Supplement of

Role of in situ-excited planetary waves in polar vortex splitting during the 2002 Southern Hemisphere sudden stratospheric warming event

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Table S1: Wave-2-type SSW events identified from Modern-Era Retrospective analysis for Research and Applications (version 2) data in the Northern Hemisphere from 1979 to 2023. SSW events are classified using the criterion established by Charlton and Polvani (2007), while wave-2-type SSW events are identified following the method of Ryoo and Chun (2005).

	Onset date	**In situ planetary wave 2 generation signal**
1	1 Jan 1985	N
2	8 Dec 1987	**Y**
3	14 Mar 1988	N
4	21 Feb 1989	N
5	15 Dec 1998	**Y**
6	11 Feb 2001	**Y**
7	18 Jan 2003	**Y**
8	24 Feb 2007	**Y**
9	24 Jan 2009	N
10	6 Jan 2013	**Y**
11	12 Feb 2018	N

08 Dec 1987
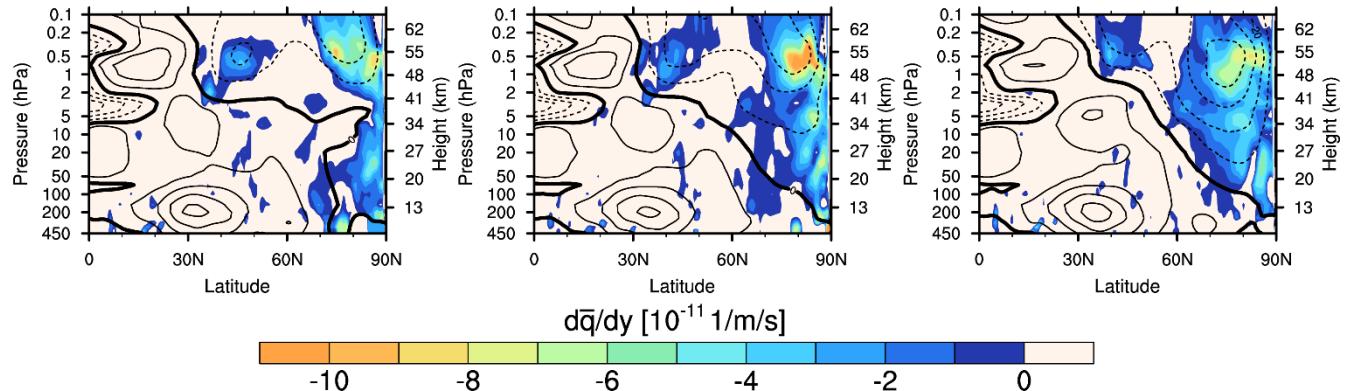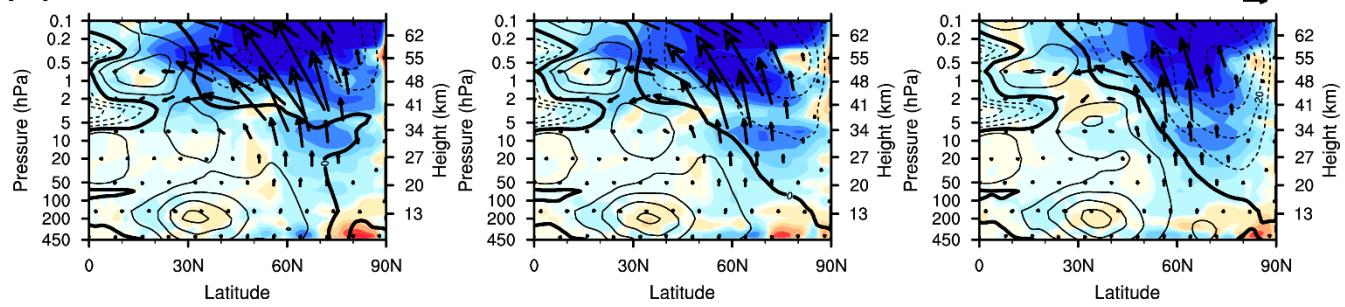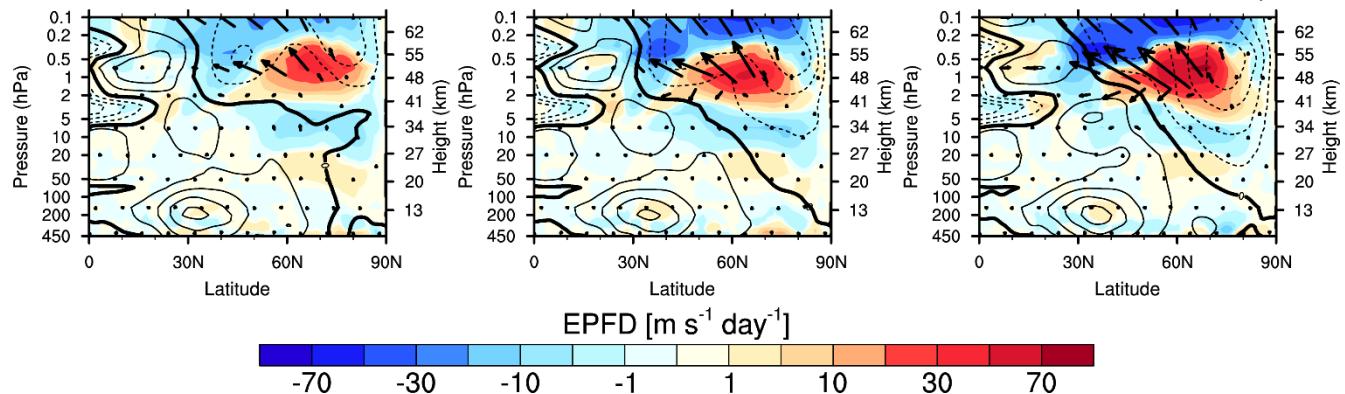
Figure S1: Latitude–height cross sections of (a) the negative meridional gradient of zonally averaged quasi-geostrophic potential vorticity ($\bar{q}_y$, shading) and Eliassen–Palm flux (EP-flux, vectors) overlaid with EP-flux divergence (EPFD, shading) for (b) PW1 and (c) PW2 from Lag = –2 to Lag = 0 for the six Northern Hemisphere SSW events listed in Table S1, where signals of in situ PW2 generation are observed. Black contours in (a)–(c) indicate zonal-mean zonal wind with solid, dashed, and thick solid lines indicating positive, negative, and zero wind, respectively.

15 Dec 1998

Lag = -2	Lag = -1	Lag = 0

(a) d$\bar{q}$/dy

d$\bar{q}$/dy [10^{-11} m^{-1} s^{-1}]

(b) PW1 EPFD

(c) PW2 EPFD

EPFD [m s^{-1} day^{-1}]
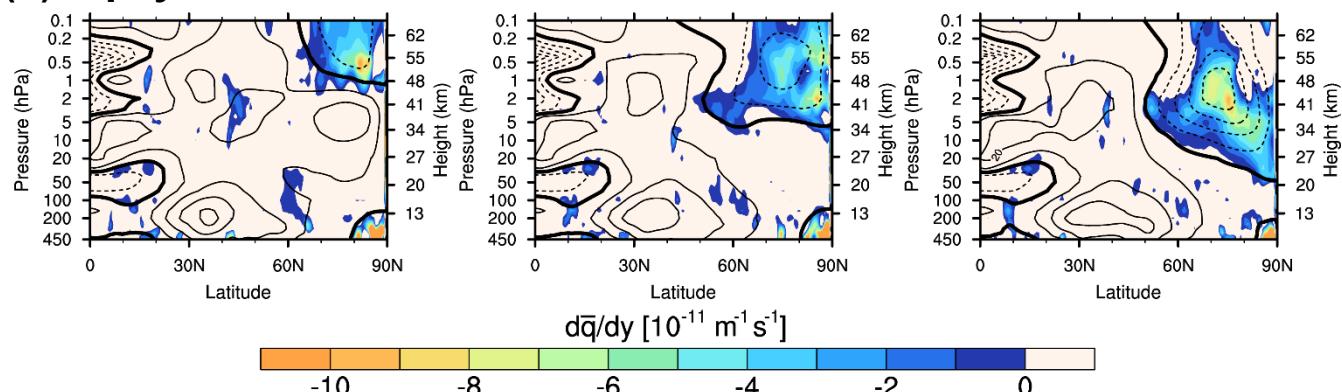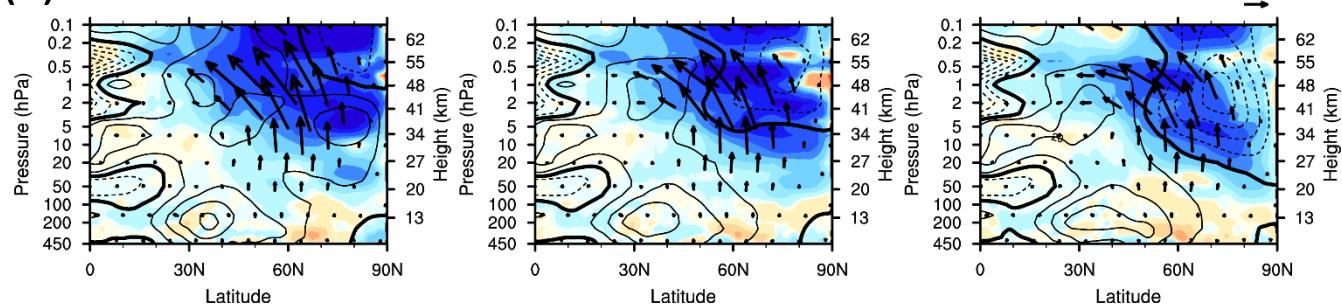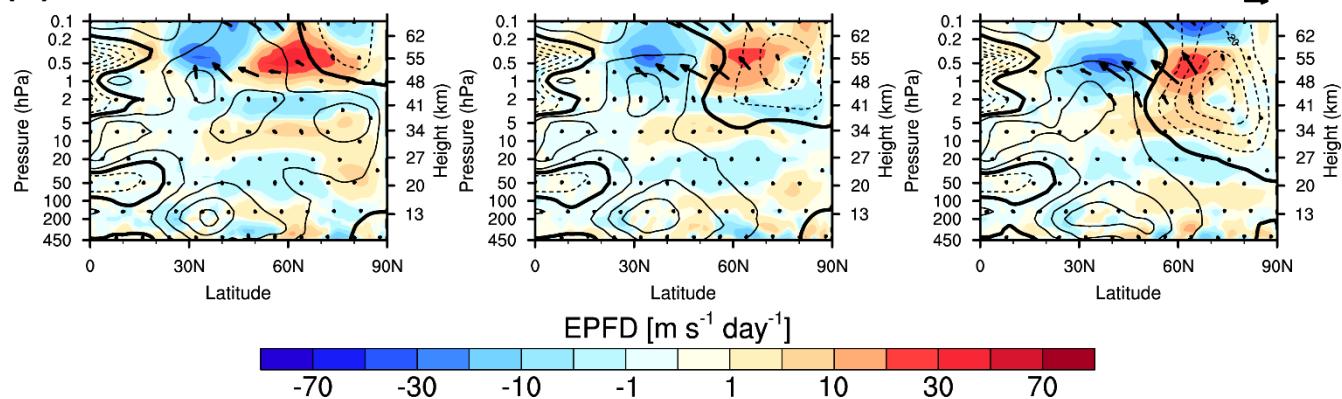
20   **Figure S1.** (Continued)

11 Feb 2001

Lag = -2 Lag = -1 Lag = 0

(a) dq̄/dy

dq̄/dy [10^{-11} m^{-1} s^{-1}]

(b) PW1 EPFD

(c) PW2 EPFD

EPFD [m s^{-1} day^{-1}]
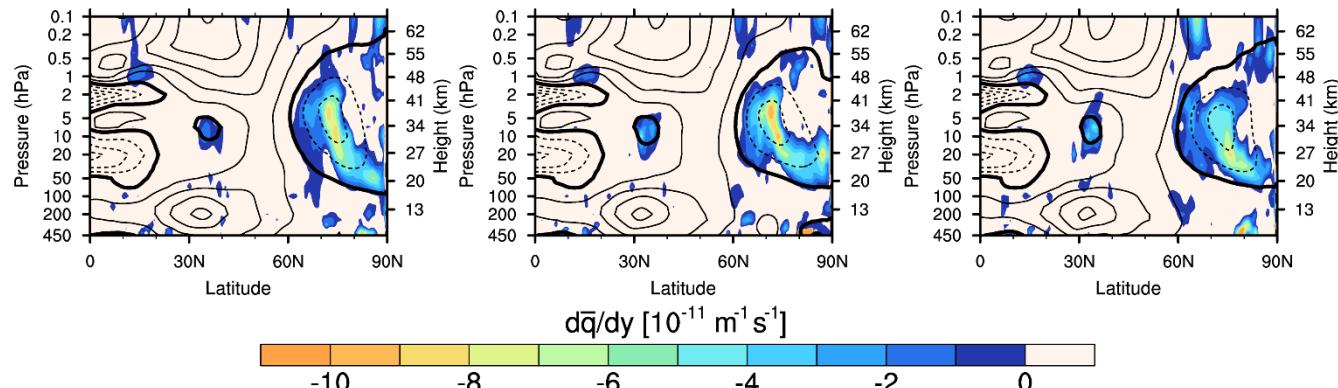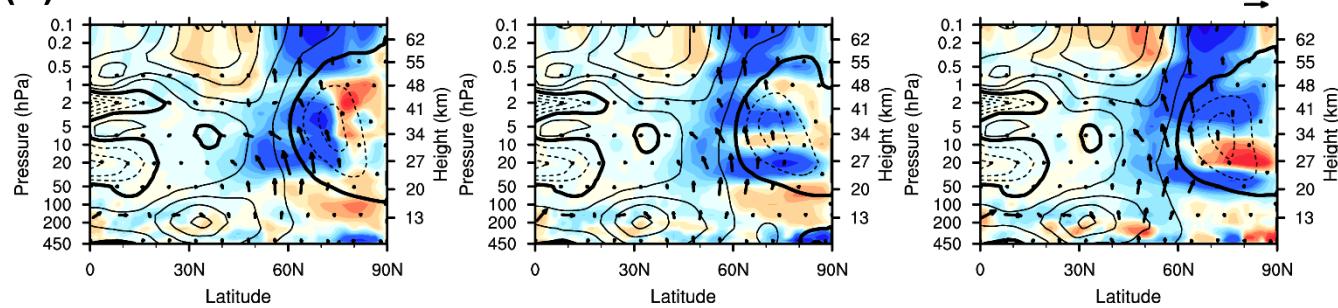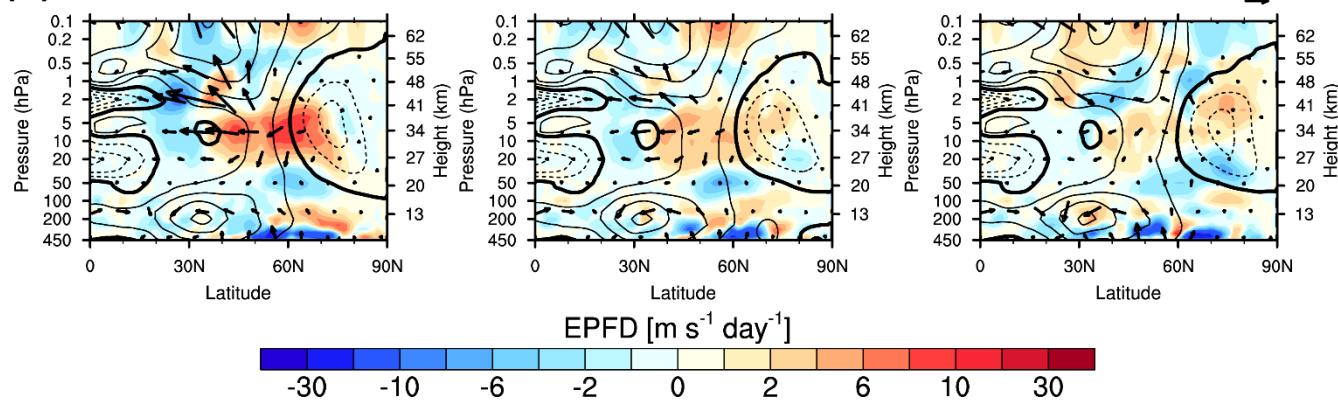
Figure S1. (Continued)

18 Jan 2003
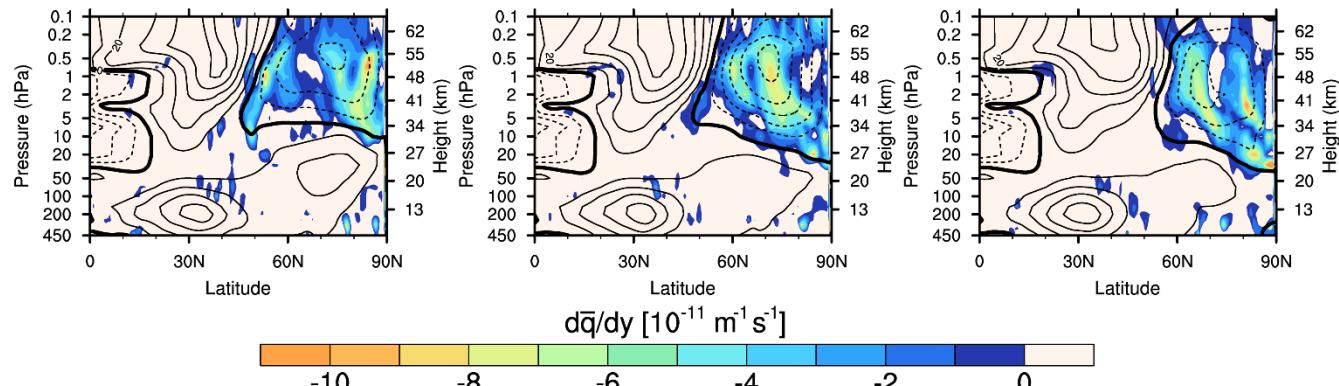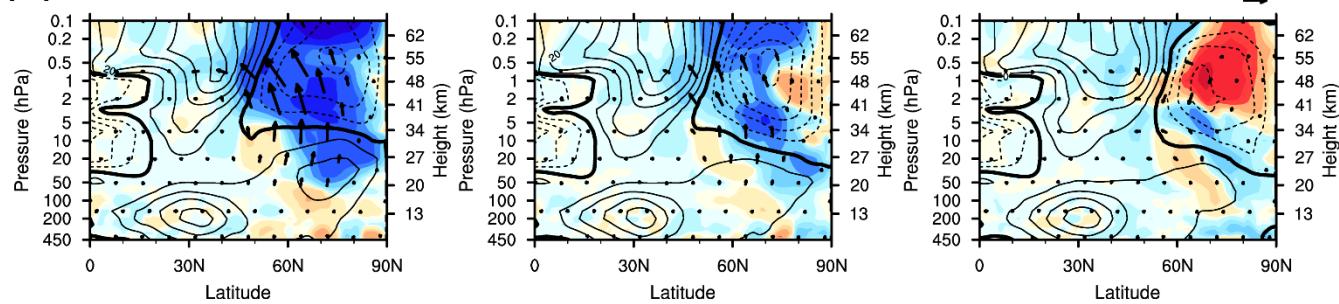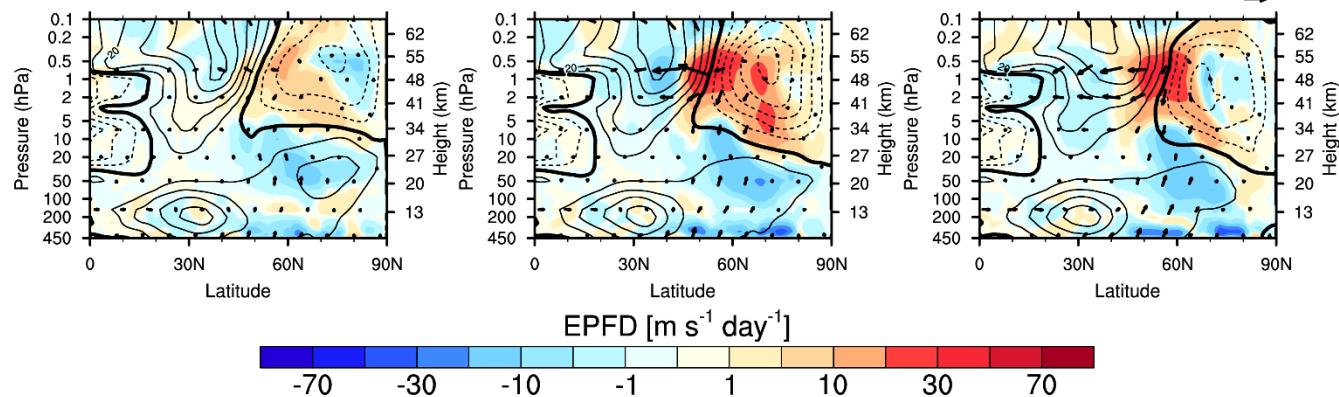
Figure S1. (Continued)

24 Feb 2007
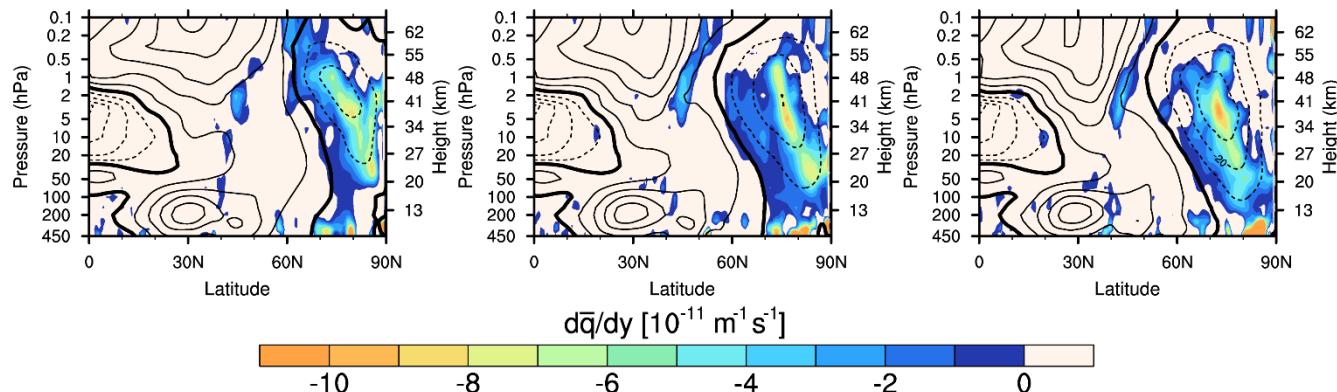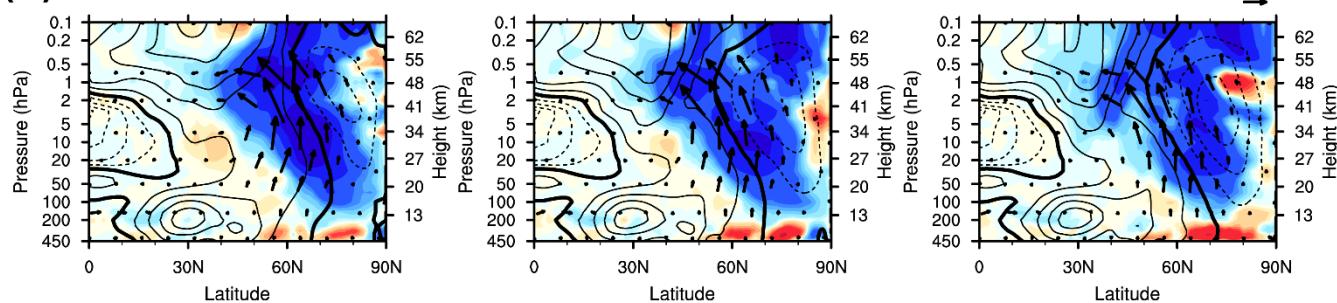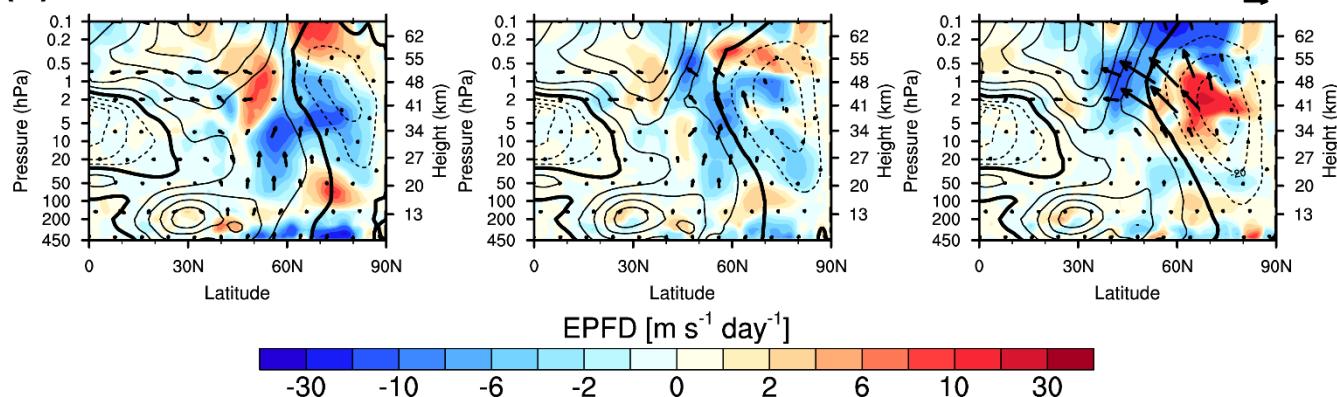
Figure S1. (Continued)

6 Jan 2013

Figure S1. (Continued)