

# ***Interactive comment on “Estimates of climatic influence on the carbon cycle” by Ian Enting and Nathan Clisby***

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Oeschger et al. (1980) defined a dilution factor ( $D(\mu)$  in their notation), corresponding to what we denote as  $1 + \beta_O(p) + \beta_L(p)$  where  $1/\mu$  is the e-folding time of the growth of emissions, corresponding to our variable,  $p$ .

Their equation (4) partitions  $D(\mu)$  as

$$D(\mu) = 1 + e(\mu) \frac{h_{oc}(\mu)}{H_{oc}} \times \frac{N_{oc}}{\xi N_a} + \epsilon \frac{h_b(\mu)}{H_b} \times \frac{N_b}{N_a}$$

The second and third terms in this equation correspond to  $\beta_O$  and  $\beta_L$  expressed in terms of quantities characteristic of the oceans and biota respectively (see Oeschger et al. for details of notation). The timescale dependence for the ocean is captured

through  $h_{oc}(\mu)$  (an equivalent penetration depth for CO<sub>2</sub>, which they later express as mixed layer depth  $+\sqrt{K/\mu}$  using a box-diffusion model) and an equilibration factor  $e(\mu)$ . For the biosphere, the dependence  $h_b(\mu)$  is parameterised in terms of a one-box model.

On reflection, given that the pioneering aspect of the Oeschger et al. analysis is the  $\mu$ -dependence of their equivalents to  $\beta_O$  and  $\beta_L$ , (unlike the implicit assumption of fixed  $\beta$  in the work by Friedlingstein) our citation of Oeschger et al. might be better placed after equation (5).

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