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A conservative leap-frog time stepping method

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The Leap-Frog scheme associated with a Robert-Asselin time filter (LFA) has been used for years in numerous GCMs. This is due to its low computational cost and implementation simplicity. Nevertheless, it has been found to be non conservative for tracers (Griffies et al. 2001). That's why, recently, alternative time stepping schemes have been considered in many of these GCMs (Shcheptkin and McWilliams 2005, Griffies 2004).
However, we will show here that minor corrections of the Robert-Asselin time filter associated with a careful implementation of the LFA scheme allow us to make it perfectly conservative for both tracers and volume.
Thus we build a robust, cheap and conservative time stepping scheme, which is very suitable in coupled climate models.