The reviewer comments are in blue and italic and the replies are in black.

Anonymous Referee #1

*The manuscript presents the usefulness of a "feasible" Ku-band precipitation radar for a geostationary satellite (GeoSat/PR). It is an effort ongoing at JAXA to overcome two limitations of orbiting radar-based systems such as TRMM or GPM, namely, the limited swath and revisit time. A geostationary satellite needs a larger antenna than TRMM PR and GPM KuPR. A 20-m antenna for a 20 km footprint is considered in the study for its feasibility. The scan of the radar is within 6◦ that makes measurements available for a circular disk with a diameter of 8400 km.*

*Effects of Non Uniform Beam Filling (NUBF) and clutter are presented usng an extremely simple cloud model. The impact of coarse resolutions of the GeoSat/PR is quantified on 3-D Typhoon observations obtained with realistic simulations. The subject of is important and the manuscript is, in general, well written. Therefore it can be recommended for publication. I have some comments and suggestions that should result in a minor revision work for the authors.*

*1. What is the need of the approximation of equation 4? (moreover, tetab is not defined in the text).*

We made the approximation to truncate the edge of the Gaussian function and to confine the calculation domain for Pr and Ps. This approximation may result in an underestimation of surface clutter. We will explain why the approximation was made and the potential caveats of this approximation in the revised manuscript. We will also add the definition of theta_b. Thank you.

*2. The model of NRCS of ocean surface does not take into account the modification due to impinging rain. Authors should provide evidence of the fact that this contribution can be neglected.*

We appreciate the suggestion. As previous studies show (e.g. Braun et al., 1999; Contreras et al., 2003), the impact of impinging rain is negligible at high wind speed (10 m $s^{-1}$~). Because the main target of this study is a typhoon which accompanies strong winds, we did not account for the modification due to impinging rain. We will explicitly mention the reason for the assumption of the study in the revised manuscript.

*3. Lines 233-234: I guess that the case of a 5 km beamwidth is given provided to make something similar to TRMM PR as reference. The text should better explain why the authors choose the different spatial resolutions. Also the "feasibility" of a 20x20 m antenna should better justified.*

We simulated the case with 5 km beam width to see the sensitivity of the result to radar resolution. We will positively explain the reason why we show the case in the revised manuscript.

For the latter point, we will cite a study by Meguro et al. (2009) and Joudoi et al. (2018) on the feasibility of 20m-by-20m size antenna in the revised manuscript.

*4. Lines 350-351: Authors guess that Ku attenuation can be corrected. Do they think that SRT method can be applied with this configuration ? (maybe some references are needed; the same is for sidelobe correction)*

We are not sure if the SRT method is applicable to this radar measurement because of its relatively large scattering volume: it is possible that scattering from the surface is not affected by the attenuation because of NUBF. However, development of the attenuation correction method is out of the scope of this study. Therefore, we would like to leave this point for future work. Nevertheless, we will add discussion on the impact of the attenuation and the attenuation correction in the revised manuscript. We will also include discussion on the sidelobe clutter. Presumably, the impact of sidelobe clutter should be insignificant as shown by Li et al. (2017).

*5. Figure 6: please report in the caption that "distance" in the panel is referred to the nadir.*

We will define the term "distance" explicitly in the revised manuscript. Thank you.

*6. Figure 8, 9, 11, 12: The captions report "Note that the areas where reflectivity form precipitation larger than 0 dBZ are shaded". It is not clear. In figure 9 and 12, close to ground we can see some darker grey that maybe are due to the resolution of the manuscript available to reviewers.*

We will revise the caption as "Area where reflectivity from precipitation less than 0 dBZ are left blank". To make the point clear, we will also modify the figure in the revised manuscript.

*7. Figure 8: I suggest to remove wind from panel (a) because it just clutters the "true" reflectivity image.*

Will be removed in the revised manuscript.

References:

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Conteran, R. F., Plant, W. J., Keller, W. C., Hayes, K., & Nystuen, J., Effects of rain on Ku-band backscatter from the ocean, J. Geophys, Res., 108(C5), 3165, 2003.

Joudoi, D., Kuratomi, T., & Watanabe, K., The construction method of a 30-m-class large planar

antenna for Space Solar Power Systems, 69th International Astronautical Congress, Bremen, Germany, 1-5, October 2018.

Li, X., He, J., Wang, C., Tang, S., & Hou, X., Evaluation of surface clutter for future geostationary spaceborne weather radar, atmosphere, 8, 14.

Meguro, A., Shintate, K., Usui, M., & Tsujihata, A., In-orbit deployment characteristics of large deployable antenna reflector onboard Engineering Test Satellite VIII, Acta Astronautica, 65(9-10), 1306-1316, 2009.