

Which averaging method should be used for drift vector binning?

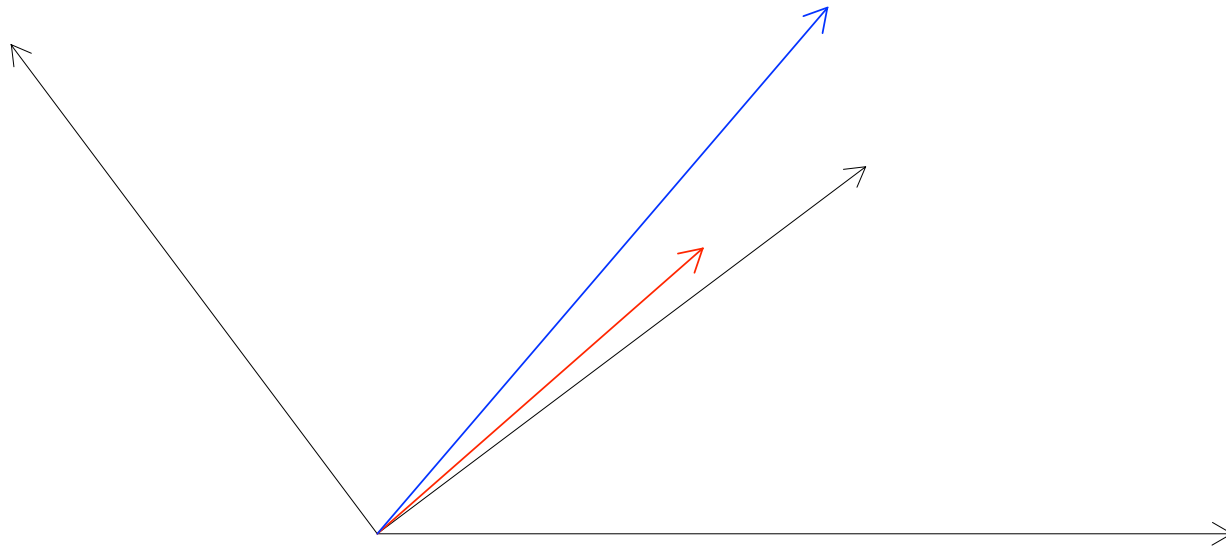


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ISSI Team of Adrian Grocott:

**A statistical investigation into coupled magnetospheric -
ionospheric dynamics via multi-scale, multi-instrument, data
assimilation**



$$V_1 = (700, 0) \Rightarrow |V_1| = 700 \text{ m/s}$$

$$V_2 = (400, 300) \Rightarrow |V_2| = 500 \text{ m/s}$$

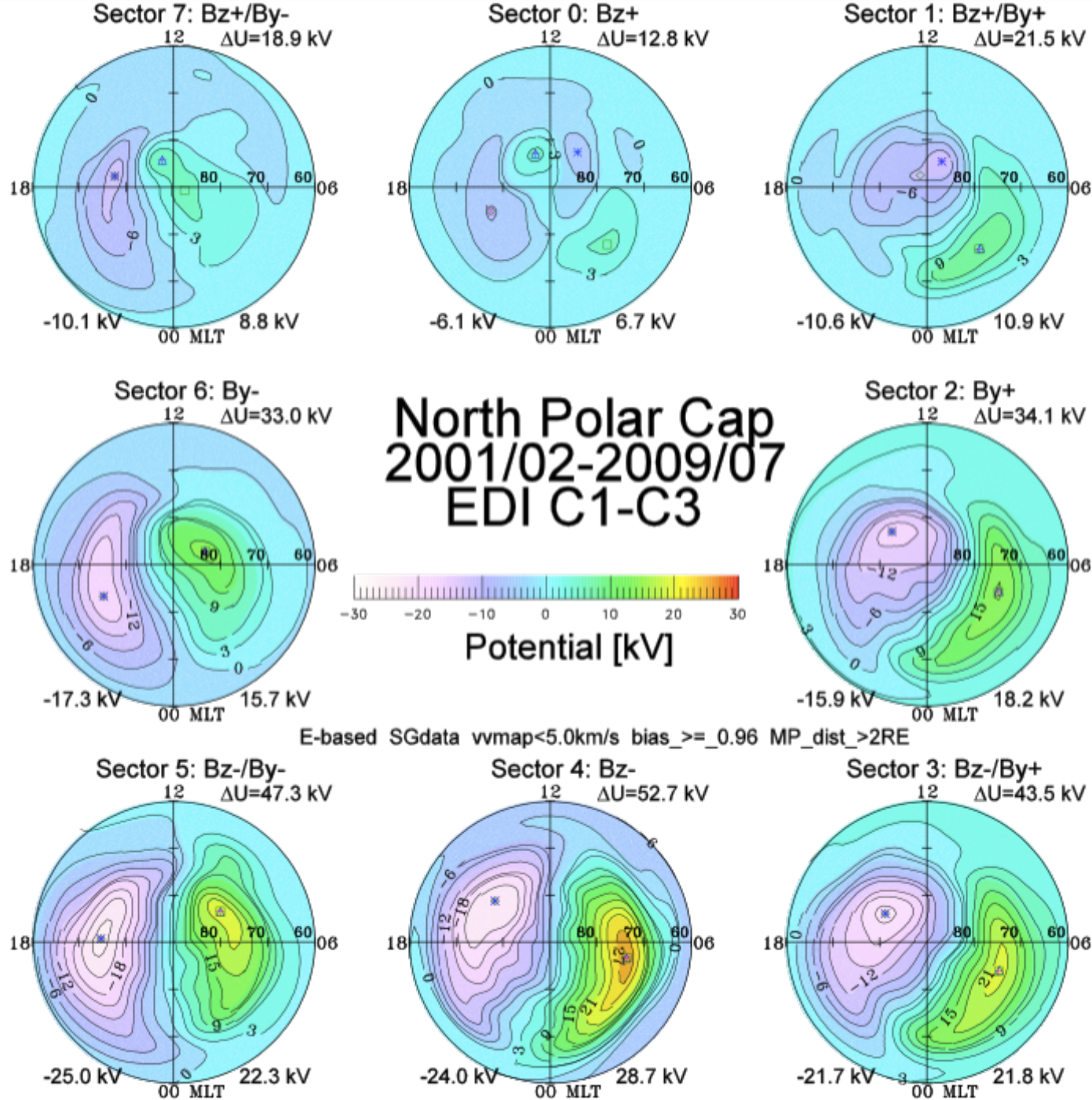
$$V_3 = (-300, 400) \Rightarrow |V_3| = 500 \text{ m/s}$$

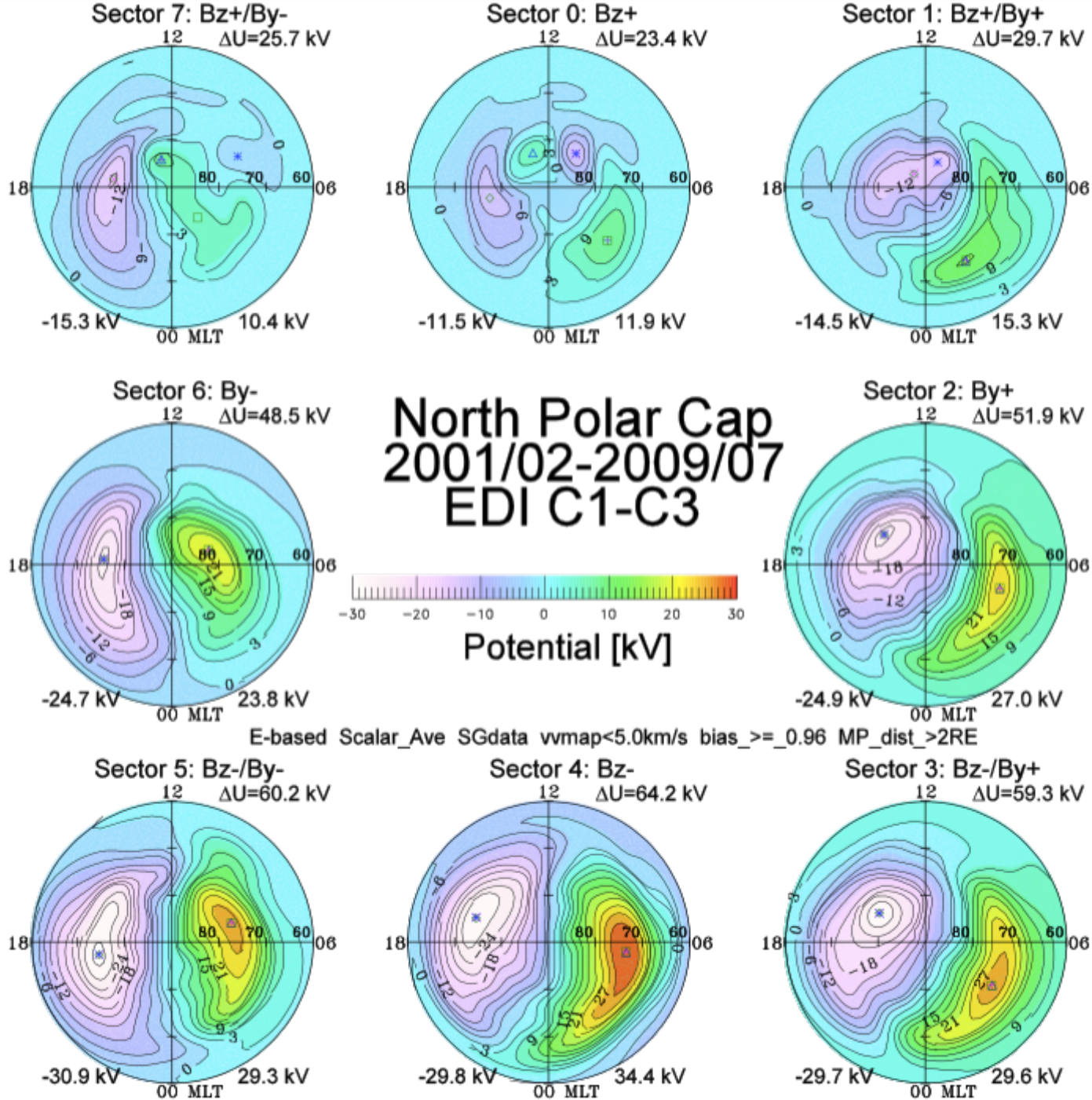
$$V_{\text{vector}} = (267, 233) \Rightarrow |V_{\text{vector}}| = 354 \text{ m/s}$$

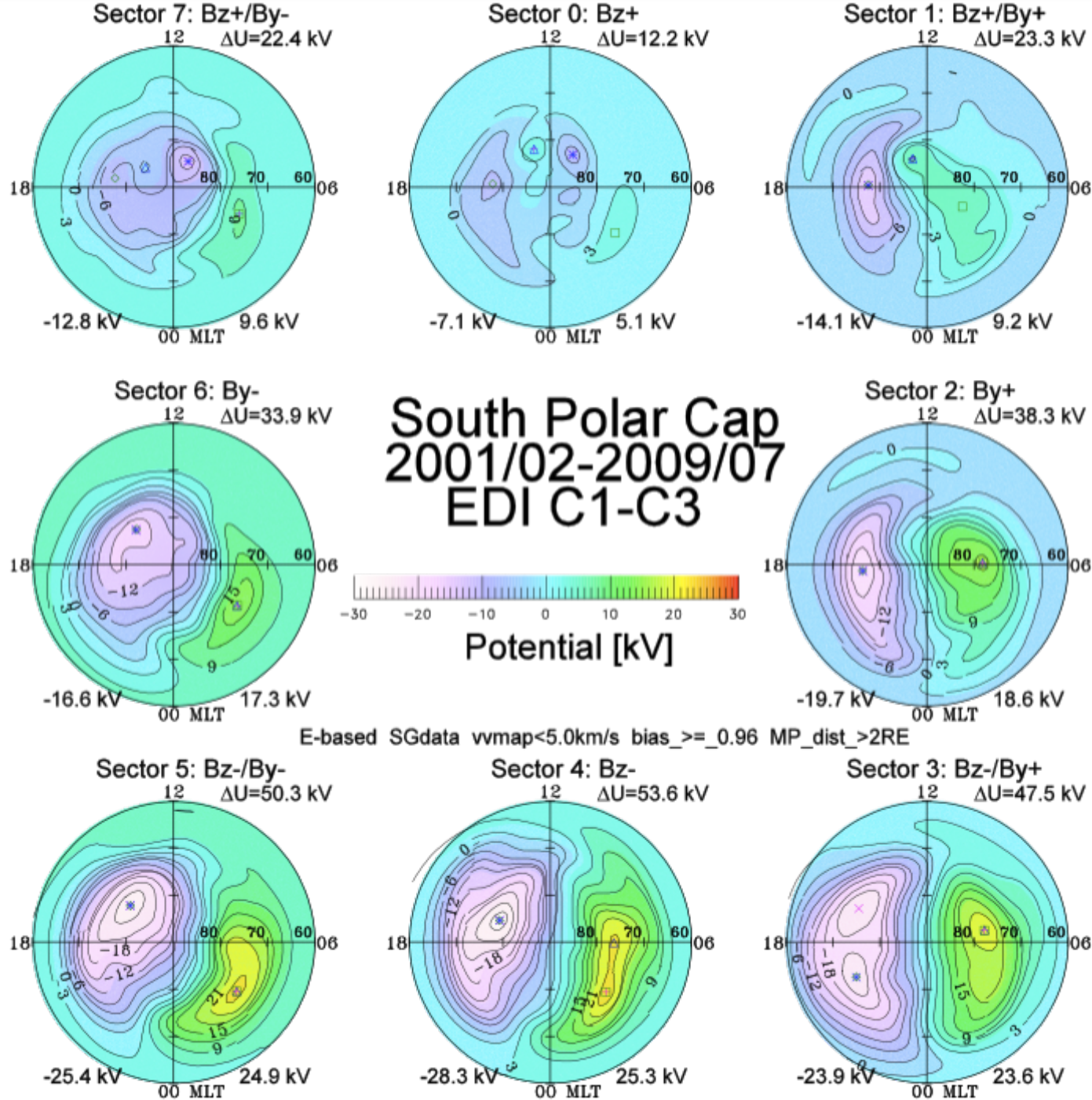
$$V_{\text{scalar}} = (369, 430) \Rightarrow |V_{\text{scalar}}| = 567 \text{ m/s}$$

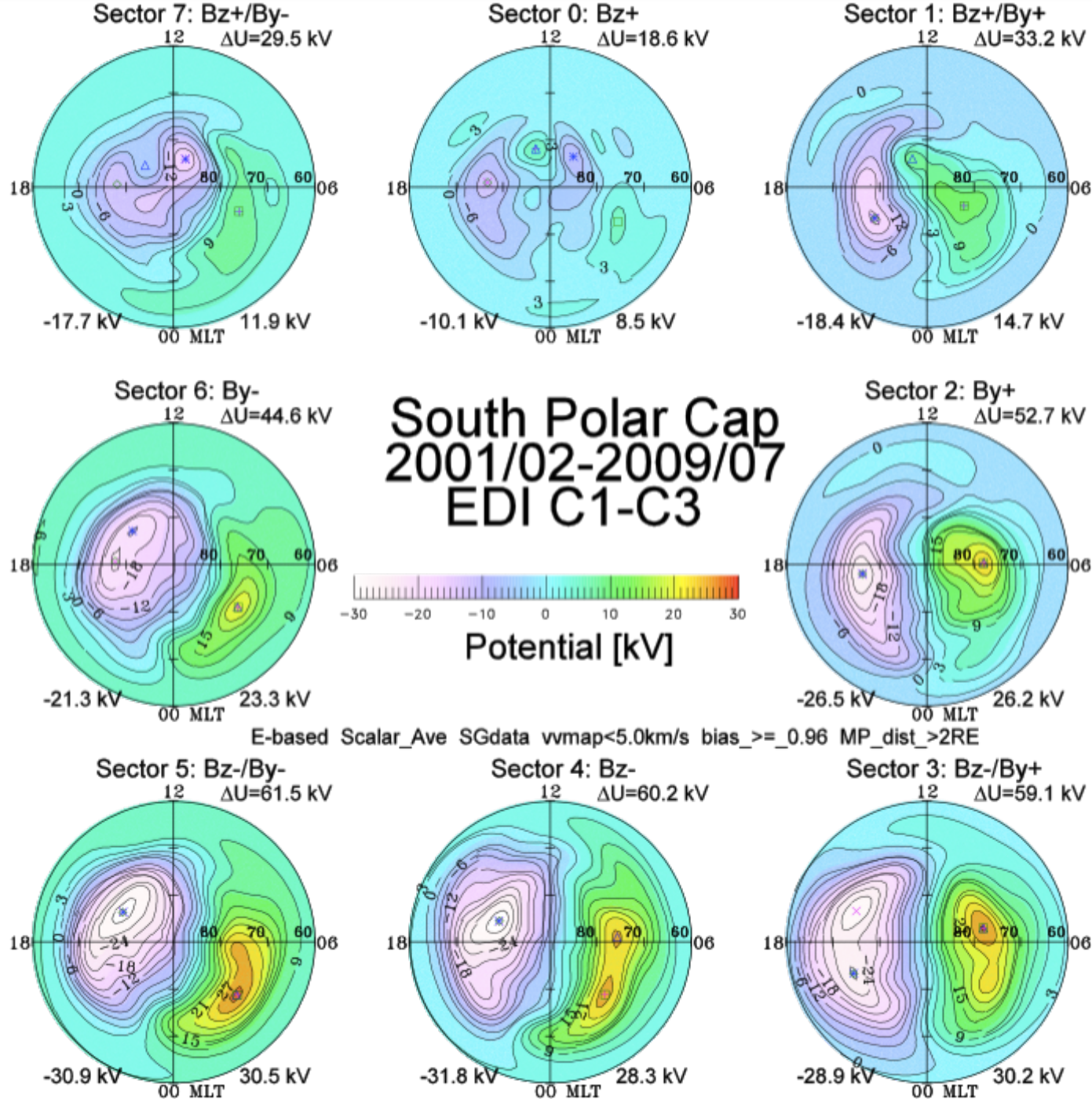
$$\text{bias value} = 0.6146$$

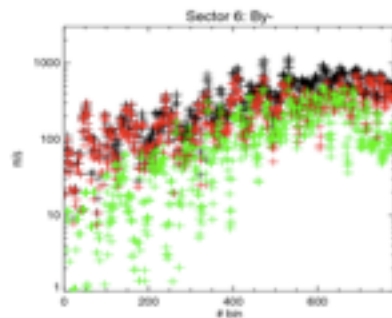
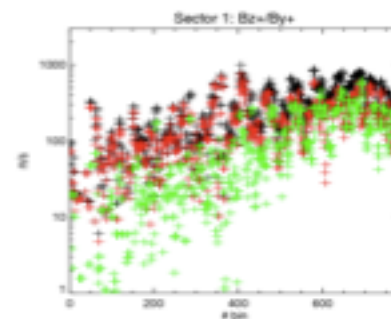
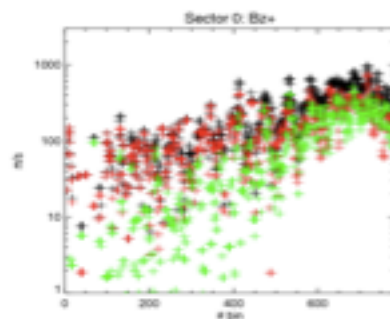
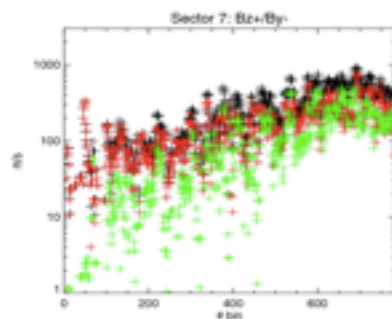
$$\alpha = 8.21 \text{ deg}$$











EDI C1-C3 2001/02-2009/07

North hemisphere

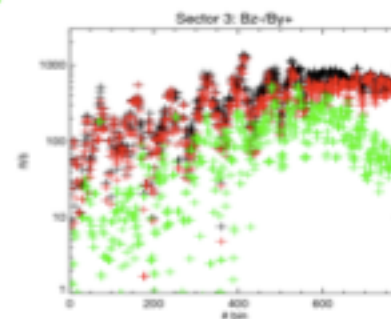
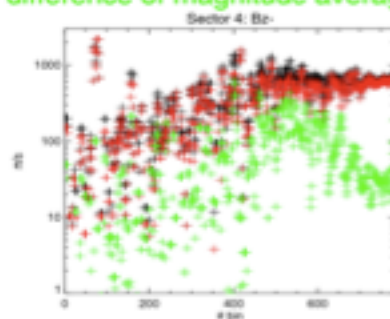
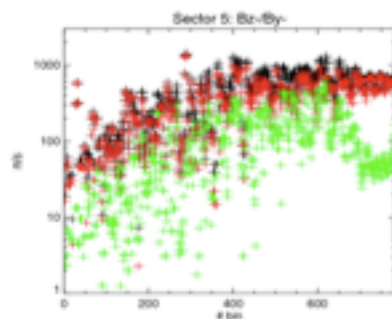
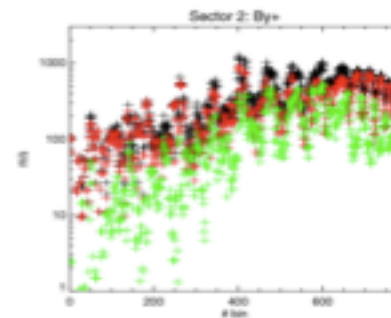
IMF +Bz

+By

new scalar average of |v|

original vector average

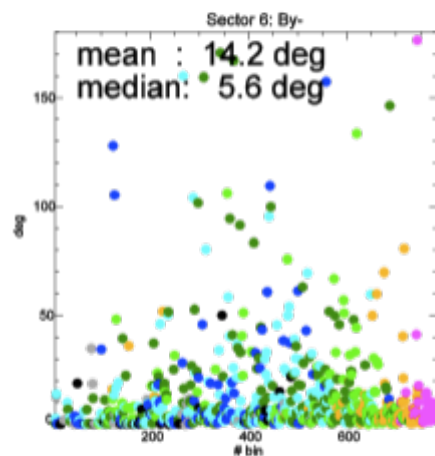
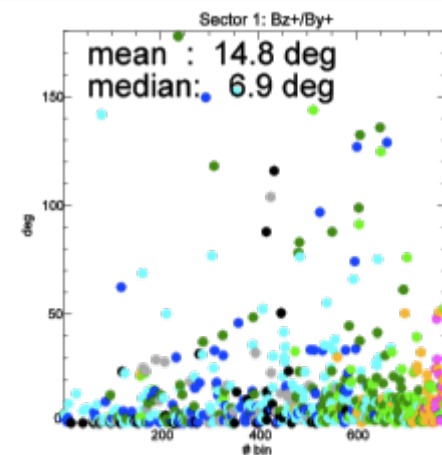
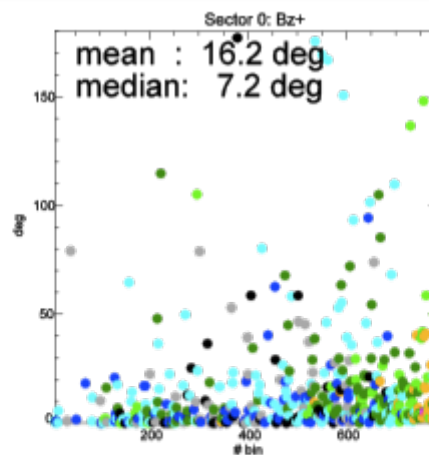
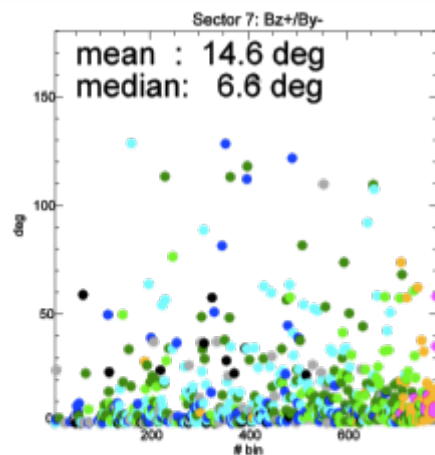
difference of magnitude averages



min mlat=58.0 deg dlat=2.0 dlon=2.0 min npo=11

vmax=5.0 km/s bias >= 0.96 MP det >276

2009/02/15 15:15:00



EDI C1-C3 2001/02-2009/07

North hemisphere

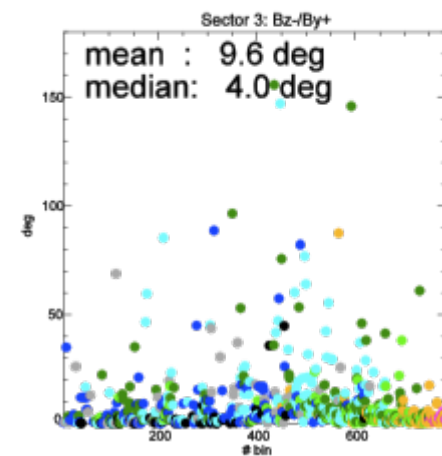
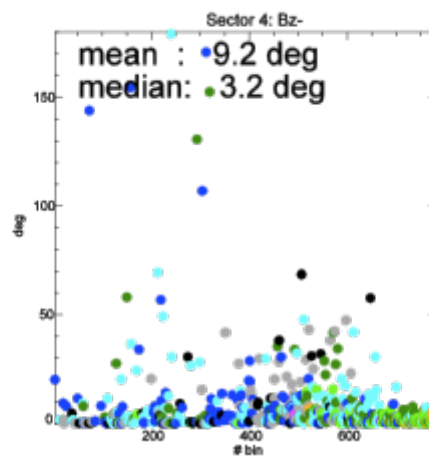
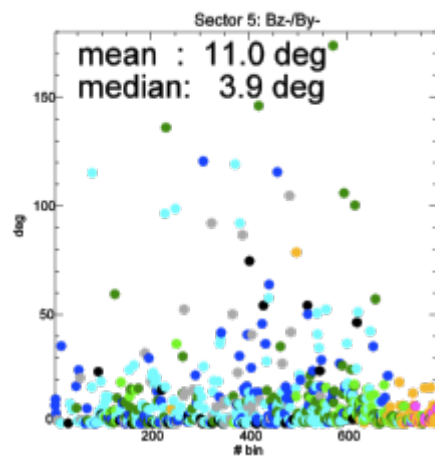
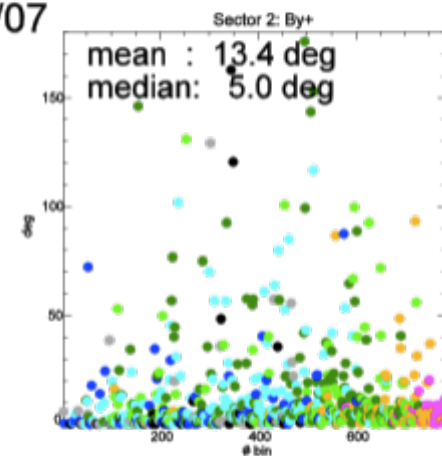
min npp = 11 points

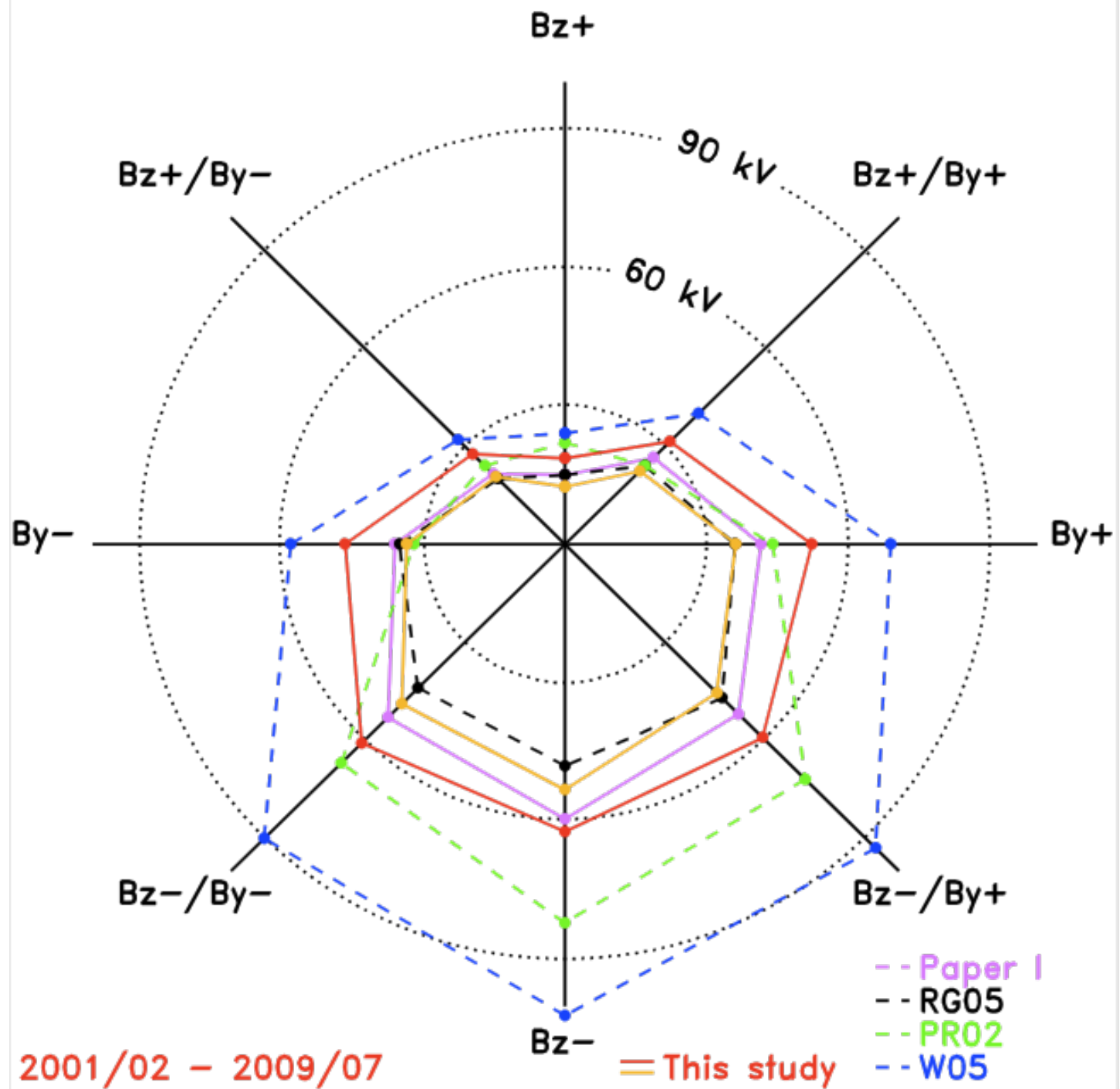
- > 25 points
- > 50 points
- > 100 points
- > 250 points
- > 500 points
- > 1000 points
- > 2500 points

IMF +Bz

+By

angle between
vector & scalar average





IMF		Polar cap potentials [kV]					
Sector	direction	Paper I ¹		vector average		scalar average	
		N	S	N	S	N	S
0	B_z+	16	14	12.8	12.2	19.8	17.4
1	B_z+ / B_y+	28	25	21.5	23.3	29.7	33.2
2	B_y+	40	43	34.1	38.3	51.9	52.7
3	B_z- / B_y+	54	50	43.5	47.5	59.3	59.1
4	B_z-	61	58	52.7	53.6	64.2	60.2
5	B_z- / B_y-	51	55	47.3	50.3	60.2	61.5
6	B_y-	33	39	33.0	33.9	48.5	44.6
7	B_z+ / B_y-	18	25	18.9	22.4	25.7	29.5

Table 1. Polar cap potential drop between the main cells of the statistical plasma drift patterns obtained from mapped EDI Cluster measurements for 8 separate sectors. The first two data columns are taken from Table 3 in Haaland et al. (2007) (called henceforth “paper I”) and comprise the interval 2001/02–2006/03. They are compared with more recent estimations comprising an extended interval of EDI measurements from 2001/02–2009/07 with both “vector averaging” (Fig. 2 and “scalar averaging” (Fig. 3 of the drift vector magnitudes during the binning process (see also Figure 4). ¹ N = northern hemisphere (see Figure 7 in Paper I), S = southern hemisphere (see Figure 8 in Paper I).