From: Jaymes Kenyon <jaymes.kenyon@gmail.com>
Subject:
Date: 6 May 2013 9:48:45 AM EDT

From: "Bosart, Lance F" <lbosart@albany.edu>
Date: 4 May 2013 10:53:03 AM EDT
Subject: **Re: Q-vector formulations**

Hi Jaymes,

Excellent comparison! Many thanks.

Presumably, the neglected deformation term in the ST equation will explain 80-90% of the difference between the two calculations. Feel free to run a test calculation of the deformation term if you have the time.

Please post your email and attached PP file to the Atm 401/501 class page.

Thanks again.

Lance

On 3 May, 2013, at 21:53, Jaymes Kenyon wrote:

> Hi Everyone,
>
> I pulled some of Tom Galarneau's diagnostic charts for the period of interest for a side-by-side comparison. The results are attached (click here for link).
>
> The bottom line conclusion: QG forcing for vertical motion differs noticeably between the Q-vector and Sutcliffe-Trenberth forms of the omega equation near the region of geostrophic frontogenesis.
>
> Some naming clarification: Tom Galarneau refers to Bluestein's Eq. (5.7.40) as the "Trenberth formulation." After retaining only term A, he calls the new equation the "Sutcliffe-Trenberth form." His discussion is posted here:
> http://www.mmm.ucar.edu/people/tomjr/files/realtime/qgomega-usersguide.pdf
>
> Thanks for the interesting discussion today!
>
> Jaymes
>
> On 3 May 2013, at 4:38 PM, Bosart, Lance F wrote:
>
> > Hi Guys,
> >
> > You gave a very nice discussion today. Great way to end the semester! :)
> >
> > With regard to the discussion of the Sutcliffe-Trenberth (ST) form of the omega equation, the full ST equation with Coriolis and deformation terms included appears as Equation (5.7.40) on p. 349 of Bluestein (1992) Volume I (the deformation term in (5.7.40) is defined in (5.7.39) on the top of p. 349). An interesting exercise would be to calculate the three terms on the RHS of (5.7.40) and their sum (which can be compared to the Q-vector form of the omega equation with the Coriolis term included) for 1-2 May 2013. As Dan said, the usually neglected deformation term in (5.7.40) may be playing a starring role in this event.
> >
> > Details on alternative forms of the QG omega equation can be found in the original papers by Trenberth (1978, MWR, 106, 131-137) and Hoskins et al. (1978; QJRMS, 104, 31-38). Sanders and Hoskins (1990; WAF, 5, 346-353) discussed applications of Q-vectors to real data situations through use of a natural coordinate form of the Q-vector.
> >
> > Lance