

Hist. Geo Space. Sci. Discuss., referee comment RC2  
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## **Comment on hgss-2022-4**

Anonymous Referee #2

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Referee comment on "A review of different mascon approaches for regional gravity field modelling since 1968" by Markus Antoni, Hist. Geo Space. Sci. Discuss.,  
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The author provides a review of different mascon techniques, from a viewpoint of consistent mathematical representation of the mascons. That's a laudable effort given that mascons enjoy increasing popularity with the GRAIL and GRACE/-FO missions. A systematic presentation of the approaches would be helpful not only for junior researchers in the field.

However I believe the author chose the wrong journal for publishing his findings. In HGSS the focus should be on the historical context, and that would need to include both the historical technological situation and consequently the spacecraft and ground instrumentation and the line-of-sight data limitations, but in particular also the geophysical problems that people tried to address through mascon approaches. Which was, and is to some extent, the quest for testing geophysical hypotheses on crater formation, impact estimates and thermal regimes, and strength of the underlying lunar crust. See papers by Arkani-Hamed (On the origin of lunar mascons) and others. Both aspects are nearly absent in the paper. Also little is said about more recent planetary applications. I think the paper is well-intended but for HGSS it misses its mark. It should be submitted to e.g. the Journal of Geodesy. If the author insists on HGSS, my suggestion would be to entirely remove the GRACE applications (all this is essentially known, including the authors conclusions in sec 5) and focus his review on the Moon (I can recommend reading the Phd theses by Rune Floberghagen and Sander Goossens), but definitely including an overview of how mascons helped to improve the lunar geophysics.