Comparison of different terms of thermal dynamic equation

We compared the different terms of the thermal dynamic equation (eq. 1). The years are between 1979 and 1998. The resolution is T42 in horizontal direction and it has 5 sigma levels in vertical direction (0.1, 0.3, 0.5, 0.7, 0.95). Here we only show three-layer results. The original data has 26 levels in vertical direction in CAM and 23 levels in ECMWF.

$$\hat{V}\bullet\nabla\overline{T}_E + \overline{V}_E\bullet\nabla\hat{T} + \hat{\omega}\left(\frac{\partial\overline{T}_E}{\partial P} - \frac{\alpha}{C_V}\right) + \overline{\omega}_E\left(\frac{\partial\hat{T}}{\partial P} - \frac{\alpha}{C_V}\right) = -\hat{V}\bullet\nabla\hat{T} - \hat{\omega}\frac{\partial\hat{T}}{\partial P}$$

$$\underbrace{-\overline{V'_C\bullet\nabla T'_C} + \overline{V'_E\bullet\nabla T'_E} - \overline{\omega'_C\frac{\partial T'_C}{\partial P}} + \overline{\omega'_E\frac{\partial T'_E}{\partial P}}}_{=\ THF} + \hat{Q} \qquad (1)$$

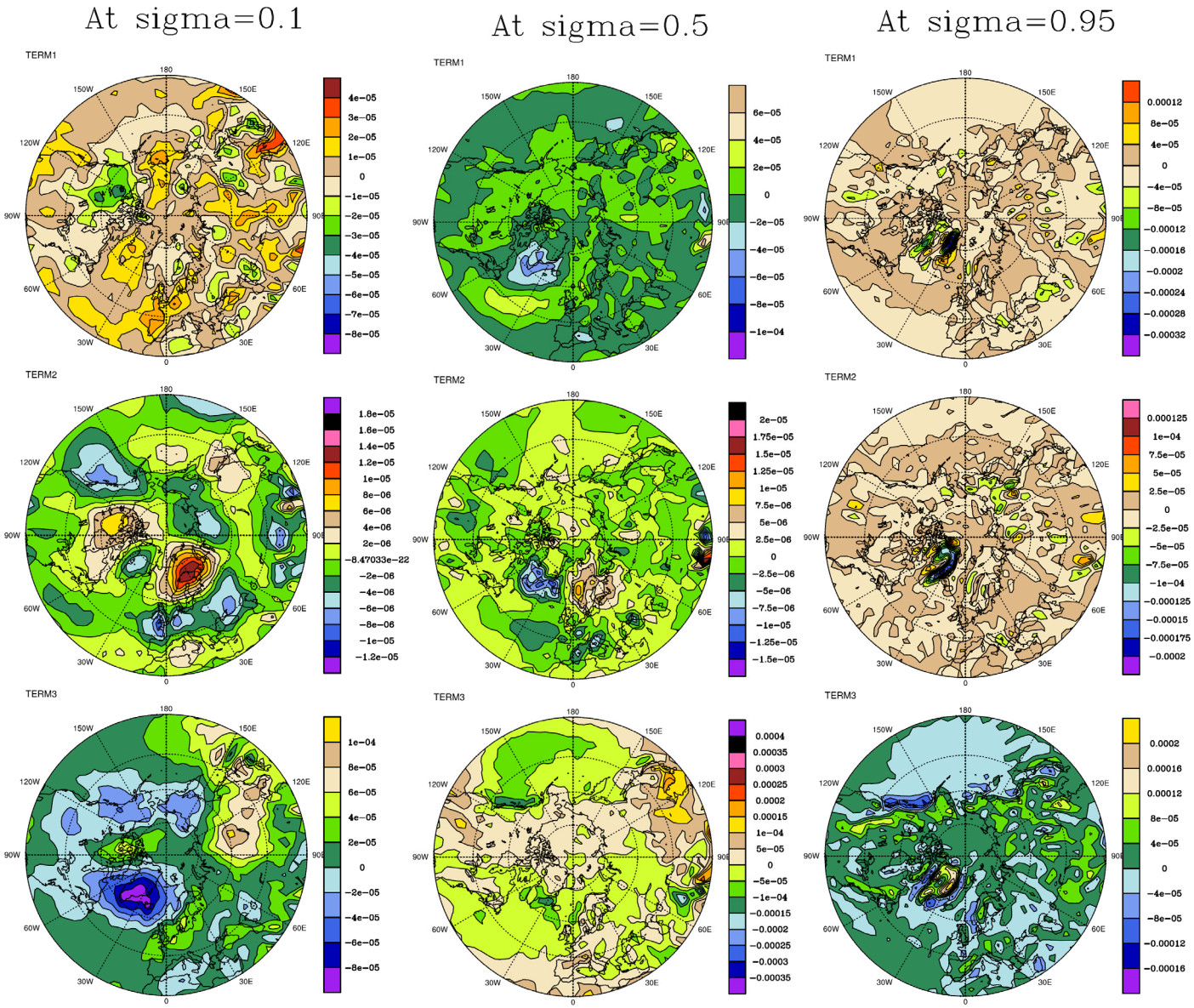

Figure 1 term 1 (LHS of (1)), term 2 (nonlinear bias-bias advect.) and term 3 (transients)

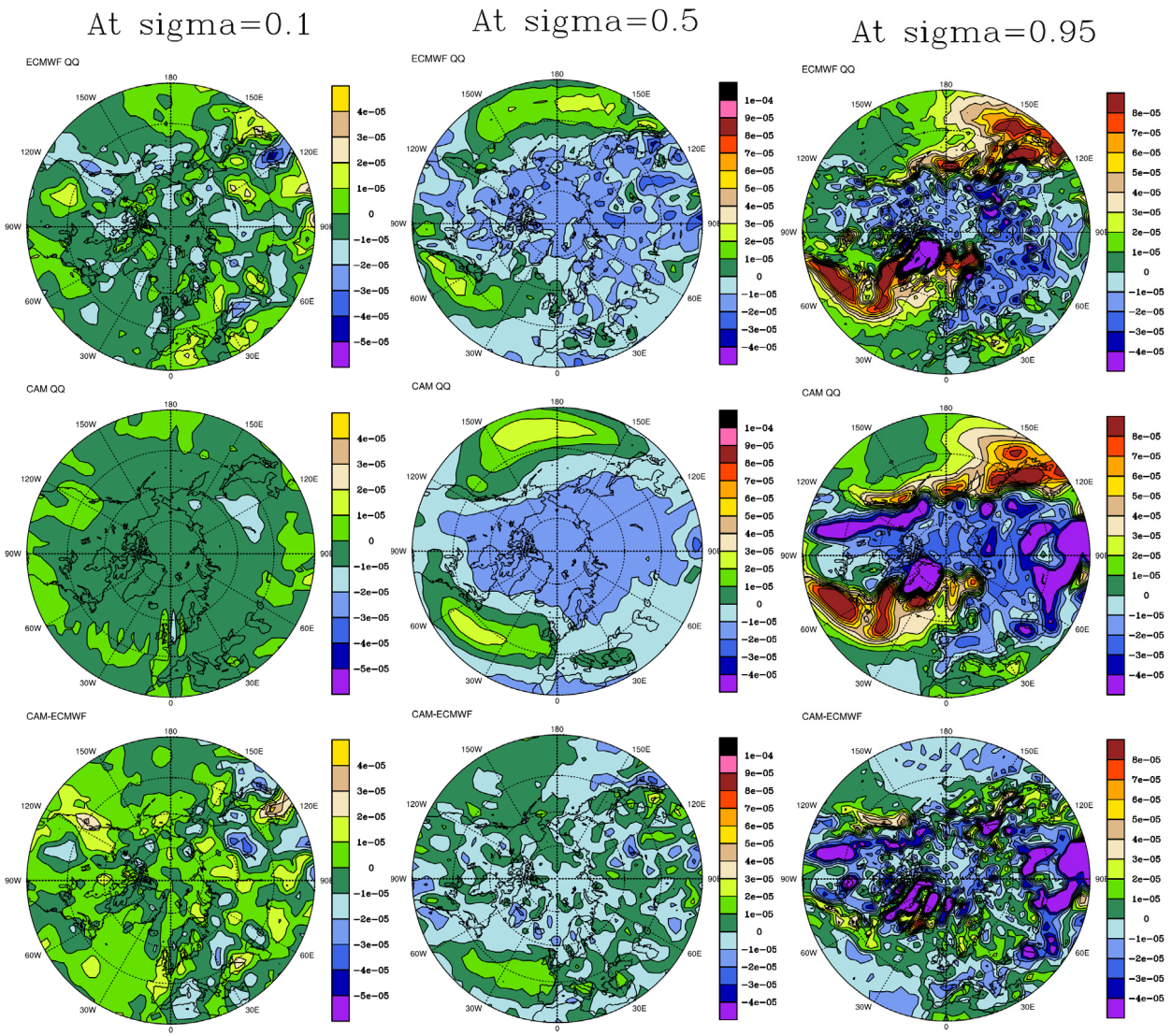

Figure 2. term 4 (diabatic heating bias) without filtering of transients.

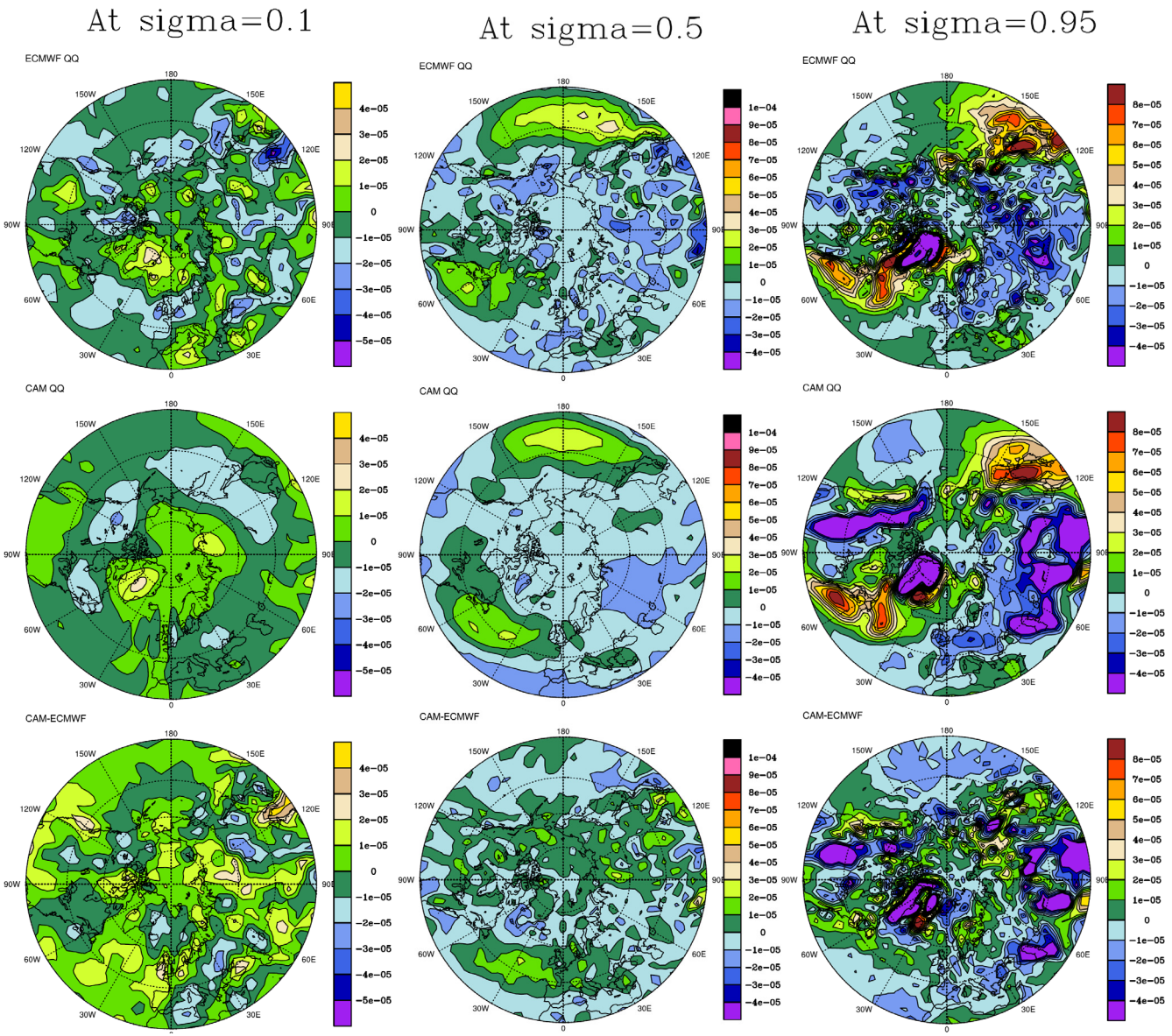

Figure 3 diabatic heating with filtering of transient part to include 2-8 day frequencies only.