General Comments:

This manuscript presents a novel methodology for measuring and correcting MWR geolocation pointing errors using correlation between on-orbit brightness temperature measurements and modeled effective land fraction. The approach employs an iterative optimization technique that successfully reduces ambiguity in error components while simultaneously measuring antenna beam diameter, thereby enabling improved sea level determination in coastal regions. The study demonstrates robust methodology supported by a statistically significant number of measurements across each of three missions: ERS-1, ERS-2, and Envisat. Successful detection of a known gyroscope failure on ERS-2 provides validation of the method's sensitivity and results are consistent with previous literature. The method is clearly presented and directly applicable to future missions, including Sentinel-3 and Sentinel-6.

This work represents a significant and well-executed contribution to the field but there are a few things I suggest addressing in the specific comments below.

Major Comments:

1. Figures 2-5: These figures are difficult to interpret because symbol definitions are presented in Panel 1, which lacks visual representations of the various symbols and line types. While Panel 1 provides useful explanatory text, each figure should include its own self-contained legend for improved clarity and accessibility.
2. Figure 10: The flow diagram effectively illustrates the overall process but omits the outlier rejection and correlation threshold described in Section 5.3.3. Including these critical components would provide a more complete representation of the iterative method.
3. Section 4.1: The filtering process would benefit from additional criteria to remove spurious measurements. Specifically, filters should detect and exclude: (1) cloud contamination, (2) known tidal flats, and (3) coastlines adjacent to mountainous terrain. For example, coastlines near the Andes in South America routinely show cold temperatures on one side and warm temperatures on the other, creating artificial contrast that mimics a false coastline displaced from the actual coast. These features may not be adequately captured by existing filters.

Minor Comments

1. Beam Smearing: The paper would benefit from explicitly addressing beam smearing effects. Signal integration during platform motion causes the effective antenna beam to smear in the along-track direction. Accounting for this effect would improve correlation accuracy and provide better initial conditions for the optimization algorithm. The

measured beamwidths correspond to the effective smeared beam rather than the static beam pattern.

2. Antenna Beam Shape Assumption: The measurement process assumes a circular antenna beam, and Section 6.3 presents results supporting this assumption. However, this analysis may contain bias due to the circular assumption built into the modeling approach. While likely a small effect, using an elliptical antenna beam model when calculating effective land fraction would strengthen the results and eliminate the need to defend/prove the circular assumption is valid.
3. The paper would benefit from showing corrected geolocation error statistics in a figure like figure 11 as further evidence that the method works.

Technical Corrections:

Line 177: Change "the antenna pattern used for calculating ELF is approximated as 2D Gaussian" to "the antenna pattern used for calculating ELF is approximated as **a** 2D Gaussian"

Line 779: Remove extra periods following author names in the reference entry.