Corrigendum to Ann. Geophys., 35, 721–731, 2017
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Corrigendum to "Atmospheric loss from the dayside open polar region and its dependence on geomagnetic activity: implications for atmospheric escape on evolutionary timescales" published in Ann. Geophys., 35, 721–731, 2017

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In the paper "Atmospheric loss from the dayside open polar region and its dependence on geomagnetic activity: implications for atmospheric escape on evolutionary timescales" by Rikard Slapak et al., published in in Ann. Geophys., 35, 721–731, 2017, there is an error in the quantification of the O^+ escape rate (total flux) via the plasma mantle ($\Phi^{pm}_{O^+}$). The O^+ escape rate directly from the cusp into the dayside magnetosheath ($\Phi^{ms}_{O^+}$) is correct, however. The discovered error is due to a small mistake in relation to the considered outflow area when calculating the total flux, and $\Phi^{pm}_{O^+}$ should be a factor of about 2.1 larger than given in the paper. The error does not affect the found Kp dependence that was presented. Therefore, the correct expression for the plasma mantle O^+ escape rate as a function of Kp is

$$\Phi^{pm}_{O^+}(\mathrm{Kp}) = 8.2 \times 10^{24} \exp(0.45\,\mathrm{Kp}), \quad [\mathrm{s}^{-1}].$$

Figure 7 in the paper should be updated accordingly and a correct figure is given in this corrigendum (Fig. 7). As can be seen, the corresponding upper and lower limits of the plasma mantle O^+ escape have also been adjusted in response to the calculation error. The average O^+ escape directly from the cusp into the dayside magnetosheath is approximately $\Phi^{ms}_{O^+} \approx \Phi^{pm}_{O^+}/6$, instead of $\Phi^{pm}_{O^+}/3$ as stated in the paper, and the total escape ($\Phi^{ms}_{O^+} + \Phi^{pm}_{O^+}$) should therefore be a factor of 1.8 larger than stated in the paper.

This factor of 1.8 affects our estimations that follow in the discussion section; the total O^+ escape extrapolated to extreme geomagnetic conditions (Kp = 9) gives an escape rate of $5.5 \times 10^{26}\,\mathrm{s}^{-1}$, instead of $3 \times 10^{26}\,\mathrm{s}^{-1}$ as presented in the paper. Also, we made rough estimates of the total O^+ escape during the course of roughly 4 billion years. We used two different and simple assumptions on how the average Kp index has changed over time and estimated the total escape to be 0.4 and 1.3, respectively, of today's atmospheric oxygen content. These values are instead 0.7 and 2.3, respectively.

As far as we know results from the paper have been used or discussed in two newly published papers: Schillings et al. (2017), who studied O^+ escape during events of extreme geomagnetic conditions and compared their result with ours, and Yamauchi and Slapak (2018), who suggested magnetospheric O^+ outflow to mass-load incoming solar wind plasma causing field-aligned currents that connect the magnetosphere and ionosphere. The discussions and conclusions in these two papers are not affected by the error in the paper.

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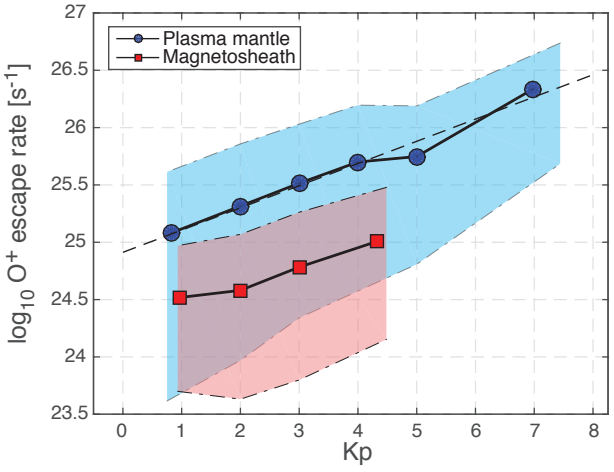

Figure 7. Corrected figure, where the lower, average and upper O^+ escape rate as a function of Kp has been corrected with a factor of 2.1. The corresponding O^+ escape rates directly from the cusp into the dayside magnetosheath are left unchanged.

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