

Interactive comment on “Stratospheric tropical warming event and its impact on the polar and tropical troposphere” by Kunihiro Koderu et al.

Anonymous Referee #2

Received and published: 3 November 2016

Summary: The manuscript describes an event in Nov/Dec 2011, where an anomalous strengthening occurred in the middle atmosphere subtropical jet (MASTJ), a band of strong winds at the subtropical stratopause. Exceptionally, the stratospheric polar night jet (PNJ), which tends to be anticorrelated in strength with the MASTJ, shifted equatorward in an event that the authors argue was due to internal stratospheric dynamics, as opposed to tropospheric forcing. Only later during the event did tropospheric wave propagation set on and further weaken the PNJ. This stratospheric anomaly had an effect on the tropospheric circulation, both by changing the refractive properties of the stratosphere for tropospheric wave propagation in the extratropics, but also through an impact on the TTL, changing tropical convection and leading to an abrupt change in the MJO.

General assessment: The authors develop a clean case study of a phenomenon that is

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otherwise not yet well represented in the literature, but which confirms earlier studies on stratosphere - troposphere coupling on wave reflection and the impact of the tropical lower stratosphere on tropical convection. The study is well documented, but could use a consolidation of figures for clarity. Overall, the case study is well written and supported by the recent literature, mainly from the authors themselves. This study is worth publishing after minor revisions to the text and figures.

Detailed assessment: page 1, line 25: "downward penetration of zonal winds" is misleading, it should rather be called a downward propagation of anomalies, cite e.g. Plumb & Semeniuk (2003) page 2, line 4: "external forcings in the stratosphere": external to the troposphere? page 2, line 5: "ozone depletion"? page 2, line 8: please add a reference page 2, lines 8 - 10: It would be helpful to explain the MASTJ itself before looking at its impact. One option would be to move part of the first paragraph in section 3.1 (page 3, lines 15 - 20) to the introduction. page 2, line 16: nearly? page 3, line 26: remove "in" page 4, line 20: "largely" -> "strongly" page 5, line 2: where does the 12 come from? page 5, line 6: growth -> grow page 5, line 8: it looks more like divergence in the polar regions, please be more clear in the description Figure 1: a) missing in caption Figure 2a): there seems to be a similar structure in the SH as in the NH, but much weaker

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-852, 2016.

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