

## Correction to “Chemical markers of possible hot spots on Mars”

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[1] In our paper “Chemical markers of possible hot spots on Mars,” published in the *Journal of Geophysical Research*, 108(E4), 5026, doi:10.1029/2002JE002003, 2003 (WAE, hereafter), there is an error in one of the reactants of Reaction R34 in Table 2. Sulfur monoxide (SO) instead of sulfur dioxide (SO<sub>2</sub>) was used. The correct reaction is:



The rate coefficient,  $k$ , of the reaction is, however, the same as for R34 of WAE, i.e.,  $k = 3.6 \times 10^{-12} \text{ cm}^3 \text{ s}^{-1}$ . The above correction in R34 impacts the SO<sub>2</sub> abundance and lifetime somewhat, as discussed below.

[2] Once in the atmosphere, SO<sub>2</sub> is photodissociated to produce SO, which is further photodissociated to form sulfur atoms. The reaction of SO with O<sub>2</sub> or OH recycles sulfur atoms back to SO<sub>2</sub> (R33, R35 in Table 2 of WAE). On the other hand, SO<sub>2</sub> reacts with ozone (O<sub>3</sub>) to form

sulfur trioxide (SO<sub>3</sub>, R34), which quickly combines with water vapor to form sulfuric acid (H<sub>2</sub>SO<sub>4</sub>, R39). H<sub>2</sub>SO<sub>4</sub> undergoes condensation in the atmosphere. The revised reaction pathway is shown in Figure 1.

[3] After applying the correction, for Model B in the original paper (WAE) where the assumed mixing ratio of the outgassed SO<sub>2</sub> is 10<sup>-5</sup> at the surface, the column abundance of SO<sub>2</sub> above 10 km is found to be  $3.8 \times 10^{17}$  molecules cm<sup>-2</sup>. The new abundance is 40% smaller compared with WAE because the additional loss of SO<sub>2</sub> with O<sub>3</sub> (R34) is now properly included. The abundance of SO<sub>3</sub> and SO are also reduced but only slightly. The photochemical lifetime of SO<sub>2</sub> is now 40 days, smaller than in WAE. Other species and their abundances, as well as the overall conclusions, are not affected.

[4] For Model G of the original paper (WAE), where both SO<sub>2</sub> and H<sub>2</sub>S are outgassed, each with a mixing ratio of 100 ppm at the surface, the resulting mixing ratios at 10 km are calculated to be  $1.6 \times 10^{-4}$ ,  $1.7 \times 10^{-5}$ , and  $1.9 \times 10^{-7}$ , respectively, for SO<sub>2</sub>, H<sub>2</sub>S, and SO. The corresponding column abundances above 10 km are, in molecules cm<sup>-2</sup>,  $1.5 \times 10^{19}$ ,  $6.2 \times 10^{17}$ , and  $5.4 \times 10^{16}$ . The maximum difference is in the SO<sub>2</sub> abundance, with approximately 40% reduction compared to WAE. The number densities and mixing ratios of important sulfur species for this case are shown in Figure 2. For the case with current global upper limit of 0.1 ppm each for SO<sub>2</sub> and H<sub>2</sub>S, the change due to above correction in R34 is imperceptible.

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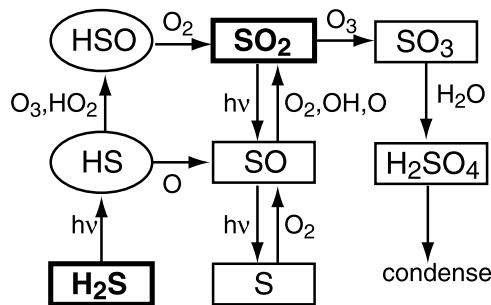
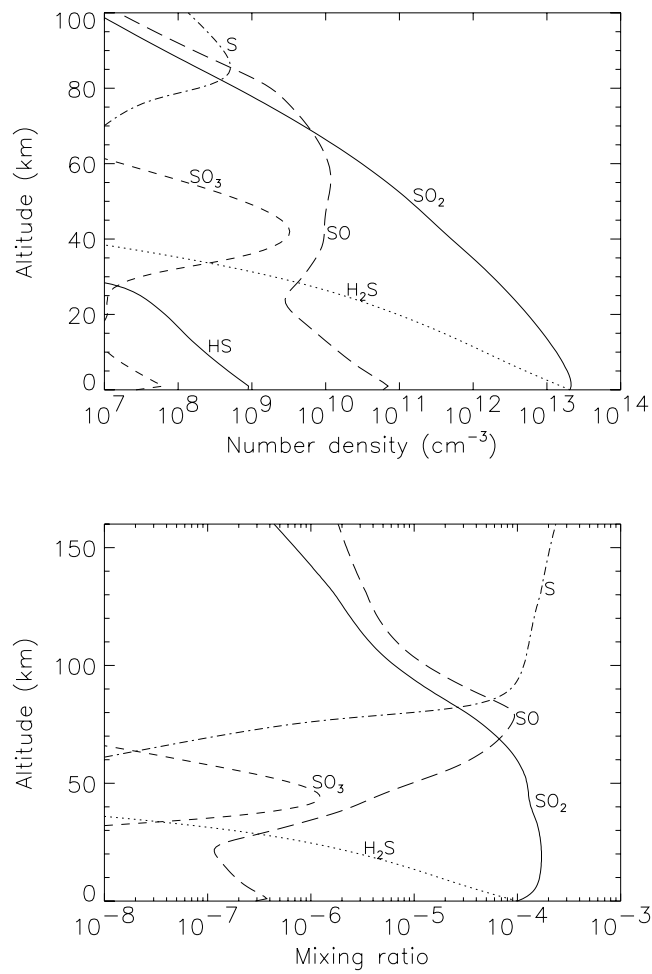


Figure 1. The revised reaction pathway.



**Figure 2.** The number densities and mixing ratios versus altitude for important sulfur species calculated with 100 ppm each of H<sub>2</sub>S and SO<sub>2</sub> at the surface of Mars (Model G).