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2 **Replies to M.-Y. Lin:** Interactive comment on “The ENSO signal in atmospheric composition
3 fields: emission driven vs. dynamically induced changes” by A. Inness et al.

4 Received and published: 22 June 2015

5 This comment is posted by Meiyun Lin (Princeton University). The role of emission driven
6 versus dynamically induced changes in atmospheric composition in association with ENSO is
7 a very interesting topic. The following two publications particularly addressed this question,
8 and thus are highly relevant to many discussions in your paper. Meiyun Lin, L.W. Horowitz,
9 S. J. Oltmans, A. M. Fiore, Songmiao Fan (2014): Tropospheric ozone trends at Manna Loa
10 Observatory tied to decadal climate variability, Nature Geoscience, 7, 136-143,
11 doi:10.1038/NGEO2066.

12 Meiyun Lin, A.M. Fiore, L.W. Horowitz, A.O.Langford, S. J. Oltmans, D. Tarasick, H.E. Reider
13 (2015): Climate variability modulates western US ozone air quality in spring via deep
14 stratospheric intrusions, Nature Communications, 6, 7105, doi:10.1038/ncomms8105

15 Despite large El Nino enhancements to wildfire activity in equatorial Asia, the model
16 sensitivity experiments in Lin et al (2014, Nature Geosci) indicate that wildfire emissions are
17 not the main driver of ENSO-related ozone variability observed at Mauna Loa, Hawaii (Figure
18 3). The dynamically induced eastward extension and equatorward shift of the subtropical jet
19 stream during El Nino plays a key role on observed interannual variability of springtime
20 lower tropospheric ozone at Mauna Loa. These shifts enhance long range transport of Asian
21 ozone and CO pollution towards the eastern North Pacific in winter and spring during El
22 Nino.

23 Lin et al (2015, Nature Communications) demonstrated a connection between springtime
24 western US ozone air quality and jet characteristics associated with strong La Nina winters.
25 They showed more frequent late spring deep stratospheric ozone intrusions when the polar
26 jet stream meanders southward over the western United States as occurs following strong
27 La Nina winters. Their finding again reflects the dynamically driven changes in atmospheric
28 composition in association with ENSOT.

29 *Thanks for pointing out these extra references. We have included them in Section 3.2 of the*
30 *paper: **The importance of the dynamically driven ozone changes was also highlighted by***
31 ***Lin et al. (2014 and 2015). Despite large El Nino enhancements to wildfire activity in***
32 ***equatorial Asia, the model sensitivity experiments in Lin et al. (2014) indicated that***
33 ***wildfire emissions are not the main driver of ENSO-related ozone variability observed at***
34 ***Mauna Loa, Hawaii. The dynamically induced eastward extension and equatorward shift***
35 ***of the subtropical jet stream during El Nino plays a key role on observed interannual***

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