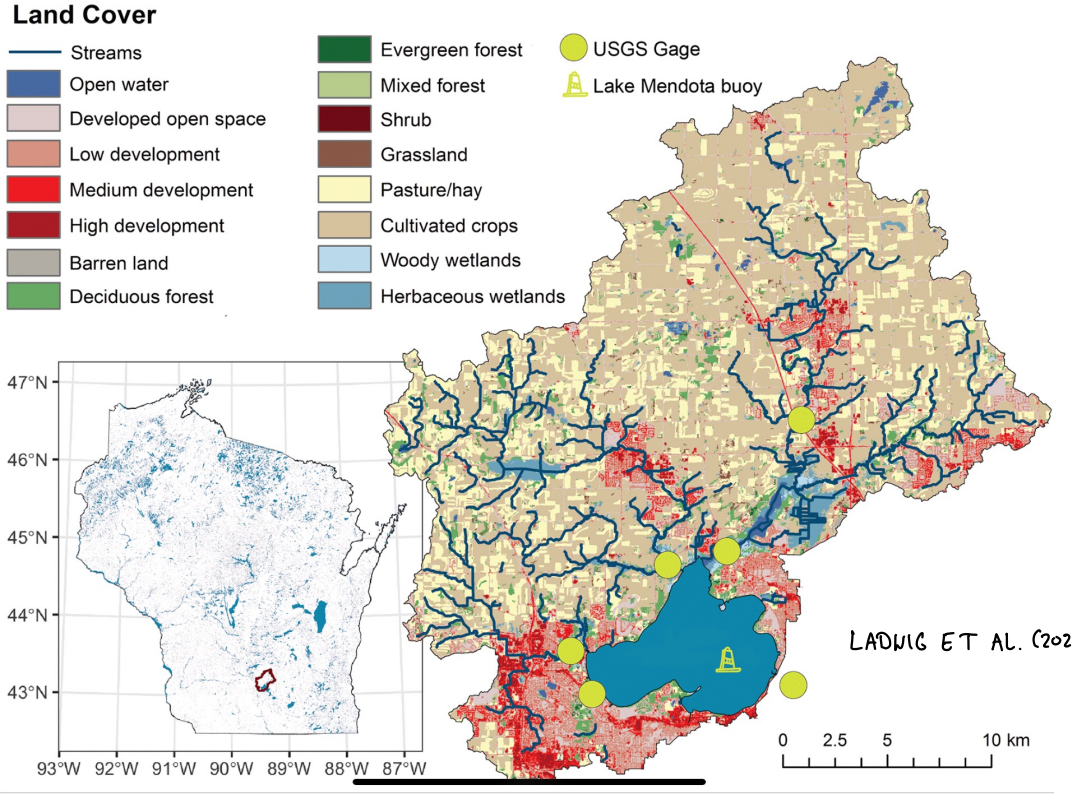
LOCAL LAKE ANALYSIS

- MODEL = GOTM
- GCM = GFDL-ESM
- SCENARIO = RCP 8.5
  2015 - 2100

- LAKE MENDOTA, WISCONSIN, USA
- EUTROPHIC
- DIMICTIC
- ~25 m DEEP



LADWIG ET AL. (2021)

SCHMIDT NUMBER

MASS OF WATER

$$M = \int \rho A \, dz$$

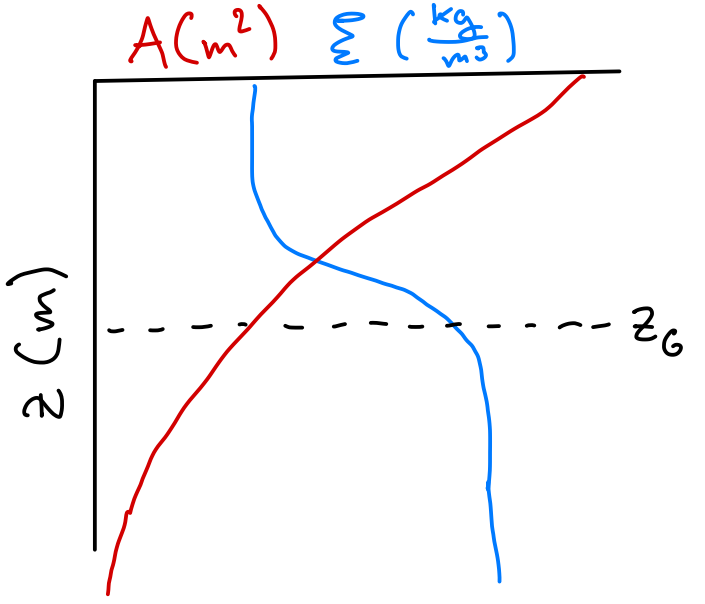
CENTER OF MASS / GRAVITY

$$z_G = \frac{1}{\int \rho A dz} \int z \rho A \, dz$$

$$= \frac{1}{M} \int z \rho A \, dz$$

MEAN DENSITY

$$\hat{\rho} = \frac{1}{V} \int \rho A \, dz$$



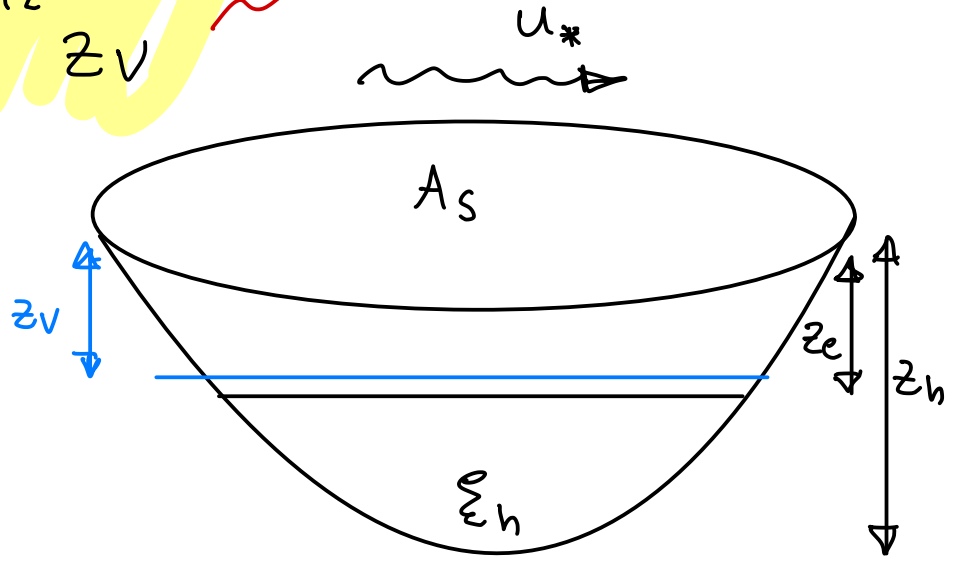
$$S_t = \frac{g}{A_0} \int (z - z_G)(\rho - \hat{\rho}) A \, dz$$

LAKE NUMBER

$$L_N = \frac{S_t \left(z_e + z_h\right)}{2 \varepsilon_h u_*^2 A_s^{1/2} z_v}$$

STABILIZING FORCES

MIXING FORCES



CENTER OF VOLUME

$$z_v = \frac{1}{V} \int z \, A \, dz$$

COUPLED MODEL

(1) TEMPERATURE OUTPUT FOR MIXING (HONDZO & STEFAN, 1993)

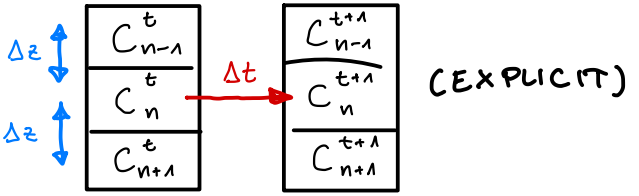
$$K_z = a_k \left(N_z^2\right)^{-0.43} \quad \text{WITH} \quad a_k = 0.00706\, A_s^{0.56}$$

$$N_z^2 = \frac{g}{\varepsilon_z} \frac{d\varepsilon_z}{dz}$$

(2) BUILD OUR MODEL

$$\frac{dC}{dt} = K \frac{d^2C}{dz^2} \xrightarrow[(FTCS)]{\text{NUMERICS}} C_n^{t+1} = C_n^t + K\frac{\Delta t}{\Delta z^2}\left(C_{n+1}^t - 2C_n^t + C_{n-1}^t\right)$$

(3) BE CREATIVE



(EXPLICIT)