

# Optimal TITAN parameters

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- Parameter tests results reside in `~/wrf/P3/param_test/`.
- Over all tests, TITAN (TRT) tracks were cut short 40.3% (54.3%) of the time.
- Over all tests, TITAN (TRT) tracks were split 17.14% (1.07%) of the time.
- Tracks included in these results had a minimum duration of 30 minutes.
- The low dBZ threshold was tested from 34 dBZ to 42 dBZ.
- The dual dBZ threshold was tested from 4 dBZ to 12 dBZ above the low threshold.
- Minimum storm area threshold was tested for 25, 50, 75 km<sup>3</sup> (note this is actually a threshold on volume for TITAN).
- Area comparison in this document shows the TITAN “projected area” (2D) compared to TRT 2D storm area.
- To select the “best” parameter set, we subset the results to those with:
  - absolute value of median relative bias on number of cells per hour within the best 10% of values, THEN subset for
  - absolute value of median relative bias for daily median cell area within the best 10% of values.

Then we choose the configuration with the best  $r^2$  value for per time-step number of cells.

- The best parameters are:

Low dBZ thresh. [dBZ]	Dual dBZ thresh. [dBZ]	Min storm size [km <sup>3</sup> ]
39.00	47.00	50.00

- The “winning” statistics are (on cells per hour):

Statistic	Result
Cell number bias [cells/hour]	1.41
Cell number RMSE [cells/hour]	5.64
Cell number mean rel. bias [%]	58.57
Cell number median rel. bias [%]	6.25
Cell number rel. bias IQR [% pts]	92.98
Cell number $r^2$ [-]	0.77
Mean area, median rel. bias [%]	-11.58

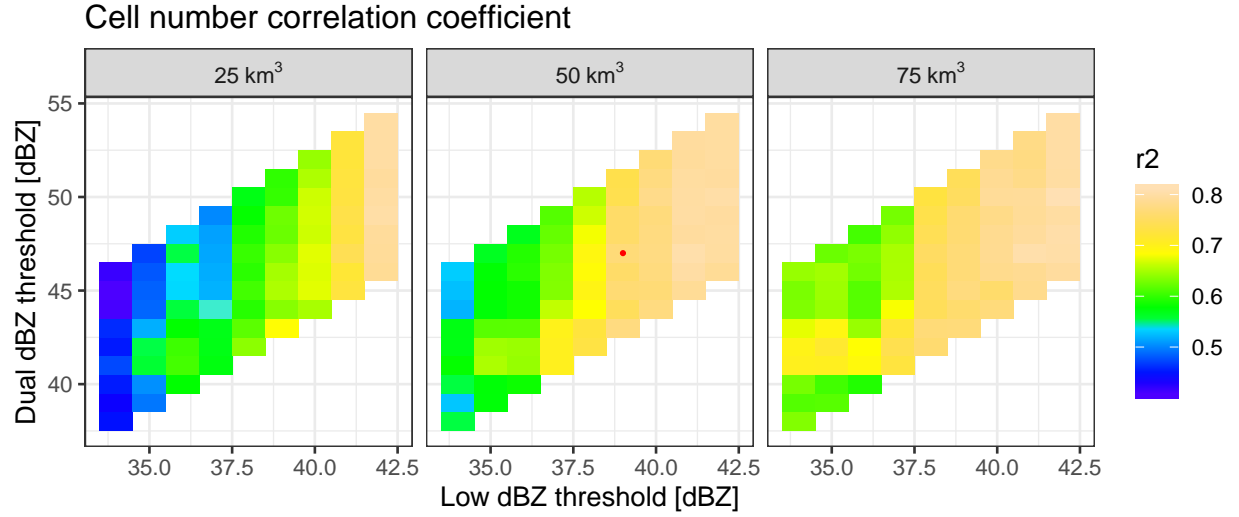


Figure 1: Cell number correlation coefficient results, with a red dot showing the selected configuration.

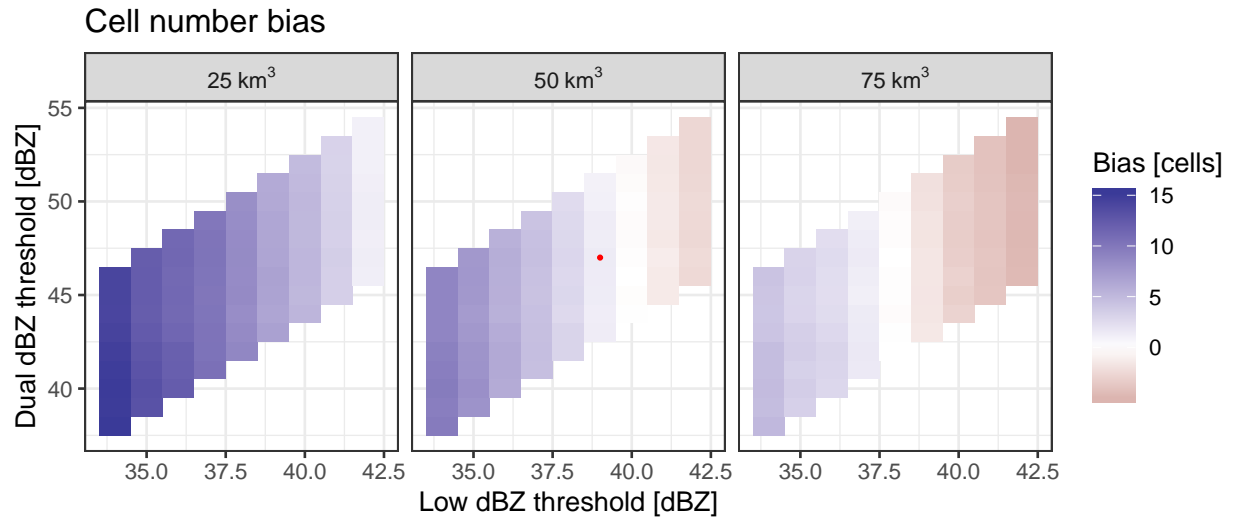


Figure 2: Cell number bias (mean difference) results, with a red dot showing the selected configuration.

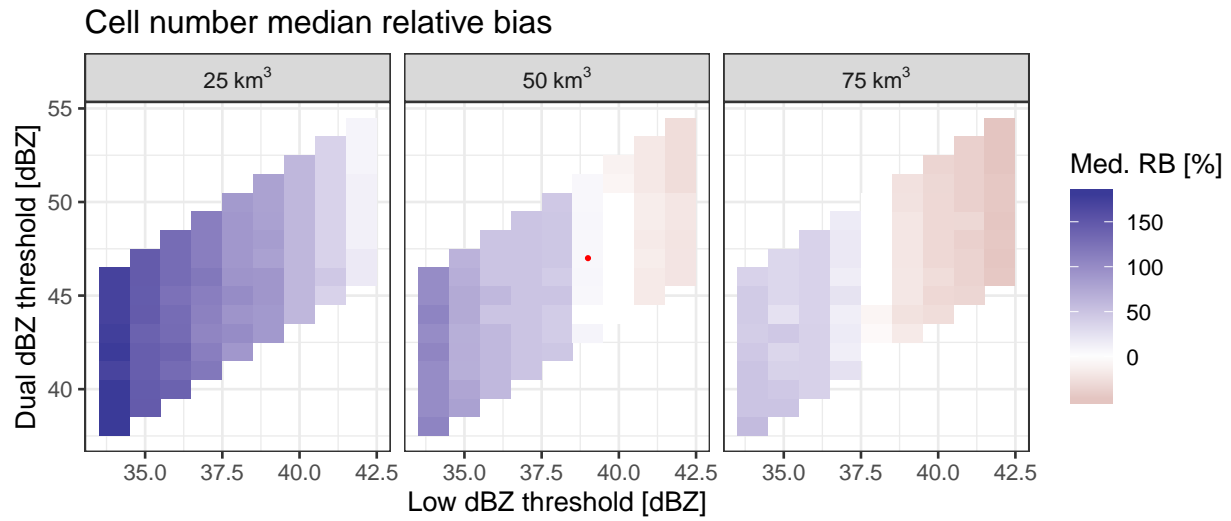


Figure 3: Cell number median relative bias results, with a red dot showing the selected configuration.

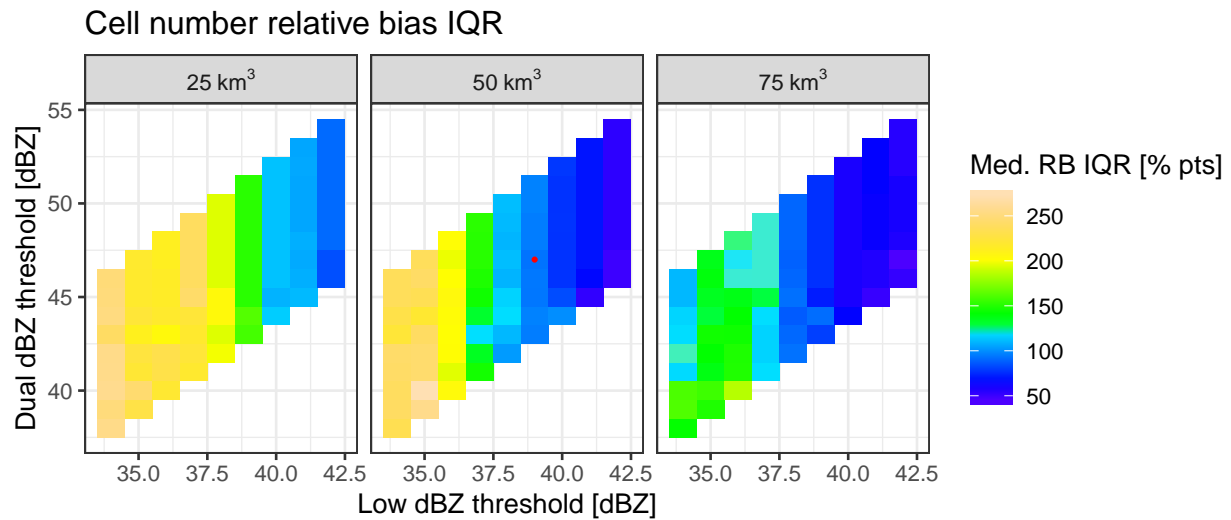


Figure 4: Cell number relative bias IQR results, with a red dot showing the selected configuration.

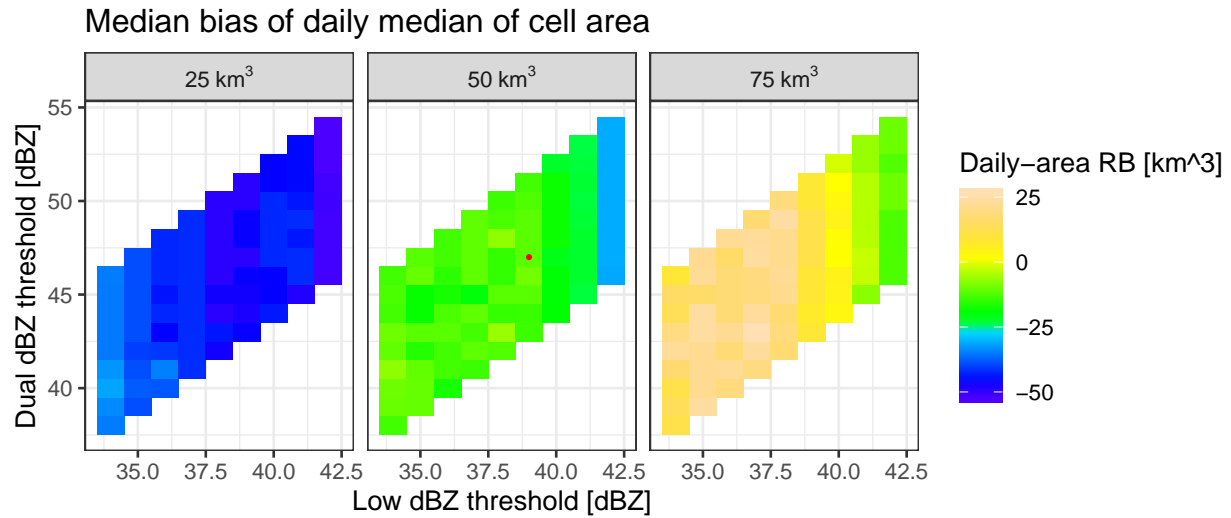


Figure 5: Difference in area distributions, with a red dot showing the selected configuration.

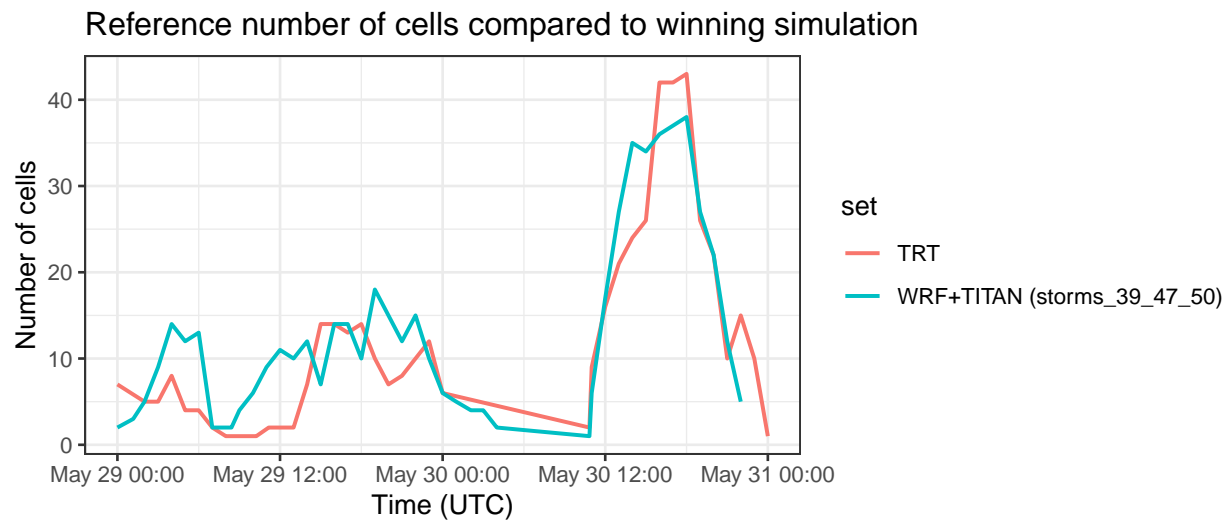


Figure 6: Timeseries of number of cells by time step, for TRT vs. the winning parameter set.

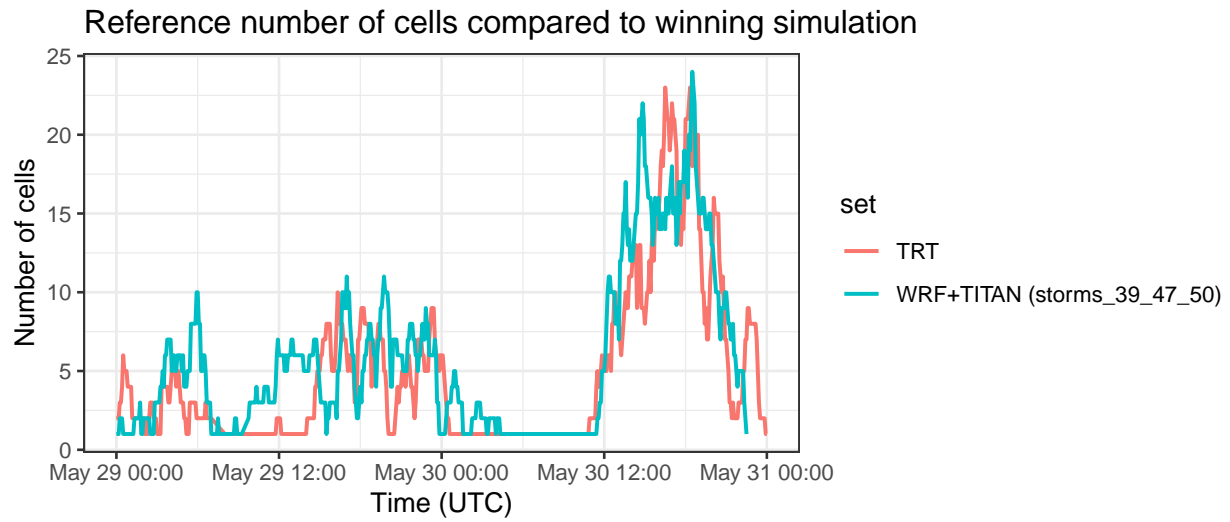


Figure 7: Timeseries of number of cells by time step, for TRT vs. the winning parameter set.

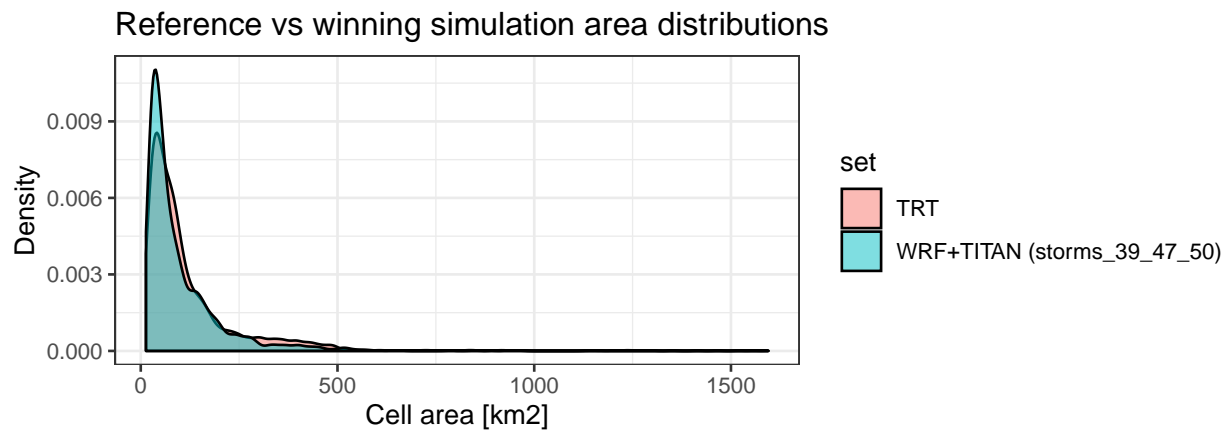


Figure 8: Area distributions for TRT vs. winning parameter results.

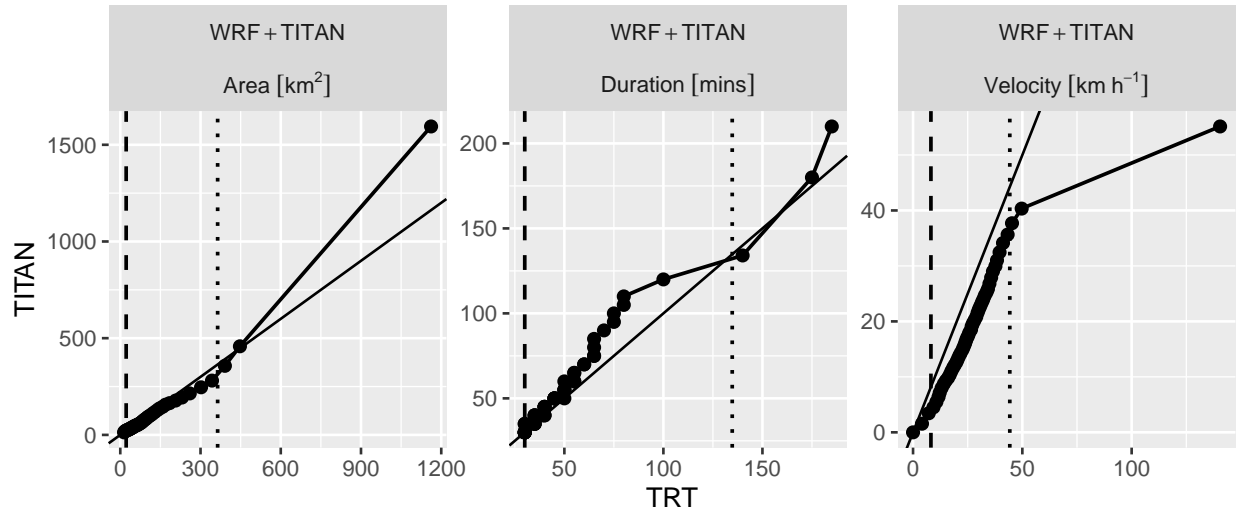


Figure 9: QQ plots for all cells. Dashed vertical lines show the 5th and 95th percentile of TRT values.

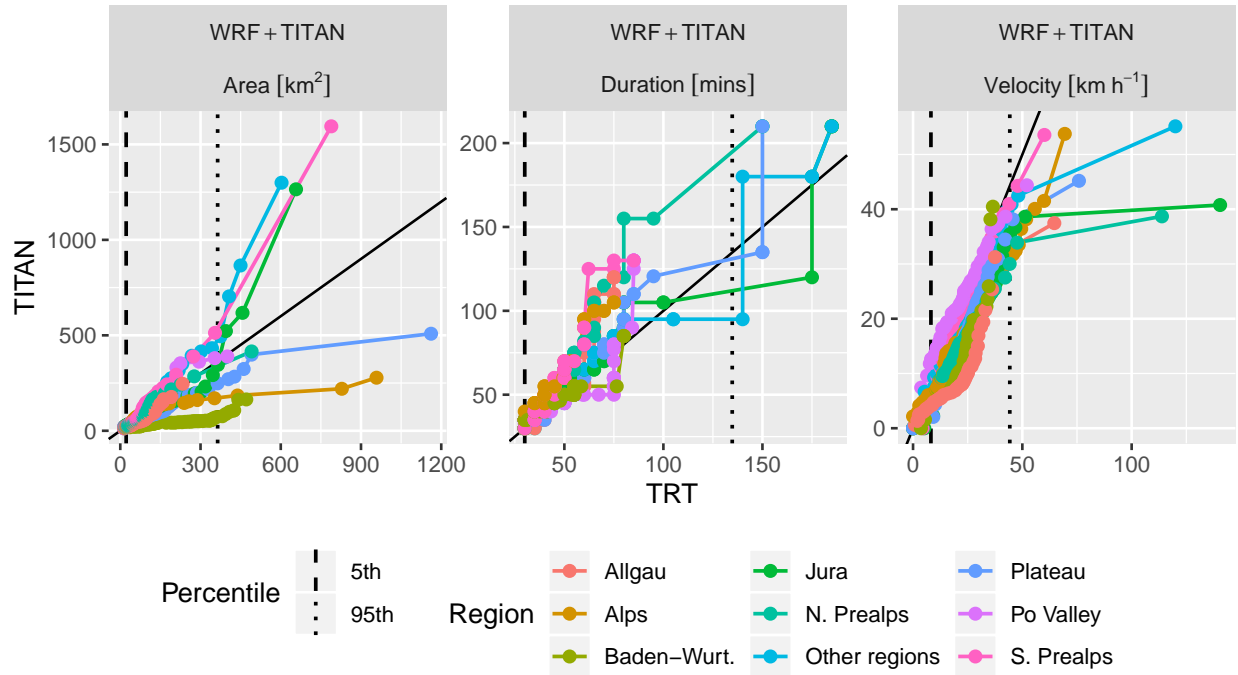


Figure 10: QQ plots for cell properties by region. Dashed vertical lines show the 5th and 95th percentile of TRT values.