

# ALMA Science

Knowledgebase > Archive & Data Retrieval > I heard that TP images generated with CASA<5.7/6.1 are affected by an issue with the task (t)sdimaging. How should I deal with it?

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## I heard that TP images generated with CASA<5.7/6.1 are affected by an issue with the task (t)sdimaging. How should I deal with it?

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An issue has been identified in CASA single-dish imaging with the tasks of `sdimaging` and `tsdimaging`. The issue is present in all the CASA releases before CASA 5.7/6.1. It affects the brightness distribution and flux density in the combined image if a fraction of the data set does not have the correct celestial coordinates by the issue. All the data sets suffered from this issue are set to QA3 and being reprocessed.

When executing `(t)sdimaging` with more than one measurement sets (MSs), if the same antenna name and ID as the previously loaded MS are used, the antenna position information of the MS is not updated. In the ALMA operations, TP antennas sometimes get moved to different pads. Accordingly, it happens that the same antenna name and ID are assigned even if the antenna position has changed. In this case, the coordinates of the image of the corresponding data are not correct since the antenna position is used for converting the coordinates from AZ-EL to RA-DEC. The amount of the positional offset depends on the difference between the correct antenna position relative to the incorrect antenna position used in `(t)sdimaging`, and the elevation angle of the target at the time of the observation.

This issue is triggered only when all the following conditions are met:

- a) More than one measurement sets (MSs) are provided as the input in `(t)sdimaging`,
  - b) Positions are different for the same antenna name among the MSs,
- and
- c) The above antenna has the same antenna ID.

Furthermore, the order in which the data are loaded in `(t)sdimaging` ultimately determines whether or not it is affected by the issue. Note that the input files are sorted internally in `(t)sdimaging` and it can be different from the order entered by the user. In the fixed version of CASA, the antenna position information is updated every time MS is loaded, regardless of antenna name and the ID.

The workaround for using CASA before CASA 5.7/6.1 is to make images for individual MS separately with `(t)sdimaging` and combine the produced images with `immath`. For instance,

after running (t)sdimaging on each EB measurement set (e.g., EB1.ms and EB2.ms), image and weight products are produced (e.g., EB1.ms.sd and EB1.ms.sd.weight for EB1.ms). Using all the images and weight data, produce the combined image ('combined.image.sd') as follows:

```
immath(imagename=['EB1.ms1.sd', 'EB2.ms.sd',  
                'EB1.ms.sd.weight', 'EB2.ms.sd.weight'],  
       mode='evalexpr', expr='(IM0*IM2+IM1*IM3)/(IM2 + IM3)',  
       outfile='combined.image.sd')
```