

Wet & Dry, by L.-Y. Oey, Princeton University

I present a wet and dry (WAD) scheme that is general, simple and robust for OGCM's. Sea level is re-defined with respect to an absolute land point where water can never reach. Dry cells are defined as where the water depths become very thin, say 5cm; fluxes across the dry cells' faces are then set to zero. The full primitive equations are solved at all grid cells, dry or wet. Tests are presented to compare the WAD solution against analytic solution with friction, but model results with zero friction are also given. Results from a Cook Inlet (Alaska) simulation with tides, fresh-water inputs, wind forcing etc. are shown. Details of all these can be found in Oey [2005, 2006; Ocean Modelling] and Oey, Ezer, Hu, Muller-Karger [2007, Ocean Dynamics]. Codes may be downloaded from:

<http://aos.princeton.edu/WWWPUBLIC/PROFS/>

I then show a slide pointing out the false idea that hydrostatic inconsistency is relevant to the sigma-level pressure gradient error. I include that slide below:

Sigma-pressure gradient truncation error (for POM; Mellor et al. 1994; 1998):

$$E\left(\frac{\delta_x b^*}{\delta x^*}\right) = \frac{H}{4} \frac{\delta_x H}{\delta x} \left[\left(\frac{\partial^2 b}{\partial z^2}\right) + \frac{\sigma H}{3} \left(\frac{\partial^3 b}{\partial z^3}\right) + \dots \right] \times \left\{ (\delta\sigma)^2 - \sigma^2 \left(\frac{\delta_x H}{H}\right)^2 \right\}$$

$$b = \rho'g/\rho_0$$

$$Is \quad |(\sigma\delta_x H)/(H\delta\sigma)| > 1$$

***(the so called "hydrostatic inconsistency")
a meaningful measure of PGE?***

***A little thought (with the aid of the above equation) should convince
you that it is not.***