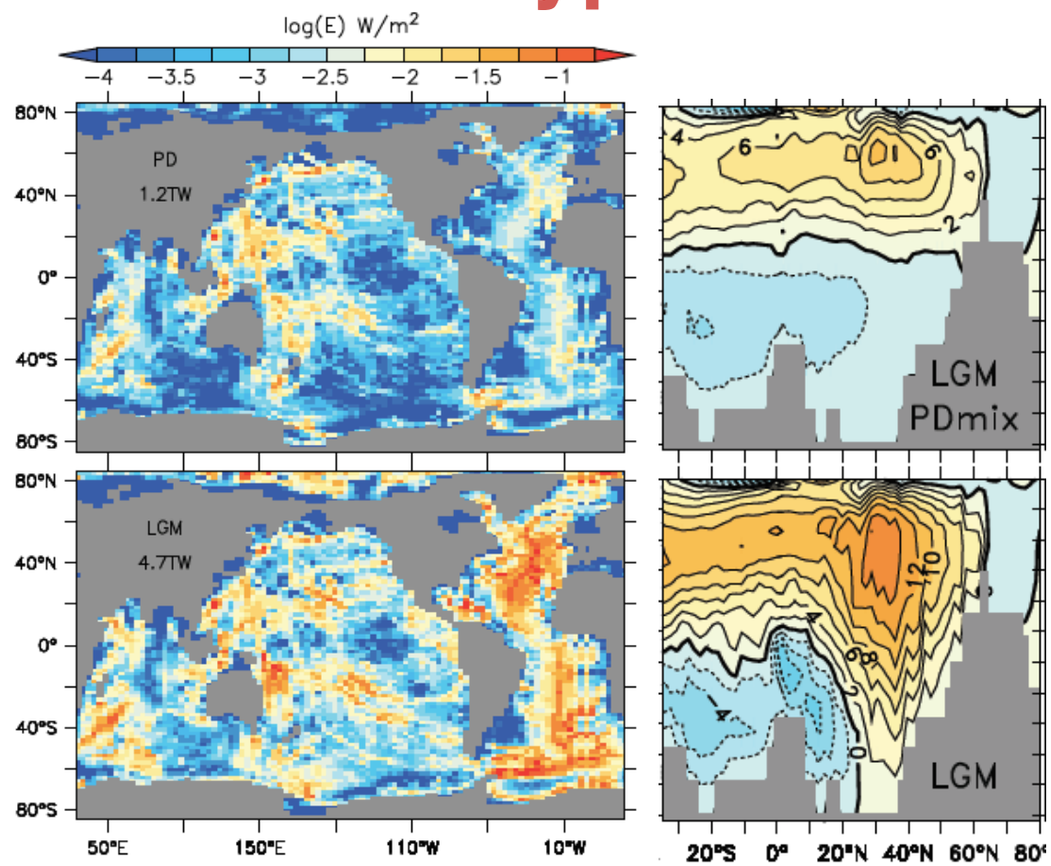
# Case study: glacial vs interglacial MOC where did all the carbon go?

## Hypothesis 1



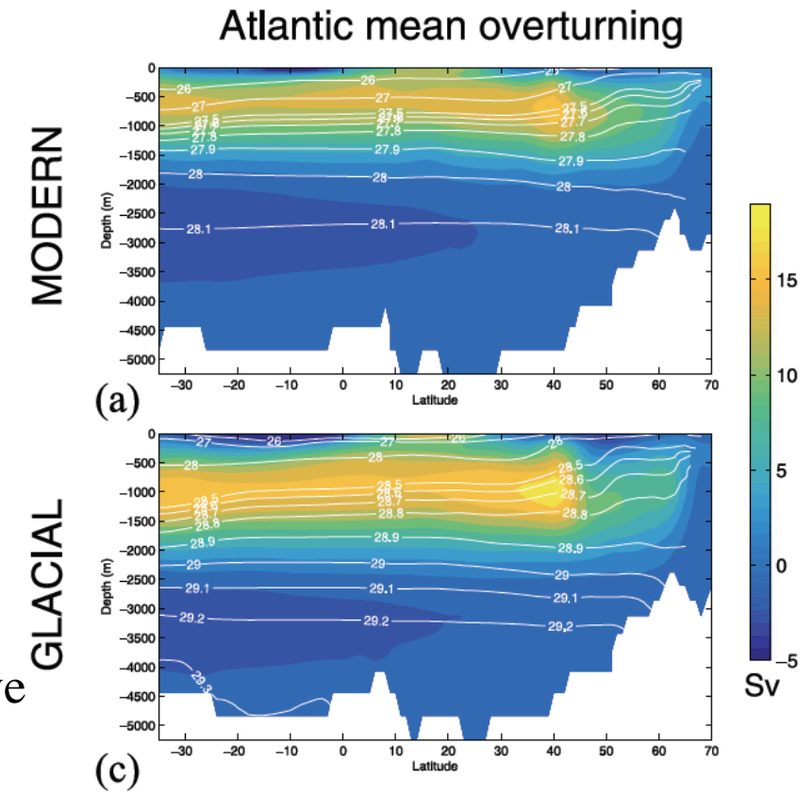

One hypothesis: shoaling and isolation of AMOC (Ferrari et el. 2014)

## Hypothesis 2




But tides changed, so did mixing (Schmittner et al. 2015)

contradicting?




More evidence for the above Amrhein et al. (2018)

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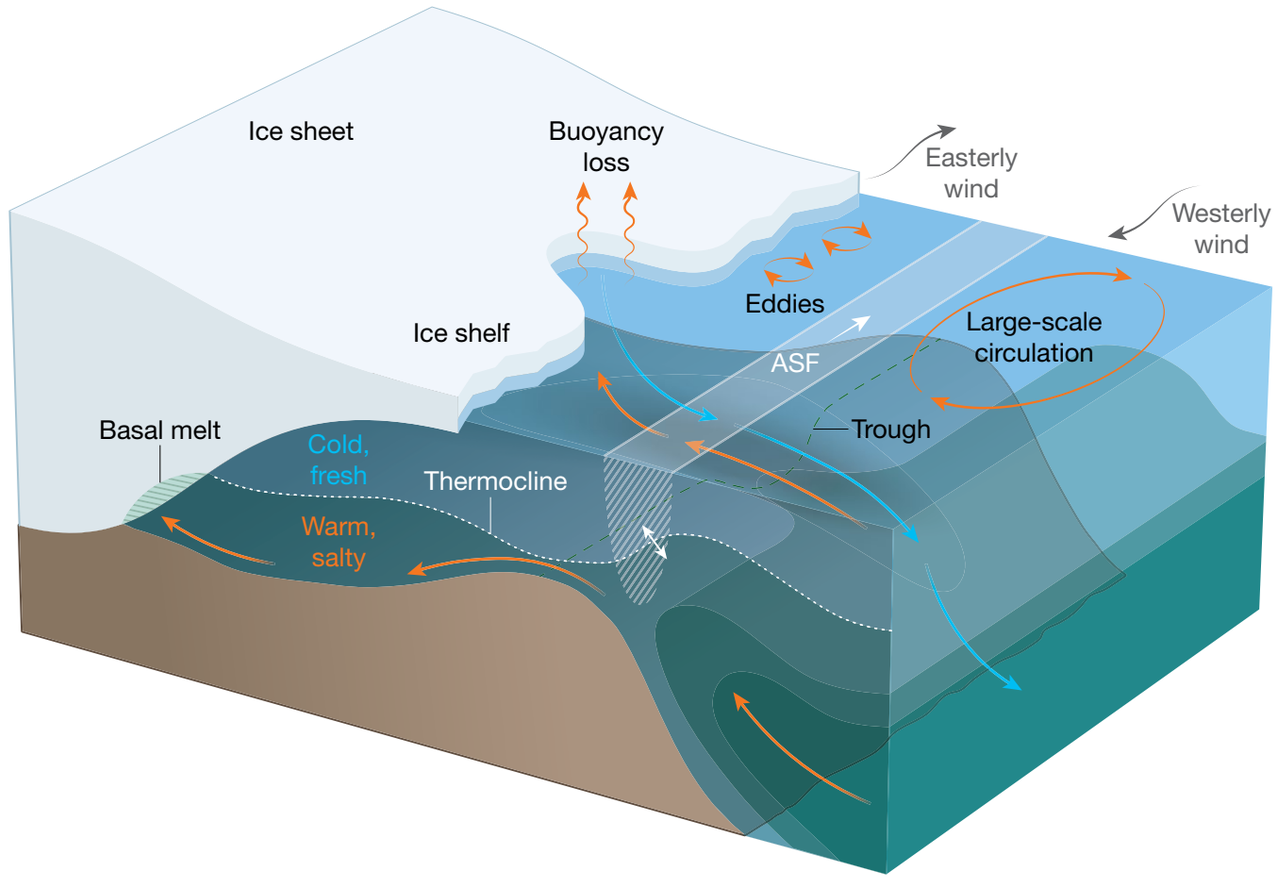


**Tasks:**

In this project we will

- explore the sensitivity of MOC to more realistic deep ocean mixing distribution
- explore the impact of changes to MOC due to increase in tidal mixing during the LGM
- study the impact of changes of surface fluxes in the Southern Ocean during the LGM on the MOC (Rintoul_Nature_2018)
- construct an LGM and a present day (PD) circulation scenarios for both Atlantic and Pacific basins, compare them
- compare our findings with the two hypotheses mentioned in the previous slide
- explore the implications of changes of MOC between PD and LGM for carbon storage in the ocean