ARE THERE BETTER ALTERNATIVES TO STANDARD ROSE DIAGRAMS?

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**ABSTRACT:** Standard rose diagrams are a favorite method of depicting orientations because of their ease of comprehension, but they are known to have two serious problems. First, arbitrary decisions about class width and starting position can dramatically alter the resulting diagram, although the degree of variation has been underappreciated. Second, when rose diagrams are correctly scaled to the square root of the class frequency, they can be awkward to evaluate. Possible solutions that deserve consideration include (1) representing 1° classes with rays of dots (dot diagrams) allows linear scaling, and (2) overcoming arbitrariness by combining all possible rose diagrams for a dataset into one diagram (summed datasets). Solution #1 can work by plotting either one dot per datum (corona dot diagrams) or one dot for each value above or below the mean membership (mean-deviation dot diagrams). Both plot types can show either raw or summed data. Drawing one-degree class-width diagrams and summing (combining) all possible rose diagrams offers the only non-arbitrary versions of orientation diagrams, but summing diagrams smoothes the data slightly, thereby additionally weighting clusters of similar but not identical data points. My recommendation is to publish a dot plot of the raw data, and another of the summed results. Mean-deviation diagrams and factor-averaged summed datasets work together particularly well.

**DATA**

Appendix for "Are there better alternatives to standard rose diagrams?",

by Neil Wells (Journal of Sedimentary Research, 2000, 70(1):37-47.

The article presents 2 methods for calculating two non-arbitrary combinations

of all possible rose diagrams that can be drawn from a single dataset. Each of

the two methods sums all possible rose diagrams. The functions are described

in Tables 2 & 3 in the text, and they can be seen in Figure 4, or they can be

accessed via the program Astra.bas, now posted on the Computers &

Geosciences website. However, the tables below provide a complete print-out

that shows how each method inflates and spreads a single orientation

(measured to the nearest degree) into adjacent one-degree cells.

A) Method 1, factor-averaged summing, listing 180 numbers for the new

distributed and summed values in, respectively: the "home" cell (where the

original value was 1), adjacent cells (1 degree away), cells outside those

(2 cells away), cells adjacent to those (ñ3), and so on to the cell 180 degrees

away in either direction.

3.2450, 1.6983, 1.1465, .84470, .65404, .52589, .43774, .37736,

.31698, .27222, .23981, .21741, .19500, .17954, .16407, .14861,

.13760, .12658, .11556, .10762, .09969, .09426, .08883, .08340,

.07796, .07427, .07057, .06688, .06318, .05948, .05579, .05320,

.05062, .04803, .04545, .04286, .04028, .03846, .03665, .03484,

.03302, .03184, .03065, .02946, .02827, .02708, .02639, .02569,

.02500, .02431, .02361, .02292, .02222, .02153, .02083, .02014,

.01944, .01875, .01806, .01736, .01667, .01625, .01583, .01542,

.01500, .01458, .01417, .01375, .01333, .01292, .01250, .01208,

.01167, .01144, .01122, .01100, .01077, .01055, .01032, .01010,

.00988, .00965, .00094, .00921, .00898, .00876, .00853, .00831,

.00809, .00786, .00763, .00753, .00743, .00733, .00723, .00713,

.00703, .00693, .00683, .00673, .00663, .00653, .00643, .00633,

.00623, .00613, .00603, .00593, .00583, .00573, .00563, .00553,

.00543, .00533, .00523, .00513, .00503, .00493, .00483, .00473,

.00463, .00460, .00045, .00453, .00450, .00447, .00444, .00441,

.00438, .00435, .00432, .00429, .00425, .00422, .00419, .00416,

.00413, .00410, .00407, .00404, .00401, .00398, .00395, .00392,

.00388, .00385, .00382, .00379, .00376, .00373, .00370, .00367,

.00364, .00361, .00358, .00354, .00351, .00348, .00345, .00342,

.00339, .00336, .00333, .00330, .00327, .00324, .00321, .00317,

.00314, .00311, .00308, .00305, .00302, .00299, .00296, .00293,

.00290, .00287, .00284, .00280, .00277

B) Method 2, straight summing, listing 180 numbers from 0 to 180 cells away

from the "home cell":

23.0028, 19.7556, 17.5085, 15.7610, 14.3472, 13.1833, 12.2194, 11.4222, 10.6249,

9.9527, 9.3916, 8.9305, 8.4694, 8.0917, 7.7139, 7.3361, 7.0250, 6.7139,

6.4028, 6.1472, 5.8917, 5.6861, 5.4806, 5.2750, 5.0695, 4.9056, 4.7417,

4.5778, 4.4139, 4.2500, 4.0861, 3.9556, 3.8250, 3.6945, 3.5639, 3.4334,

3.3028, 3.2000, 3.0972, 2.9945, 2.8917, 2.8139, 2.7361, 2.6583, 2.5806,

2.5028, 2.4473, 2.3917, 2.3361, 2.2806, 2.2250, 2.1694, 2.1139, 2.0583,

2.0028, 1.9472, 1.8917, 1.8361, 1.7806, 1.7250, 1.6694, 1.6306, 1.5917,

1.5528, 1.5139, 1.4750, 1.4361, 1.3972, 1.3583, 1.3194, 1.2806, 1.2417,

1.2028, 1.1778, 1.1528, 1.1278, 1.1028, 1.0778, 1.0528, 1.0278, 1.0028,

.97778, .95278, .92778, .90278, .87778, .85278, .82778, .80278, .77778,

.75278, .73889, .72500, .71111, .69722, .68333, .66945, .65556, .64167,

.62778, .61389, .60000, .58611, .57222, .55833, .54445, .53056, .51667,

.50278, .48889, .47500, .46111, .44722, .43333, .41945, .40556, .39167,

.37778, .36389, .35000, .33611, .33056, .32500, .31944, .31389, .30834,

.30278, .29722, .29167, .28611, .28056, .27500, .26944, .26389, .25833,

.25278, .24722, .24167, .23611, .23056, .22500, .21944, .21389, .20833,

.20278, .19722, .19167, .18611, .18056, .17500, .16944, .16389, .15833,

.15278, .14722, .14167, .13611, .13056, .12500, .11944, .11389, .10833,

.10278, .09722, .09167, .08611, .08056, .07500, .06944, .06389, .05833,

.05278, .04722, .04167, .03611, .03056, .02500, .01944, .01389, .08333,

.02778