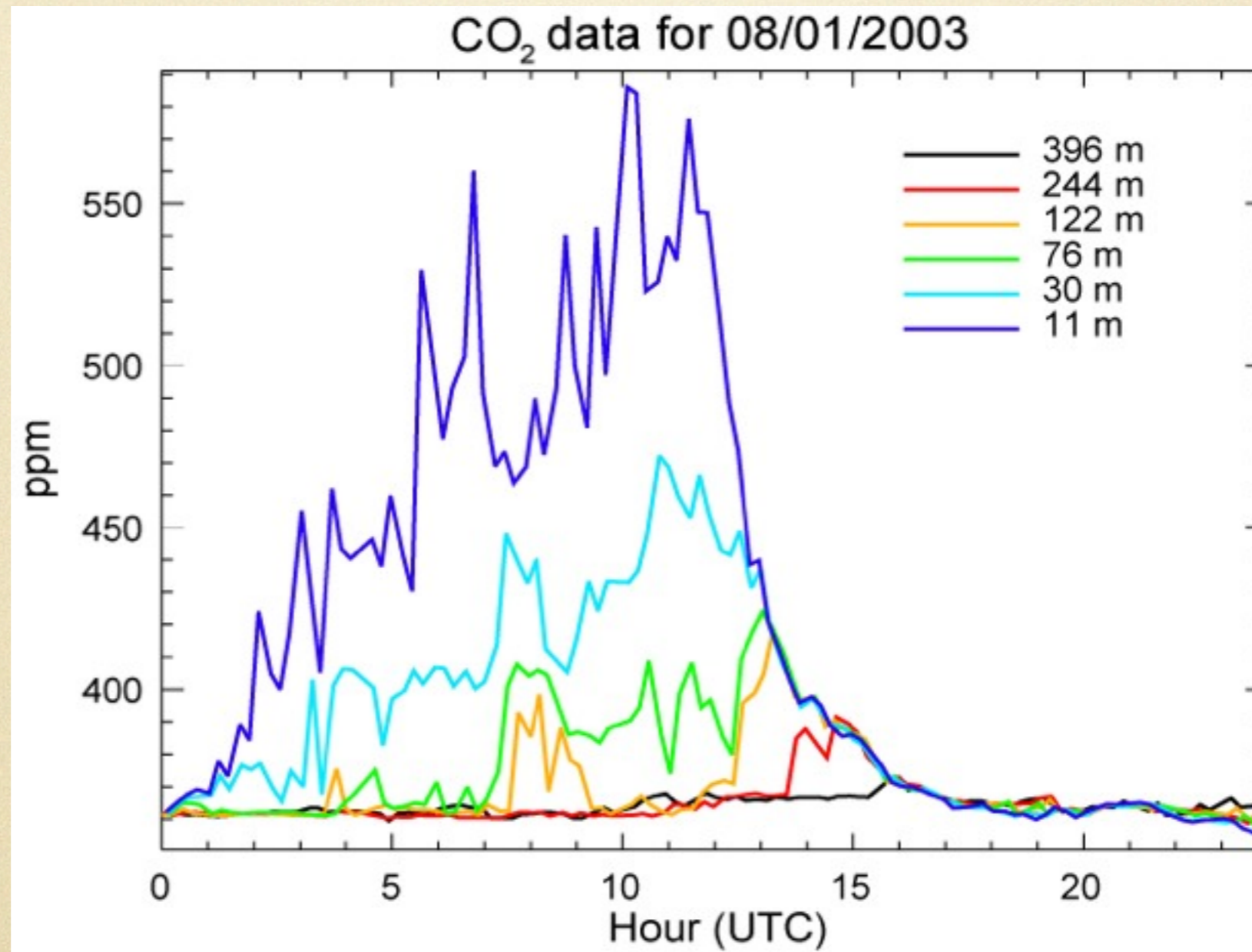
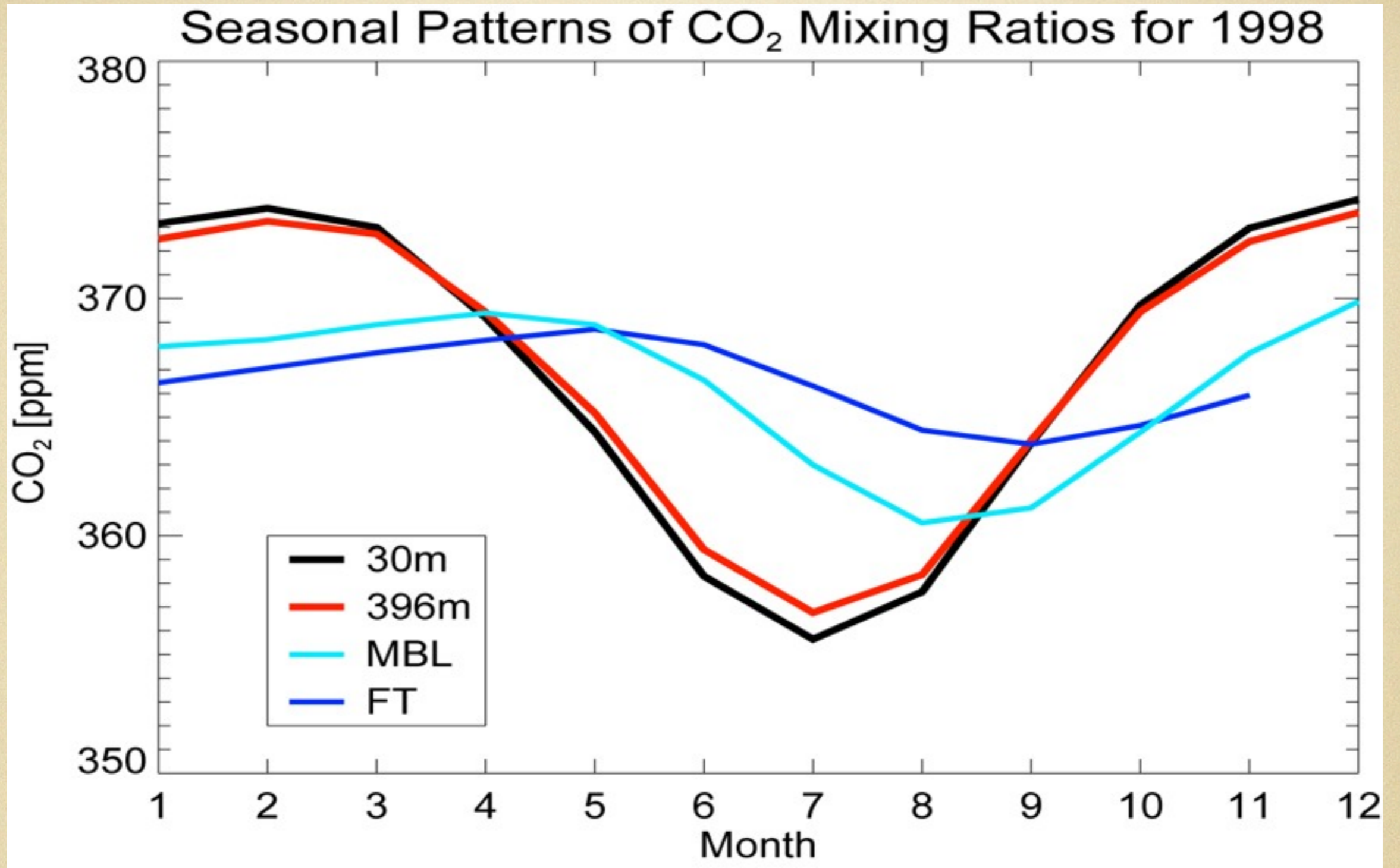


Sampling the
surface
concentration in
large scale
models

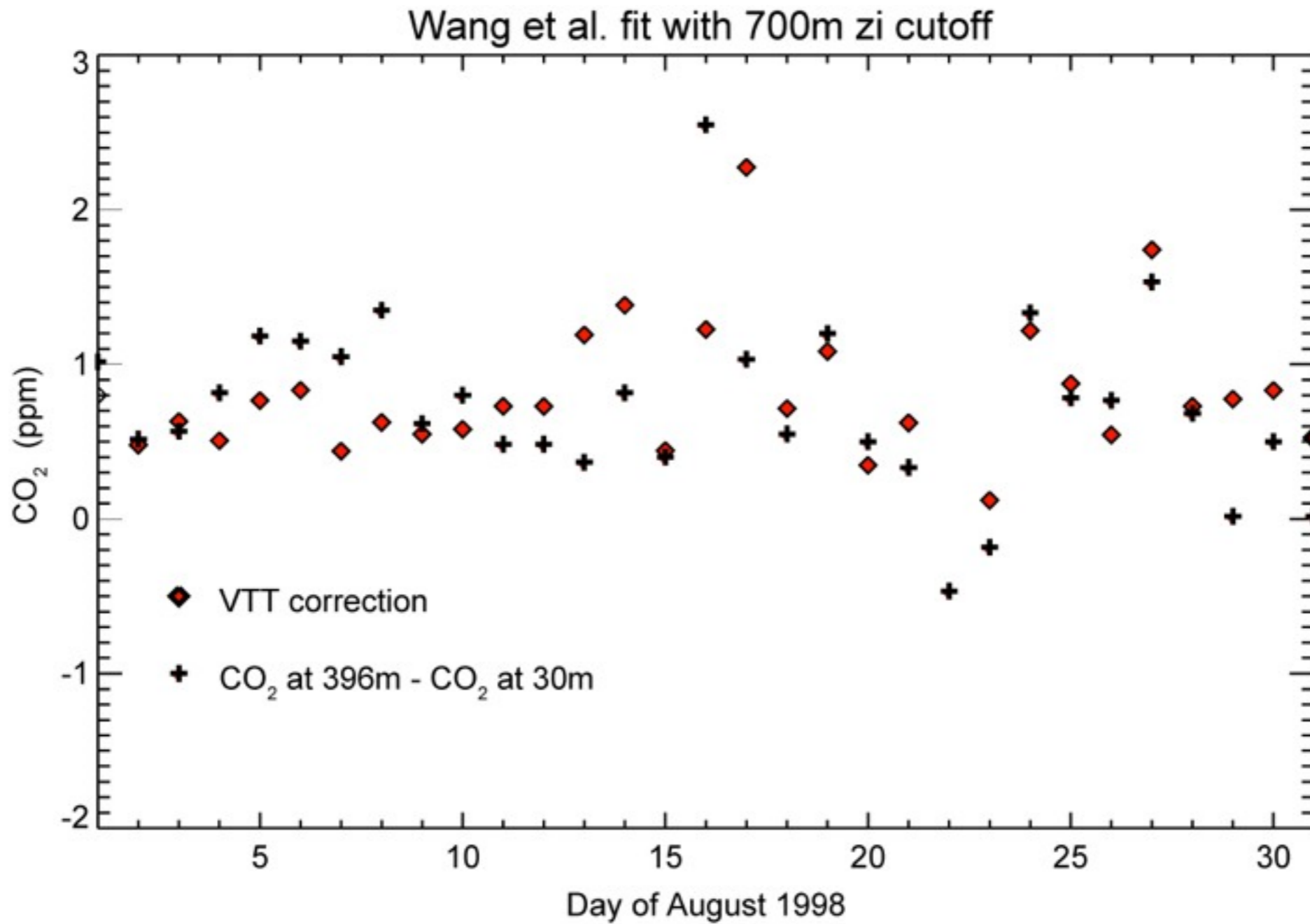
CO₂ measurements good 'Test-case'





Butler: Virtual Tall Towers

VTT results from Butler:



Wageningen Input (Jordi Vila)

$$\overline{wC}_S = -K \left(\frac{\partial \overline{CO}_2}{\partial Z} \right)$$

$$K = \frac{K_Z U_s}{\phi_c}$$

In convective conditions

$$\phi_c = \phi_{u1} = \left(1 - 16 \frac{Z}{L} \right)^{-1/2}$$

Continued....

$$\left(\frac{\partial Q_2}{\partial z} \right) = - \frac{\overline{w'c_s}}{KzU_*} \phi_c$$

$$\int_{z_0}^{z_*} \partial Q_2 = - \frac{\overline{w'c_s}}{KzU_*} \int_{z_0}^z \phi_c \frac{\partial z}{z}$$

Result:

$$CO_2(z_0) = CO_2(z) + \frac{\overline{\omega C_s}}{K_{LH}} \left[\ln \left(\frac{z}{z_0} \right) - \psi_c(z) + \psi_c(z_0) \right]$$

Discussion

- Propose to use 'reverse-VTT' approach to translate modeled 400m level to 30m for CBL
- In that case, less numerical and sampling issues are expected (Wouter)
- Formulas are available based on flux-gradient relationships in the CBL
- We will implement and test these in TM5