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Interactive comment on "Radar observability of near-Earth objects using EISCAT 3D" *by* Daniel Kastinen et al.

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Review of "Radar Observability of near-Earth objects using EISCAT3D" by Kastinen et al.

This paper provides theoretical estimates of the detectability of small NEOs by radar, specifically small NEO flybys and minimoons. Moreover, it examines both the feasibility and expected detection rate for NEOs using radar for search as well as the ability of EISCAT3D in particular to follow-up small NEOs detected from the ground. While the paper focuses on E3D as a NEO detection instrument it also explores and presents generic algorithms for radar detection of NEOs, with an emphasis on small NEOs. I very much enjoyed reading the paper; it is well written and the first to my knowl-

edge to quantitatively explore radar as a search tool for small NEOs /minimoons. It is clearly a valuable contribution to the field. In particular, the use of both a full population model of NEOs/minimoons extrapolated down to decimeter sizes coupled to a E3D detection model and various considerations/choices for detection modes/integration windows through simulation software is a particularly valuable approach for optimizing both E3D and other radars for NEO/minimoon detection. I recommend publication in essentially the current form.

A few minor technical items/questions the authors may wish to address:

For the case of mini-moon detection, no discussion is given of how to distinguish natural objects (which are comparatively rare) from much more common artificial objects in geocentric orbit. Can the authors comment on the challenges this would pose for radar detection of mini-moons?

At the smallest sizes (sub-meter to decimeter) there is the question of what is the scientific value of radar detections? For such small objects can we estimate rotation rates or surface roughness or is the SNR too low? What can we learn from detecting such small objects which we would not learn but studying them ablate in the atmosphere?

The introduction is very complete, but the authors may want to consider adding or discussing the one reference to the only published paper relating to attempted radar detection of decimeter sized NEOs/meteoroids: Kessler D. J., Landry P. M., Gabbard J. R., and Moran J. L. T. 1980. Ground radar detection of meteoroids in space. In In: Solid particles in the solar system; Proceedings of the Symposium, edited by Halliday I., and McIntosh B. A. IAU. p. 137.

Rotation rates of decimeter-sized meteoroids have been discussed and modelled in a few works such as: Čapek D. 2014. Rotation of cometary meteoroids. Astronomy and Astrophysics 568:1–8. Beech M., and Brown P. G. 2000. Fireball flickering: the case for indirect measurement of meteoroid rotation rates. Planetary and Space Science 48:925–932.

Line 245: transmitter bandwidth of < 5 Hz; transmitter bandwidth of < 30 Hz – I think the latter should be receiver bandwidth?

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