Rounded Area Magic Squares

Walter Trump, 2017-02-15

Area Magic Squares are an idea of William Walkington

Consider an area square where all distances of intersections with the borders are positive integers, and all areas were rounded to the nearest integer.
If the resulting integer matrix is a magic square we call it a ***rounded area magic square***.

If J is an entry of the magic square and A the associated area then
(with tie-breaking rule: round half up): $A - 0.5 \le J < A + 0.5$

Often we get a better approximation where $A - \varepsilon \le J \le A + \varepsilon$ with $\varepsilon < 0.5$ for all J and A.
Then ε is the maximum absolute deviation.

The quality of a rounded AMS is best described by the maximum relative deviation =
maximum value of $\frac{|J - A|}{A}$ for all entries J and their associated areas A.

Rounded linear 5x5 AMS with magic sum S = 250 and max. rel. deviation = 0.28%