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Title: **Martian magnetism with orbiting sub-millimeter sensor: Simulated retrieval system**
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The manuscript is well-written and I consider that the work can be considered for its publication.
In general terms I consider that there is still much work to be able to produce results with enough sensitivity using this method (at least with the sensitivity of the already done measurements: Mars Global Surveyor). Maybe one of the major inconveniences of the manuscript is the example of application. Also the work is based on the oxygen concentration determined by the models and this can have some errors, as well as inhomogeneities and temporal variations.

In particular I suggest the following modifications based on the content:

It is said in 2.1, line 18, that "A full sampling of the polarization state of the radiation is thereby the best way to retrieve the magnetic field."
On the one hand the statement should be moderated since the works done with previous missions carrying magnetometers have casted better results than this theoretically method. Also the success in its application on Mars precisely is very doubtful. (The error is in the order of magnitude of the range).
On the other hand, only one component of the polarized radiation is retrieved. Regarding the sources that may contribute to this single component, it is assumed some approximations that constrain these contributions. However, without these approximations, would the final value of 200 nT error in the magnetic field sensitivity be affected?
If it is the case what would be the impact on the global coverage (< 4 % or < 36 % ?).
It would be very important to make a connection with the utilization of this methodology in an application with better results. (It can be with atmospheric examples but the discussion would have to be included in the manuscript).

And the following regarding the style:

1) The manuscript should be reviewed to avoid repetitions. For instance: page 2 line 2 and in the same page line 25, and in page 3, line 16. All the paragraph is repeated. Additionally, the question mark might be removed.
2) Abstract. Lines 1 to 5, Rephrase. Suggestion: "A Mars-orbiting sub-millimeter sensor can be used to retrieve the magnetic field at low altitudes over large areas of significant planetary crustal magnetism of the surface of Mars from measurements of circularly polarized radiation emitted by the 368 GHz ground-state molecular oxygen absorption line".

3) In 1, page 2, line 25, is repeated what is said in the line 3, and it is repeated in the page 10 line 8. This should be rephrased to avoid repetition.
4) Page 2, line 15, shouldn't have the interrogation at the end of the sentence. Lines 15 to 18 should be rephrased to avoid repetition.

END OF REPORT