

## ***Interactive comment on “Diurnal variability of total column NO<sub>2</sub> measured using direct solar and lunar spectra over Table Mountain, California (34.38° N)” by King-Fai Li et al.***

### **Anonymous Referee #1**

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This is a good paper, but the title is misleading even though it is accurate. For Table Mountain, a mostly NO<sub>2</sub> free site, the diurnal variation is stratospheric, except for 1 day during the 1-week campaign. The title should say as much. “Stratospheric diurnal variability of NO<sub>2</sub> measured and modelled using direct solar and lunar spectra over Table Mountain, California (34.38°N)”.

Since the authors have 6 days of data, it would be interesting to have an extra figure showing the daily diurnal variation in addition to Figure 3. The agreement with the model run is quite good except after sunset (Fig. 3) when the magnitude and shape are different. Is there an explanation? I know this is not a modelling paper, but the

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treatment of sunrise and sunset seems incomplete. There should be a time delay as a function of altitude with the sun reaching higher altitudes first. Since the authors are not showing data during sunrise and sunset, it does not matter much.

The linear fit in Figure 6 does not mean much, other than as a baseline, as there are two linear regimes, one from 07:00 to 13:00 and from 13:00 to 16:00 hours. Is there an explanation for the two regimes?

On the instrument: What is the stray light. What is the SNR of each measurement?

I know you are working with the standard QDOAS software, but could you give examples of the DOAS fitting and residuals.

The writing is clear with no significant errors. The figures are clear and easy to understand. The title should be revised. The paper should be published with only minor changes as described above.

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