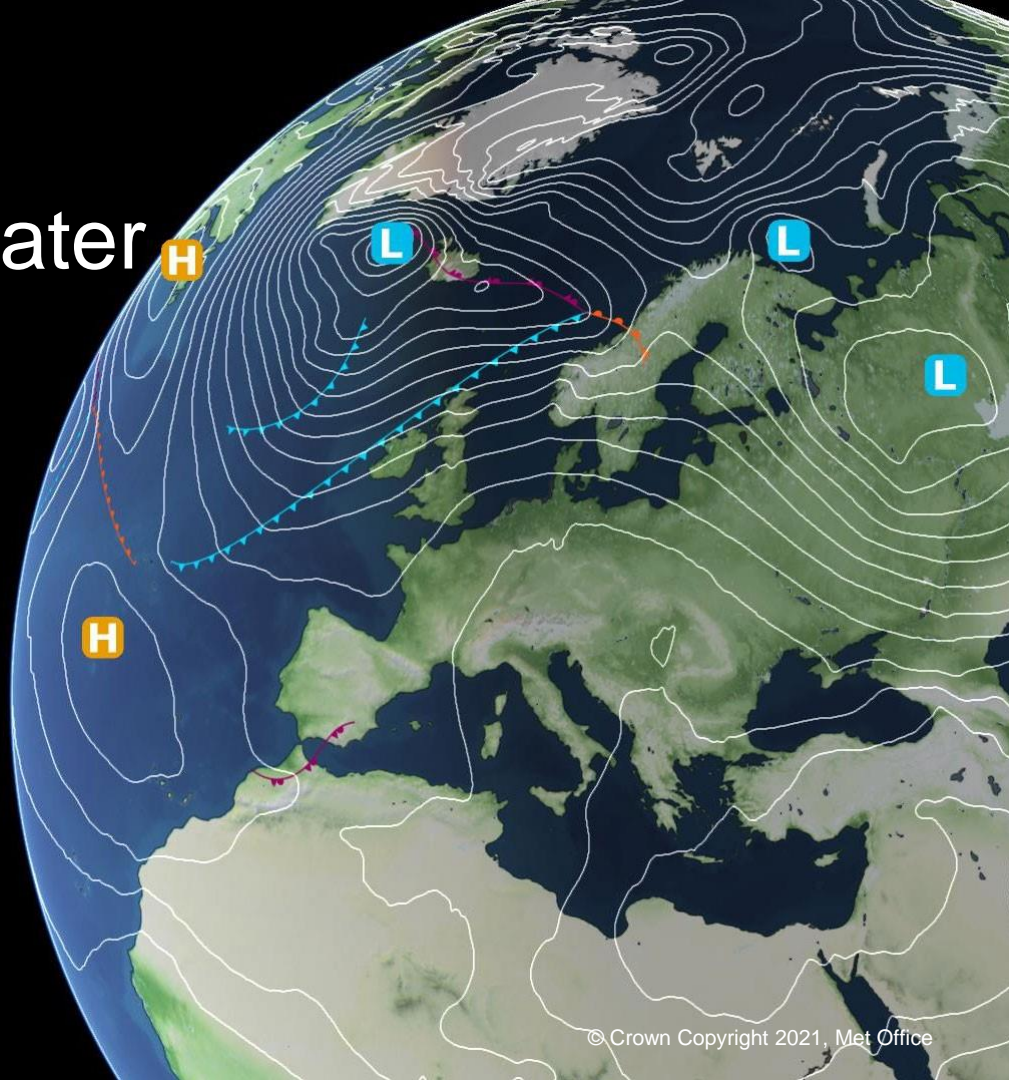# Introducing the freshwater lake model: FLake
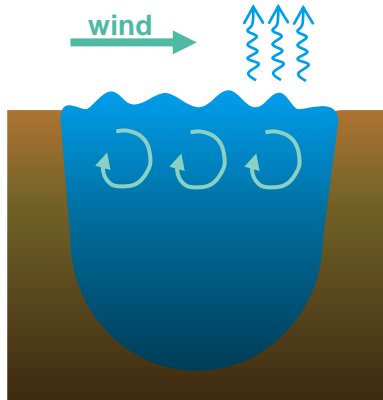
Helen Johnson

Building on work by Gabriel Rooney
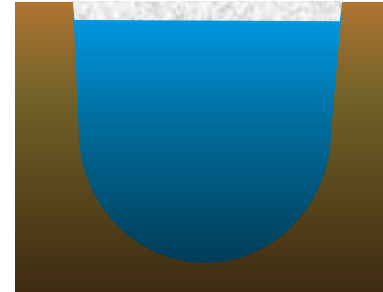
JULES meeting, 15th September 2021

How lake surfaces interact with the atmosphere

- Wind driven thermal mixing
- Lots of water available for evaporation
- Large heat store

- Seasonal ice cover decouples water body from atmosphere
- Snow cannot settle until ice forms
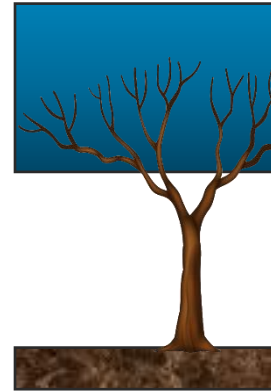- Snow and ice alter surface albedo

How lakes have been represented in JULES until now:

Soggy soil treatment:

Canopy lake treatment:

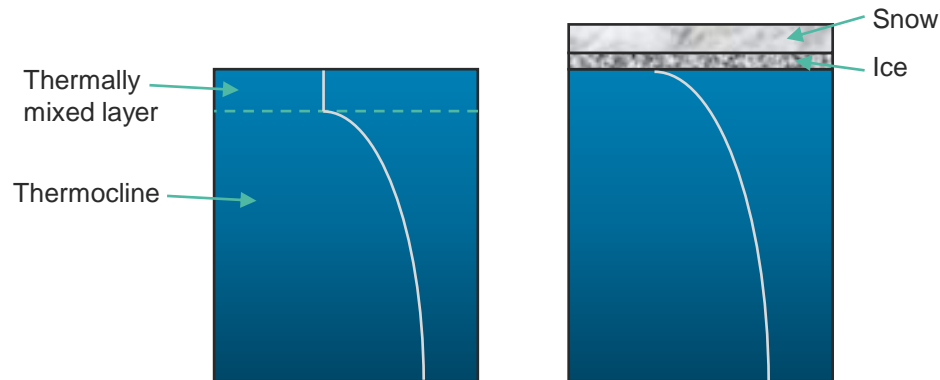- Freely evaporating soil surface
- Low albedo

- Canopy water capacity
- Canopy thermal capacity

What is FLake:

FLake:

- The **F**reshwater **Lake** model
- A standalone model developed by DWD for use in numerical weather prediction.
- 1D bulk model
- Intended for modelling shallow (<50m) lakes

Thermally mixed layer

Thermocline

Snow

Ice

- Vertical mixing
- Snow and ice cover

How FLake is used in JULES

- In JULES and the UM, we use the JULES surface exchange scheme to calculate fluxes from the lake surface to the atmosphere.

- We use the JULES snow scheme rather than the one provided with FLake.

- Thermal coupling between the bottom lake sediments and deep soil is turned off.

Decoupling FLake from soil

- In practice, most lakes are deeper than the soil column typically used in JULES so it doesn't make sense to thermally couple the bottom of the lake to the soil column.

3m
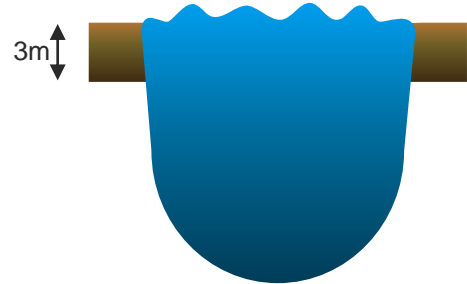
Future work / things to investigate

- Does FLake help improve fog prediction?

- How does FLake interact with wetland areas?

- How well does FLake perform for big lakes?