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Using different Vlsr 's to obtain better-pointing statistics and source confusion insights

In Radio Astronomy there are several steps to follow to calibrate the data before it can be used for scientific research. One of these steps, specifically for a single-dish telescope like the Hartebeesthoek 26m telescope, is to do pointing observations to determine if the pointing model of the telescope is working properly. The pointing observations consists of pointing the telescope at the half power beam width points North, South, East and West of the On-source position. The currently used approach to determine the pointing correction factor is to use the brightest spectral feature. In this work we have investigated the comparison between the currently used approach and a new approach for determining the pointing correction factor. The new approach consists of taking multiple spectral features and determining the pointing correction factor for each of them. The results from this is compared to the standard approach to see if a more accurate and statistically more significant pointing correction factor can be determined.

The results from determining the average pointing correction factor from multiple velocity features compares well with the standard approach of determining the pointing correction factor, as for all the sources, the standard pointing correction factor lies within the average and the error margin. This results in that the time-dependent average pointing correction factor compares reasonable well with the standard time-dependent pointing correction factor, for most of the sources investigated, however, one of these sources show a interesting deviation from this trend. Here we give possible reasons for this deviation. Lastly, we present the comparison between the time-dependent flux density for the multiple velocity feature pointing correction factor and the standard pointing correction factor and an opinion on whether this approach is viable to be used.

Keywords: Radio Astronomy ,calibration, Pointing Accuracy, HartRAO, Maser, Time-dependent analysis

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