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# Atmospheric angular momentum balance for southern hemispheric polar caps during the major warming event in 2002

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The components of the conservation equation of atmospheric angular momentum (AAM) have been calculated for southern hemispheric polar caps in order to examine the importance of their contributions to the AAM tendency during the unexpected break-up of the polar vortex.

It is found that the AAM tendency for the mean polar cap (90° - 65° S) oscillates with a period of 5 days until the break-up of the polar vortex. On average we found an increase of AAM until day 18, followed by a strong decrease to day 27 during vortex splitting in the upper stratosphere, and a final increase to the end of September. The positive (negative) imbalance between mountain torque, friction torque and the convergence of relative AAM fluxes causes the increase (decrease) of AAM tendency. For the polar cap, the mountain torque is mainly positive and larger than the friction torque. The changes of the mountain torque are determined by shifts of surface pressure in relation to the orography of Antarctica. The fluxes of AAM are northwards and reduce the AAM of the polar cap. The changes of AAM fluxes are mainly determined by the evolution of momentum fluxes due to transient Rossby waves in the upper troposphere and lower stratosphere.

During the polar vortex break-up event there is a negative imbalance between mountain torque and the convergence of relative AAM fluxes. The vortex splitting associated with a strong decrease of the amount of mountain torque and an increase in the convergence of relative AAM fluxes. These changing torques are discussed.