

Supplementary material for master's thesis "Online Change Detection for Ion-mobility Spectrometry Readings"

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Contents

1	Lemon peel	4
1.1	Baseline1	4
1.2	Baseline2	12
1.3	Baseline3	20
1.4	Baseline4	28
1.5	Baseline5	36
2	Vanilla	44
2.1	Baseline1	44
2.2	Baseline2	52
2.3	Baseline3	60
2.4	Baseline4	68
2.5	Baseline5	76
3	Grape	84
3.1	Baseline1	84
3.2	Baseline2	92
3.3	Baseline3	100
3.4	Baseline4	108
3.5	Baseline5	116
4	Jasmine	124
4.1	Baseline1	124
4.2	Baseline2	132
4.3	Baseline3	140
4.4	Baseline4	148
4.5	Baseline5	156

This supplementary material contains three plots and two tables for each data file. The three plots visualize the results of the change point detection algorithms for each moving window. The left column on the plots shows readings of each channel. The red line shows the ground truth point detected manually. The right column contains the same readings. The vertical lines on the right column show the change points detected by each algorithm. The first table contains results of the change point detection algorithms, ground truths, and running times. The two last rows of the first table are absolute and relative running times. The second table shows MAE-values for each algorithm and moving window. Abbreviations used in this document:

- gt - ground truth
- MAE - Mean Absolute Error
- shewhart - Shewhart Charts algorithm
- shewhart - Shewhart Charts algorithm
- cusum - CUSUM
- max mcusum - Multivariate MAX-CUSUM chart
- MFCUSUM - Matrix Form CUSUM
- bayes - Bayesian Online Change Point Detector

The data set can be found at:

<http://urn.fi/urn:nbn:fi:att:a434b7ae-679a-44ba-b417-1cc1d82bdbbd>

For implementing all the algorithms the Python language was used. All calculations are performed on MacBook Pro with CPU: 2 GHz Quad-Core Intel Core i5 and memory: 16 GB 3733 MHz LPDDR4X.

1 Lemon peel

1.1 Baseline1

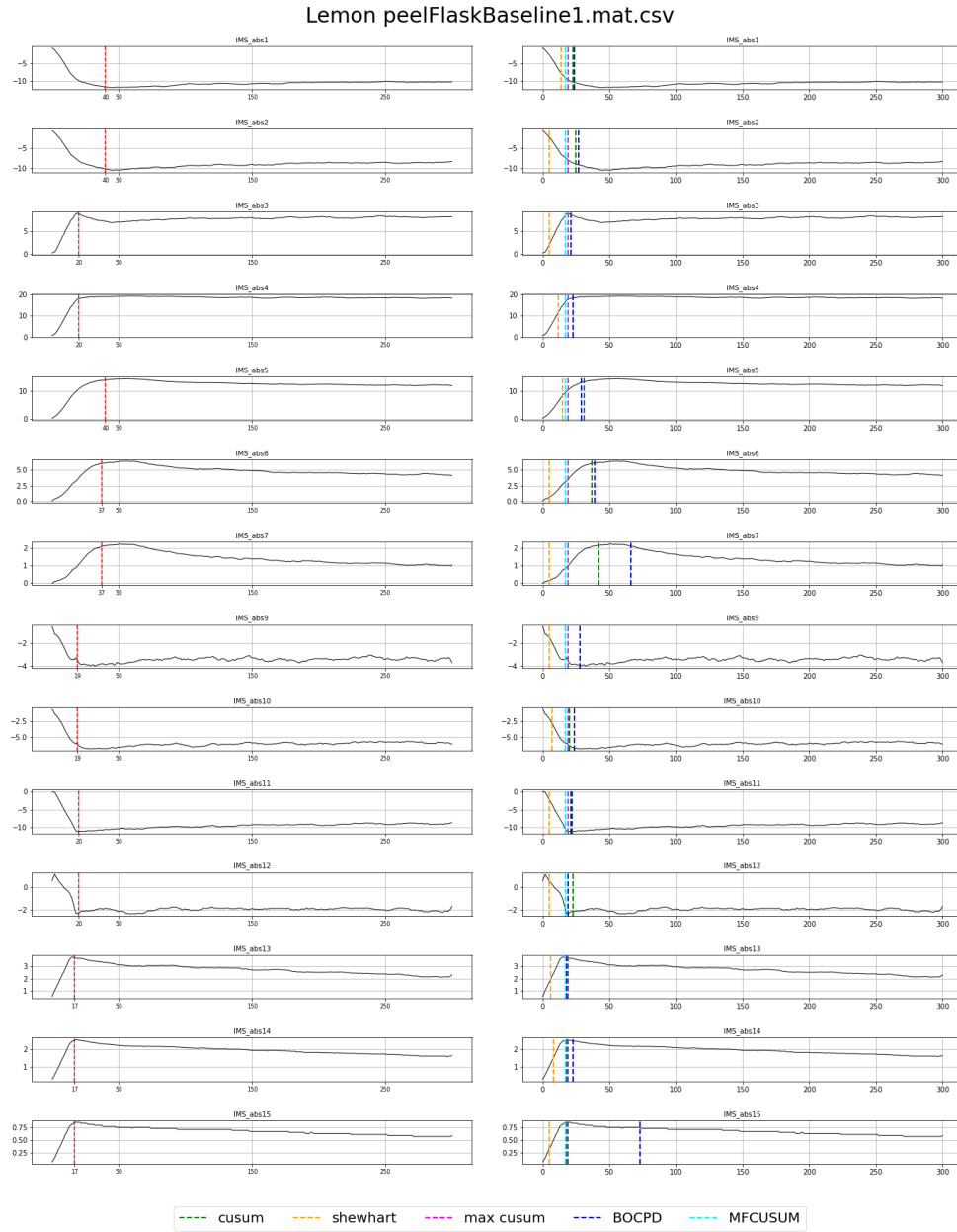


Figure 1: Lemon peelBaseline1. Window size 5.

Lemon peelFlaskBaseline1.mat.csv

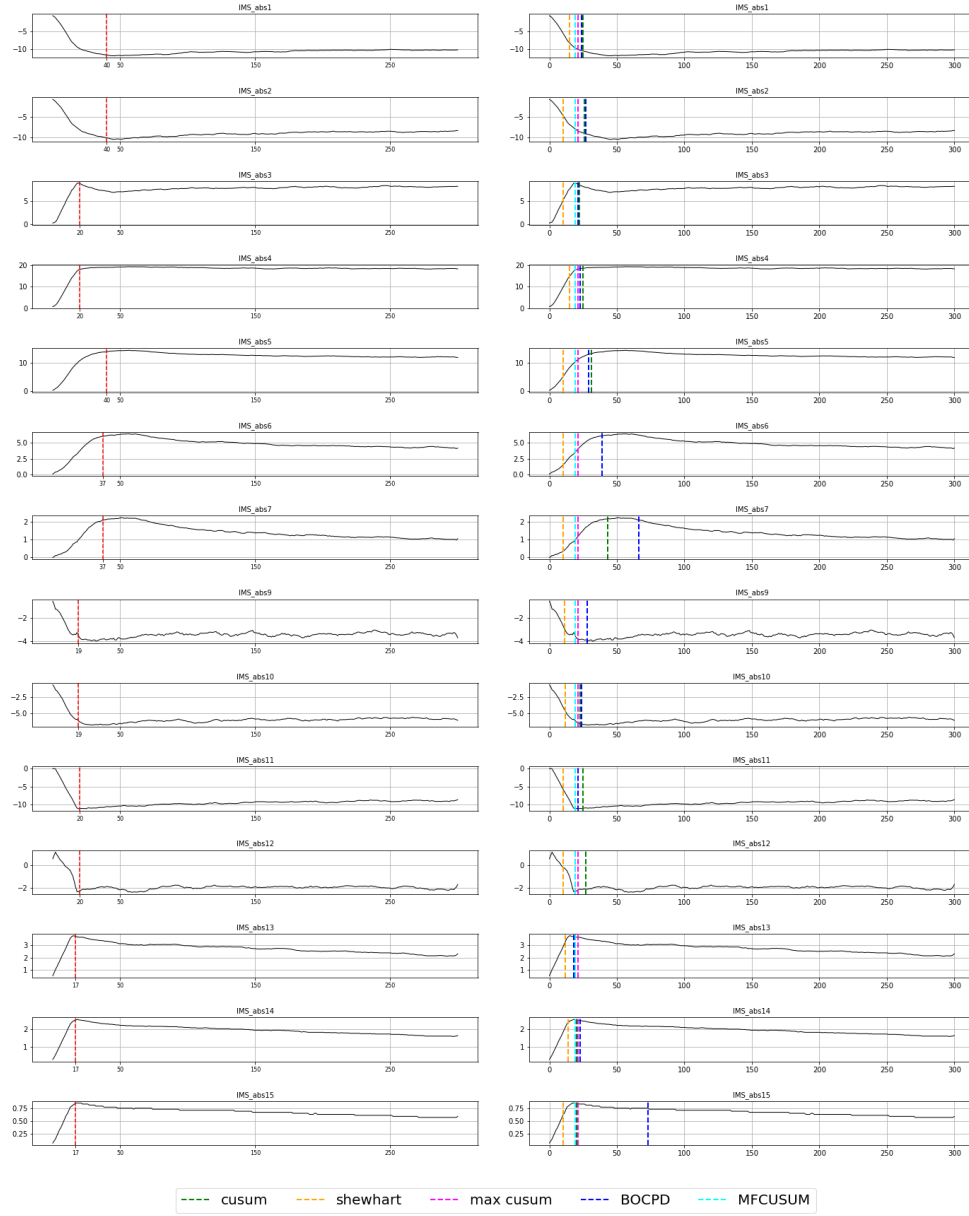


Figure 2: Lemon peelBaseline1. Window size 10.

Lemon peelFlaskBaseline1.mat.csv

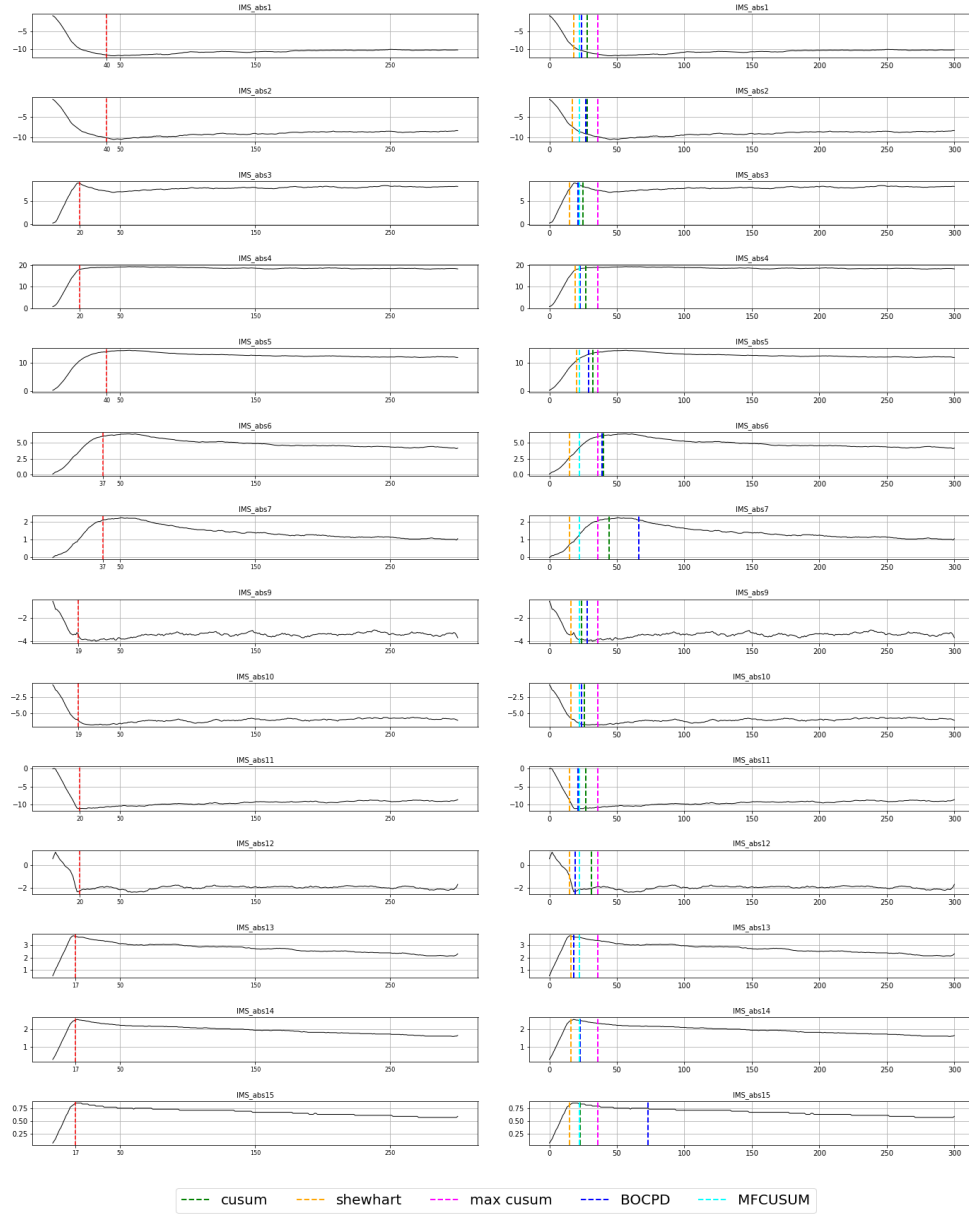


Figure 3: Lemon peelBaseline1. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	40	5	14	23	17	19	24
		10	15	25	19	21	24
		15	18	28	22	36	24
IMS_abs2	40	5	5	25	17	19	27
		10	10	26	19	21	27
		15	17	28	22	36	27
IMS_abs3	20	5	5	21	17	19	21
		10	10	22	19	21	21
		15	15	25	22	36	21
IMS_abs4	20	5	12	23	17	19	23
		10	15	25	19	21	23
		15	19	27	22	36	23
IMS_abs5	40	5	15	31	17	19	29
		10	10	31	19	21	29
		15	20	32	22	36	29
IMS_abs6	37	5	5	37	17	19	39
		10	10	39	19	21	39
		15	15	40	22	36	39
IMS_abs7	37	5	5	42	17	19	66
		10	10	43	19	21	66
		15	15	44	22	36	66
IMS_abs9	19	5	5	17	17	19	28
		10	11	21	19	21	28
		15	16	24	22	36	28
IMS_abs10	19	5	7	20	17	19	24
		10	12	23	19	21	24
		15	16	26	22	36	24
IMS_abs11	20	5	5	22	17	19	21
		10	10	25	19	21	21
		15	15	27	22	36	21
IMS_abs12	20	5	5	23	17	19	19
		10	10	27	19	21	19
		15	15	31	22	36	19
IMS_abs13	17	5	6	17	17	19	18
		10	12	19	19	21	18
		15	16	22	22	36	18
IMS_abs14	17	5	8	18	17	19	23
		10	14	20	19	21	23
		15	16	23	22	36	23
IMS_abs15	17	5	5	18	17	19	73
		10	10	20	19	21	73
		15	15	23	22	36	73
mean run time (sec)			2.291e-03	7.220e-03	3.476e-04	9.774e-04	7.260e-02
mean relative run time			6.590	20.769	1.000	2.812	208.866

Table 1: Change found for each moving window. Lemon peelFlaskBaseline1.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	18.64	4.29	8.93	7.79	11.00
10	14.57	5.64	7.79	7.79	11.00
15	9.64	7.21	8.07	12.07	11.00

Table 2: MAE of each algorithm for Lemon peelFlaskBaseline1.

Lemon peelTableBaseline1.mat.csv

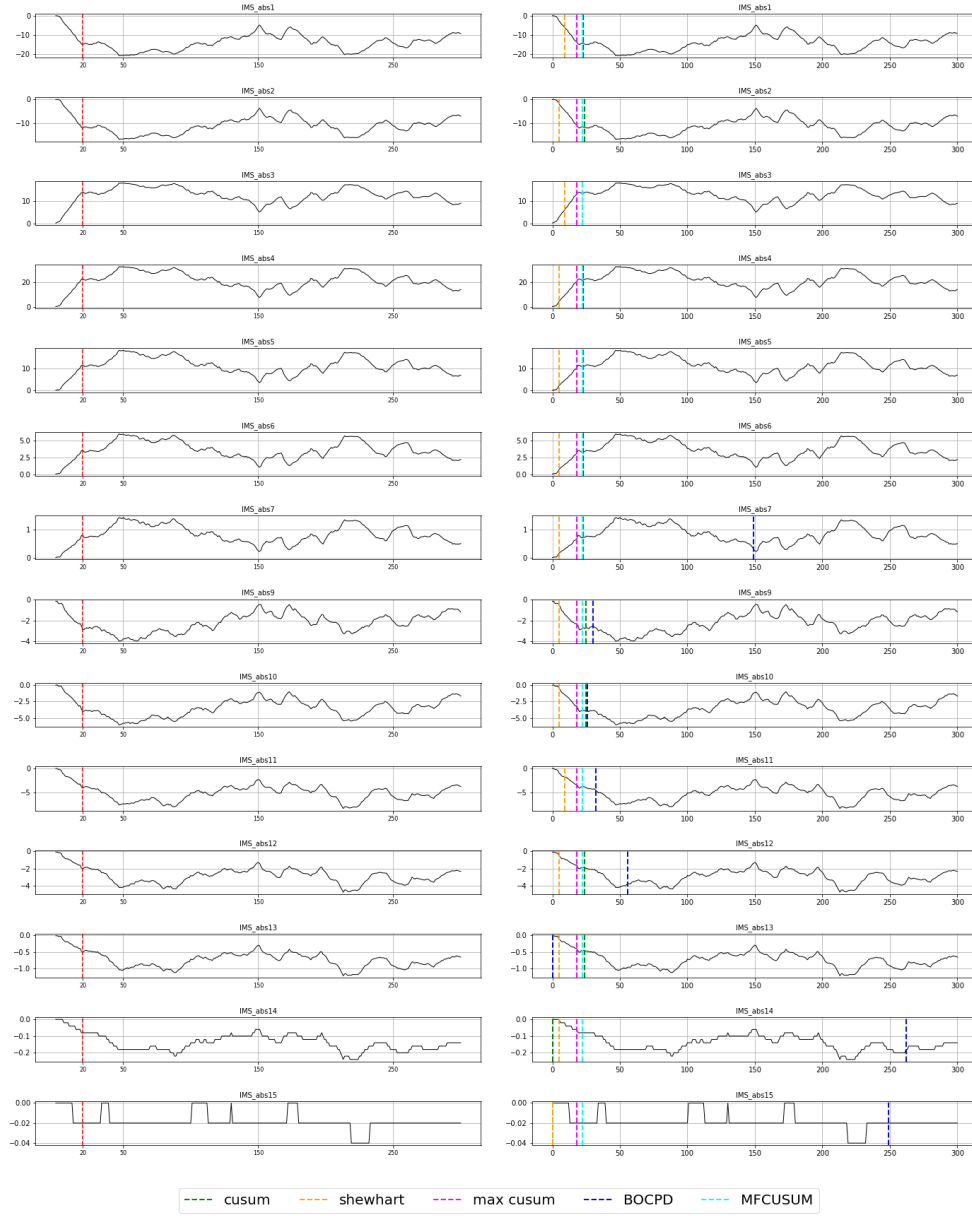


Figure 4: Lemon peelBaseline1. Window size 5.

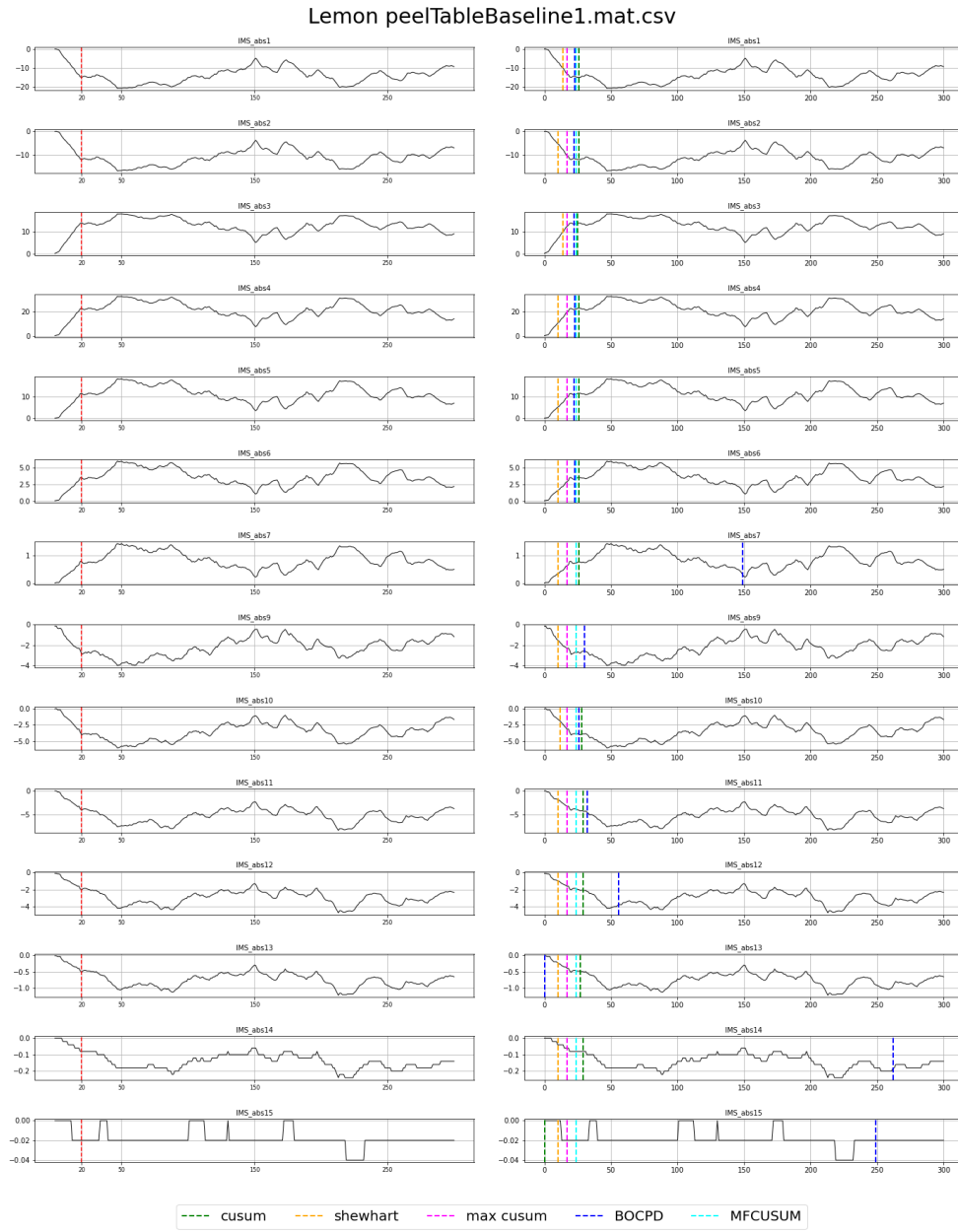


Figure 5: Lemon peelBaseline1. Window size 10.

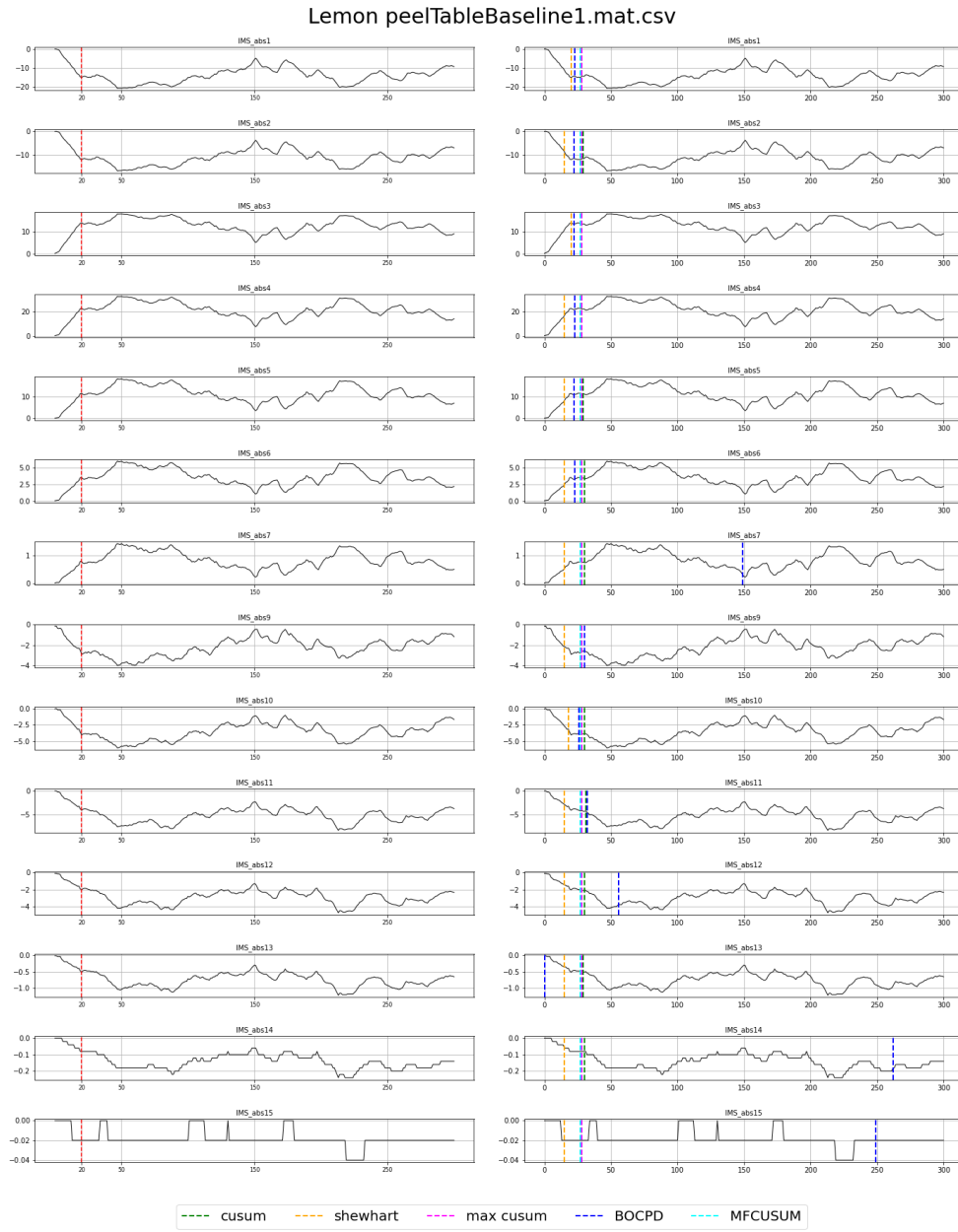


Figure 6: Lemon peelBaseline1. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	20	5	9	22	22	18	23
		10	14	26	24	17	23
		15	20	28	27	28	23
IMS_abs2	20	5	5	24	22	18	22
		10	10	26	24	17	22
		15	15	29	27	28	22
IMS_abs3	20	5	9	22	22	18	22
		10	14	25	24	17	22
		15	20	28	27	28	22
IMS_abs4	20	5	5	22	22	18	23
		10	10	26	24	17	23
		15	15	28	27	28	23
IMS_abs5	20	5	5	23	22	18	22
		10	10	26	24	17	22
		15	15	29	27	28	22
IMS_abs6	20	5	5	23	22	18	23
		10	10	26	24	17	23
		15	15	30	27	28	23
IMS_abs7	20	5	5	23	22	18	149
		10	10	26	24	17	149
		15	15	30	27	28	149
IMS_abs9	20	5	5	25	22	18	30
		10	10	24	24	17	30
		15	15	27	27	28	30
IMS_abs10	20	5	5	25	22	18	26
		10	12	28	24	17	26
		15	18	30	27	28	26
IMS_abs11	20	5	9	22	22	18	32
		10	10	29	24	17	32
		15	15	31	27	28	32
IMS_abs12	20	5	5	24	22	18	56
		10	10	29	24	17	56
		15	15	30	27	28	56
IMS_abs13	20	5	5	24	22	18	0
		10	10	27	24	17	0
		15	15	29	27	28	0
IMS_abs14	20	5	5	0	22	18	262
		10	10	29	24	17	262
		15	15	30	27	28	262
IMS_abs15	20	5	0	0	22	18	249
		10	10	0	24	17	249
		15	15	28	27	28	249
mean run time (sec)			4.560e-03	1.216e-02	4.350e-04	7.546e-04	2.593e-01
mean relative run time			10.482	27.959	1.000	1.735	596.054

Table 3: Change found for each moving window. Lemon peelTableBaseline1.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	14.50	5.64	2.00	2.00	49.93
10	9.29	7.64	4.00	3.00	49.93
15	4.07	9.07	7.00	8.00	49.93

Table 4: MAE of each algorithm for Lemon peelTableBaseline1.

1.2 Baseline2

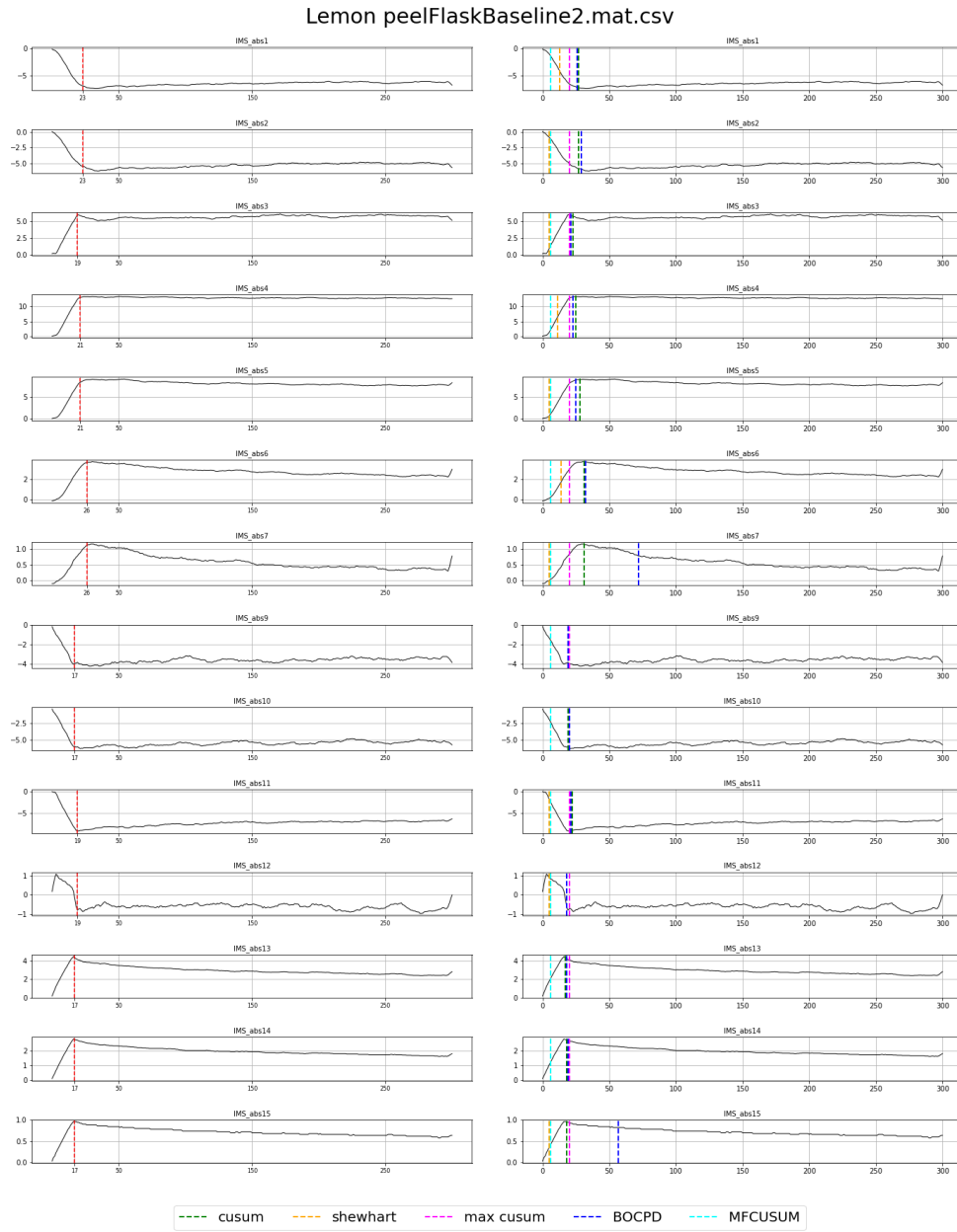


Figure 7: Lemon peelBaseline2. Window size 5.

Lemon peelFlaskBaseline2.mat.csv

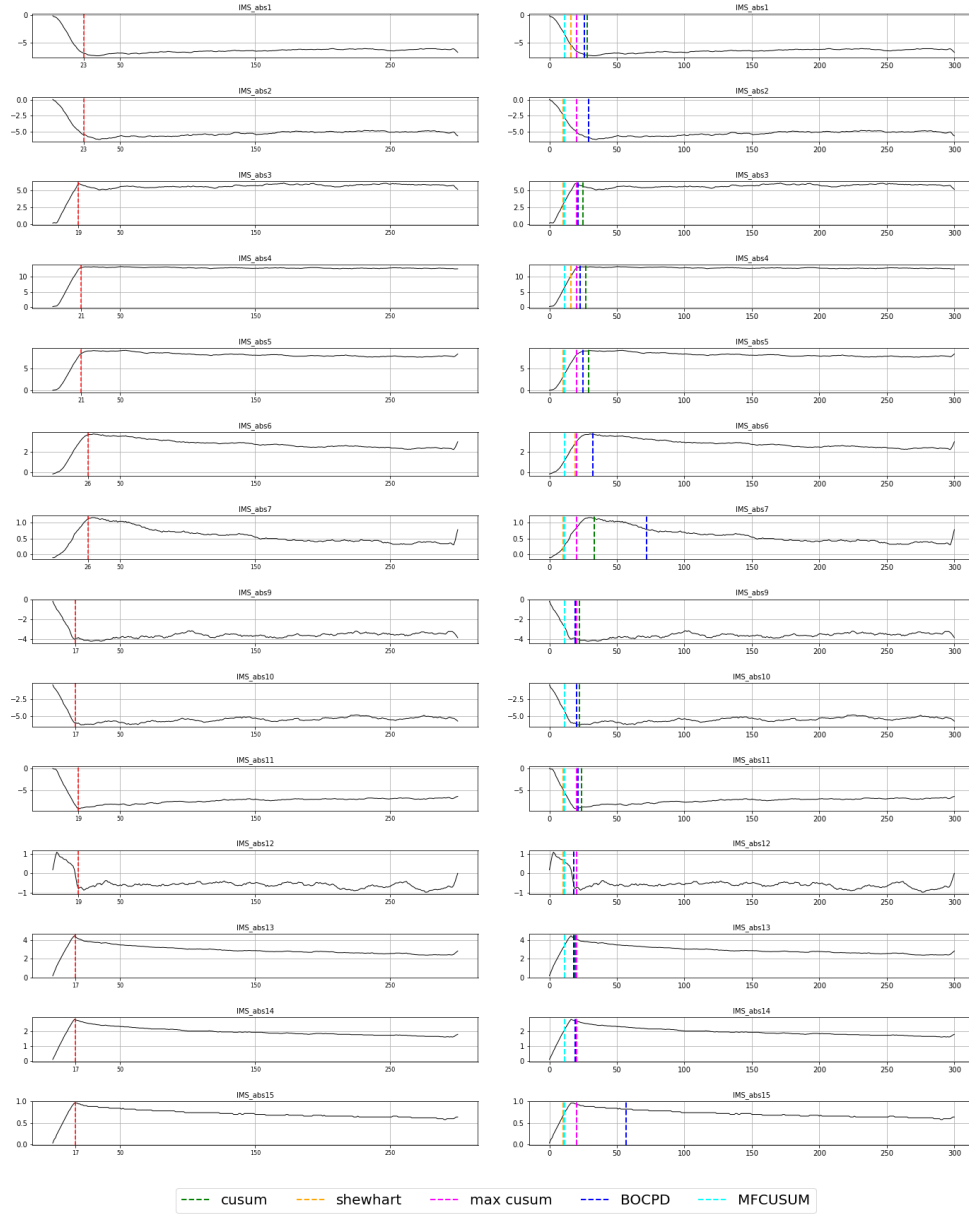


Figure 8: Lemon peelBaseline2. Window size 10.

Lemon peelFlaskBaseline2.mat.csv

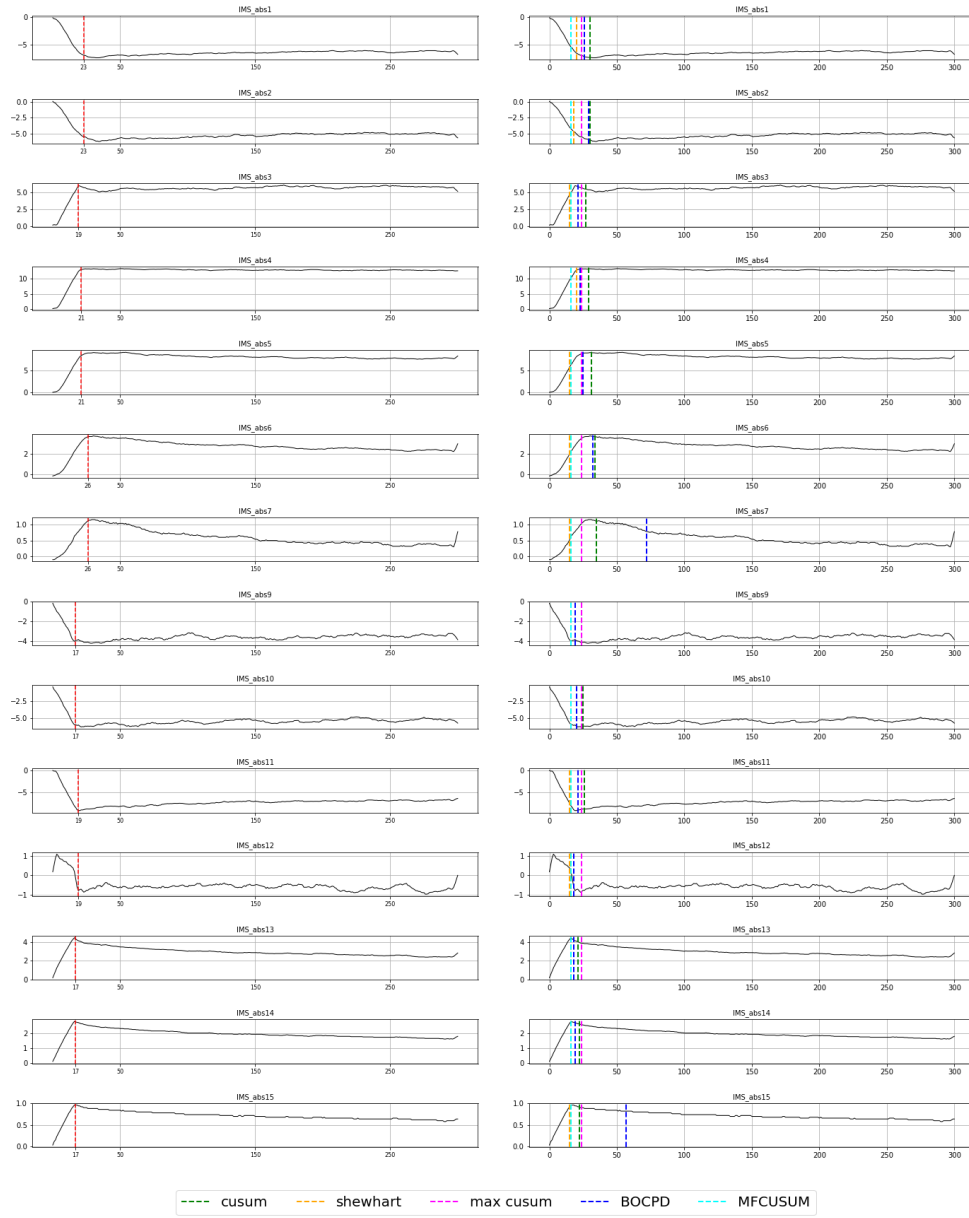


Figure 9: Lemon peelBaseline2. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	23	5	13	27	6	20	26
		10	16	28	11	20	26
		15	20	30	16	24	26
IMS_abs2	23	5	5	27	6	20	29
		10	10	29	11	20	29
		15	18	30	16	24	29
IMS_abs3	19	5	5	23	6	20	21
		10	10	25	11	20	21
		15	15	27	16	24	21
IMS_abs4	21	5	11	25	6	20	23
		10	16	27	11	20	23
		15	20	29	16	24	23
IMS_abs5	21	5	5	28	6	20	25
		10	10	29	11	20	25
		15	15	31	16	24	25
IMS_abs6	26	5	14	31	6	20	32
		10	19	32	11	20	32
		15	15	34	16	24	32
IMS_abs7	26	5	5	31	6	20	72
		10	10	33	11	20	72
		15	15	35	16	24	72
IMS_abs9	17	5	6	19	6	20	19
		10	11	22	11	20	19
		15	16	24	16	24	19
IMS_abs10	17	5	6	19	6	20	20
		10	11	22	11	20	20
		15	16	25	16	24	20
IMS_abs11	19	5	5	22	6	20	21
		10	10	24	11	20	21
		15	15	26	16	24	21
IMS_abs12	19	5	5	6	6	20	18
		10	10	11	11	20	18
		15	15	16	16	24	18
IMS_abs13	17	5	6	17	6	20	18
		10	11	19	11	20	18
		15	16	21	16	24	18
IMS_abs14	17	5	6	18	6	20	19
		10	11	20	11	20	19
		15	16	22	16	24	19
IMS_abs15	17	5	5	18	6	20	57
		10	10	20	11	20	57
		15	15	22	16	24	57
mean run time (sec)			1.855e-03	5.894e-03	1.516e-04	7.656e-04	6.515e-02
mean relative run time			12.234	38.869	1.000	5.049	429.651

Table 5: Change found for each moving window. Lemon peelFlaskBaseline2.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	13.21	3.93	14.14	2.71	8.57
10	8.36	5.36	9.14	2.71	8.57
15	3.93	6.86	4.14	4.43	8.57

Table 6: MAE of each algorithm for Lemon peelFlaskBaseline2.

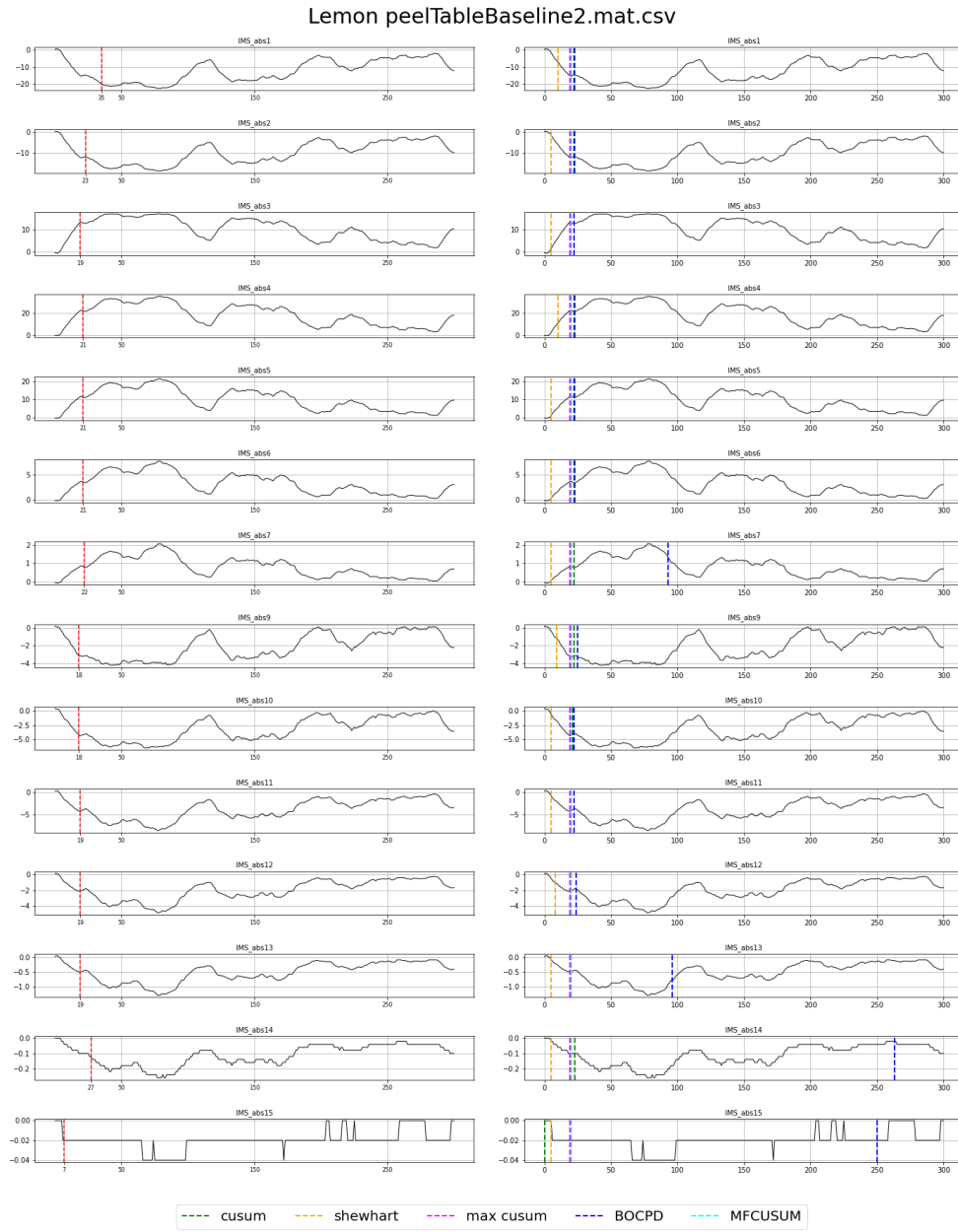


Figure 10: Lemon peelBaseline2. Window size 5.

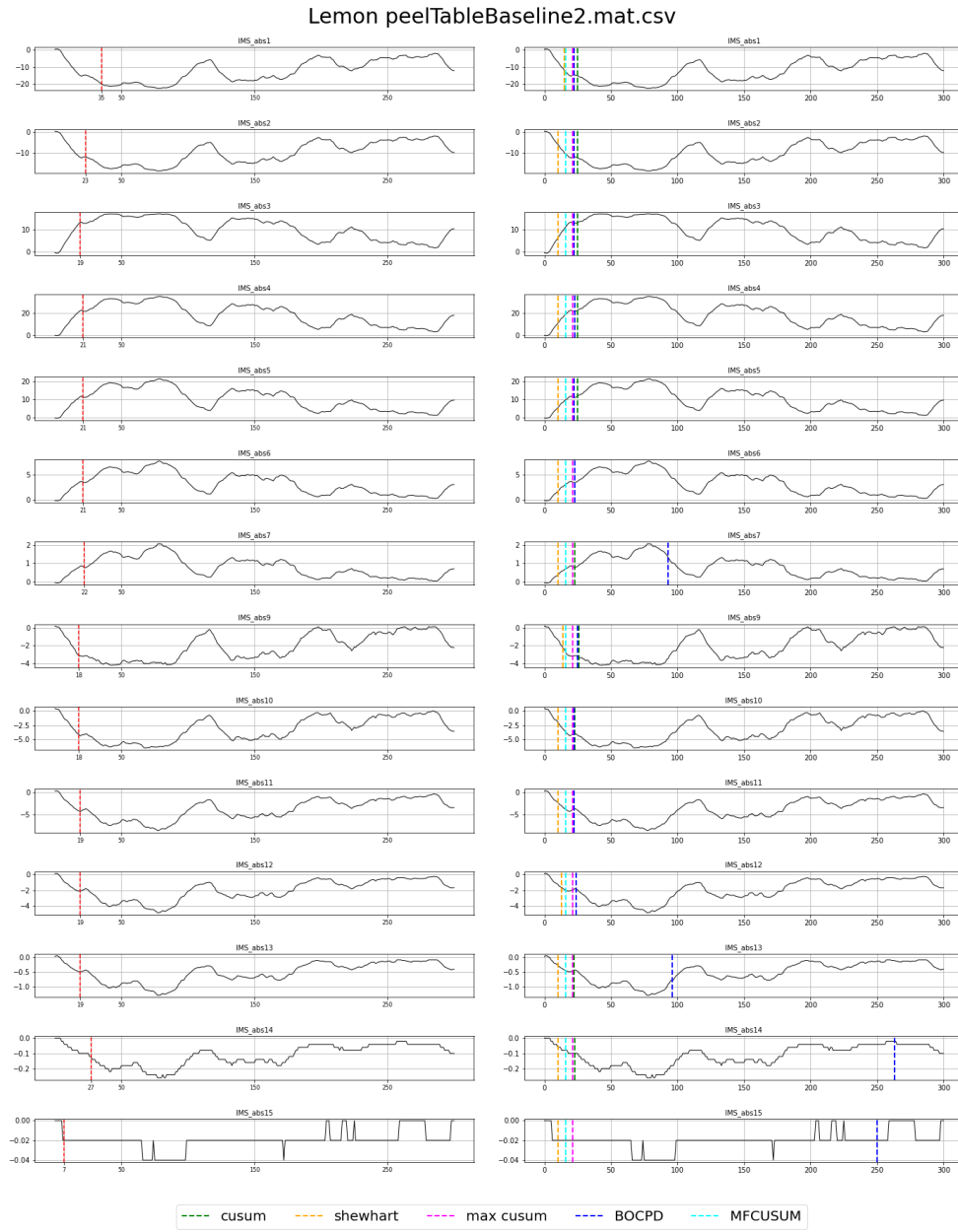


Figure 11: Lemon peelBaseline2. Window size 10.

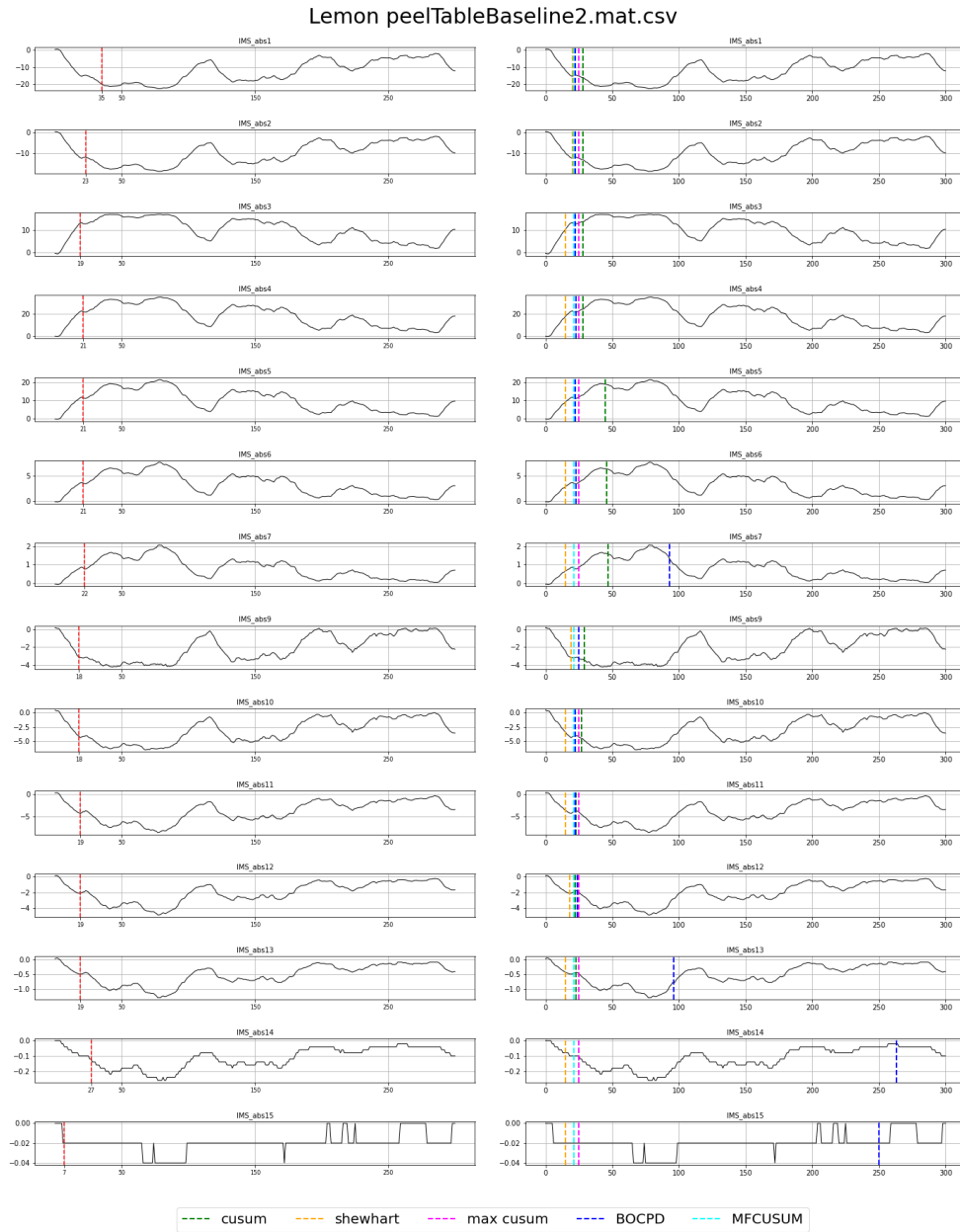


Figure 12: Lemon peelBaseline2. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	35	5	10	23	20	19	22
		10	15	25	16	21	22
		15	20	28	21	25	22
IMS_abs2	23	5	5	23	20	19	22
		10	10	25	16	21	22
		15	20	28	21	25	22
IMS_abs3	19	5	5	22	20	19	22
		10	10	25	16	21	22
		15	15	28	21	25	22
IMS_abs4	21	5	10	22	20	19	23
		10	10	25	16	21	23
		15	15	28	21	25	23
IMS_abs5	21	5	5	23	20	19	22
		10	10	25	16	21	22
		15	15	45	21	25	22
IMS_abs6	21	5	5	22	20	19	23
		10	10	23	16	21	23
		15	15	46	21	25	23
IMS_abs7	22	5	5	22	20	19	93
		10	10	23	16	21	93
		15	15	47	21	25	93
IMS_abs9	18	5	9	22	20	19	25
		10	14	26	16	21	25
		15	19	29	21	25	25
IMS_abs10	18	5	5	21	20	19	22
		10	10	23	16	21	22
		15	15	27	21	25	22
IMS_abs11	19	5	5	20	20	19	22
		10	10	22	16	21	22
		15	15	23	21	25	22
IMS_abs12	19	5	8	20	20	19	24
		10	13	21	16	21	24
		15	18	22	21	25	24
IMS_abs13	19	5	5	20	20	19	96
		10	10	22	16	21	96
		15	15	23	21	25	96
IMS_abs14	27	5	5	23	20	19	263
		10	10	23	16	21	263
		15	15	25	21	25	263
IMS_abs15	7	5	5	0	20	19	250
		10	10	16	16	21	250
		15	15	21	21	25	250
mean run time (sec)			1.302e-03	7.723e-03	3.544e-04	9.555e-04	2.161e-01
mean relative run time			3.673	21.788	1.000	2.696	609.786

Table 7: Change found for each moving window. Lemon peelTableBaseline2.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	14.43	2.86	3.64	3.64	47.71
10	10.21	4.50	5.93	3.64	47.71
15	5.71	10.64	3.64	6.07	47.71

Table 8: MAE of each algorithm for Lemon peelTableBaseline2.

1.3 Baseline3

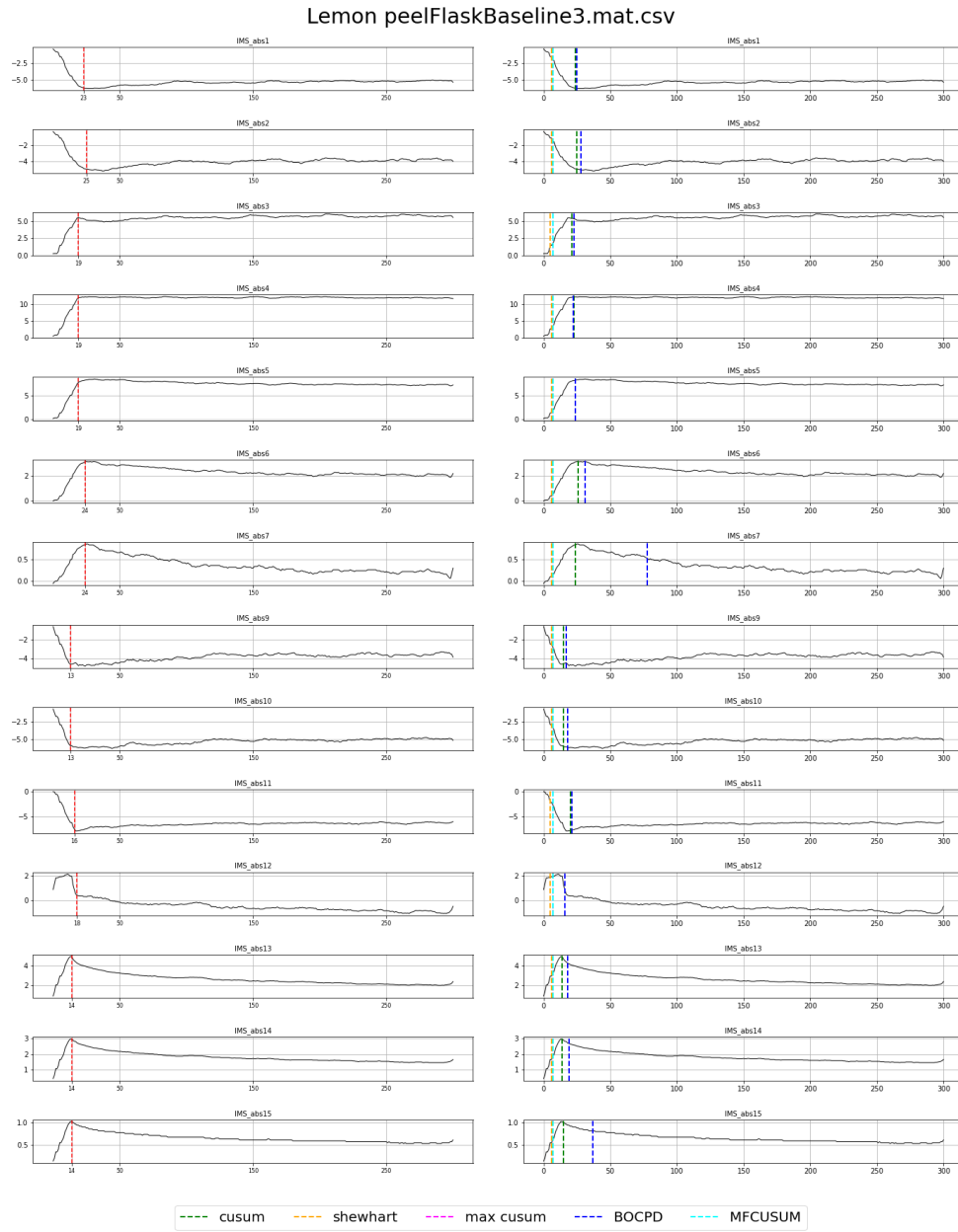


Figure 13: Lemon peelBaseline3. Window size 5.

Lemon peelBaseline3.mat.csv

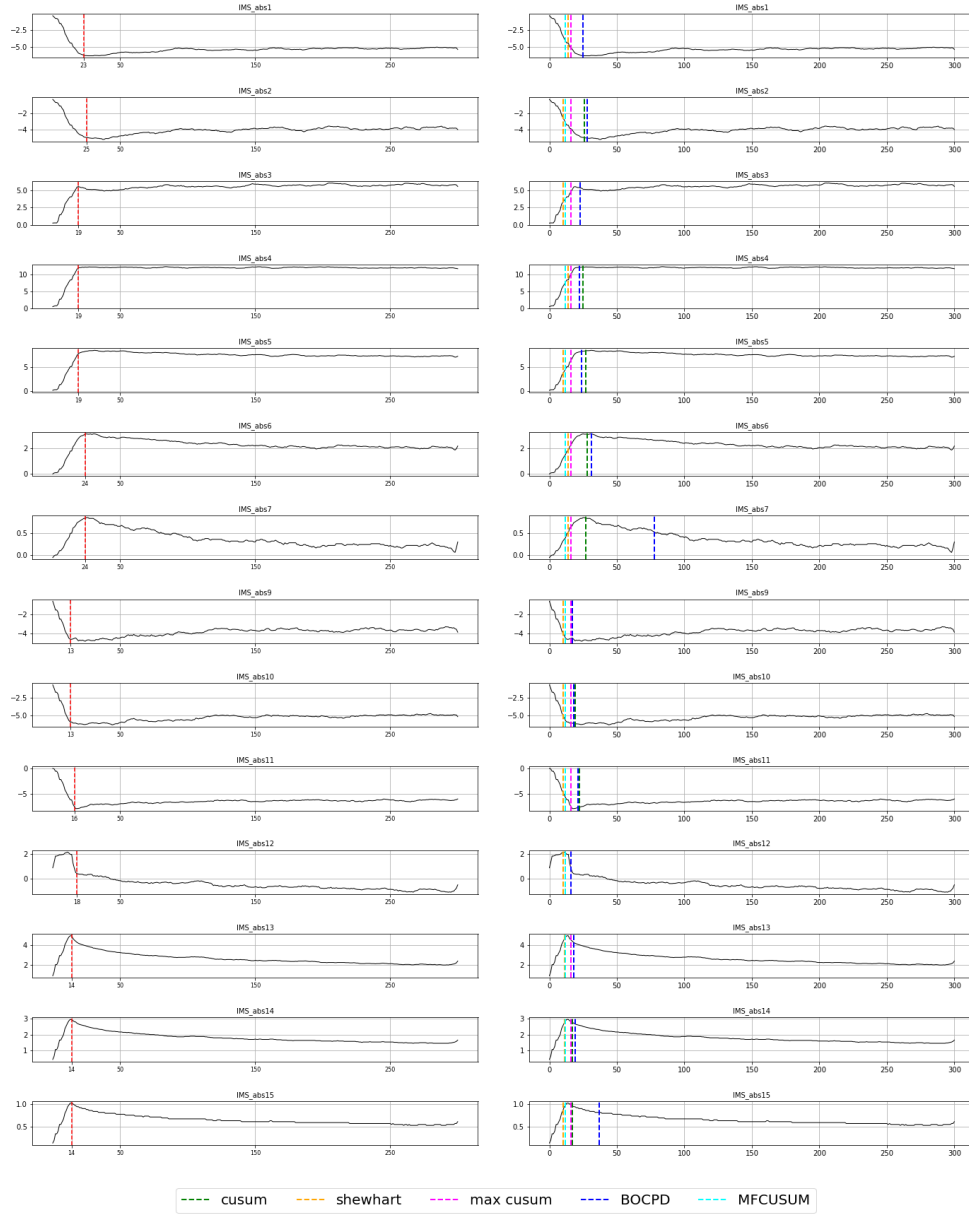


Figure 14: Lemon peelBaseline3. Window size 10.

Lemon peelFlaskBaseline3.mat.csv

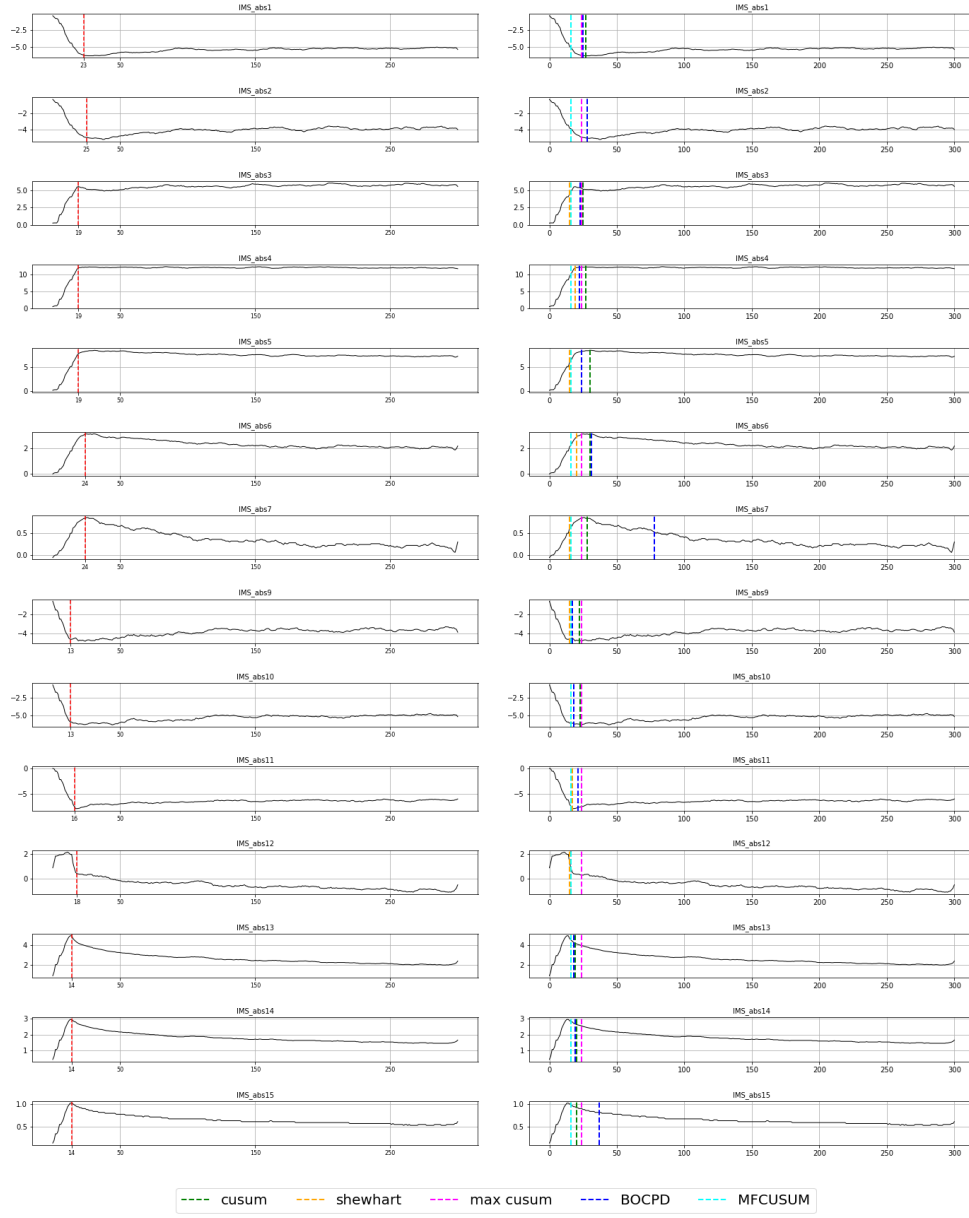


Figure 15: Lemon peelBaseline3. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	23	5	6	24	7	7	25
		10	14	25	12	16	25
		15	16	27	16	24	25
IMS_abs2	25	5	6	25	7	7	28
		10	10	26	12	16	28
		15	16	28	16	24	28
IMS_abs3	19	5	5	21	7	7	23
		10	10	23	12	16	23
		15	15	25	16	24	23
IMS_abs4	19	5	6	23	7	7	22
		10	14	25	12	16	22
		15	19	27	16	24	22
IMS_abs5	19	5	6	24	7	7	24
		10	10	27	12	16	24
		15	15	30	16	24	24
IMS_abs6	24	5	6	26	7	7	31
		10	14	28	12	16	31
		15	20	30	16	24	31
IMS_abs7	24	5	6	24	7	7	78
		10	14	27	12	16	78
		15	15	28	16	24	78
IMS_abs9	13	5	6	15	7	7	17
		10	10	17	12	16	17
		15	15	22	16	24	17
IMS_abs10	13	5	6	15	7	7	18
		10	10	19	12	16	18
		15	16	23	16	24	18
IMS_abs11	16	5	5	20	7	7	21
		10	10	22	12	16	21
		15	17	24	16	24	21
IMS_abs12	18	5	5	7	7	7	16
		10	10	12	12	16	16
		15	15	16	16	24	16
IMS_abs13	14	5	6	14	7	7	18
		10	11	16	12	16	18
		15	16	19	16	24	18
IMS_abs14	14	5	6	14	7	7	19
		10	11	17	12	16	19
		15	16	20	16	24	19
IMS_abs15	14	5	6	15	7	7	37
		10	10	17	12	16	37
		15	16	20	16	24	37
mean run time (sec)			1.869e-03	5.696e-03	1.420e-04	5.712e-04	6.248e-02
mean relative run time			13.151	40.110	1.000	4.022	439.951

Table 9: Change found for each moving window. Lemon peelFlaskBaseline3.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	12.43	2.43	11.21	11.21	9.00
10	6.93	4.14	6.21	3.93	9.00
15	3.71	6.29	3.93	5.93	9.00

Table 10: MAE of each algorithm for Lemon peelFlaskBaseline3.

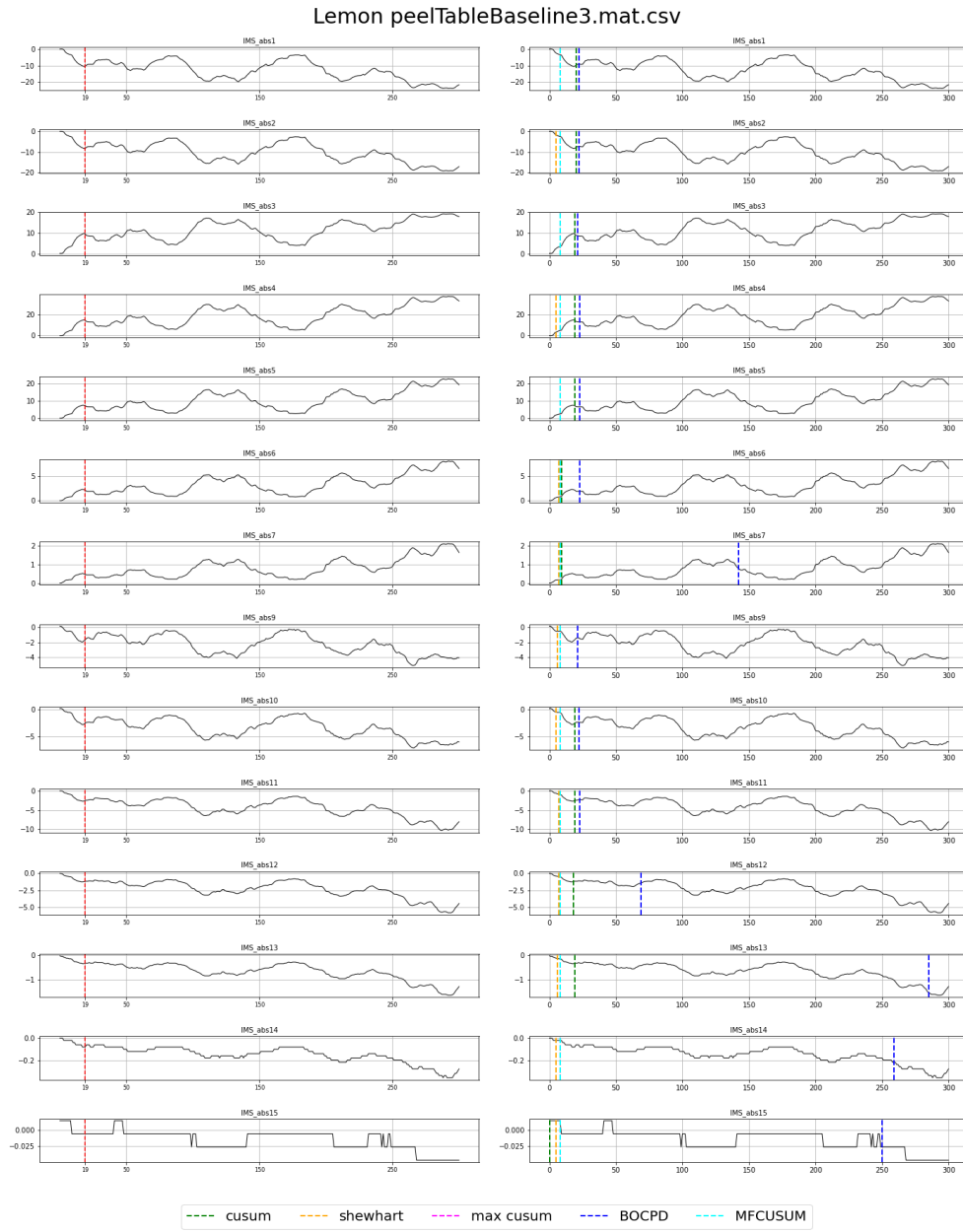


Figure 16: Lemon peelBaseline3. Window size 5.

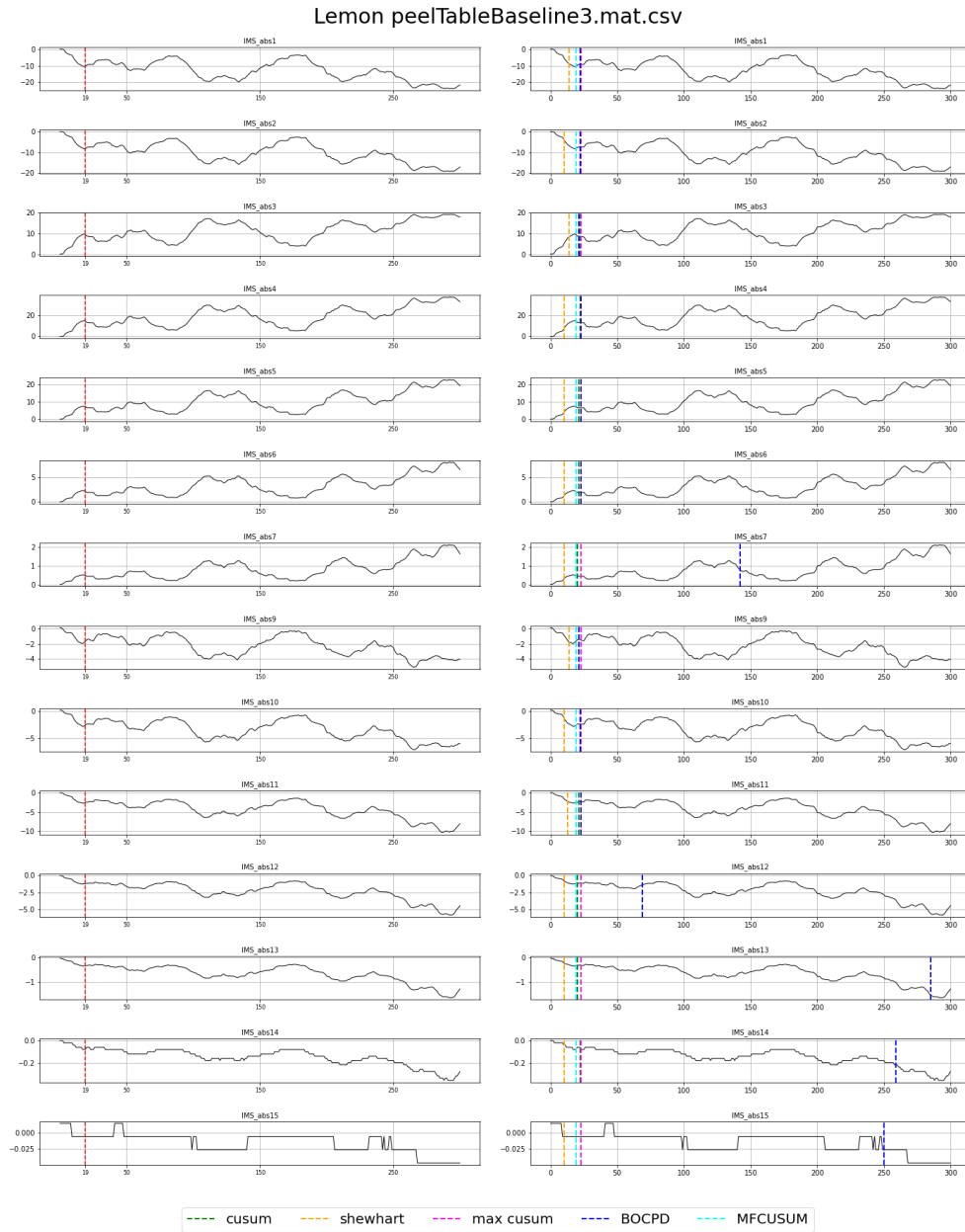


Figure 17: Lemon peelBaseline3. Window size 10.

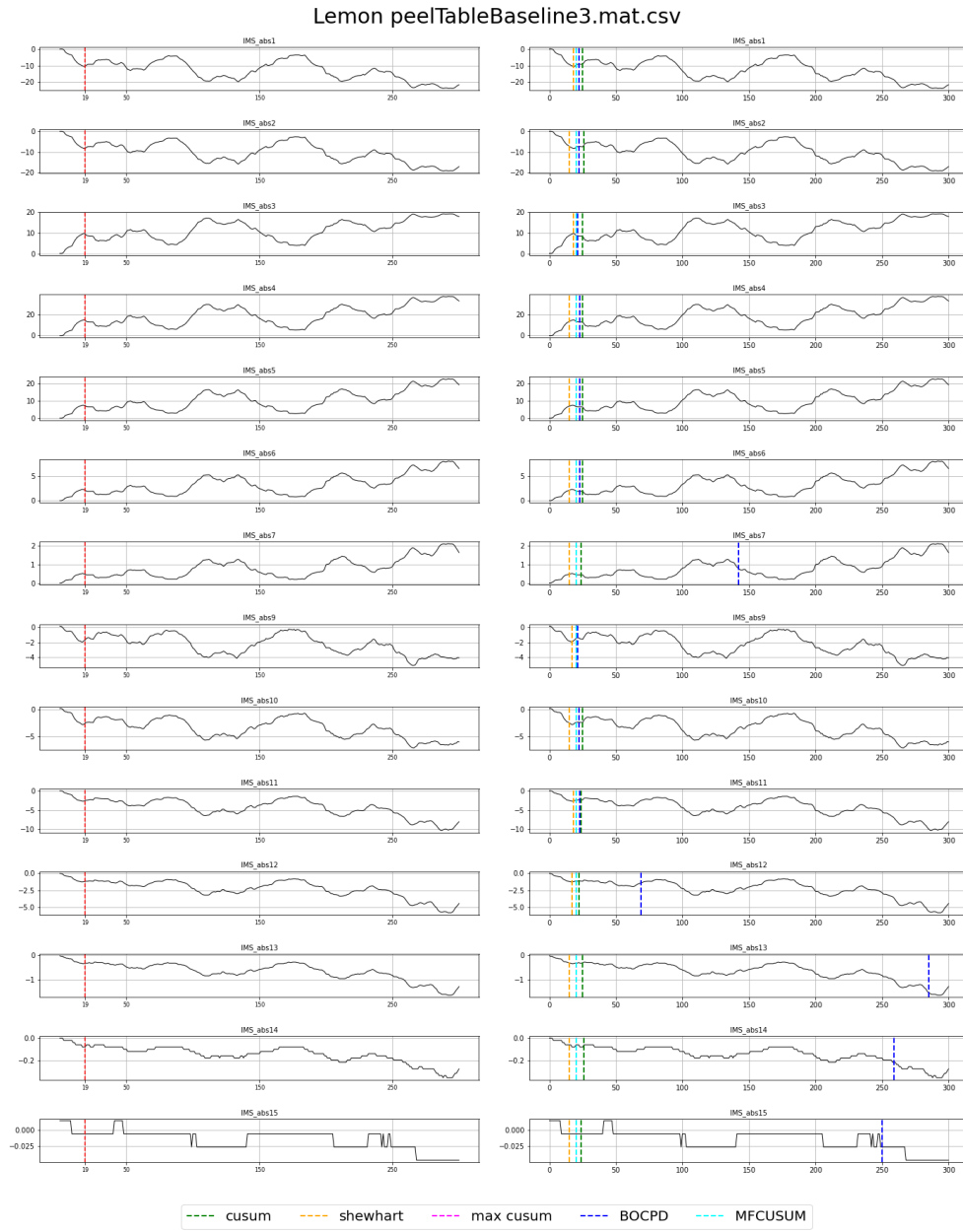


Figure 18: Lemon peelBaseline3. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	19	5	8	20	8	8	22
		10	14	22	19	23	22
		15	18	25	20	20	22
IMS_abs2	19	5	5	20	8	8	22
		10	10	22	19	23	22
		15	15	26	20	20	22
IMS_abs3	19	5	8	19	8	8	21
		10	14	22	19	23	21
		15	18	25	20	20	21
IMS_abs4	19	5	5	19	8	8	23
		10	10	22	19	23	23
		15	15	25	20	20	23
IMS_abs5	19	5	8	19	8	8	23
		10	10	21	19	23	23
		15	15	25	20	20	23
IMS_abs6	19	5	7	9	8	8	23
		10	10	21	19	23	23
		15	15	25	20	20	23
IMS_abs7	19	5	7	9	8	8	142
		10	10	20	19	23	142
		15	15	24	20	20	142
IMS_abs9	19	5	6	8	8	8	21
		10	14	21	19	23	21
		15	17	20	20	20	21
IMS_abs10	19	5	5	19	8	8	22
		10	10	22	19	23	22
		15	15	25	20	20	22
IMS_abs11	19	5	7	19	8	8	23
		10	13	21	19	23	23
		15	18	24	20	20	23
IMS_abs12	19	5	7	18	8	8	69
		10	10	20	19	23	69
		15	17	22	20	20	69
IMS_abs13	19	5	6	19	8	8	285
		10	10	20	19	23	285
		15	15	25	20	20	285
IMS_abs14	19	5	5	8	8	8	259
		10	10	22	19	23	259
		15	15	26	20	20	259
IMS_abs15	19	5	5	0	8	8	250
		10	10	19	19	23	250
		15	15	24	20	20	250
mean run time (sec)			1.583e-03	6.847e-03	2.898e-04	5.852e-04	2.821e-01
mean relative run time			5.463	23.630	1.000	2.020	973.522

Table 11: Change found for each moving window. Lemon peelTableBaseline3.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	12.64	4.57	11.00	11.00	67.07
10	7.93	2.07	0.00	4.00	67.07
15	3.07	5.36	1.00	1.00	67.07

Table 12: MAE of each algorithm for Lemon peelTableBaseline3.

1.4 Baseline4

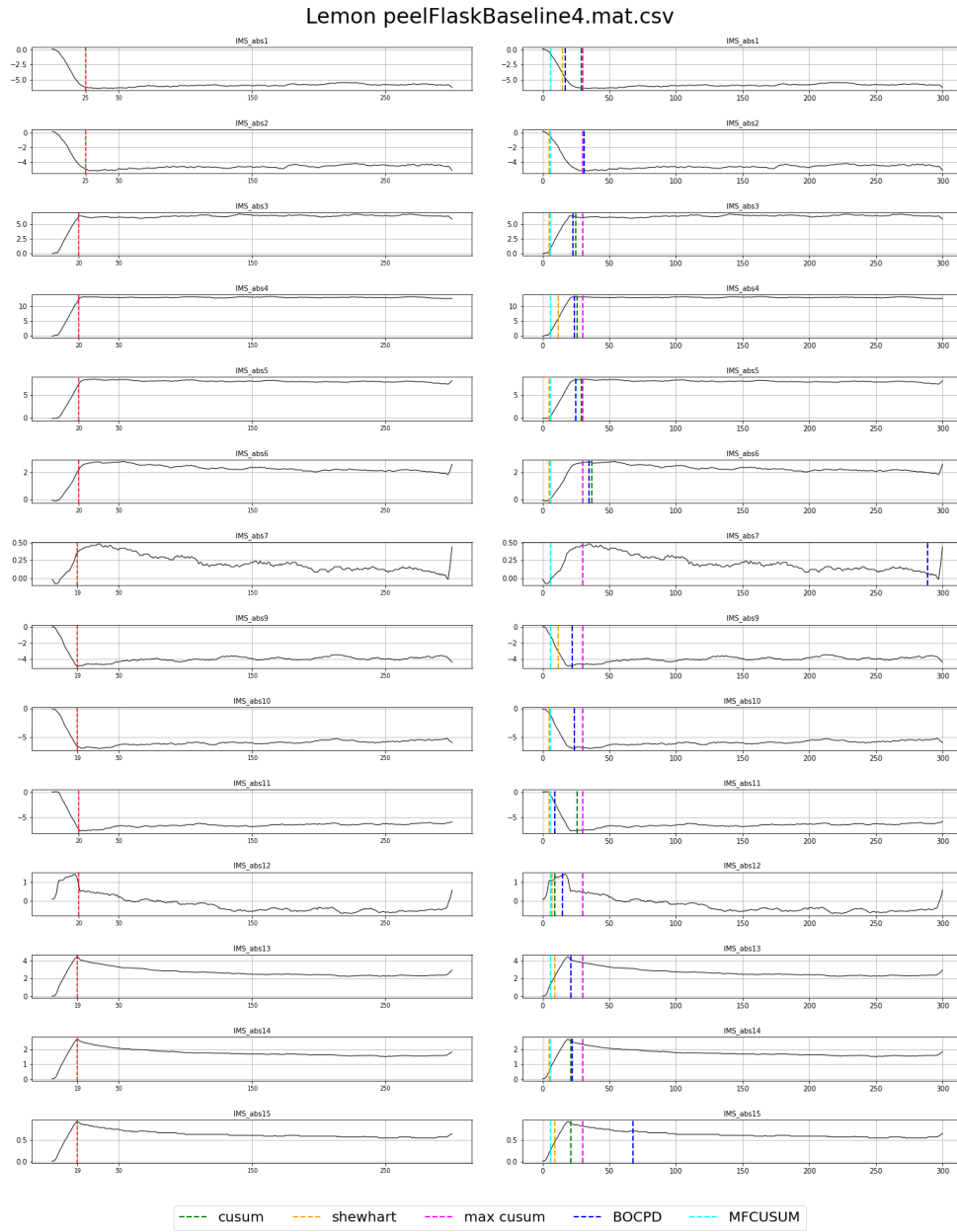


Figure 19: Lemon peelBaseline4. Window size 5.

Lemon peelFlaskBaseline4.mat.csv

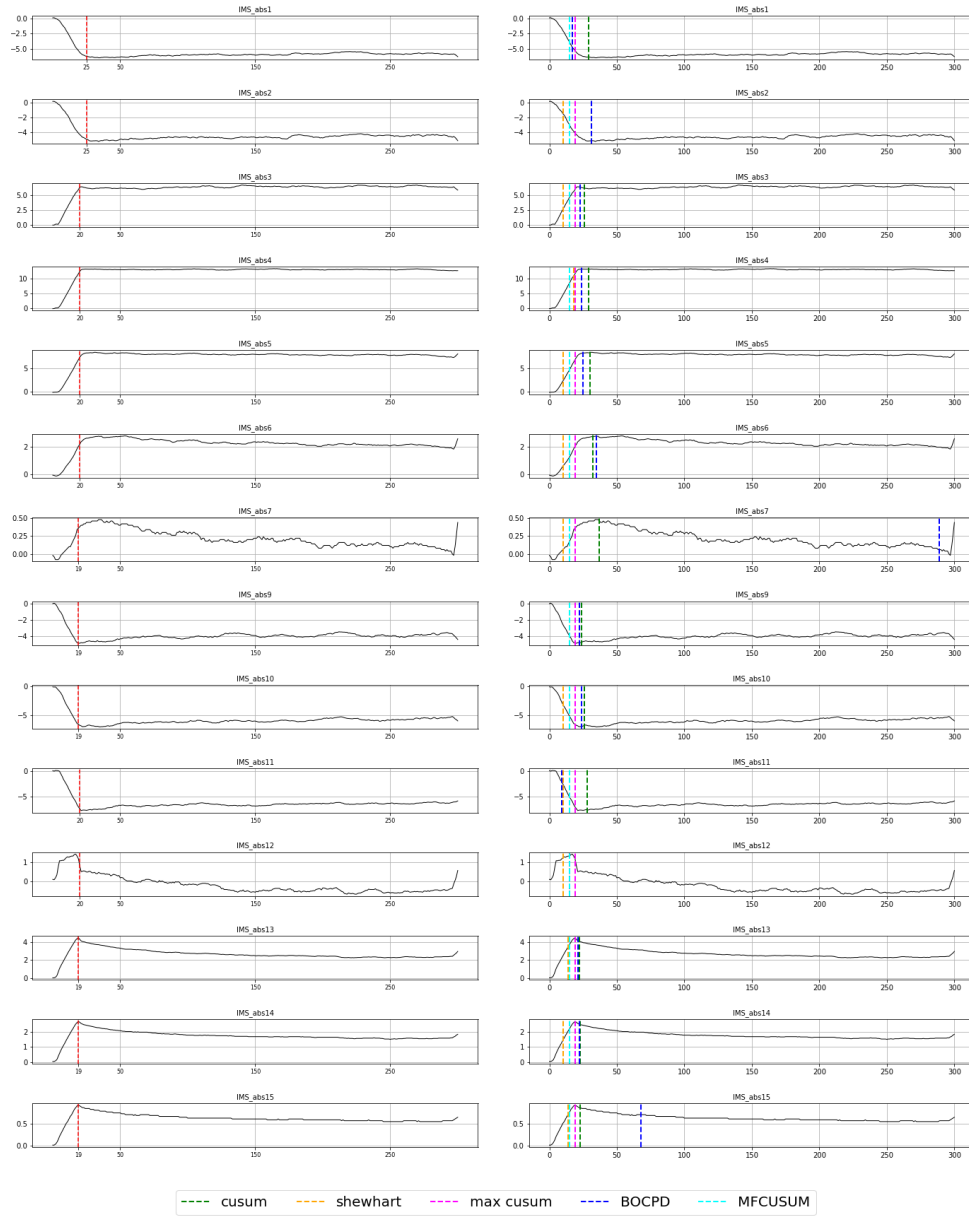


Figure 20: Lemon peelBaseline4. Window size 10.

Lemon peelBaseline4.mat.csv

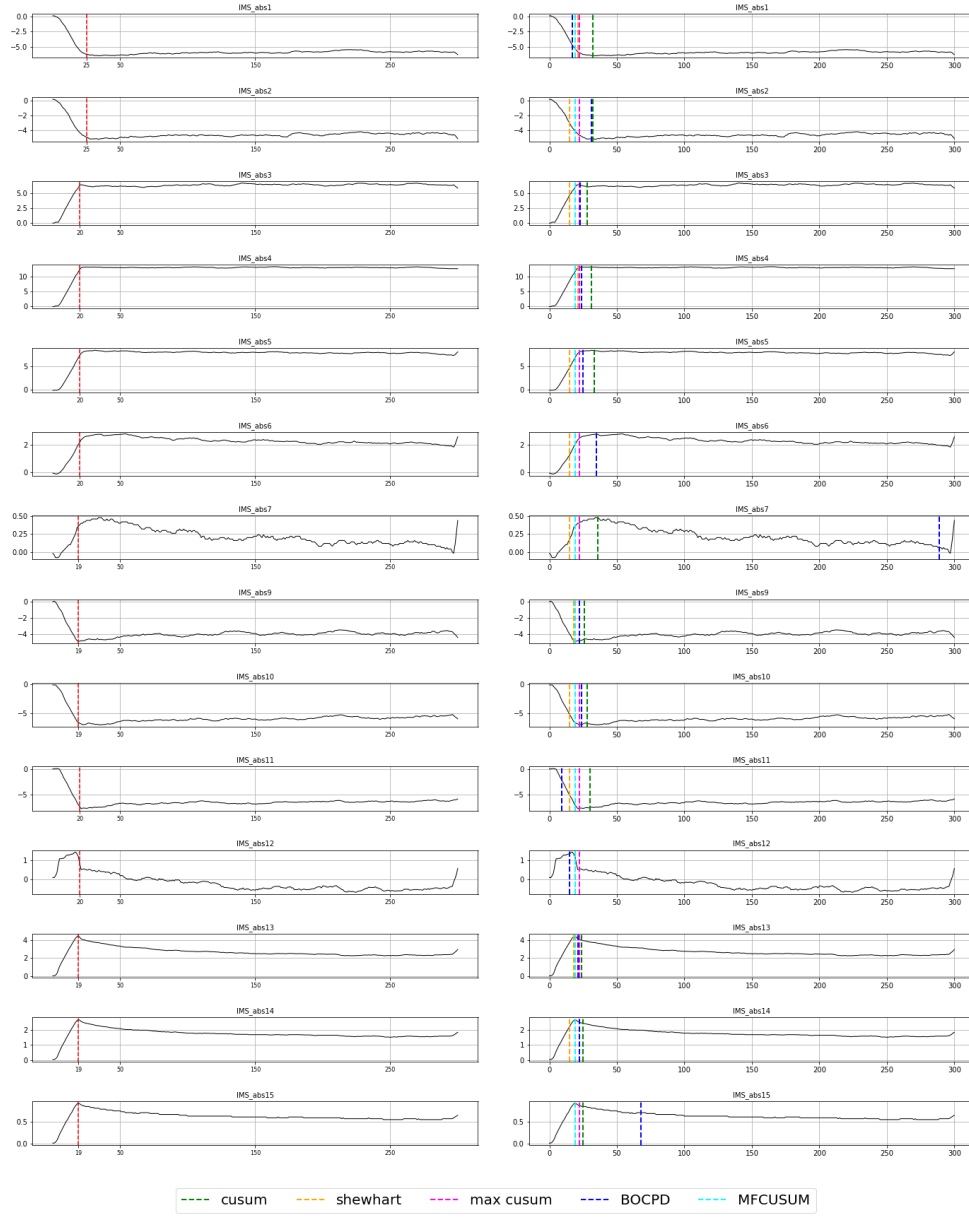


Figure 21: Lemon peelBaseline4. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	25	5	15	29	6	30	17
		10	19	29	15	19	17
		15	21	32	19	22	17
IMS_abs2	25	5	5	30	6	30	31
		10	10	31	15	19	31
		15	15	32	19	22	31
IMS_abs3	20	5	5	25	6	30	23
		10	10	26	15	19	23
		15	15	28	19	22	23
IMS_abs4	20	5	12	26	6	30	24
		10	18	29	15	19	24
		15	21	31	19	22	24
IMS_abs5	20	5	5	29	6	30	25
		10	10	30	15	19	25
		15	15	33	19	22	25
IMS_abs6	20	5	5	37	6	30	35
		10	10	32	15	19	35
		15	15	35	19	22	35
IMS_abs7	19	5	6	6	6	30	289
		10	10	37	15	19	289
		15	15	36	19	22	289
IMS_abs9	19	5	12	22	6	30	22
		10	15	24	15	19	22
		15	18	26	19	22	22
IMS_abs10	19	5	5	24	6	30	24
		10	10	26	15	19	24
		15	15	28	19	22	24
IMS_abs11	20	5	5	26	6	30	9
		10	10	28	15	19	9
		15	15	30	19	22	9
IMS_abs12	20	5	7	9	6	30	15
		10	10	15	15	19	15
		15	15	19	19	22	15
IMS_abs13	19	5	9	21	6	30	21
		10	14	22	15	19	21
		15	18	24	19	22	21
IMS_abs14	19	5	5	21	6	30	22
		10	10	23	15	19	22
		15	15	25	19	22	22
IMS_abs15	19	5	9	21	6	30	68
		10	14	23	15	19	68
		15	19	25	19	22	68
mean run time (sec)			2.276e-03	7.001e-03	1.740e-04	9.636e-04	1.181e-01
mean relative run time			13.078	40.223	1.000	5.537	678.783

Table 13: Change found for each moving window. Lemon peelFlaskBaseline4.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	12.79	6.43	14.29	9.71	27.79
10	8.14	7.21	5.29	1.29	27.79
15	3.86	8.71	1.29	2.57	27.79

Table 14: MAE of each algorithm for Lemon peelFlaskBaseline4.

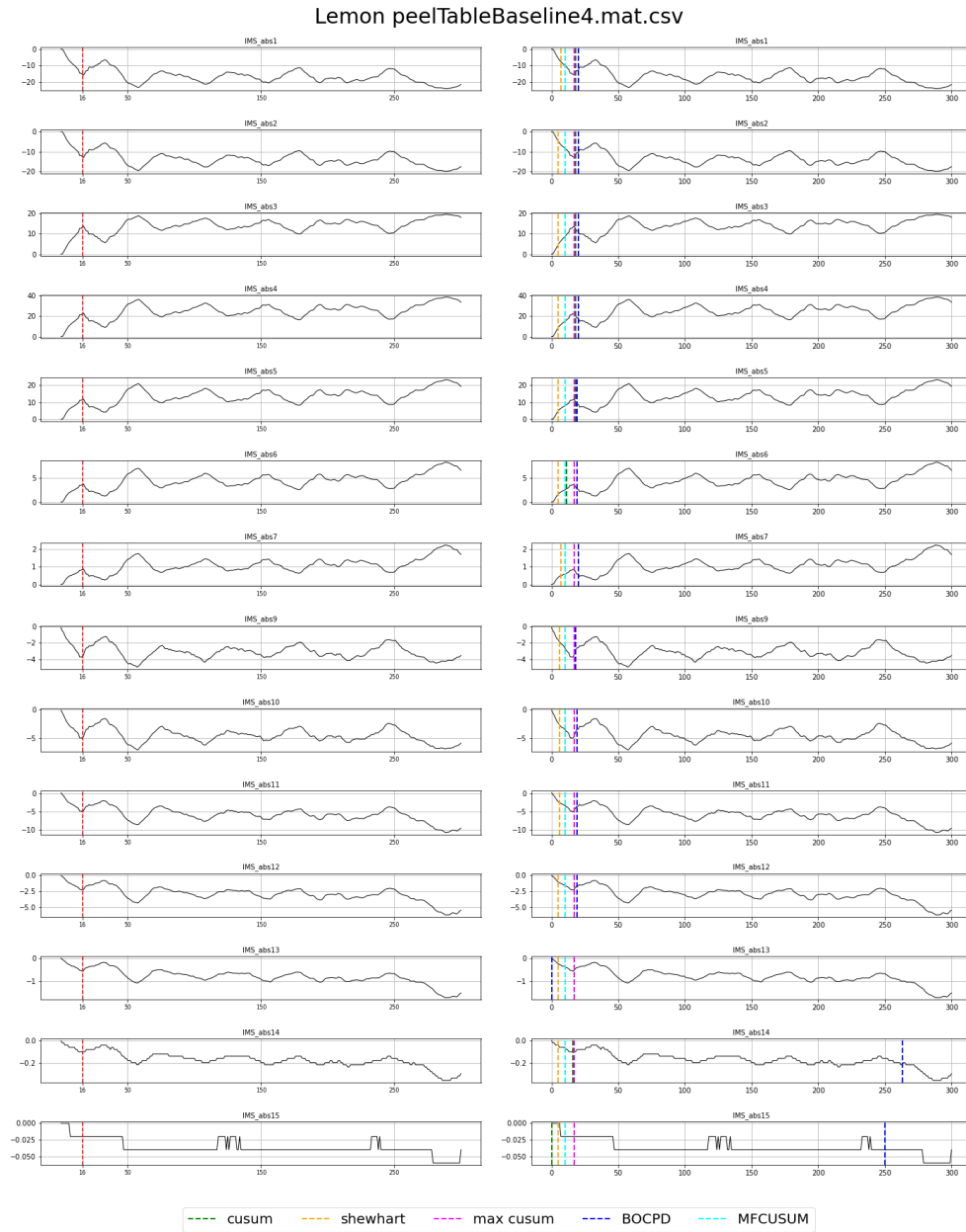


Figure 22: Lemon peelBaseline4. Window size 5.

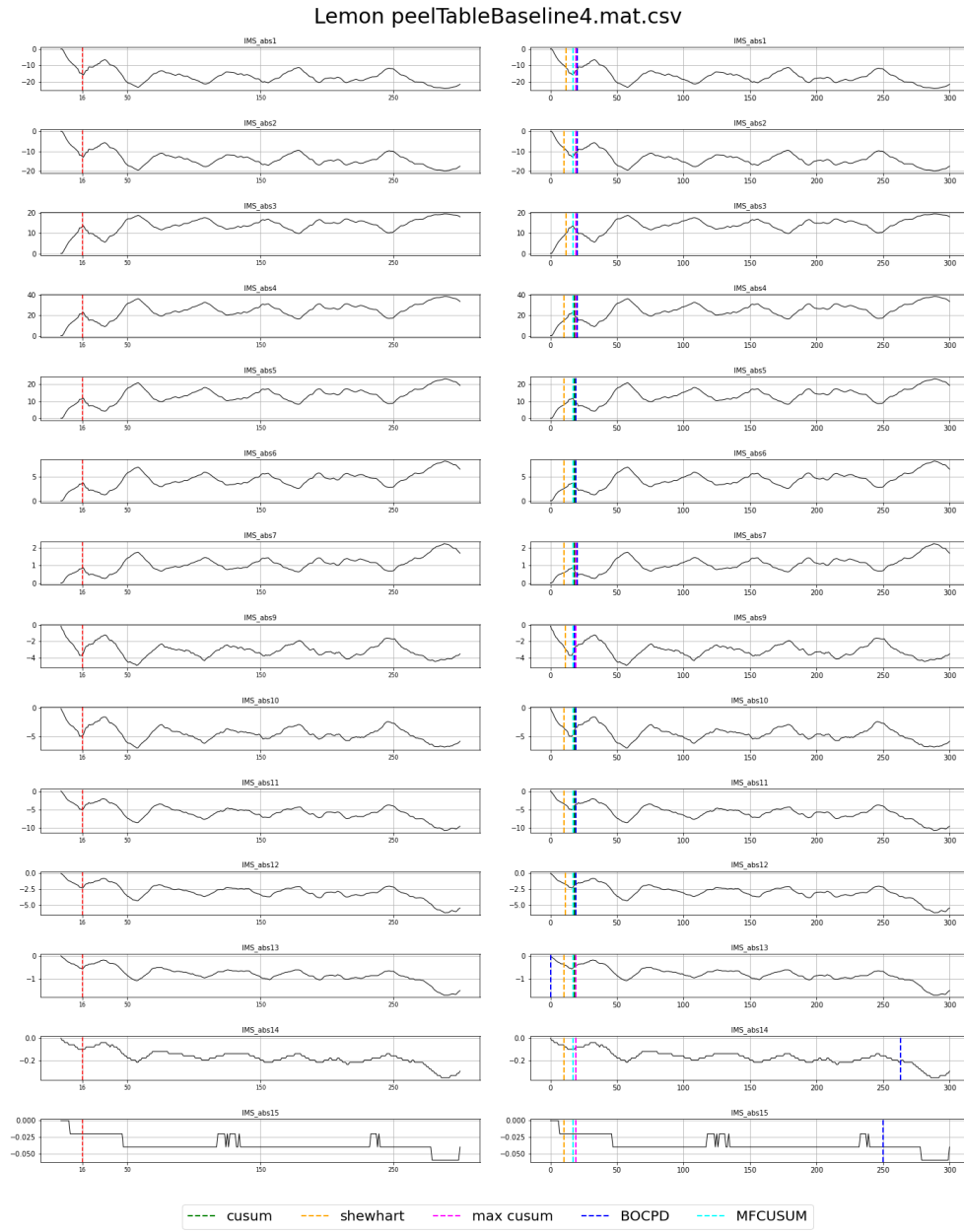


Figure 23: Lemon peelBaseline4. Window size 10.

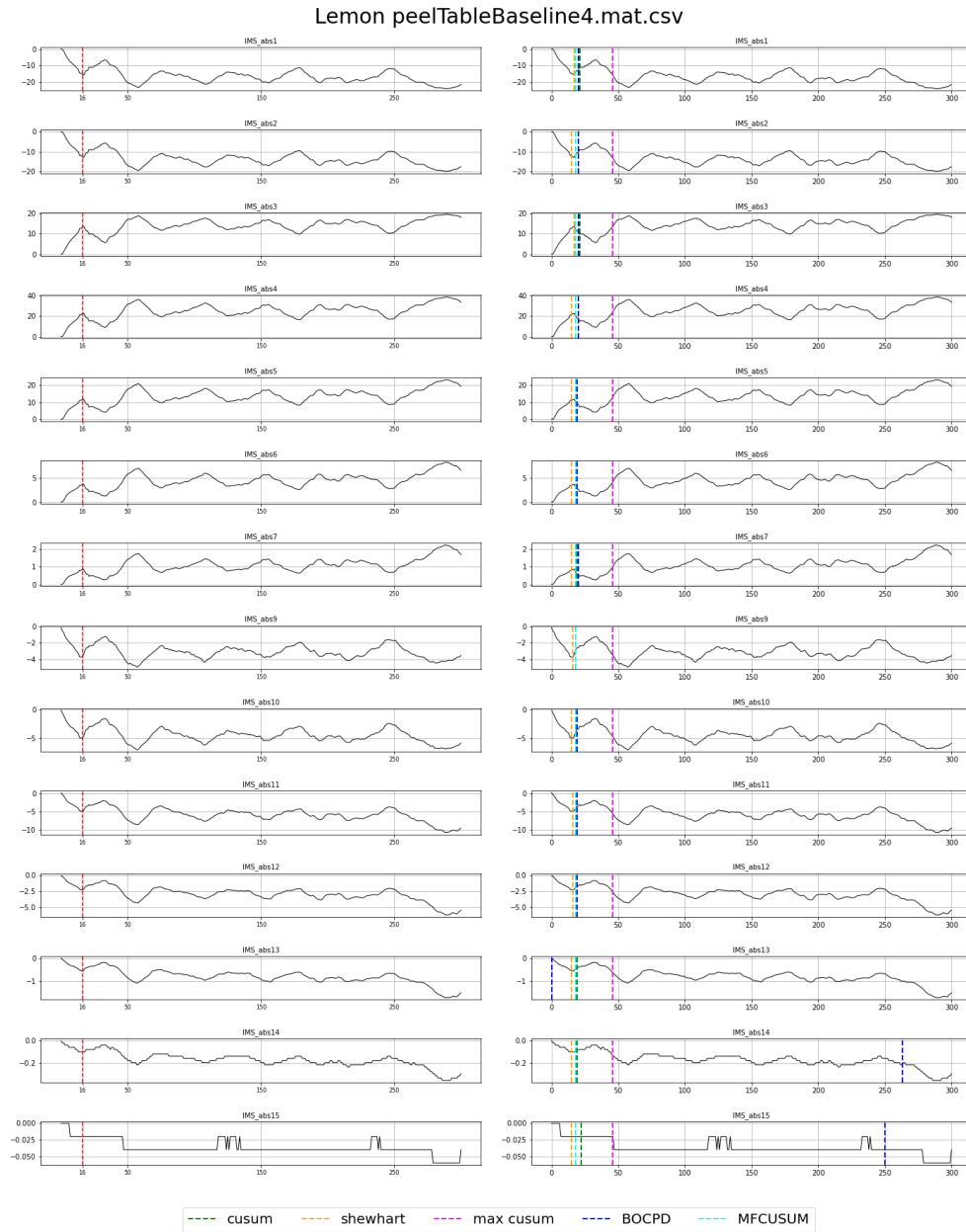


Figure 24: Lemon peelBaseline4. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	16	5	7	18	10	17	20
		10	12	19	17	19	20
		15	17	21	18	46	20
IMS_abs2	16	5	5	18	10	17	20
		10	10	19	17	19	20
		15	15	20	18	46	20
IMS_abs3	16	5	5	18	10	17	20
		10	12	19	17	19	20
		15	17	21	18	46	20
IMS_abs4	16	5	5	18	10	17	20
		10	10	18	17	19	20
		15	15	20	18	46	20
IMS_abs5	16	5	5	18	10	17	19
		10	10	18	17	19	19
		15	15	19	18	46	19
IMS_abs6	16	5	5	11	10	17	19
		10	10	18	17	19	19
		15	15	19	18	46	19
IMS_abs7	16	5	7	10	10	17	20
		10	10	18	17	19	20
		15	15	19	18	46	20
IMS_abs9	16	5	6	17	10	17	18
		10	11	18	17	19	18
		15	16	18	18	46	18
IMS_abs10	16	5	6	10	10	17	19
		10	10	18	17	19	19
		15	15	18	18	46	19
IMS_abs11	16	5	6	10	10	17	19
		10	10	18	17	19	19
		15	16	19	18	46	19
IMS_abs12	16	5	5	17	10	17	19
		10	11	18	17	19	19
		15	16	19	18	46	19
IMS_abs13	16	5	5	17	10	17	0
		10	10	18	17	19	0
		15	15	19	18	46	0
IMS_abs14	16	5	5	16	10	17	263
		10	10	19	17	19	263
		15	15	19	18	46	263
IMS_abs15	16	5	5	0	10	17	250
		10	10	17	17	19	250
		15	15	22	18	46	250
mean run time (sec)			1.351e-03	6.019e-03	2.016e-04	1.035e-03	2.179e-01
mean relative run time			6.700	29.854	1.000	5.134	1080.855

Table 15: Change found for each moving window. Lemon peelTableBaseline4.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	10.50	3.71	6.00	1.00	38.14
10	5.57	2.21	1.00	3.00	38.14
15	0.79	3.50	2.00	30.00	38.14

Table 16: MAE of each algorithm for Lemon peelTableBaseline4.

1.5 Baseline5

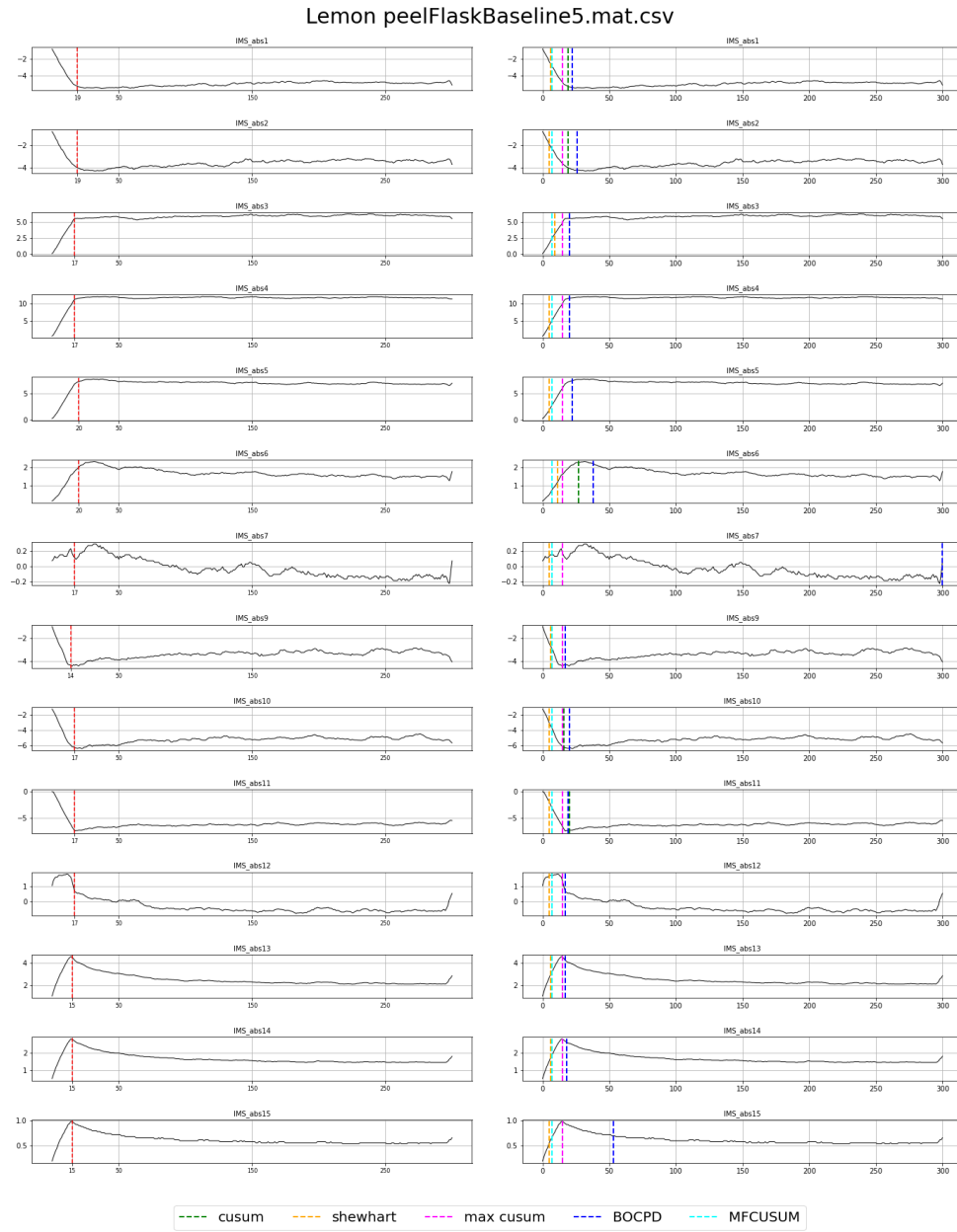


Figure 25: Lemon peelBaseline5. Window size 5.

Lemon peelFlaskBaseline5.mat.csv

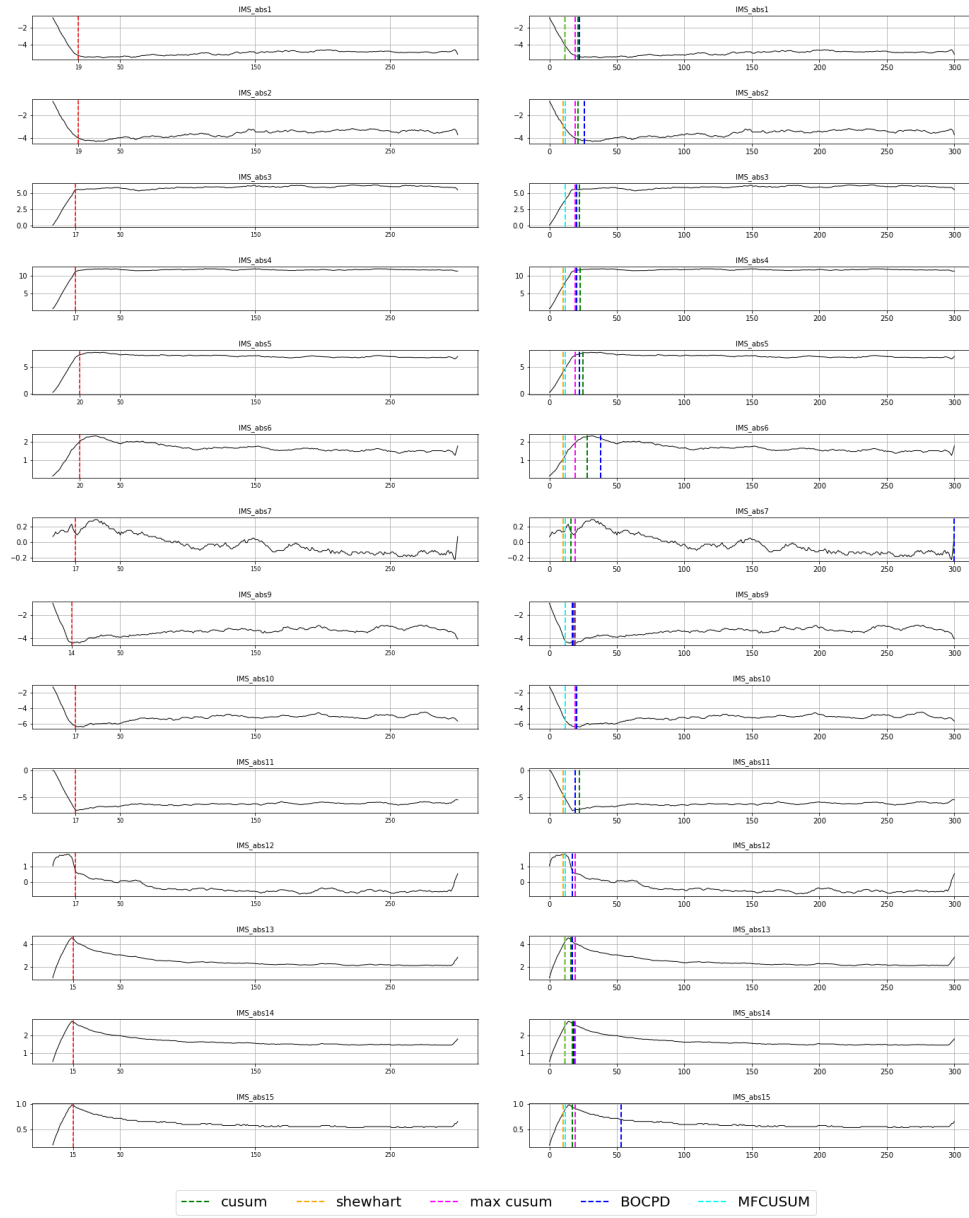


Figure 26: Lemon peelBaseline5. Window size 10.

Lemon peelFlaskBaseline5.mat.csv

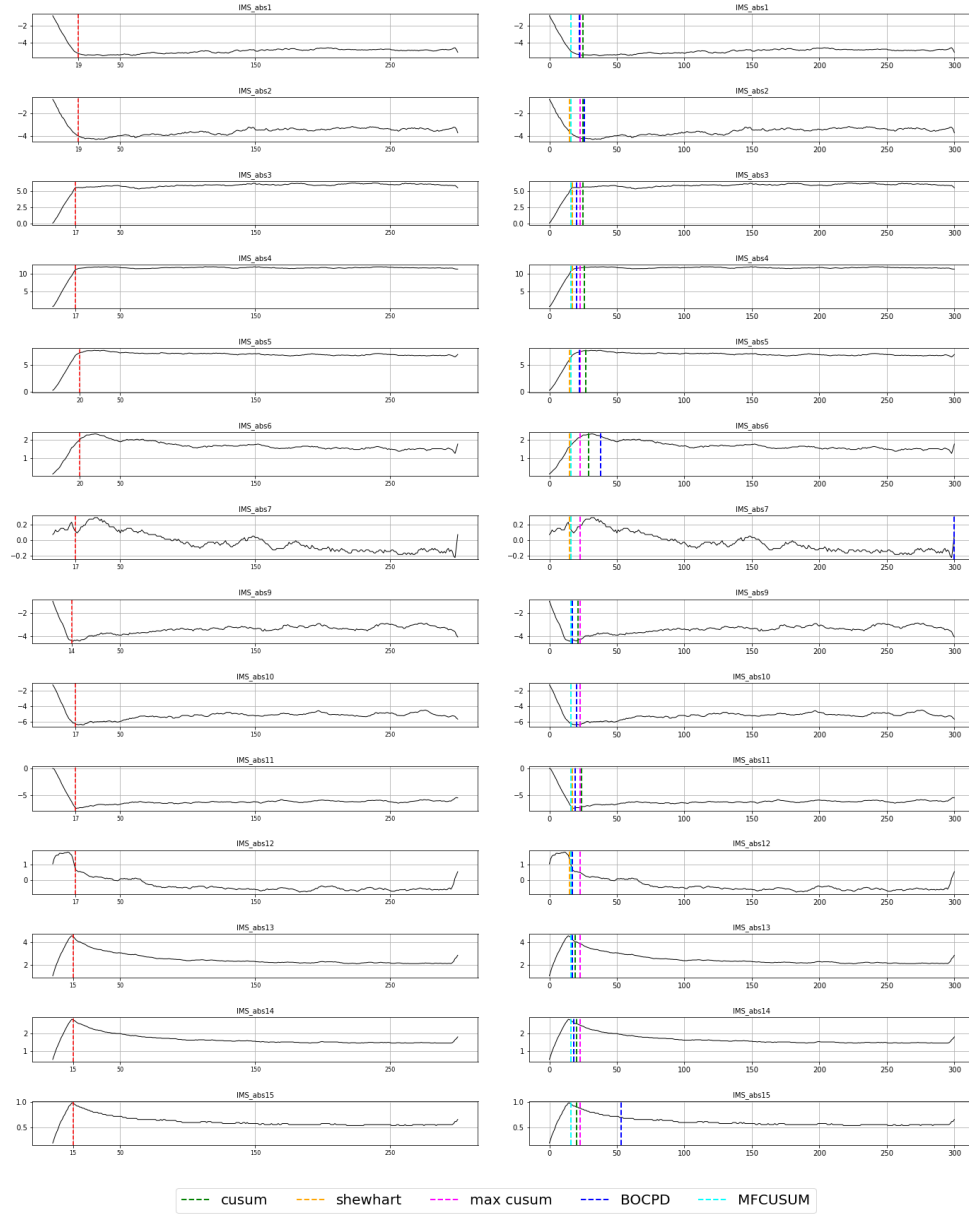


Figure 27: Lemon peelBaseline5. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	19	5	6	19	7	15	22
		10	11	21	12	19	22
		15	16	25	16	23	22
IMS_abs2	19	5	5	19	7	15	26
		10	10	21	12	19	26
		15	15	25	16	23	26
IMS_abs3	17	5	9	20	7	15	20
		10	12	22	12	19	20
		15	17	25	16	23	20
IMS_abs4	17	5	5	20	7	15	20
		10	10	23	12	19	20
		15	17	26	16	23	20
IMS_abs5	20	5	5	22	7	15	22
		10	10	25	12	19	22
		15	15	27	16	23	22
IMS_abs6	20	5	11	27	7	15	38
		10	10	28	12	19	38
		15	15	29	16	23	38
IMS_abs7	17	5	5	7	7	15	300
		10	10	16	12	19	300
		15	15	16	16	23	300
IMS_abs9	14	5	6	15	7	15	17
		10	12	18	12	19	17
		15	16	21	16	23	17
IMS_abs10	17	5	5	16	7	15	20
		10	12	19	12	19	20
		15	16	23	16	23	20
IMS_abs11	17	5	5	20	7	15	19
		10	10	22	12	19	19
		15	17	24	16	23	19
IMS_abs12	17	5	5	7	7	15	17
		10	10	12	12	19	17
		15	15	16	16	23	17
IMS_abs13	15	5	6	15	7	15	17
		10	11	16	12	19	17
		15	16	19	16	23	17
IMS_abs14	15	5	6	15	7	15	18
		10	11	17	12	19	18
		15	16	20	16	23	18
IMS_abs15	15	5	5	15	7	15	53
		10	10	17	12	19	53
		15	16	20	16	23	53
mean run time (sec)			1.131e-03	3.870e-03	2.293e-04	7.357e-04	1.264e-01
mean relative run time			4.932	16.879	1.000	3.209	551.400

Table 17: Change found for each moving window. Lemon peelFlaskBaseline5.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	11.07	2.86	10.07	2.21	26.43
10	6.43	3.57	5.07	2.21	26.43
15	1.93	5.79	1.79	5.93	26.43

Table 18: MAE of each algorithm for Lemon peelFlaskBaseline5.

Lemon peelTableBaseline5.mat.csv

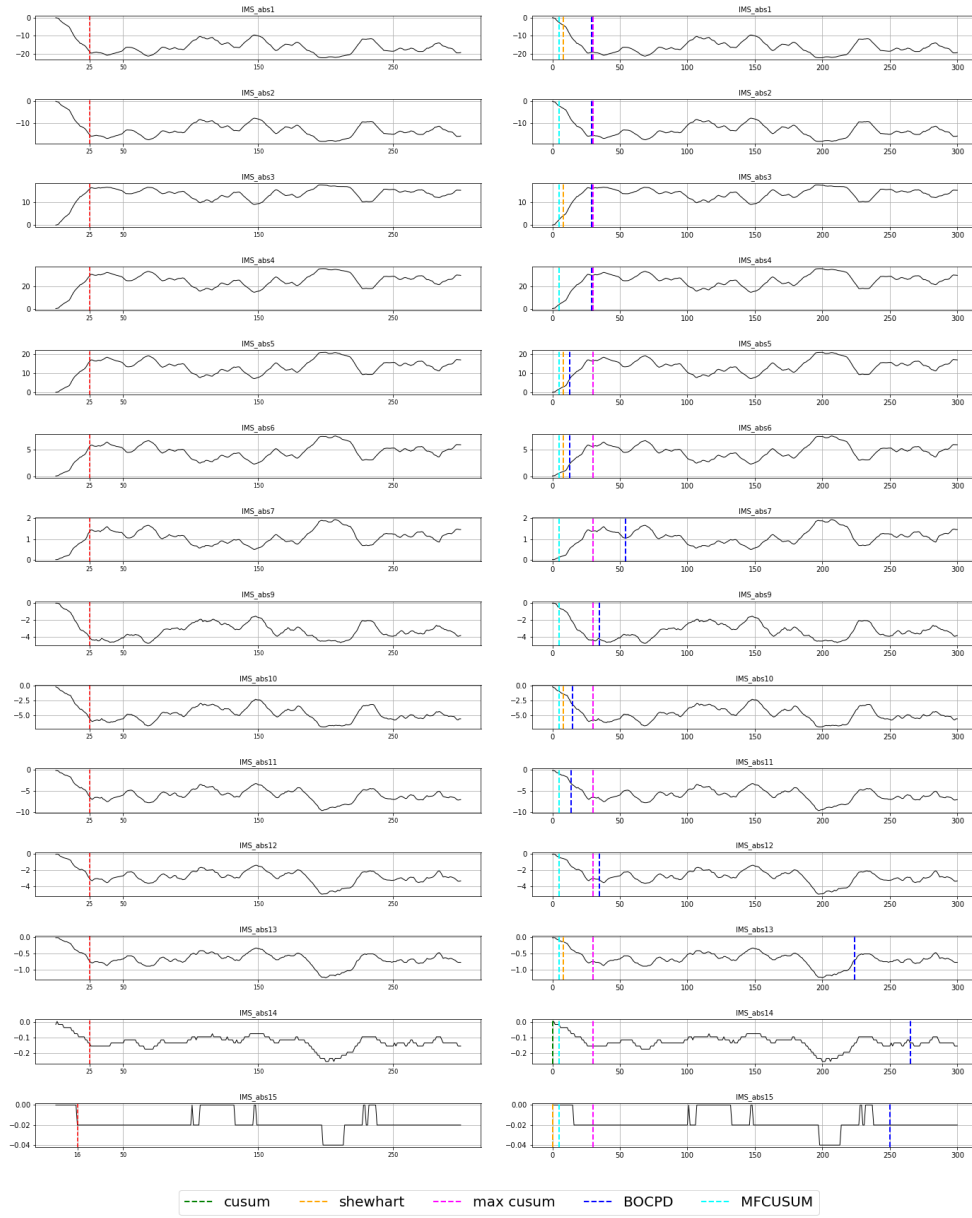


Figure 28: Lemon peelBaseline5. Window size 5.

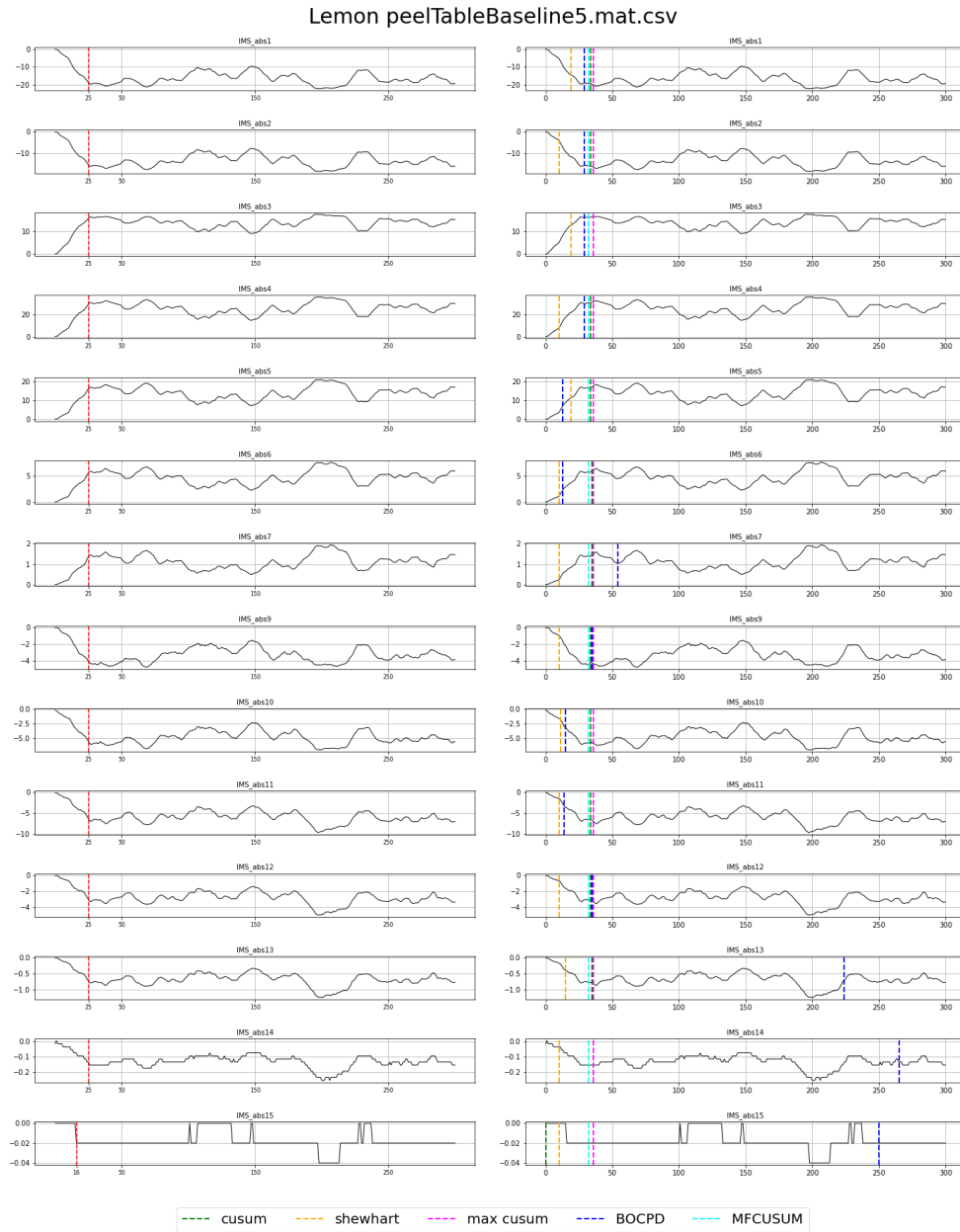


Figure 29: Lemon peelBaseline5. Window size 10.

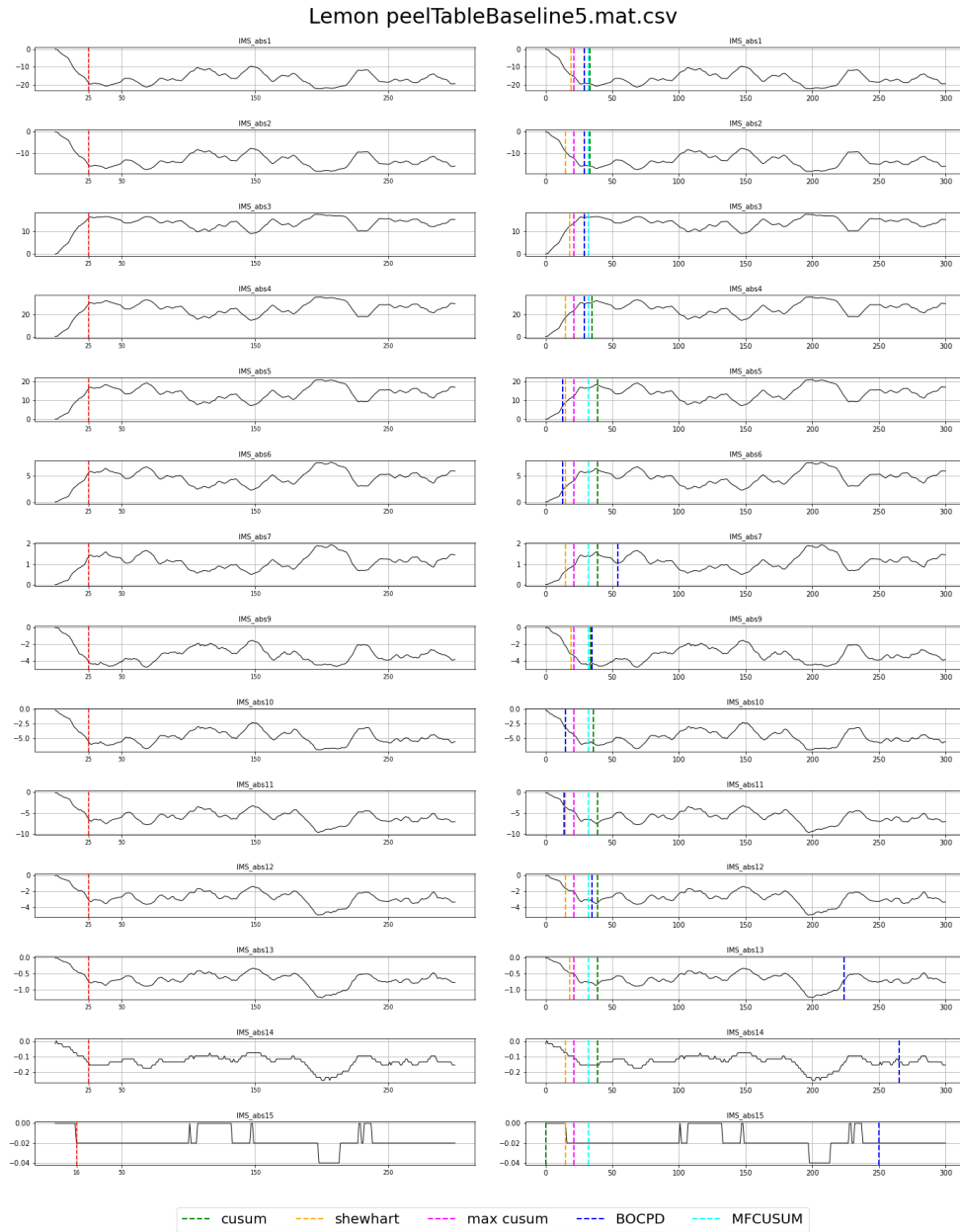


Figure 30: Lemon peelBaseline5. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	25	5	8	30	5	30	29
		10	19	34	32	36	29
		15	19	33	32	21	29
IMS_abs2	25	5	5	30	5	30	29
		10	10	34	32	36	29
		15	15	33	32	21	29
IMS_abs3	25	5	8	29	5	30	29
		10	19	32	32	36	29
		15	18	32	32	21	29
IMS_abs4	25	5	5	30	5	30	29
		10	10	34	32	36	29
		15	15	35	32	21	29
IMS_abs5	25	5	8	30	5	30	13
		10	19	34	32	36	13
		15	15	39	32	21	13
IMS_abs6	25	5	8	30	5	30	13
		10	10	35	32	36	13
		15	15	39	32	21	13
IMS_abs7	25	5	5	30	5	30	54
		10	10	35	32	36	54
		15	15	39	32	21	54
IMS_abs9	25	5	5	30	5	30	35
		10	10	34	32	36	35
		15	19	34	32	21	35
IMS_abs10	25	5	8	30	5	30	15
		10	11	34	32	36	15
		15	15	36	32	21	15
IMS_abs11	25	5	5	30	5	30	14
		10	10	34	32	36	14
		15	15	39	32	21	14
IMS_abs12	25	5	5	30	5	30	35
		10	10	34	32	36	35
		15	15	39	32	21	35
IMS_abs13	25	5	8	30	5	30	224
		10	15	35	32	36	224
		15	18	39	32	21	224
IMS_abs14	25	5	5	0	5	30	265
		10	10	36	32	36	265
		15	15	39	32	21	265
IMS_abs15	16	5	0	0	5	30	250
		10	10	0	32	36	250
		15	15	0	32	21	250
mean run time (sec)			6.286e-03	1.596e-02	3.594e-04	1.079e-03	2.041e-01
mean relative run time			17.492	44.405	1.000	3.003	567.819

Table 19: Change found for each moving window. Lemon peelTableBaseline5.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	18.43	7.14	19.36	5.64	55.93
10	12.00	9.71	7.64	11.64	55.93
15	8.36	11.93	7.64	4.07	55.93

Table 20: MAE of each algorithm for Lemon peelTableBaseline5.

2 Vanilla

2.1 Baseline1

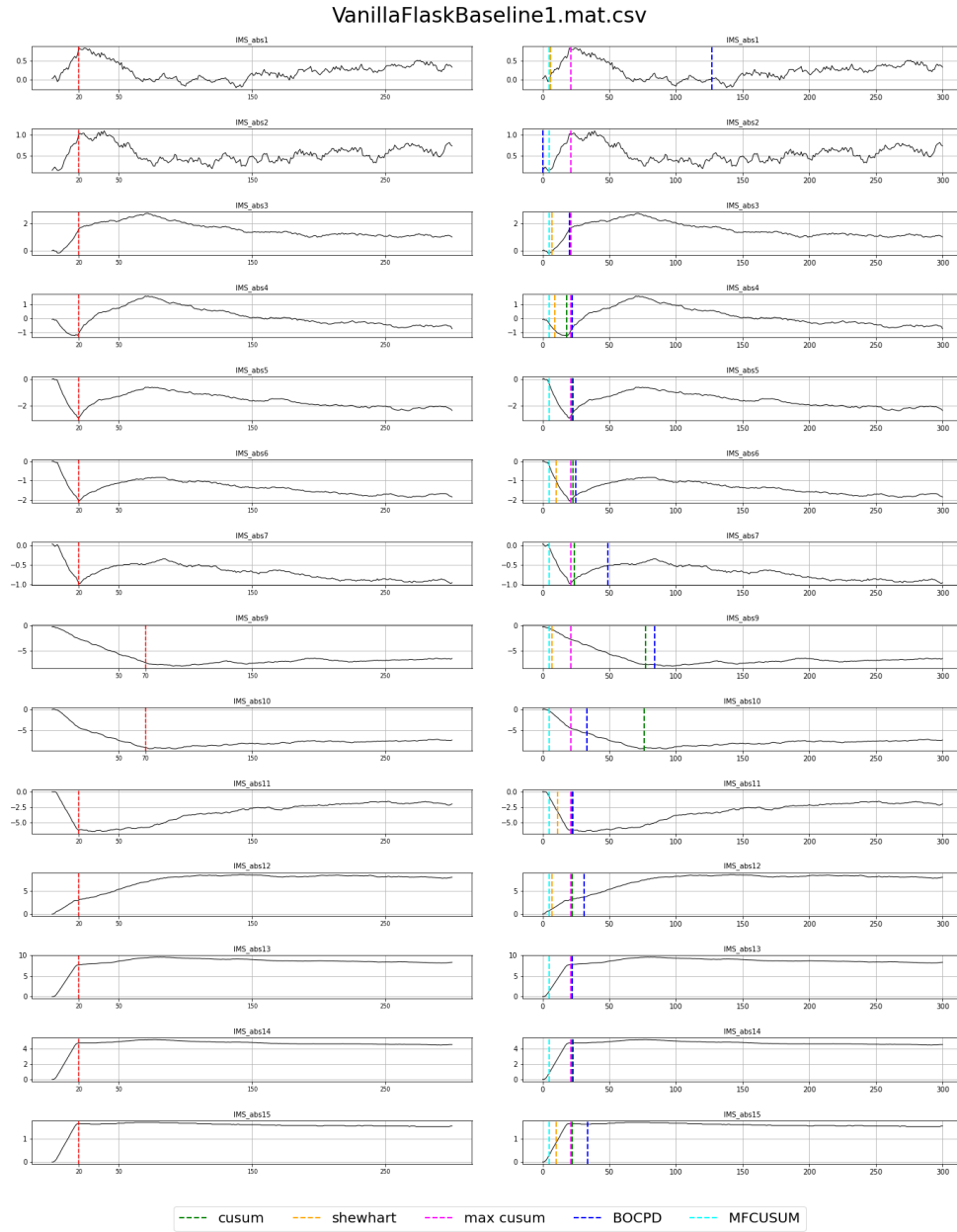


Figure 31: VanillaBaseline1. Window size 5.

VanillaFlaskBaseline1.mat.csv

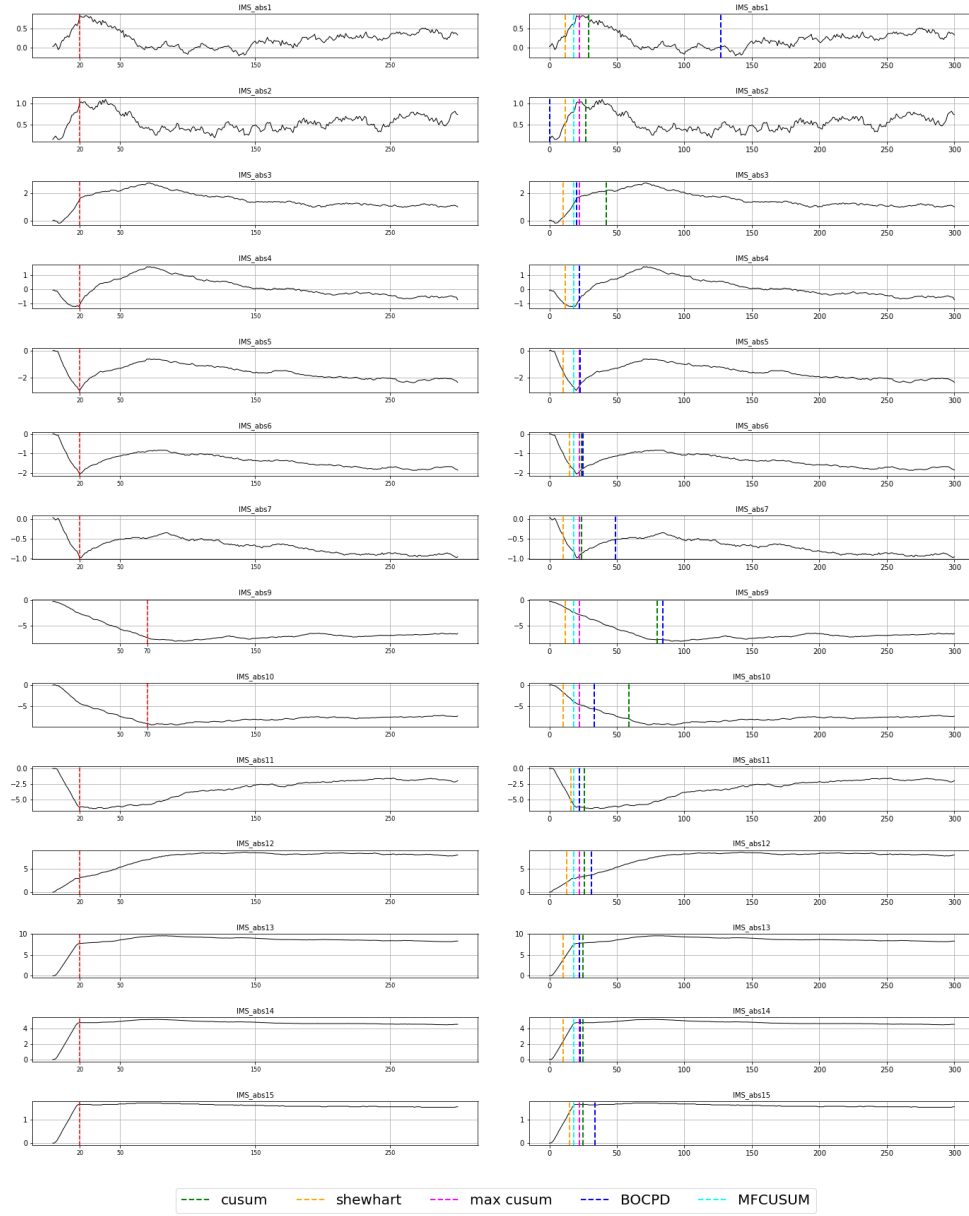


Figure 32: VanillaBaseline1. Window size 10.

VanillaFlaskBaseline1.mat.csv

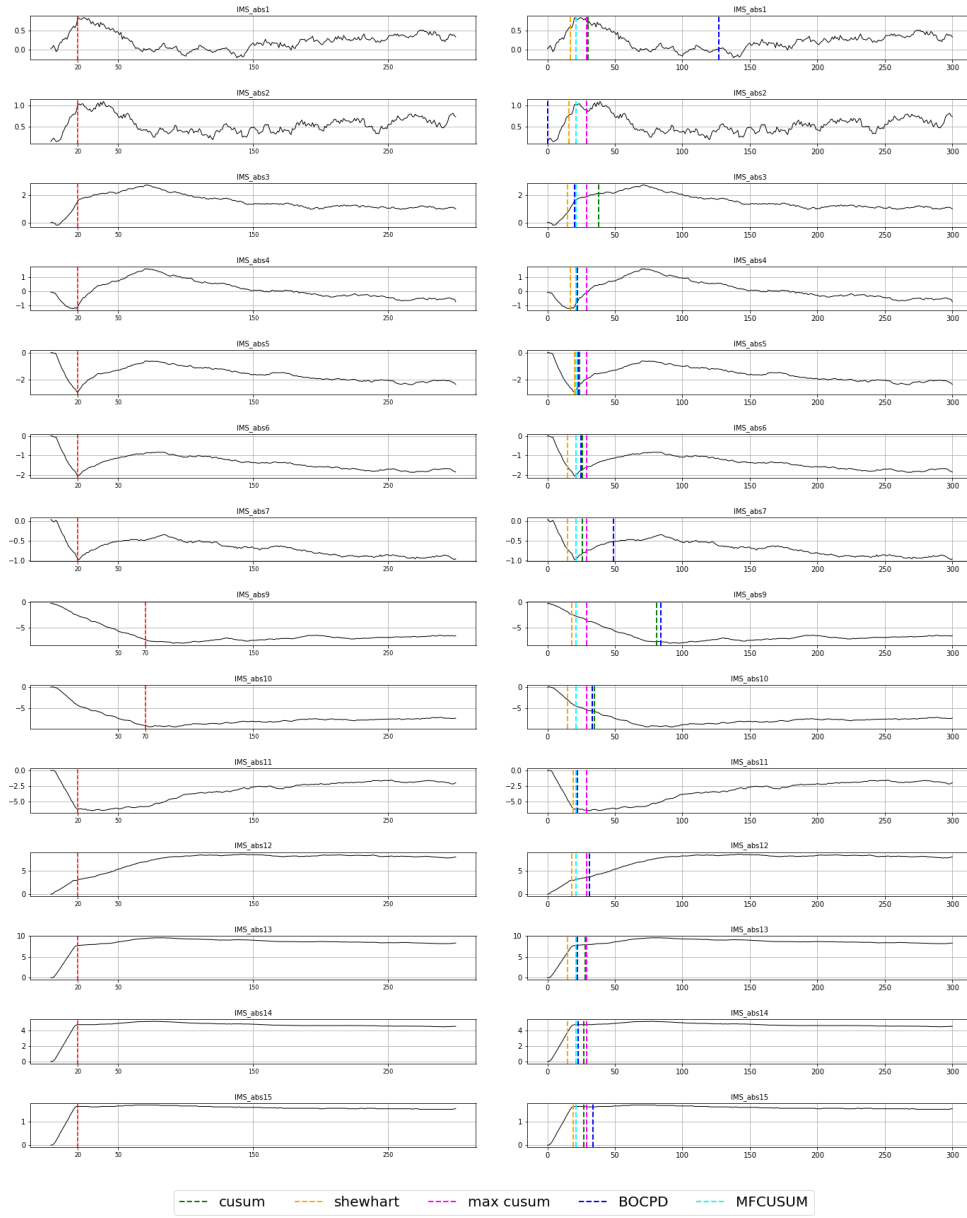


Figure 33: VanillaBaseline1. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	20	5	6	6	5	21	127
		10	12	29	18	22	127
		15	17	30	21	29	127
IMS_abs2	20	5	0	0	5	21	0
		10	12	27	18	22	0
		15	16	29	21	29	0
IMS_abs3	20	5	7	7	5	21	20
		10	10	42	18	22	20
		15	15	38	21	29	20
IMS_abs4	20	5	9	18	5	21	22
		10	12	18	18	22	22
		15	17	21	21	29	22
IMS_abs5	20	5	5	22	5	21	23
		10	10	22	18	22	23
		15	20	24	21	29	23
IMS_abs6	20	5	10	23	5	21	25
		10	15	24	18	22	25
		15	15	26	21	29	25
IMS_abs7	20	5	5	24	5	21	49
		10	10	24	18	22	49
		15	15	26	21	29	49
IMS_abs9	70	5	7	77	5	21	84
		10	12	80	18	22	84
		15	18	81	21	29	84
IMS_abs10	70	5	5	76	5	21	33
		10	10	59	18	22	33
		15	15	35	21	29	33
IMS_abs11	20	5	11	23	5	21	22
		10	16	26	18	22	22
		15	19	29	21	29	22
IMS_abs12	20	5	7	22	5	21	31
		10	13	26	18	22	31
		15	18	29	21	29	31
IMS_abs13	20	5	5	22	5	21	22
		10	10	25	18	22	22
		15	15	28	21	29	22
IMS_abs14	20	5	5	22	5	21	23
		10	10	25	18	22	23
		15	15	27	21	29	23
IMS_abs15	20	5	10	22	5	21	34
		10	15	25	18	22	34
		15	19	27	21	29	34
mean run time (sec)			3.878e-03	8.882e-03	1.975e-04	8.953e-04	1.536e-01
mean relative run time			19.635	44.974	1.000	4.534	777.984

Table 21: Change found for each moving window. VanillaFlaskBaseline1.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	20.57	5.86	22.14	7.86	17.79
10	15.21	7.00	9.14	8.57	17.79
15	10.43	10.00	7.86	13.57	17.79

Table 22: MAE of each algorithm for VanillaFlaskBaseline1.

VanillaTableBaseline1.mat.csv

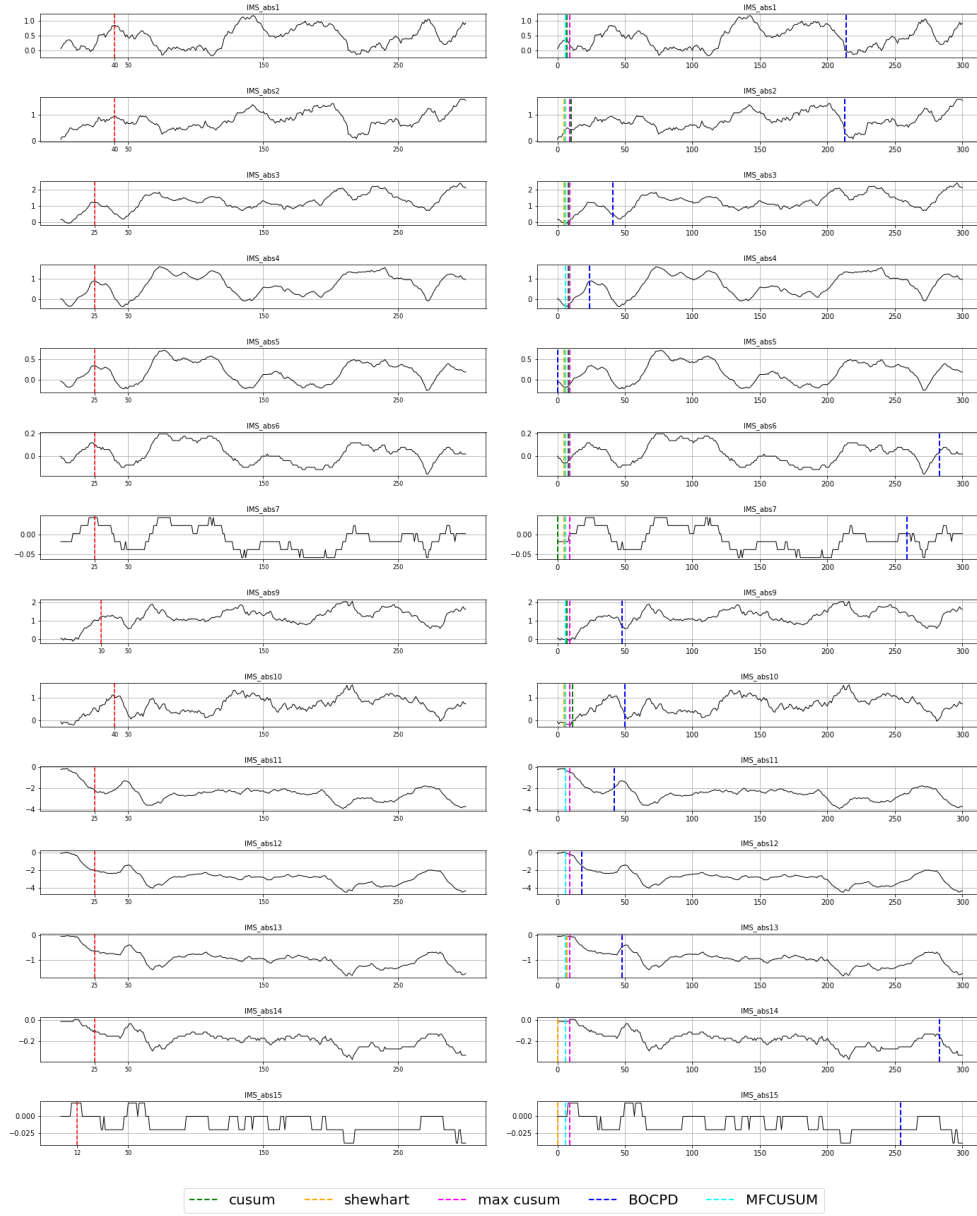


Figure 34: VanillaBaseline1. Window size 5.

VanillaTableBaseline1.mat.csv

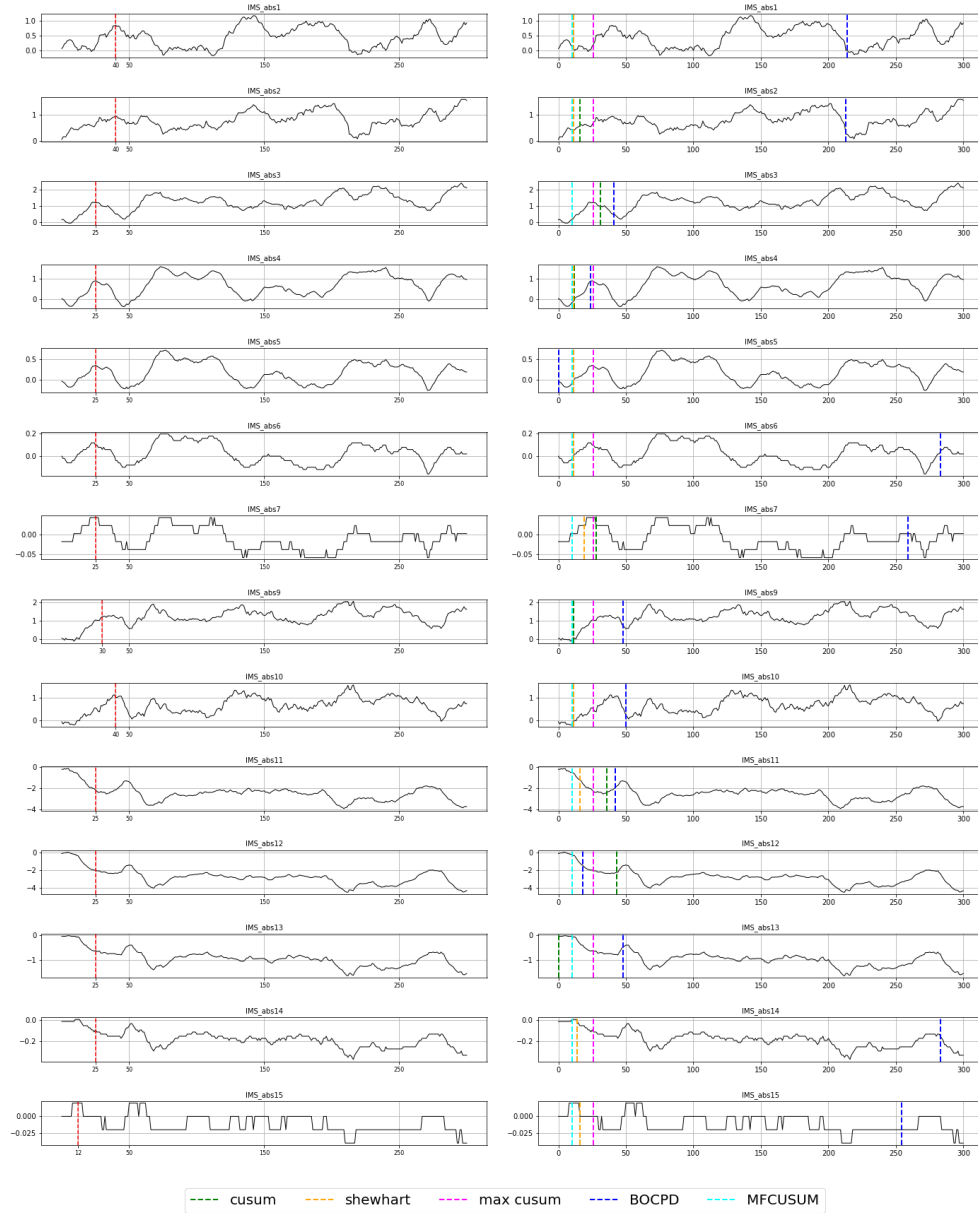


Figure 35: VanillaBaseline1. Window size 10.

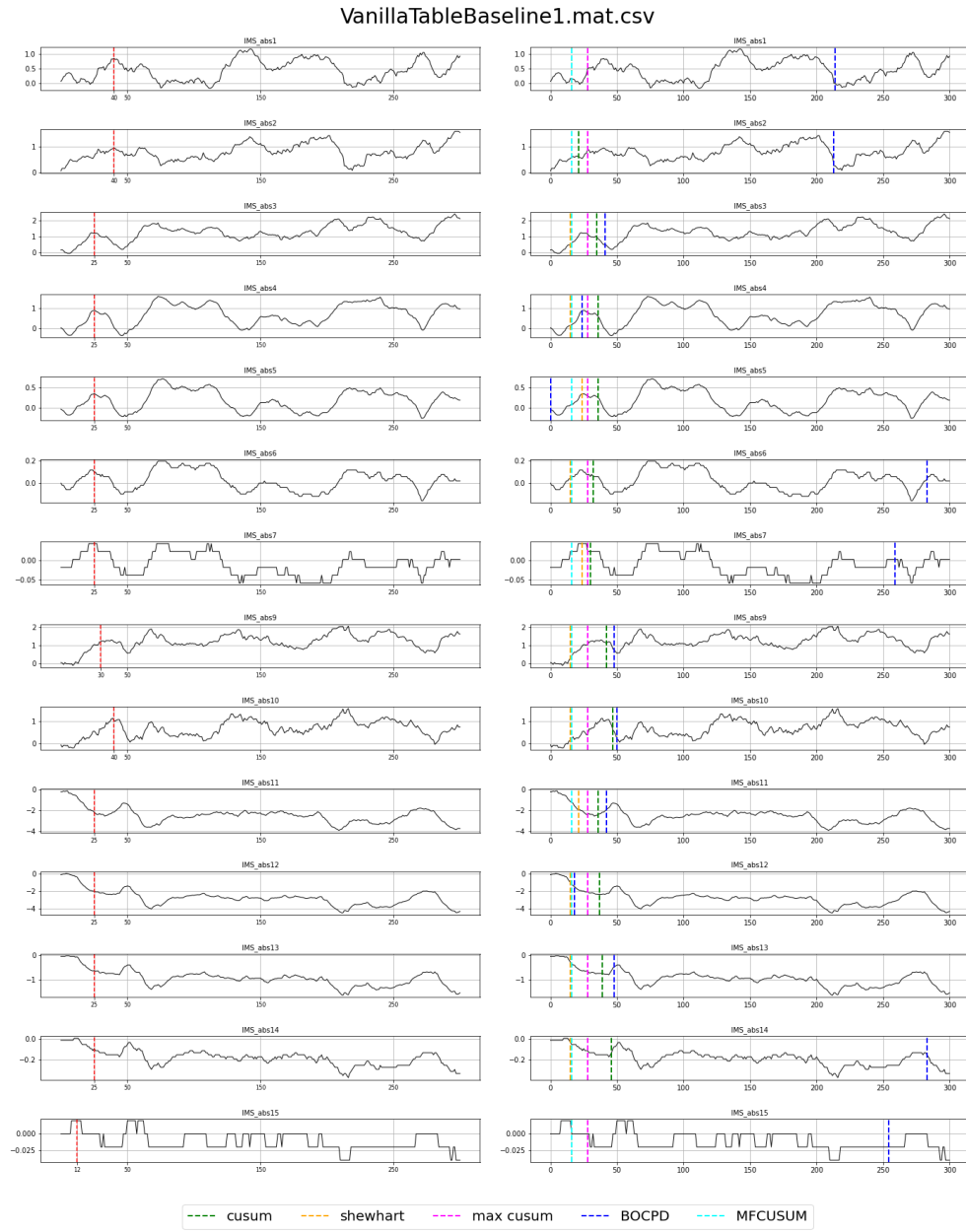


Figure 36: VanillaBaseline1. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	40	5	6	7	6	9	214
		10	11	11	10	26	214
		15	16	16	16	28	214
IMS_abs2	40	5	5	10	6	9	213
		10	11	16	10	26	213
		15	16	21	16	28	213
IMS_abs3	25	5	5	8	6	9	41
		10	10	31	10	26	41
		15	15	35	16	28	41
IMS_abs4	25	5	6	8	6	9	24
		10	11	12	10	26	24
		15	15	36	16	28	24
IMS_abs5	25	5	5	8	6	9	0
		10	11	11	10	26	0
		15	24	36	16	28	0
IMS_abs6	25	5	5	8	6	9	283
		10	11	11	10	26	283
		15	15	32	16	28	283
IMS_abs7	25	5	5	0	6	9	259
		10	19	28	10	26	259
		15	24	30	16	28	259
IMS_abs9	30	5	6	7	6	9	48
		10	10	11	10	26	48
		15	15	42	16	28	48
IMS_abs10	40	5	5	11	6	9	50
		10	11	11	10	26	50
		15	15	47	16	28	50
IMS_abs11	25	5	6	6	6	9	42
		10	16	36	10	26	42
		15	21	36	16	28	42
IMS_abs12	25	5	6	6	6	9	18
		10	10	43	10	26	18
		15	15	37	16	28	18
IMS_abs13	25	5	7	7	6	9	48
		10	10	0	10	26	48
		15	15	39	16	28	48
IMS_abs14	25	5	0	0	6	9	283
		10	14	14	10	26	283
		15	15	46	16	28	283
IMS_abs15	12	5	0	0	6	9	254
		10	16	16	10	26	254
		15	16	16	16	28	254
mean run time (sec)			5.858e-03	1.225e-02	1.220e-04	7.465e-04	4.416e-01
mean relative run time			48.019	100.423	1.000	6.119	3619.913

Table 23: Change found for each moving window. VanillaTableBaseline1.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	22.86	21.50	21.64	18.64	104.00
10	16.00	15.71	17.64	4.93	104.00
15	11.29	12.00	12.21	5.79	104.00

Table 24: MAE of each algorithm for VanillaTableBaseline1.

2.2 Baseline2

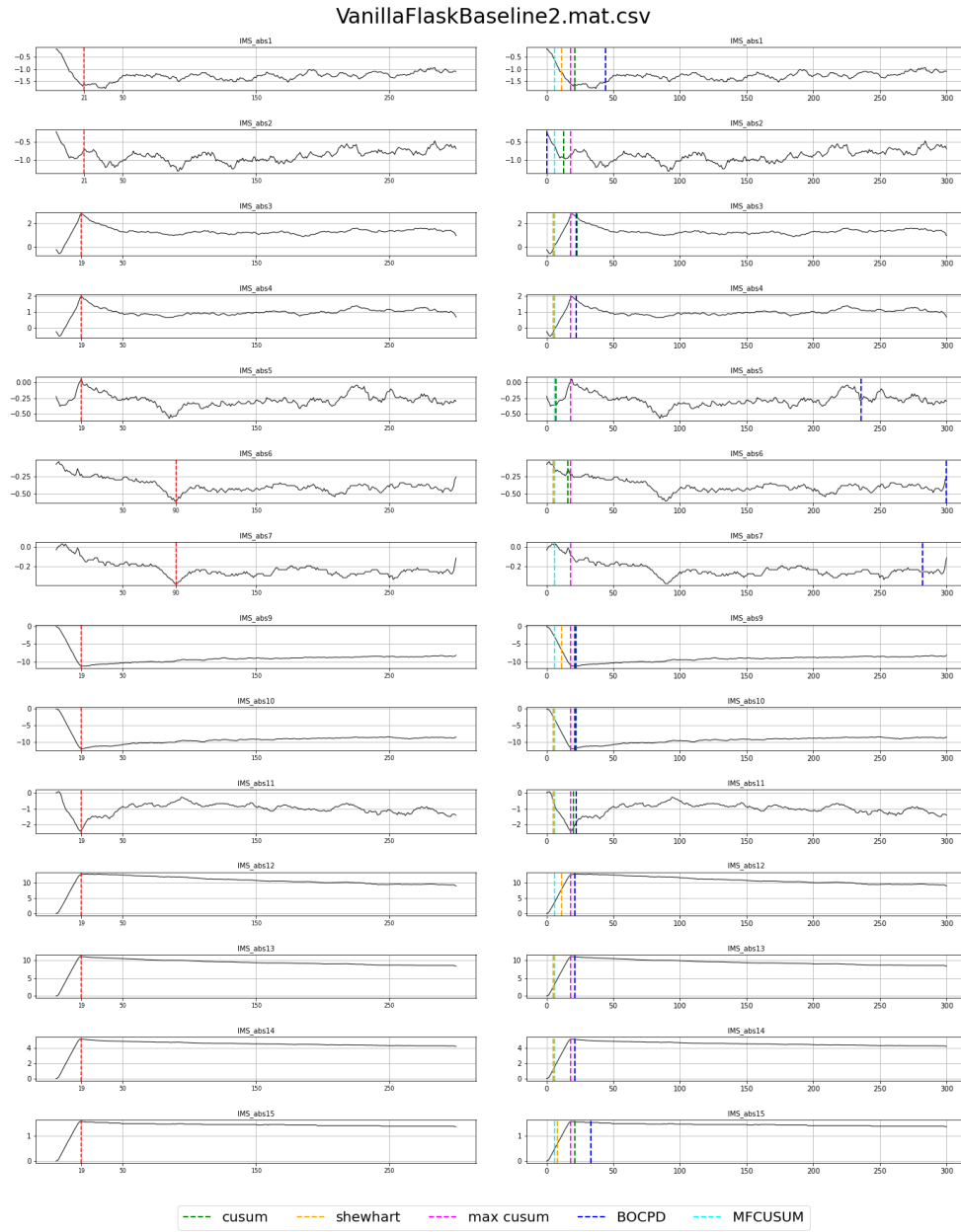


Figure 37: VanillaBaseline2. Window size 5.

VanillaFlaskBaseline2.mat.csv

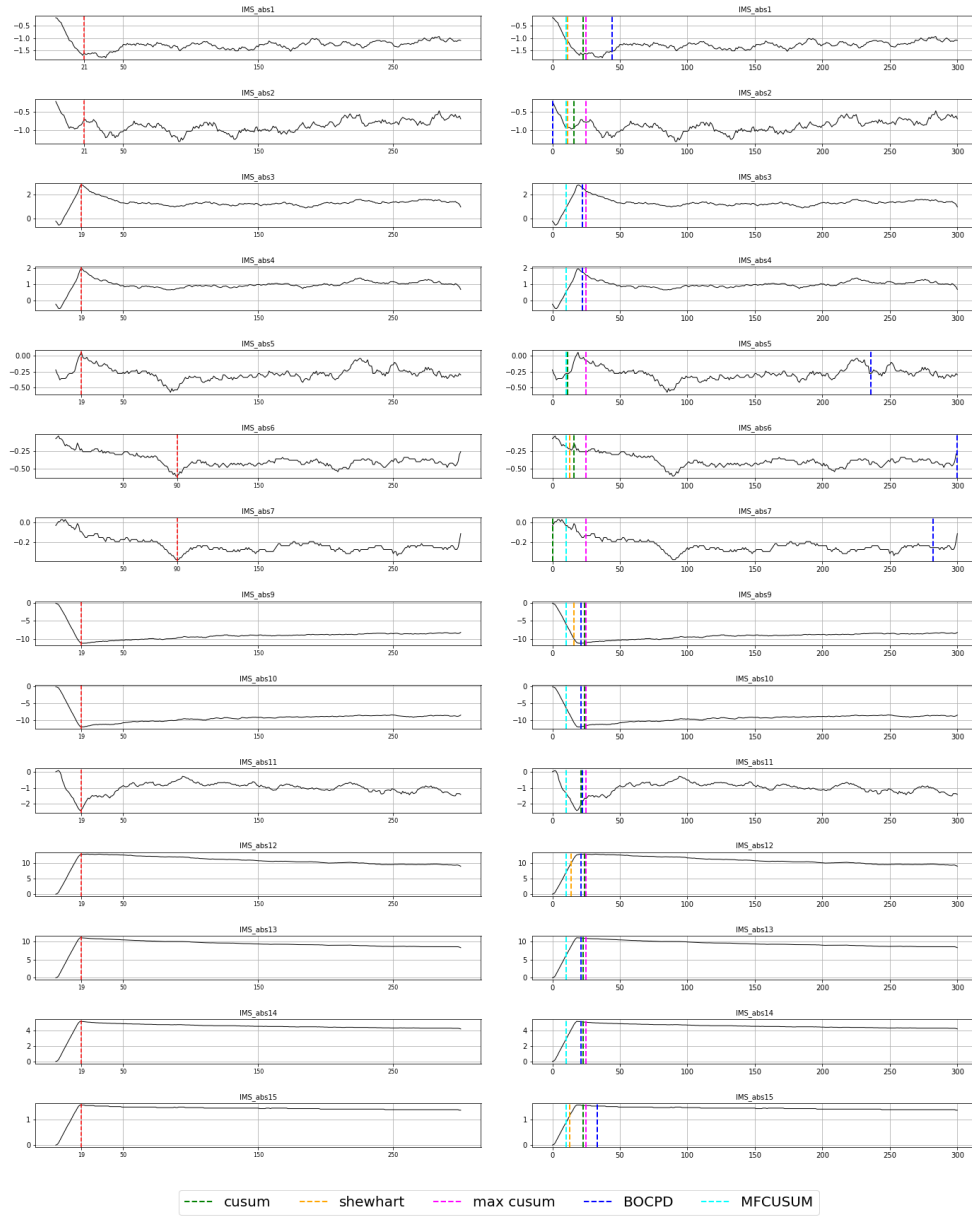


Figure 38: VanillaBaseline2. Window size 10.

VanillaFlaskBaseline2.mat.csv

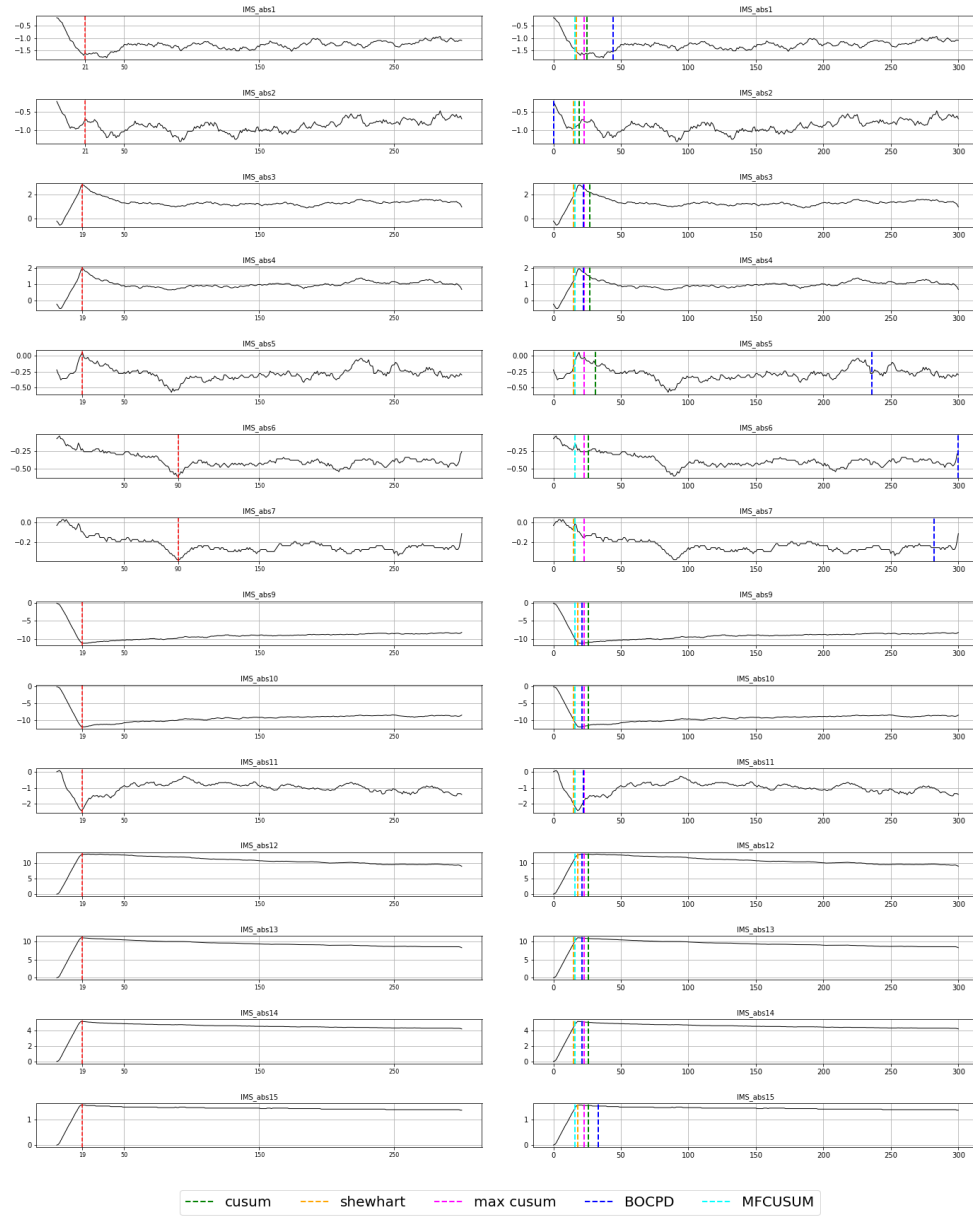


Figure 39: VanillaBaseline2. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	21	5	11	21	6	18	44
		10	11	23	10	25	44
		15	17	25	16	23	44
IMS_abs2	21	5	6	13	6	18	0
		10	11	16	10	25	0
		15	15	19	16	23	0
IMS_abs3	19	5	5	23	6	18	22
		10	10	25	10	25	22
		15	15	27	16	23	22
IMS_abs4	19	5	5	6	6	18	22
		10	10	25	10	25	22
		15	15	27	16	23	22
IMS_abs5	19	5	6	7	6	18	236
		10	10	11	10	25	236
		15	15	31	16	23	236
IMS_abs6	90	5	5	16	6	18	300
		10	13	16	10	25	300
		15	16	26	16	23	300
IMS_abs7	90	5	6	6	6	18	282
		10	10	0	10	25	282
		15	15	16	16	23	282
IMS_abs9	19	5	11	22	6	18	21
		10	16	24	10	25	21
		15	18	26	16	23	21
IMS_abs10	19	5	5	22	6	18	21
		10	10	24	10	25	21
		15	15	26	16	23	21
IMS_abs11	19	5	5	20	6	18	22
		10	10	21	10	25	22
		15	15	22	16	23	22
IMS_abs12	19	5	11	21	6	18	21
		10	14	24	10	25	21
		15	18	26	16	23	21
IMS_abs13	19	5	5	21	6	18	21
		10	10	23	10	25	21
		15	15	26	16	23	21
IMS_abs14	19	5	5	21	6	18	21
		10	10	23	10	25	21
		15	15	26	16	23	21
IMS_abs15	19	5	13	21	6	18	33
		10	13	23	10	25	33
		15	18	26	16	23	33
mean run time (sec)			1.821e-03	9.831e-03	1.327e-04	9.743e-04	3.508e-01
mean relative run time			13.719	74.072	1.000	7.341	2643.524

Table 25: Change found for each moving window. VanillaFlaskBaseline2.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	22.71	15.00	23.43	11.43	49.71
10	18.14	15.71	19.43	14.14	49.71
15	13.57	15.50	13.43	12.71	49.71

Table 26: MAE of each algorithm for VanillaFlaskBaseline2.

VanillaTableBaseline2.mat.csv

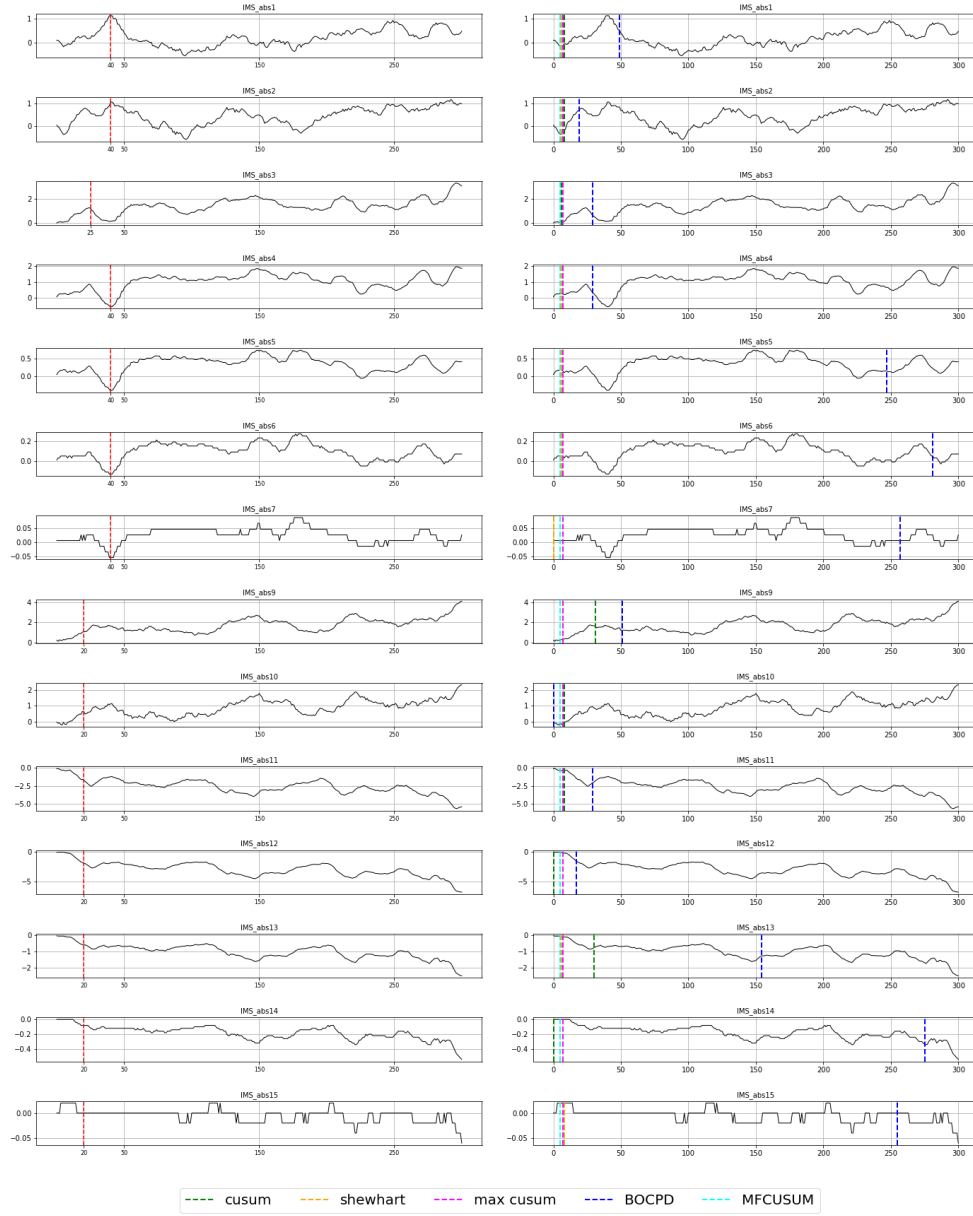


Figure 40: VanillaBaseline2. Window size 5.

VanillaTableBaseline2.mat.csv

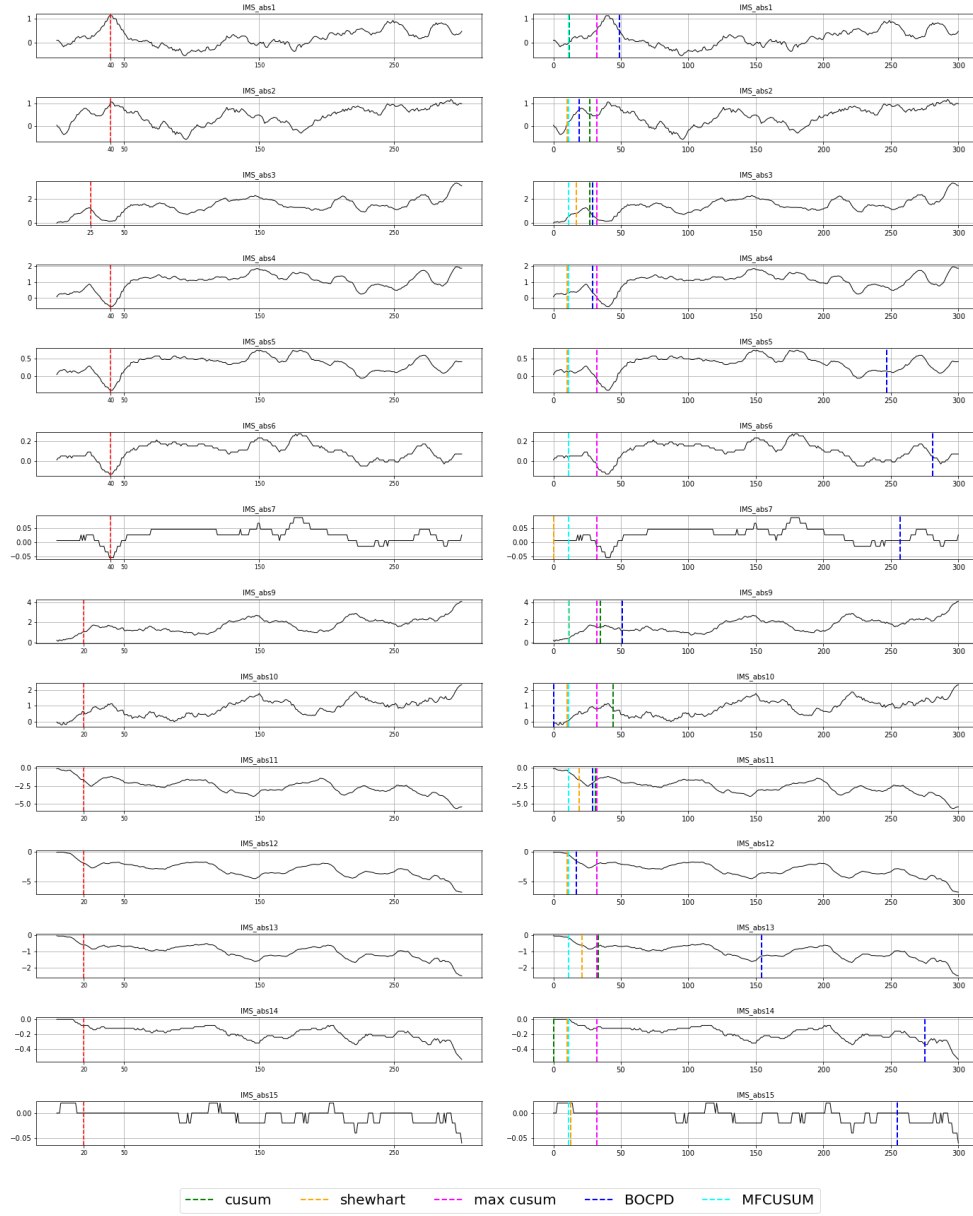


Figure 41: VanillaBaseline2. Window size 10.

VanillaTableBaseline2.mat.csv

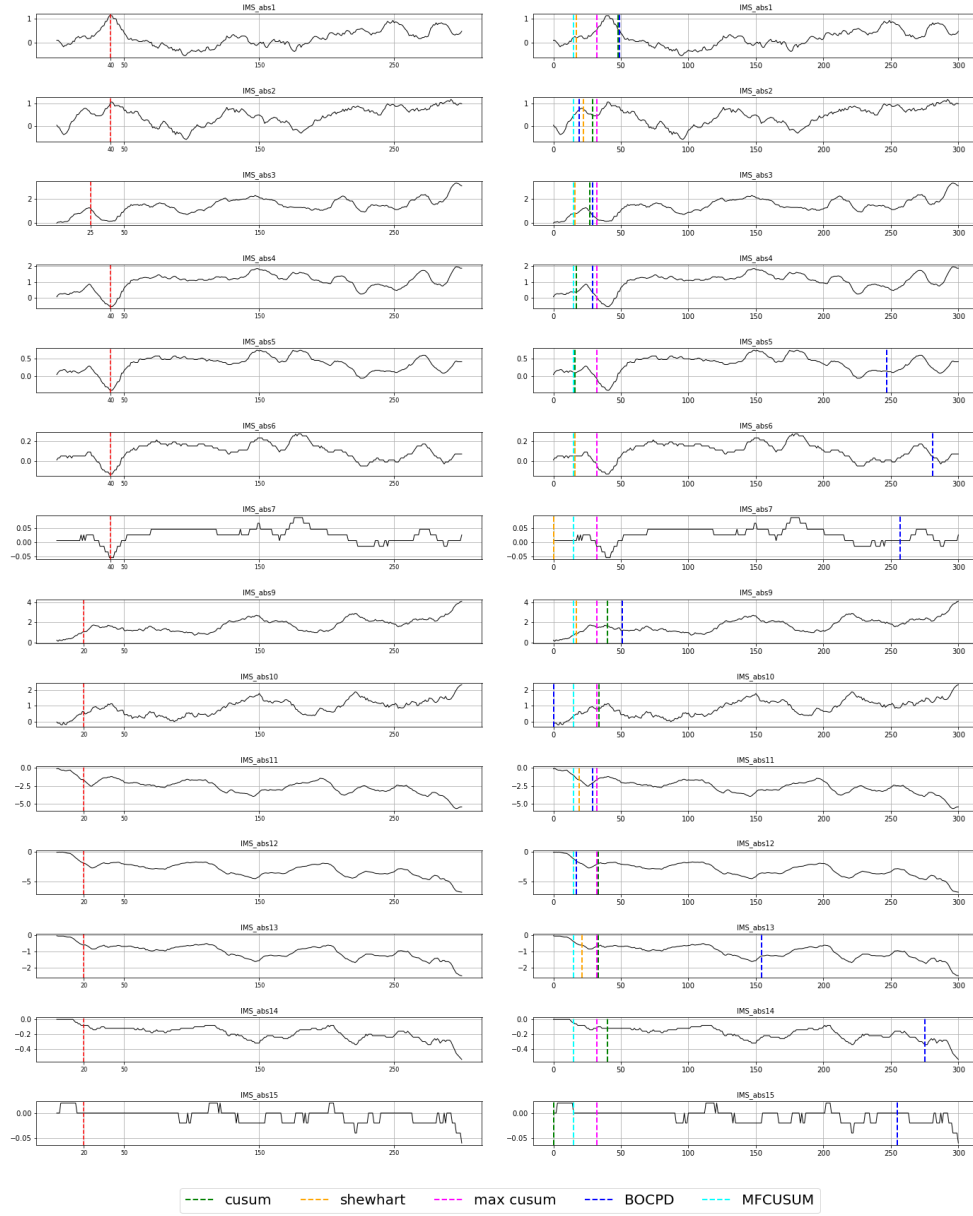


Figure 42: VanillaBaseline2. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	40	5	6	8	5	7	49
		10	11	12	11	32	49
		15	17	48	15	32	49
IMS_abs2	40	5	6	8	5	7	19
		10	10	27	11	32	19
		15	22	29	15	32	19
IMS_abs3	25	5	5	6	5	7	29
		10	17	27	11	32	29
		15	16	27	15	32	29
IMS_abs4	40	5	6	7	5	7	29
		10	10	11	11	32	29
		15	15	17	15	32	29
IMS_abs5	40	5	6	7	5	7	247
		10	10	11	11	32	247
		15	15	16	15	32	247
IMS_abs6	40	5	6	6	5	7	281
		10	11	11	11	32	281
		15	16	16	15	32	281
IMS_abs7	40	5	0	0	5	7	257
		10	0	0	11	32	257
		15	0	0	15	32	257
IMS_abs9	20	5	7	31	5	7	51
		10	12	35	11	32	51
		15	17	40	15	32	51
IMS_abs10	20	5	5	8	5	7	0
		10	10	44	11	32	0
		15	15	34	15	32	0
IMS_abs11	20	5	7	8	5	7	29
		10	19	31	11	32	29
		15	19	32	15	32	29
IMS_abs12	20	5	5	0	5	7	17
		10	10	32	11	32	17
		15	15	33	15	32	17
IMS_abs13	20	5	6	30	5	7	154
		10	21	33	11	32	154
		15	21	33	15	32	154
IMS_abs14	20	5	5	0	5	7	275
		10	10	0	11	32	275
		15	15	40	15	32	275
IMS_abs15	20	5	8	8	5	7	255
		10	13	13	11	32	255
		15	15	0	15	32	255
mean run time (sec)			8.301e-03	1.976e-02	1.357e-04	1.094e-03	4.418e-01
mean relative run time			61.187	145.623	1.000	8.062	3256.622

Table 27: Change found for each moving window. VanillaTableBaseline2.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	23.36	22.86	23.93	21.93	99.79
10	17.36	19.43	17.93	9.93	99.79
15	13.50	17.43	13.93	9.93	99.79

Table 28: MAE of each algorithm for VanillaTableBaseline2.

2.3 Baseline3

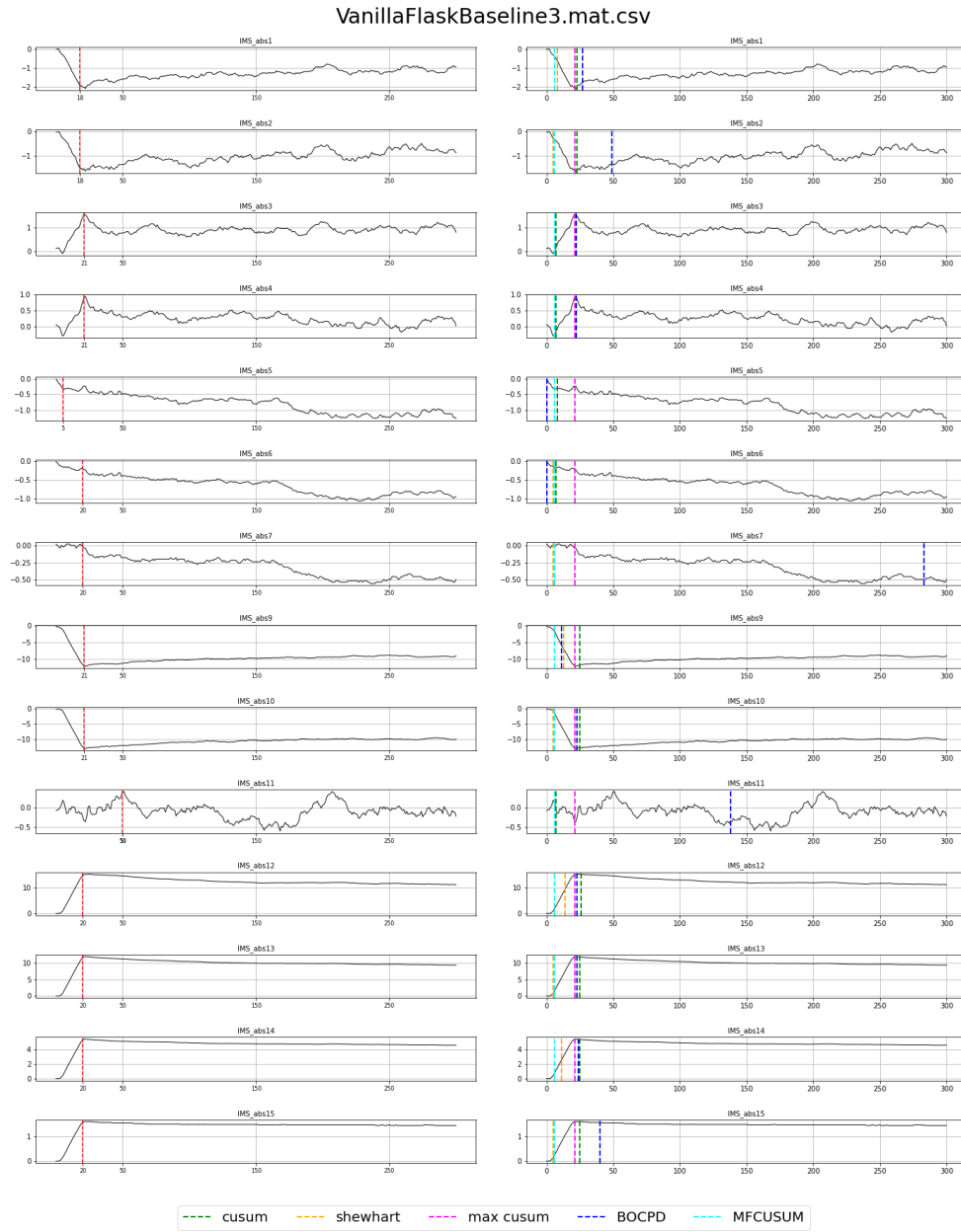


Figure 43: VanillaBaseline3. Window size 5.

VanillaFlaskBaseline3.mat.csv

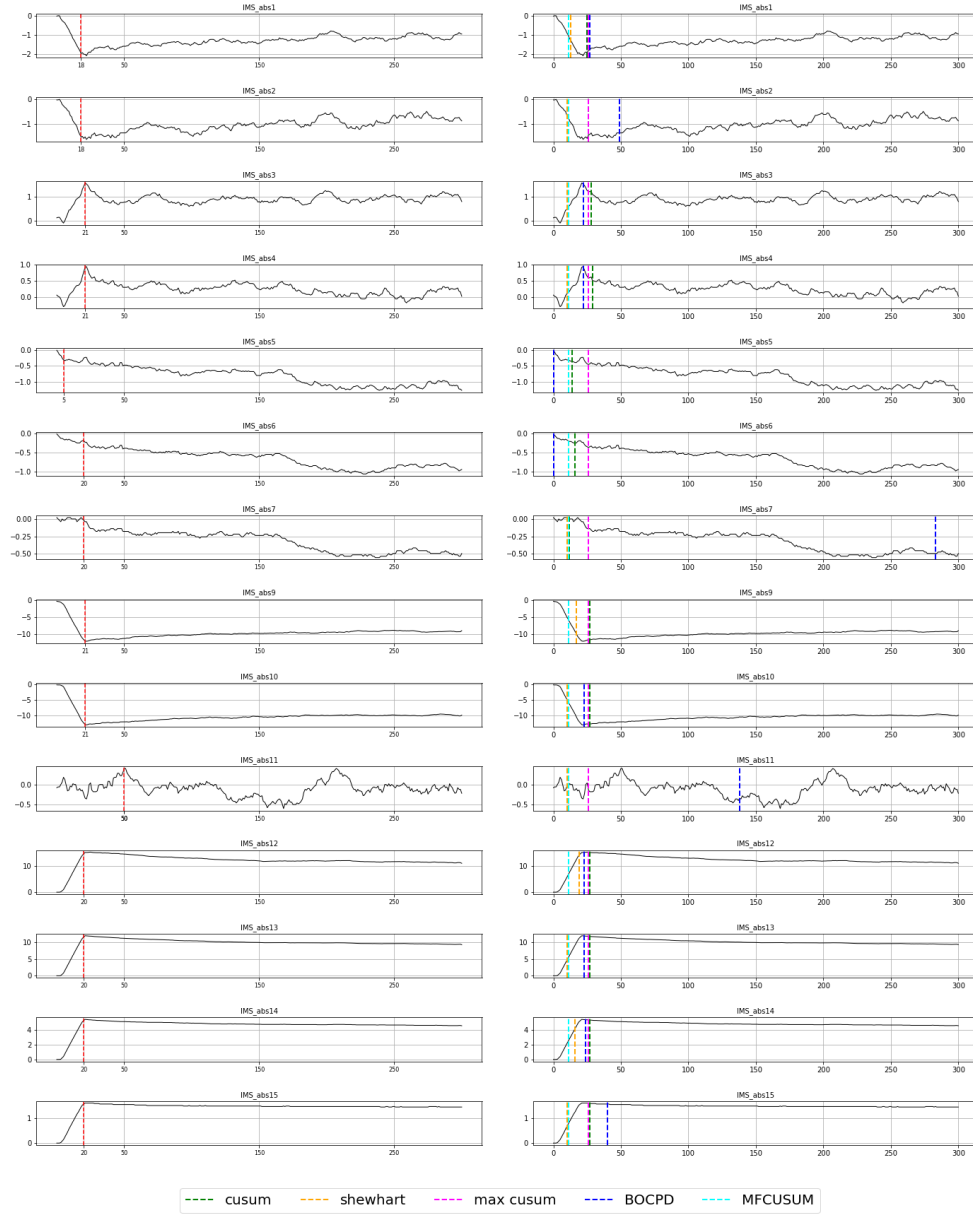


Figure 44: VanillaBaseline3. Window size 10.

VanillaFlaskBaseline3.mat.csv

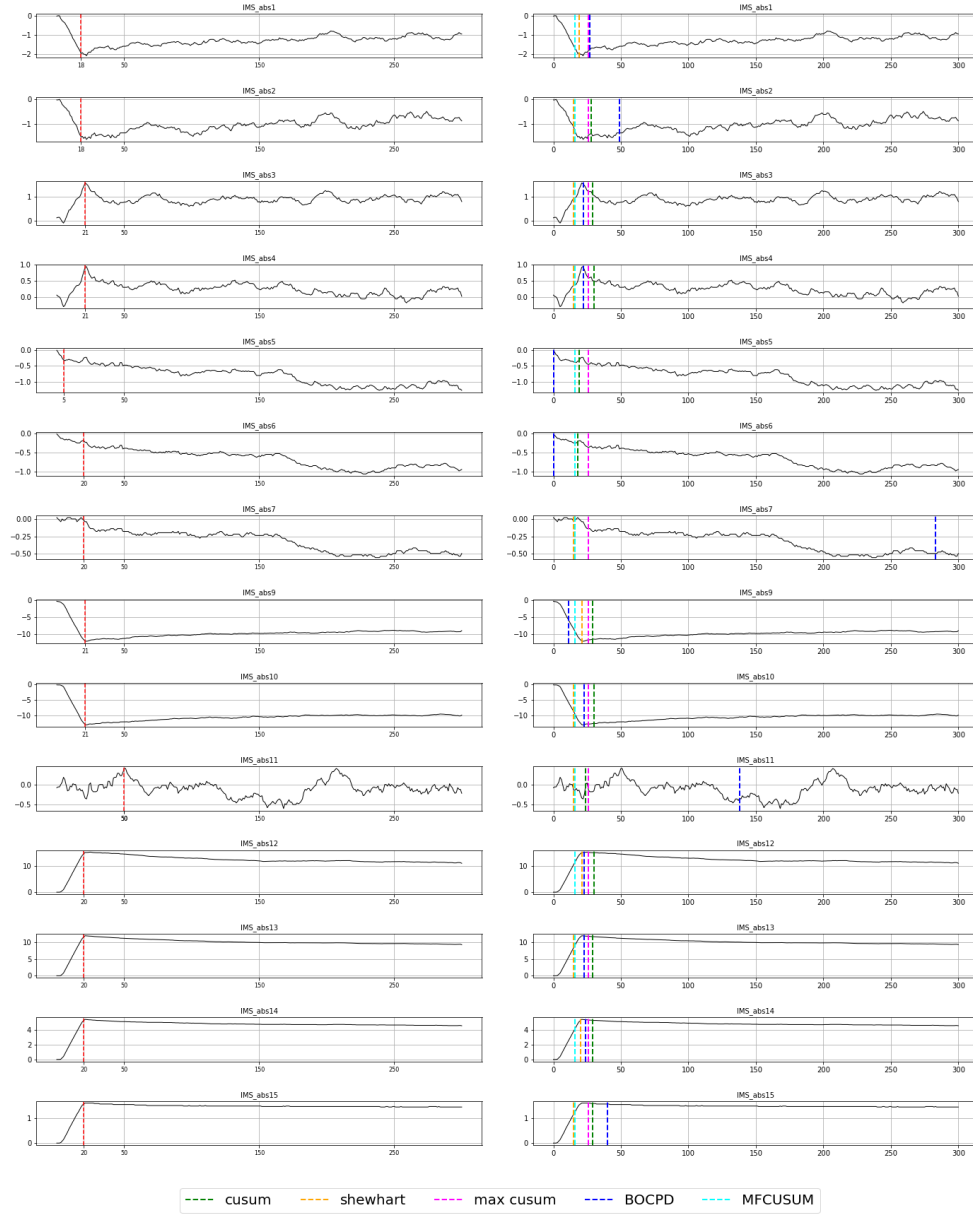


Figure 45: VanillaBaseline3. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	18	5	8	23	6	21	27
		10	13	25	11	26	27
		15	19	27	16	26	27
IMS_abs2	18	5	5	23	6	21	49
		10	10	26	11	26	49
		15	15	28	16	26	49
IMS_abs3	21	5	6	7	6	21	22
		10	10	28	11	26	22
		15	15	29	16	26	22
IMS_abs4	21	5	6	7	6	21	22
		10	10	29	11	26	22
		15	15	30	16	26	22
IMS_abs5	5	5	6	8	6	21	0
		10	11	14	11	26	0
		15	16	19	16	26	0
IMS_abs6	20	5	5	7	6	21	0
		10	11	16	11	26	0
		15	16	18	16	26	0
IMS_abs7	20	5	5	6	6	21	283
		10	10	12	11	26	283
		15	15	16	16	26	283
IMS_abs9	21	5	13	25	6	21	11
		10	17	27	11	26	11
		15	21	29	16	26	11
IMS_abs10	21	5	5	25	6	21	23
		10	10	27	11	26	23
		15	15	30	16	26	23
IMS_abs11	50	5	6	7	6	21	138
		10	10	11	11	26	138
		15	15	24	16	26	138
IMS_abs12	20	5	14	26	6	21	23
		10	19	27	11	26	23
		15	21	30	16	26	23
IMS_abs13	20	5	5	25	6	21	23
		10	10	27	11	26	23
		15	15	29	16	26	23
IMS_abs14	20	5	11	25	6	21	24
		10	16	27	11	26	24
		15	20	29	16	26	24
IMS_abs15	20	5	5	25	6	21	40
		10	10	27	11	26	40
		15	15	29	16	26	40
mean run time (sec)			1.268e-03	4.289e-03	1.244e-04	9.104e-04	2.729e-01
mean relative run time			10.194	34.485	1.000	7.319	2194.541

Table 29: Change found for each moving window. VanillaFlaskBaseline3.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	14.07	10.00	15.21	4.07	32.86
10	10.00	9.29	10.93	8.36	32.86
15	6.29	9.71	6.64	8.36	32.86

Table 30: MAE of each algorithm for VanillaFlaskBaseline3.

VanillaTableBaseline3.mat.csv

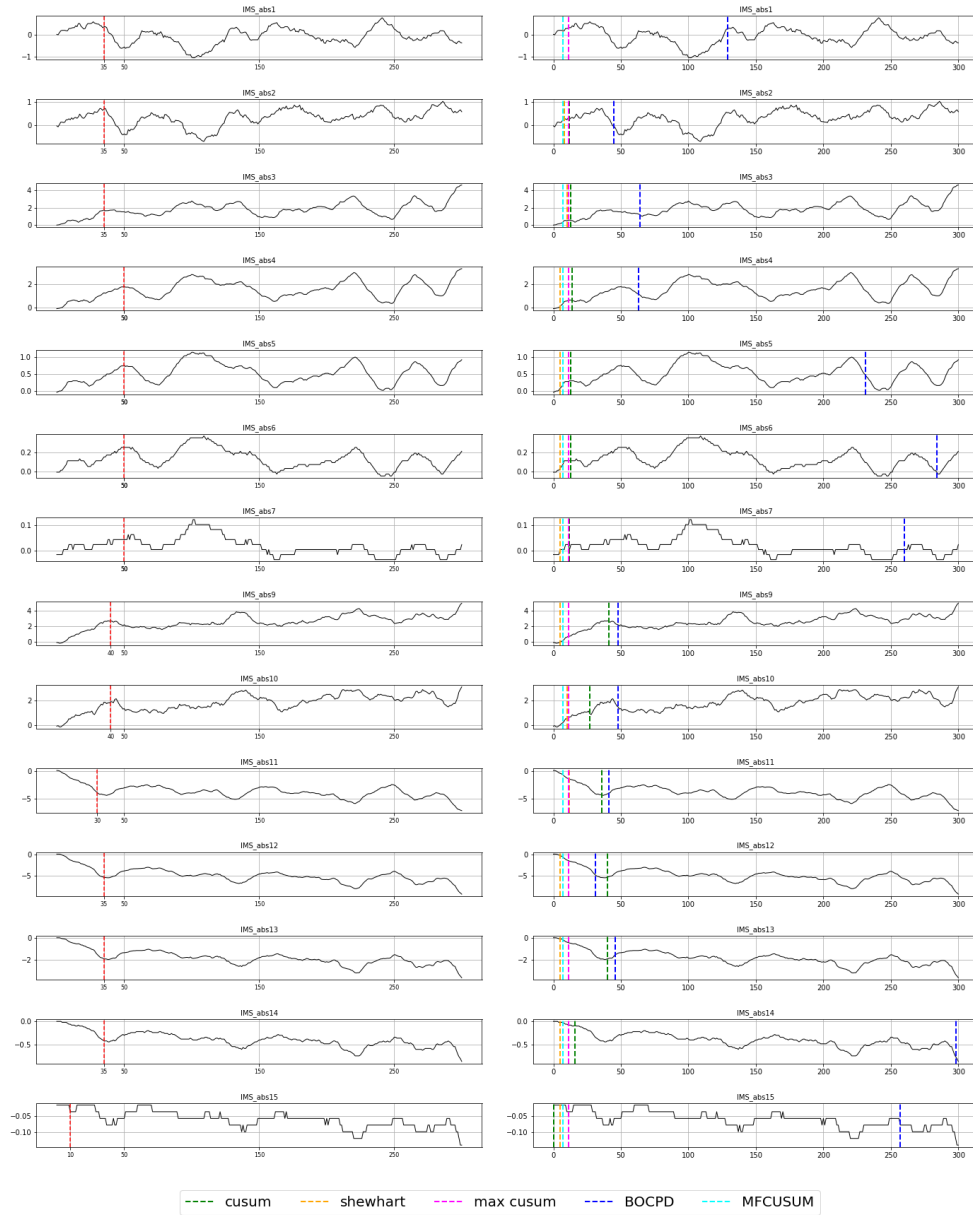


Figure 46: VanillaBaseline3. Window size 5.

VanillaTableBaseline3.mat.csv

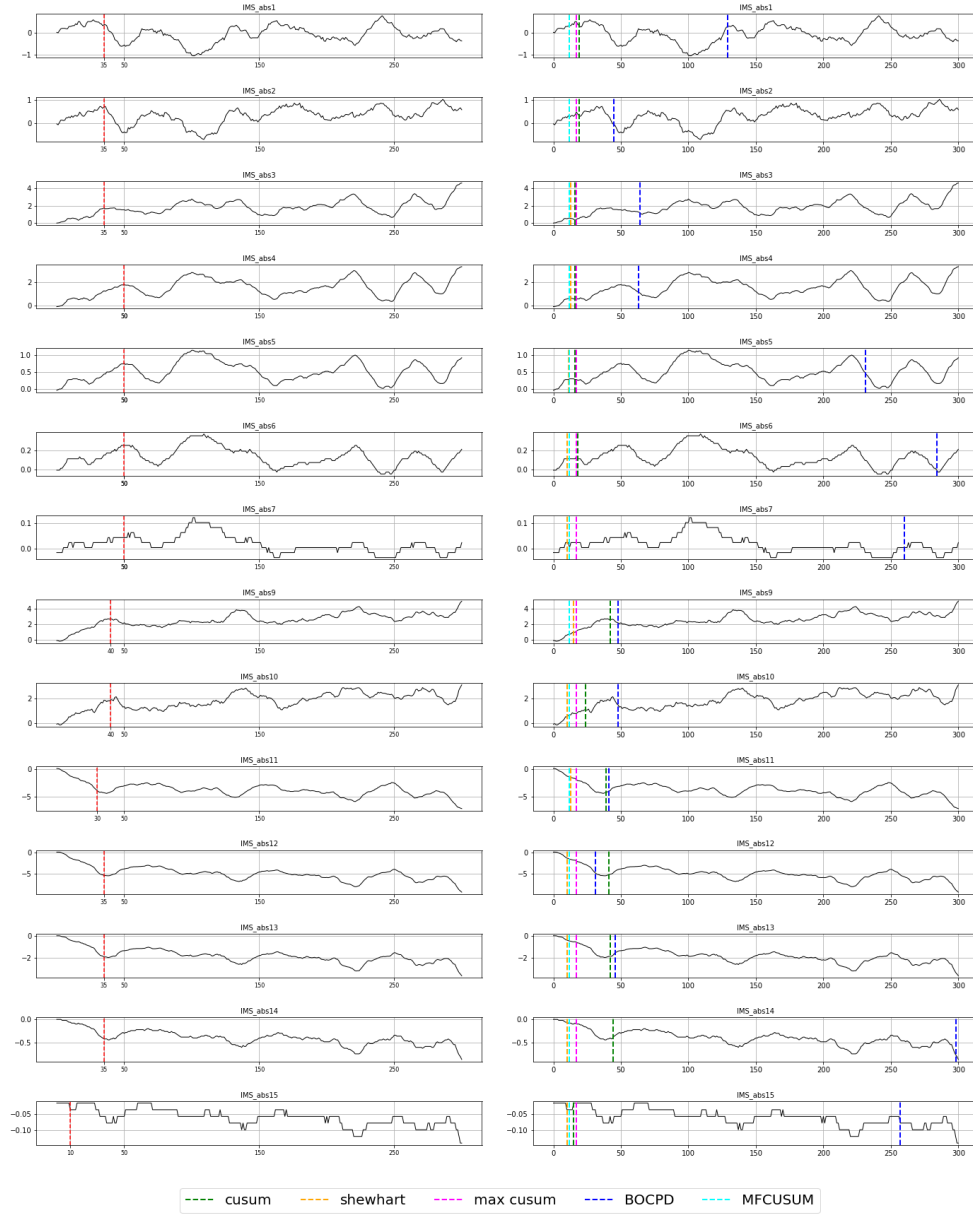


Figure 47: VanillaBaseline3. Window size 10.

VanillaTableBaseline3.mat.csv

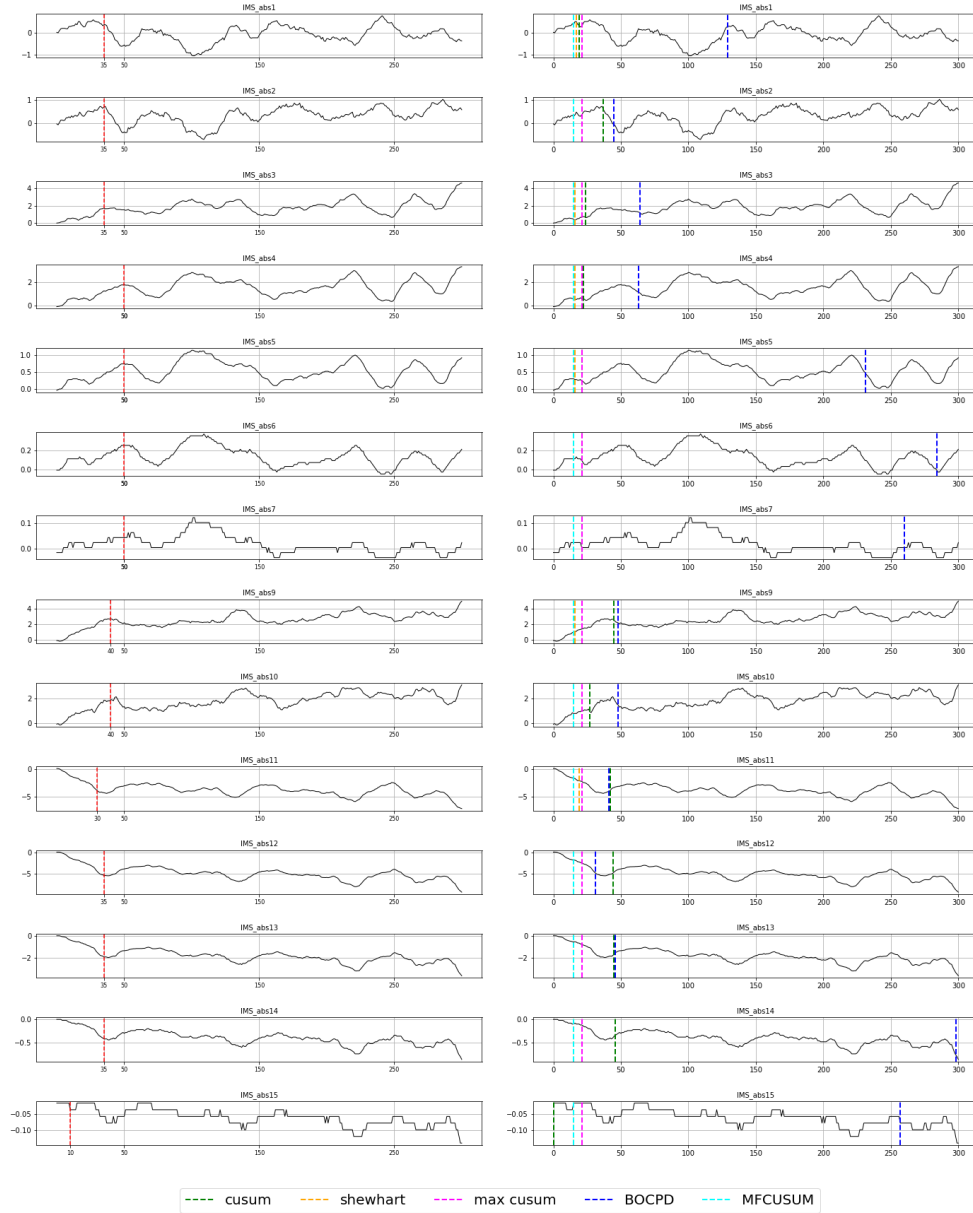


Figure 48: VanillaBaseline3. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	35	5	7	7	7	11	129
		10	12	19	12	17	129
		15	17	19	15	21	129
IMS_abs2	35	5	8	12	7	11	45
		10	12	19	12	17	45
		15	15	37	15	21	45
IMS_abs3	35	5	10	13	7	11	64
		10	13	16	12	17	64
		15	16	24	15	21	64
IMS_abs4	50	5	5	14	7	11	63
		10	13	16	12	17	63
		15	16	22	15	21	63
IMS_abs5	50	5	5	13	7	11	231
		10	11	16	12	17	231
		15	16	21	15	21	231
IMS_abs6	50	5	5	13	7	11	284
		10	10	18	12	17	284
		15	15	21	15	21	284
IMS_abs7	50	5	5	12	7	11	260
		10	10	12	12	17	260
		15	15	21	15	21	260
IMS_abs9	40	5	5	41	7	11	48
		10	15	42	12	17	48
		15	16	45	15	21	48
IMS_abs10	40	5	10	27	7	11	48
		10	10	24	12	17	48
		15	15	27	15	21	48
IMS_abs11	30	5	12	36	7	11	41
		10	13	39	12	17	41
		15	19	42	15	21	41
IMS_abs12	35	5	5	40	7	11	31
		10	10	41	12	17	31
		15	15	44	15	21	31
IMS_abs13	35	5	5	40	7	11	46
		10	10	42	12	17	46
		15	15	45	15	21	46
IMS_abs14	35	5	5	16	7	11	298
		10	10	44	12	17	298
		15	15	46	15	21	298
IMS_abs15	10	5	5	0	7	11	257
		10	10	15	12	17	257
		15	15	0	15	21	257
mean run time (sec)			1.310e-03	9.719e-03	1.513e-04	5.493e-04	4.518e-01
mean relative run time			8.660	64.231	1.000	3.630	2986.015

Table 31: Change found for each moving window. VanillaTableBaseline3.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	31.29	20.00	30.86	27.00	94.50
10	26.50	17.36	26.14	21.86	94.50
15	22.86	15.29	23.57	18.43	94.50

Table 32: MAE of each algorithm for VanillaTableBaseline3.

2.4 Baseline4

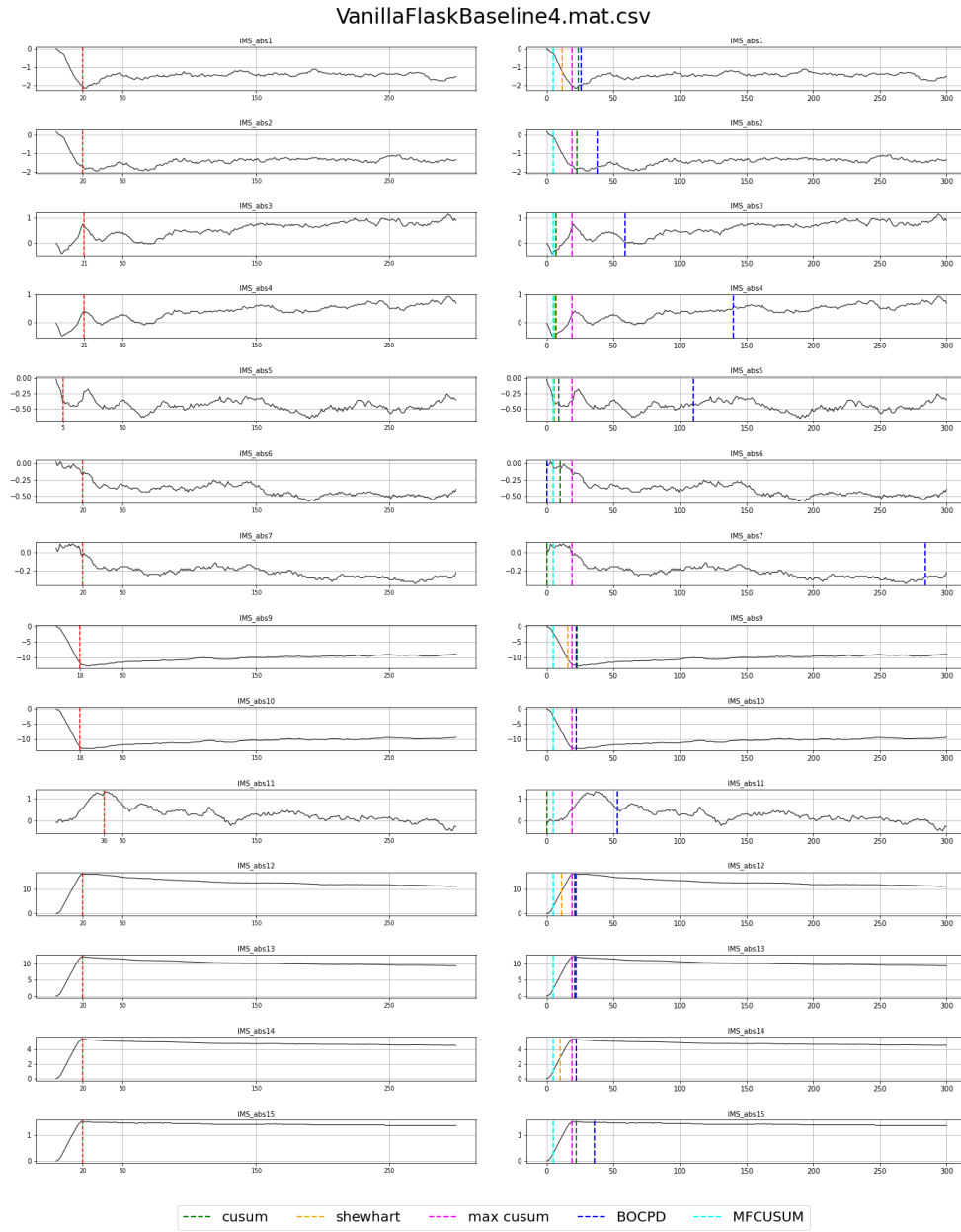


Figure 49: VanillaBaseline4. Window size 5.

VanillaFlaskBaseline4.mat.csv

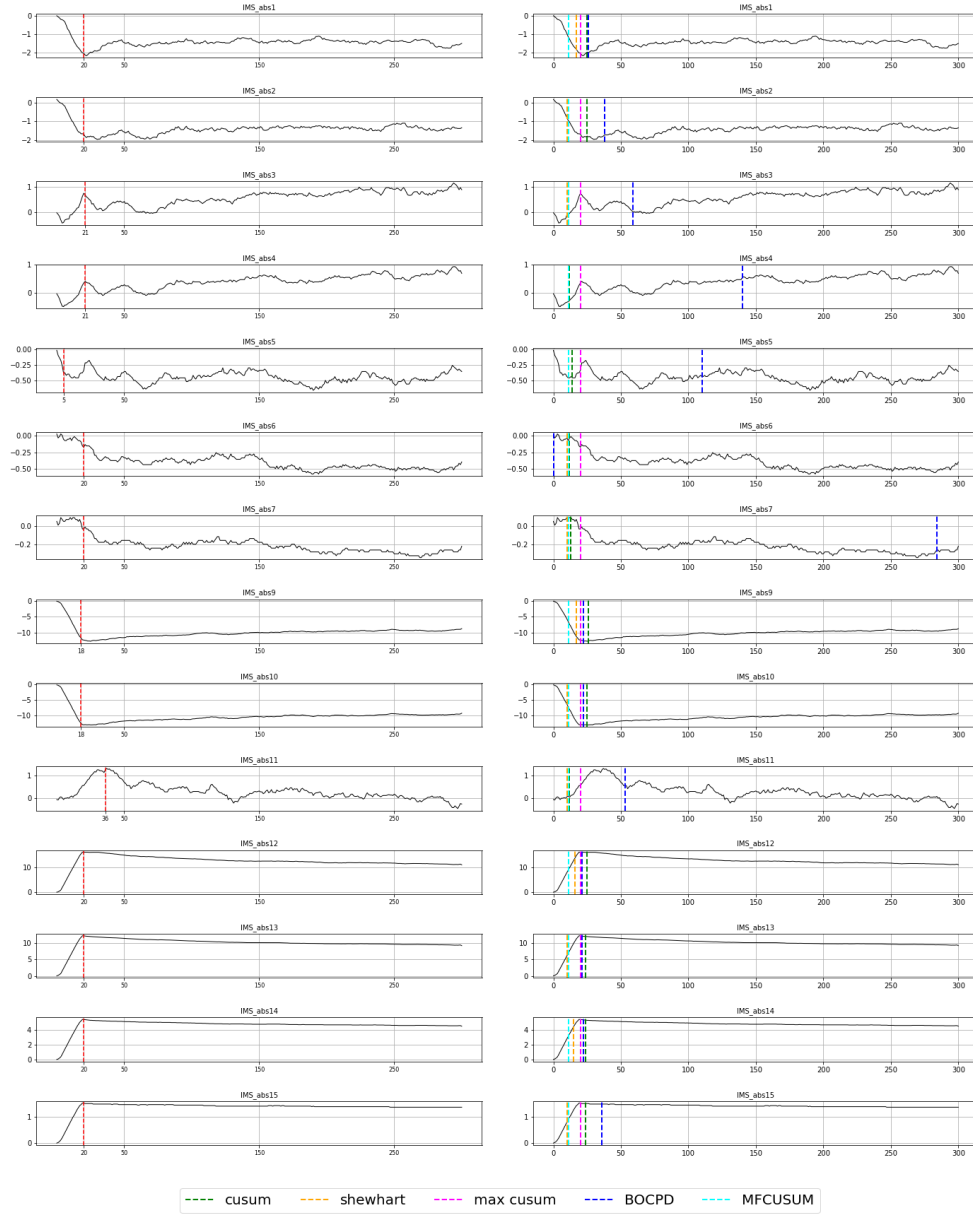


Figure 50: VanillaBaseline4. Window size 10.

VanillaFlaskBaseline4.mat.csv

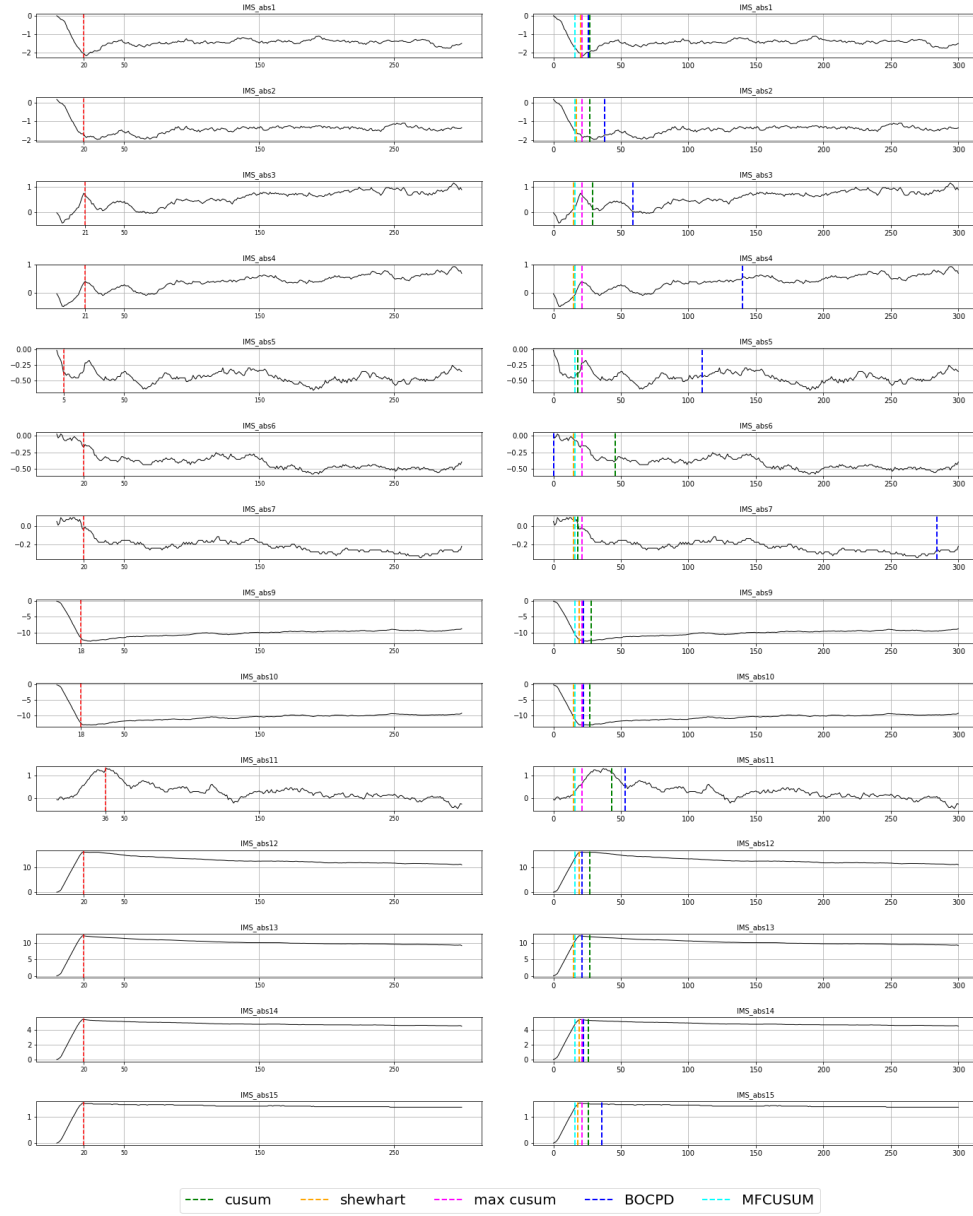


Figure 51: VanillaBaseline4. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	20	5	12	24	5	19	26
		10	17	25	11	20	26
		15	20	27	16	21	26
IMS_abs2	20	5	5	23	5	19	38
		10	10	25	11	20	38
		15	17	27	16	21	38
IMS_abs3	21	5	5	7	5	19	59
		10	10	11	11	20	59
		15	15	29	16	21	59
IMS_abs4	21	5	6	7	5	19	140
		10	11	12	11	20	140
		15	15	16	16	21	140
IMS_abs5	5	5	6	9	5	19	110
		10	11	14	11	20	110
		15	16	18	16	21	110
IMS_abs6	20	5	5	10	5	19	0
		10	10	12	11	20	0
		15	15	46	16	21	0
IMS_abs7	20	5	5	0	5	19	284
		10	10	13	11	20	284
		15	15	18	16	21	284
IMS_abs9	18	5	16	23	5	19	22
		10	17	26	11	20	22
		15	19	28	16	21	22
IMS_abs10	18	5	5	22	5	19	22
		10	10	25	11	20	22
		15	15	27	16	21	22
IMS_abs11	36	5	5	0	5	19	53
		10	10	12	11	20	53
		15	15	43	16	21	53
IMS_abs12	20	5	11	22	5	19	21
		10	16	25	11	20	21
		15	19	27	16	21	21
IMS_abs13	20	5	5	22	5	19	21
		10	10	24	11	20	21
		15	15	27	16	21	21
IMS_abs14	20	5	10	22	5	19	22
		10	15	24	11	20	22
		15	19	26	16	21	22
IMS_abs15	20	5	5	22	5	19	36
		10	10	24	11	20	36
		15	18	26	16	21	36
mean run time (sec)			2.400e-03	9.952e-03	1.187e-04	7.058e-04	2.354e-01
mean relative run time			20.229	83.875	1.000	5.948	1984.125

Table 33: Change found for each moving window. VanillaFlaskBaseline4.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	12.86	8.71	14.93	3.21	43.93
10	8.86	7.79	9.79	2.64	43.93
15	5.00	8.57	5.50	3.21	43.93

Table 34: MAE of each algorithm for VanillaFlaskBaseline4.

VanillaTableBaseline4.mat.csv

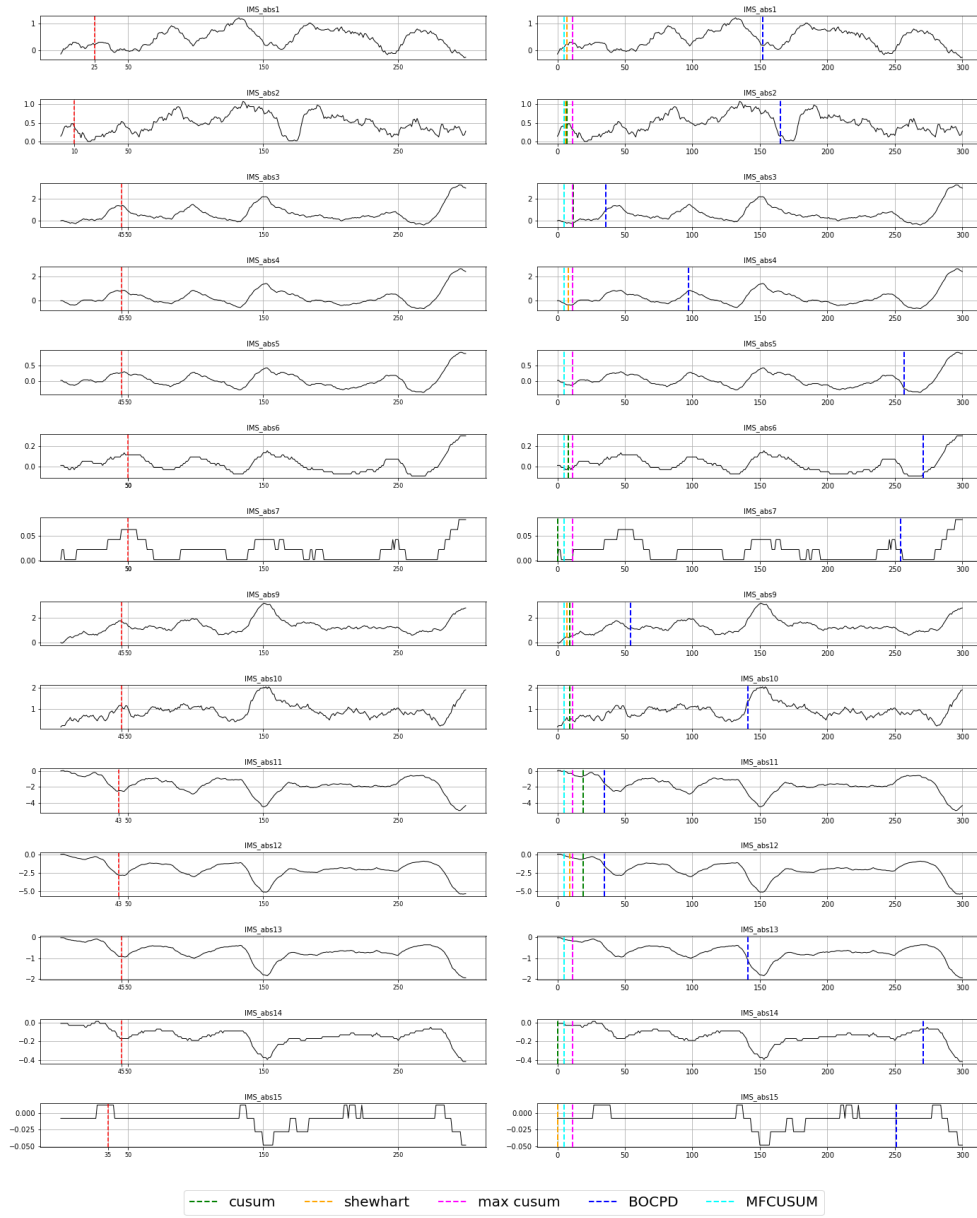


Figure 52: VanillaBaseline4. Window size 5.

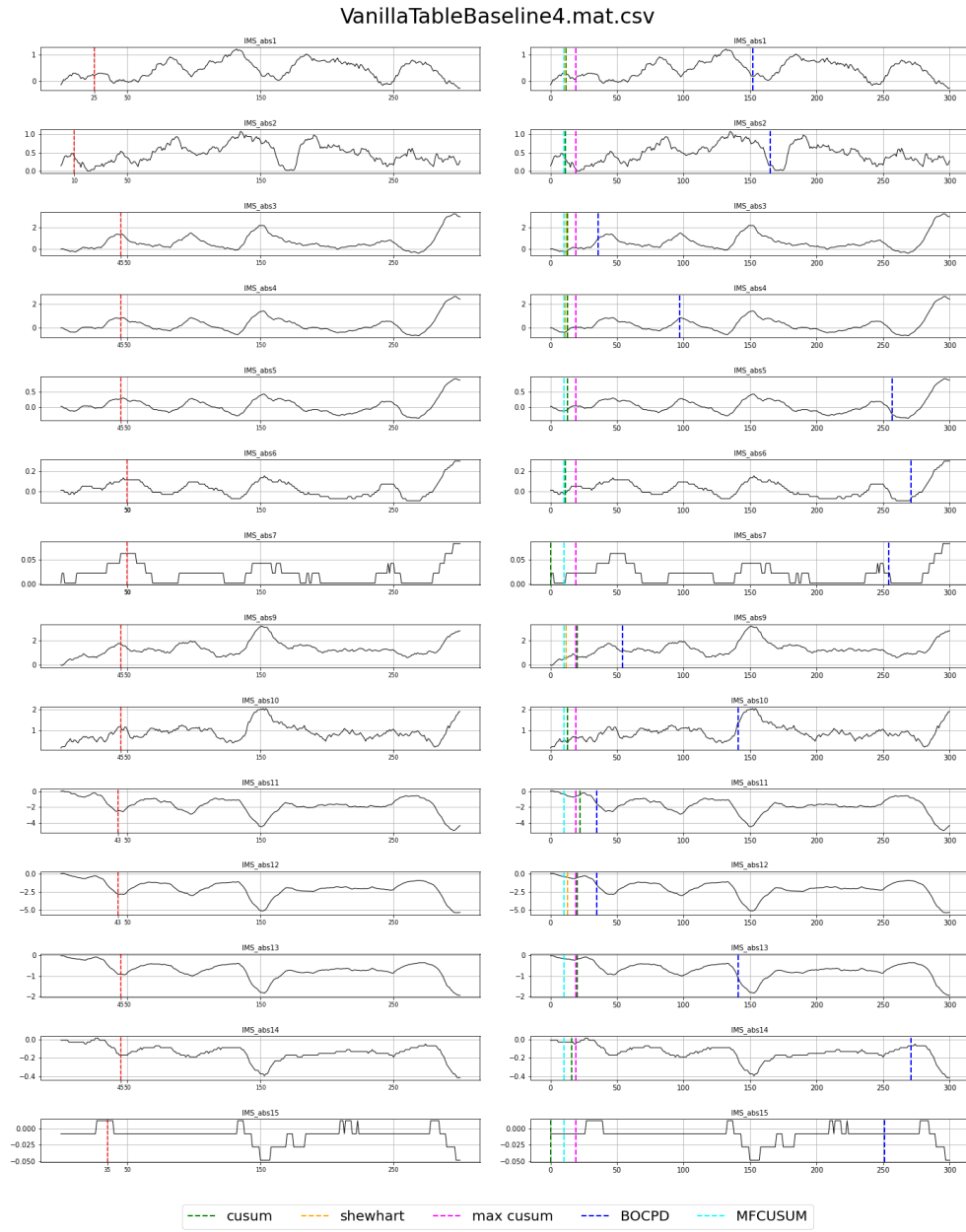


Figure 53: VanillaBaseline4. Window size 10.

VanillaTableBaseline4.mat.csv

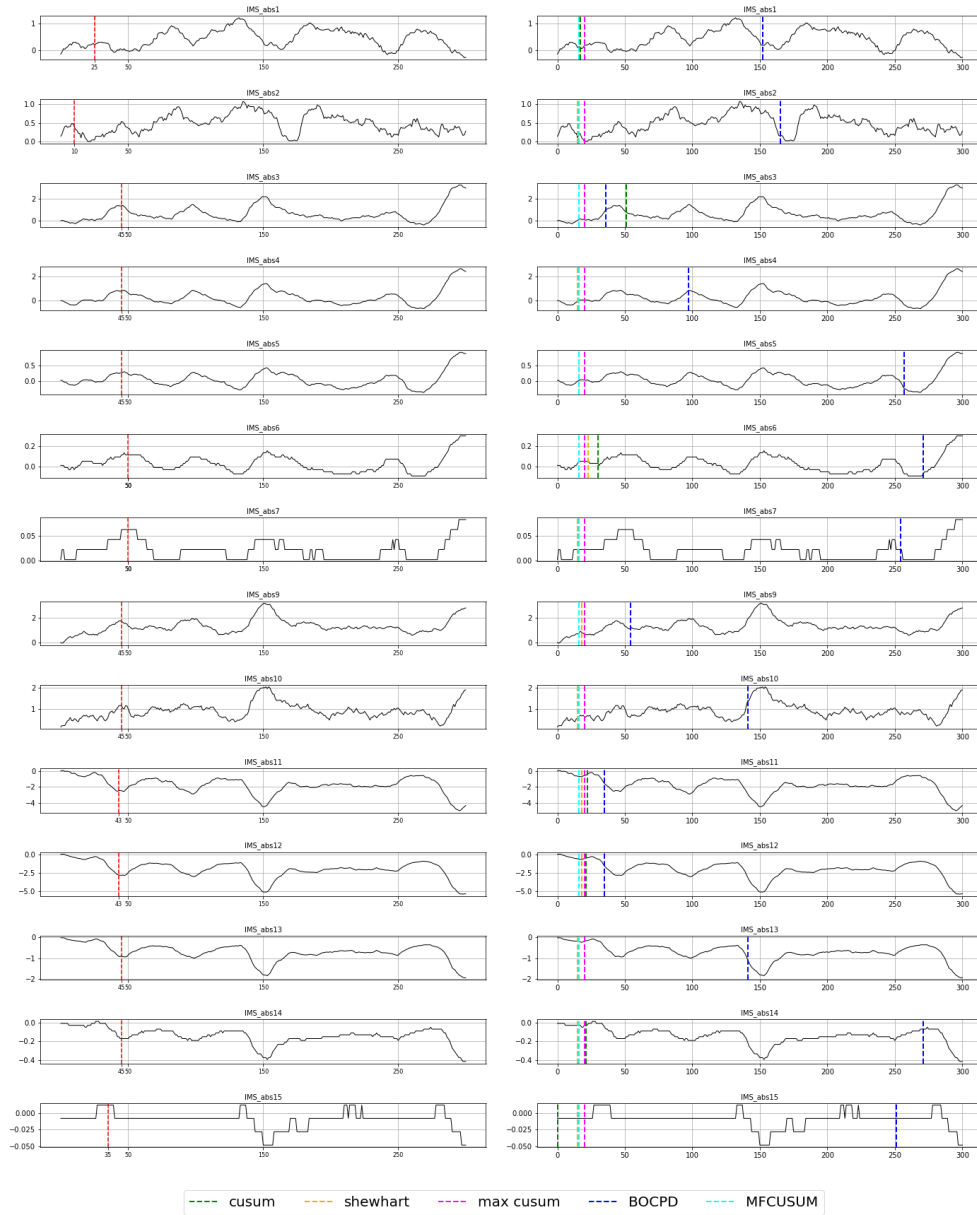


Figure 54: VanillaBaseline4. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	25	5	7	11	5	11	152
		10	11	12	10	19	152
		15	16	17	16	20	152
IMS_abs2	10	5	6	7	5	11	165
		10	10	11	10	19	165
		15	15	16	16	20	165
IMS_abs3	45	5	5	12	5	11	36
		10	12	13	10	19	36
		15	20	51	16	20	36
IMS_abs4	45	5	8	11	5	11	97
		10	11	13	10	19	97
		15	15	16	16	20	97
IMS_abs5	45	5	5	11	5	11	257
		10	10	13	10	19	257
		15	16	16	16	20	257
IMS_abs6	50	5	5	8	5	11	271
		10	10	11	10	19	271
		15	23	30	16	20	271
IMS_abs7	50	5	5	0	5	11	254
		10	10	0	10	19	254
		15	15	16	16	20	254
IMS_abs9	45	5	7	9	5	11	54
		10	12	20	10	19	54
		15	18	20	16	20	54
IMS_abs10	45	5	5	9	5	11	141
		10	10	13	10	19	141
		15	15	20	16	20	141
IMS_abs11	43	5	5	19	5	11	35
		10	10	22	10	19	35
		15	18	22	16	20	35
IMS_abs12	43	5	9	19	5	11	35
		10	13	20	10	19	35
		15	18	21	16	20	35
IMS_abs13	45	5	5	11	5	11	141
		10	10	20	10	19	141
		15	15	20	16	20	141
IMS_abs14	45	5	5	0	5	11	271
		10	10	16	10	19	271
		15	15	21	16	20	271
IMS_abs15	35	5	0	0	5	11	251
		10	10	0	10	19	251
		15	15	0	16	20	251
mean run time (sec)			4.681e-03	1.528e-02	1.692e-04	5.391e-04	4.289e-01
mean relative run time			27.668	90.295	1.000	3.186	2535.018

Table 35: Change found for each moving window. VanillaTableBaseline4.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	35.29	31.71	35.79	29.93	117.07
10	30.14	27.79	30.79	23.07	117.07
15	24.79	22.07	25.64	22.21	117.07

Table 36: MAE of each algorithm for VanillaTableBaseline4.

2.5 Baseline5

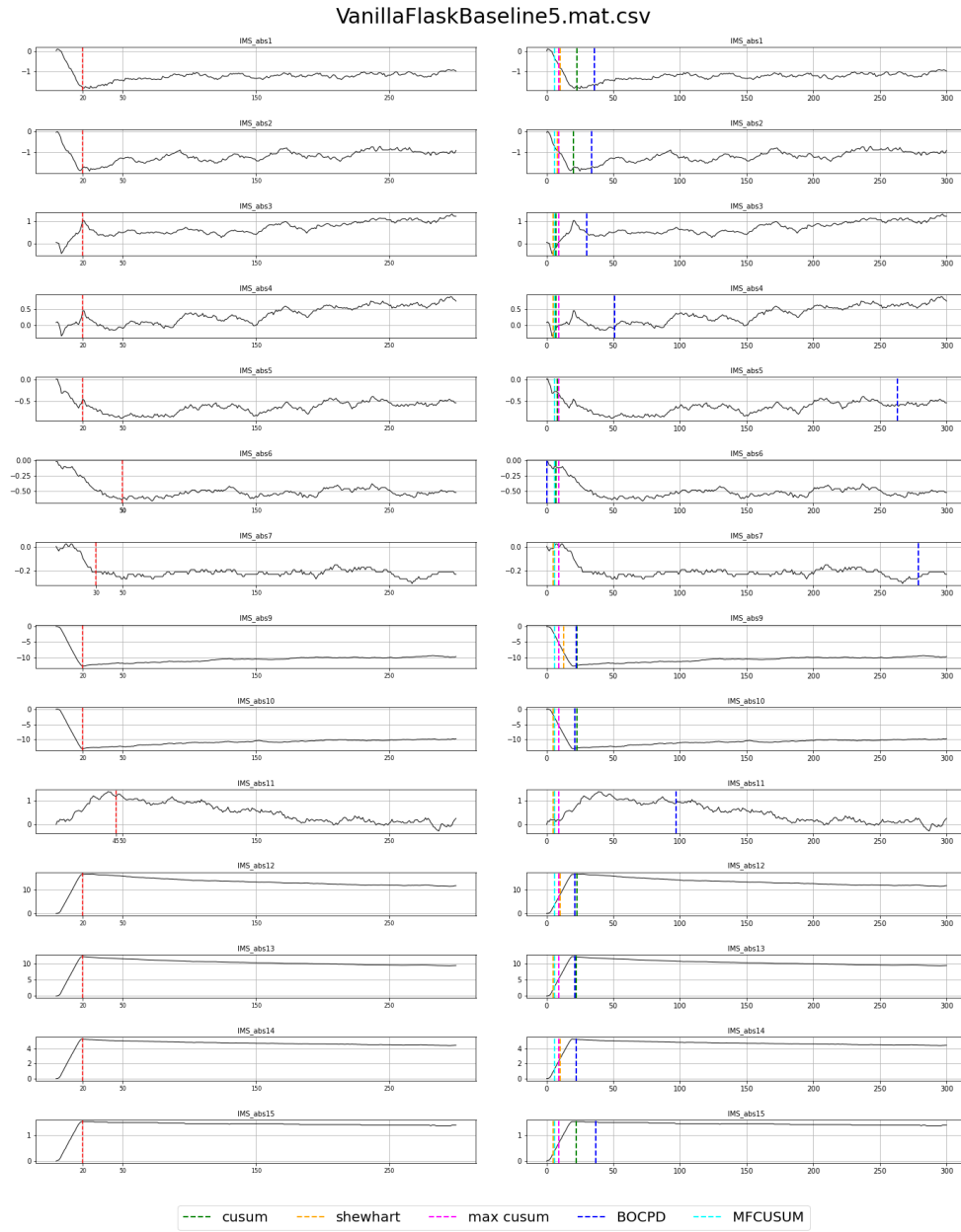


Figure 55: VanillaBaseline5. Window size 5.

VanillaFlaskBaseline5.mat.csv

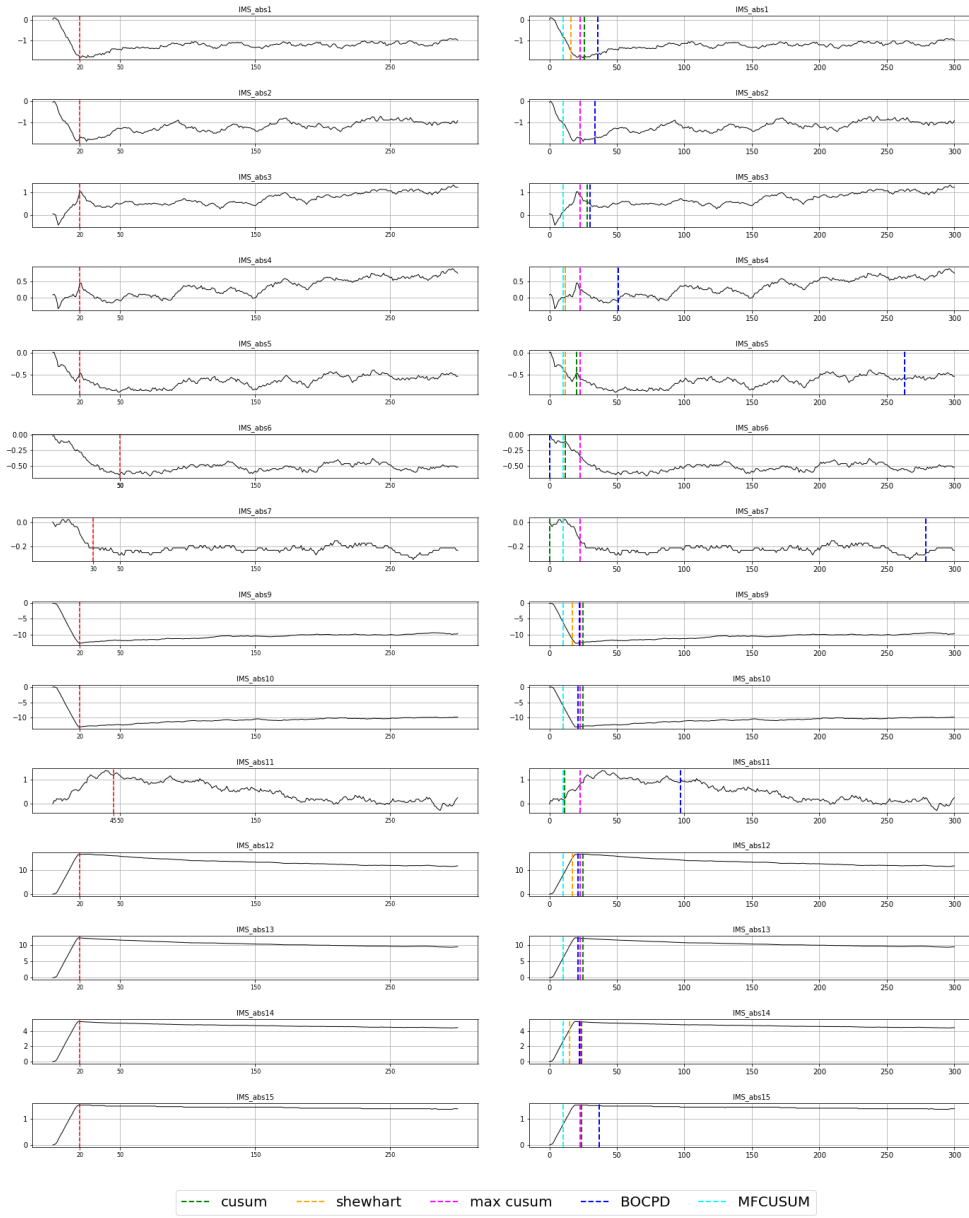


Figure 56: VanillaBaseline5. Window size 10.

VanillaFlaskBaseline5.mat.csv

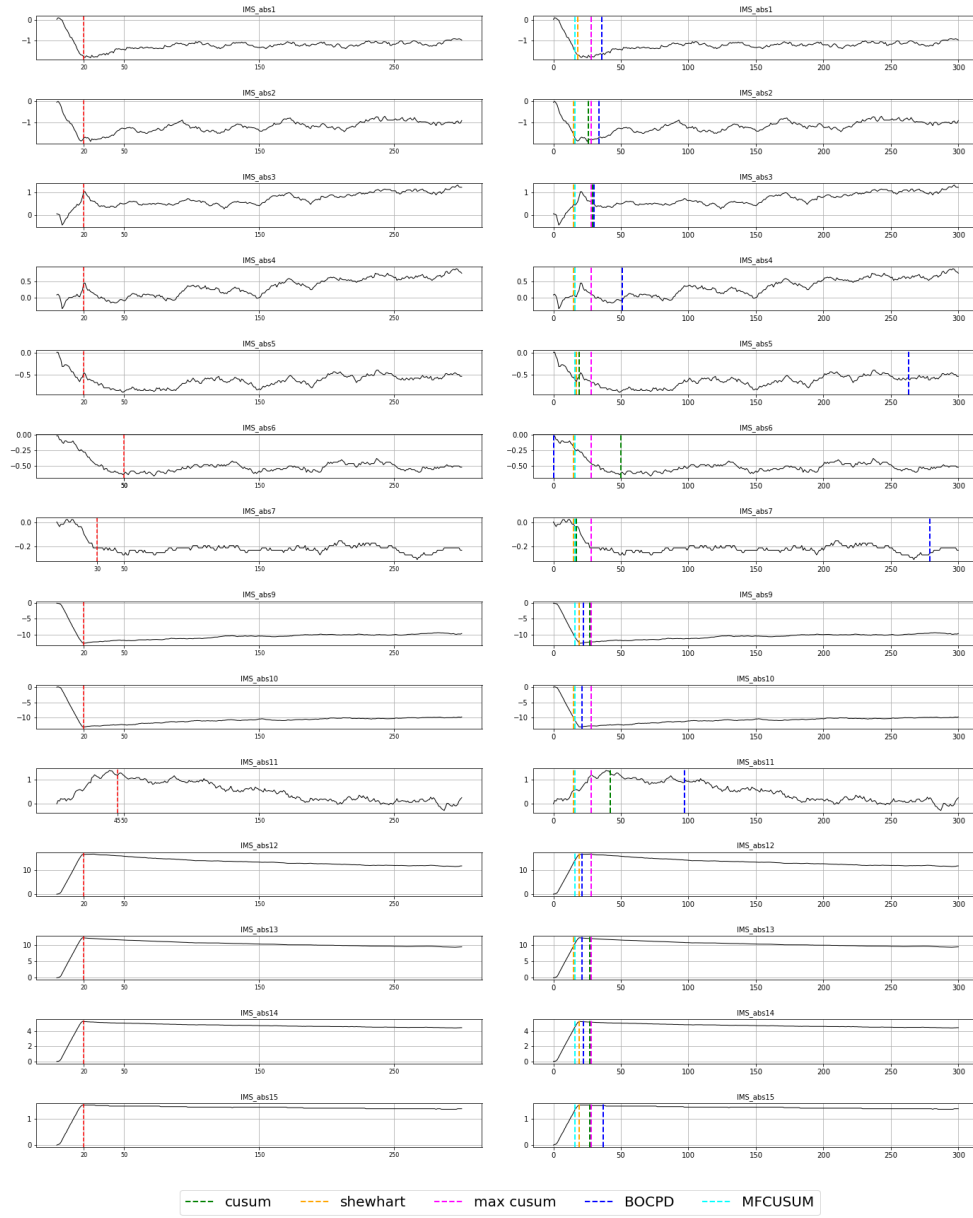


Figure 57: VanillaBaseline5. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	20	5	10	23	6	9	36
		10	16	26	10	23	36
		15	18	28	16	28	36
IMS_abs2	20	5	8	20	6	9	34
		10	10	23	10	23	34
		15	15	26	16	28	34
IMS_abs3	20	5	5	7	6	9	30
		10	10	28	10	23	30
		15	15	29	16	28	30
IMS_abs4	20	5	5	7	6	9	51
		10	12	12	10	23	51
		15	15	16	16	28	51
IMS_abs5	20	5	6	8	6	9	263
		10	12	20	10	23	263
		15	17	19	16	28	263
IMS_abs6	50	5	6	7	6	9	0
		10	10	12	10	23	0
		15	15	50	16	28	0
IMS_abs7	30	5	5	6	6	9	279
		10	10	0	10	23	279
		15	15	17	16	28	279
IMS_abs9	20	5	13	23	6	9	22
		10	17	25	10	23	22
		15	19	27	16	28	22
IMS_abs10	20	5	5	23	6	9	21
		10	10	25	10	23	21
		15	15	28	16	28	21
IMS_abs11	45	5	5	6	6	9	97
		10	10	11	10	23	97
		15	15	42	16	28	97
IMS_abs12	20	5	10	23	6	9	21
		10	17	25	10	23	21
		15	19	28	16	28	21
IMS_abs13	20	5	5	22	6	9	21
		10	10	25	10	23	21
		15	15	27	16	28	21
IMS_abs14	20	5	10	22	6	9	22
		10	15	24	10	23	22
		15	19	27	16	28	22
IMS_abs15	20	5	5	22	6	9	37
		10	10	24	10	23	37
		15	19	27	16	28	37
mean run time (sec)			2.088e-03	7.349e-03	1.196e-04	7.113e-04	2.497e-01
mean relative run time			17.458	61.447	1.000	5.947	2087.734

Table 37: Change found for each moving window. VanillaFlaskBaseline5.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	17.64	11.57	18.64	15.64	49.21
10	12.57	11.07	14.64	6.36	49.21
15	8.14	6.29	8.64	9.21	49.21

Table 38: MAE of each algorithm for VanillaFlaskBaseline5.

VanillaTableBaseline5.mat.csv

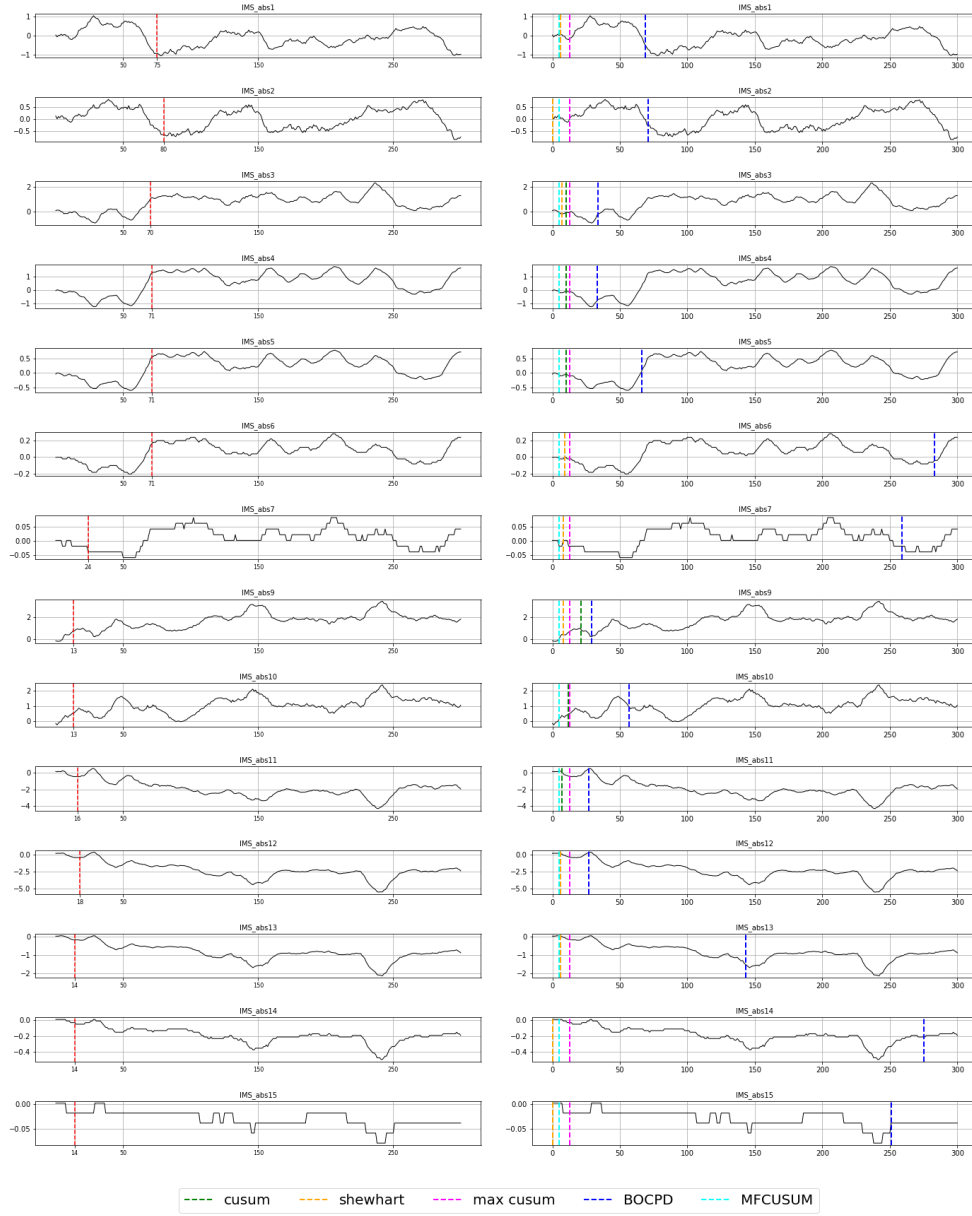


Figure 58: VanillaBaseline5. Window size 5.

VanillaTableBaseline5.mat.csv

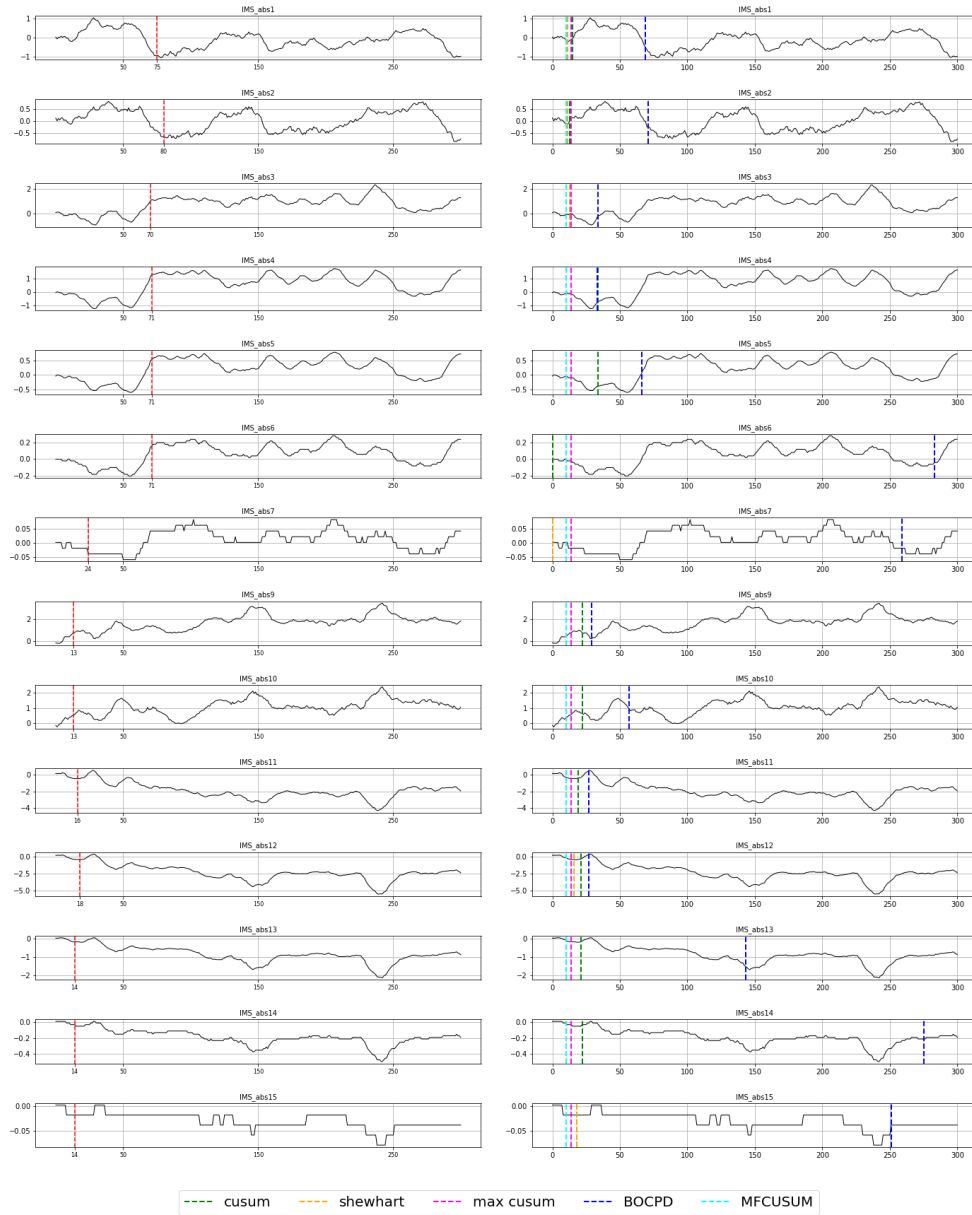


Figure 59: VanillaBaseline5. Window size 10.

VanillaTableBaseline5.mat.csv

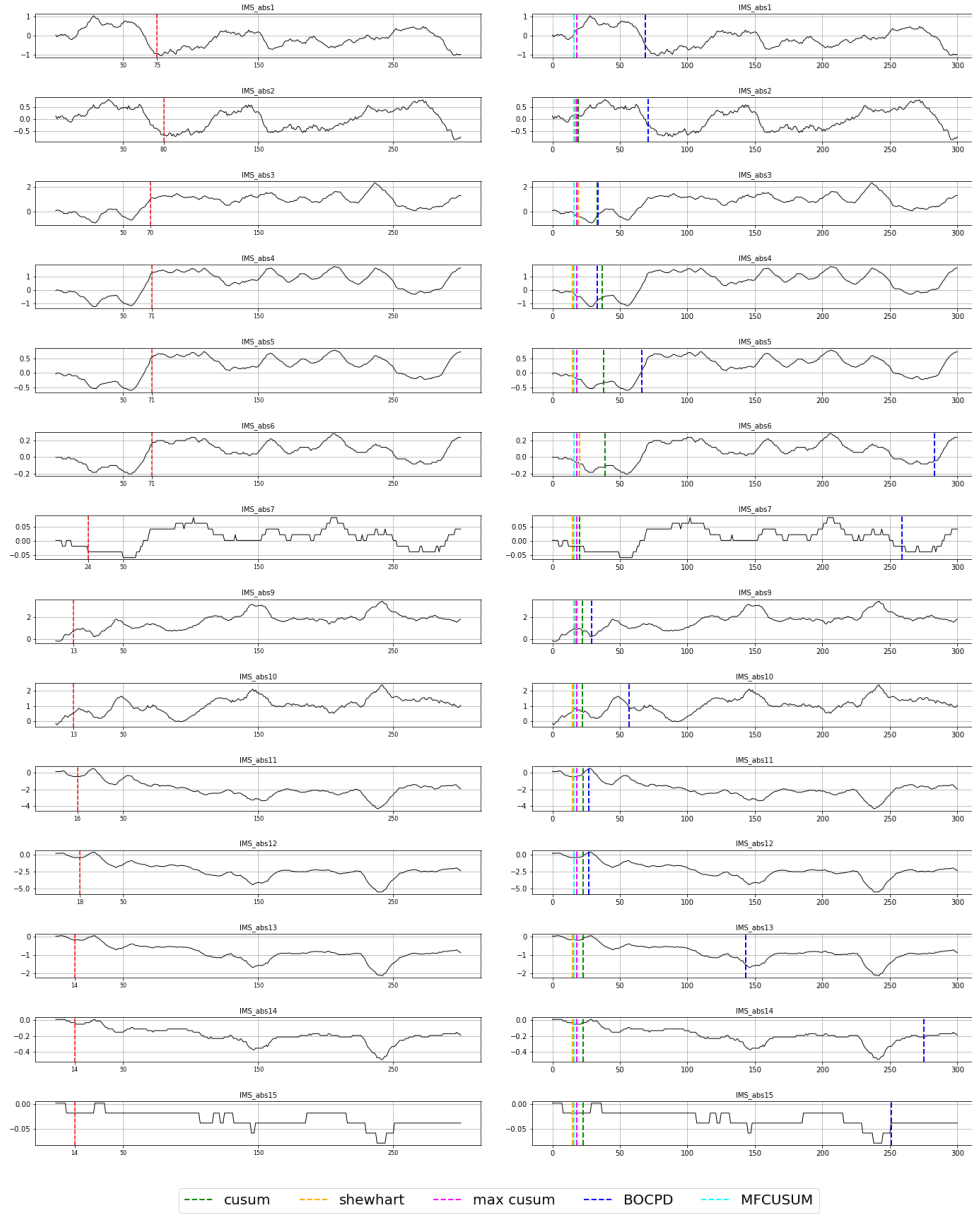


Figure 60: VanillaBaseline5. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	75	5	6	6	5	13	69
		10	11	15	10	14	69
		15	16	16	16	18	69
IMS_abs2	80	5	0	0	5	13	71
		10	11	13	10	14	71
		15	17	19	16	18	71
IMS_abs3	70	5	7	10	5	13	34
		10	13	14	10	14	34
		15	19	33	16	18	34
IMS_abs4	71	5	5	10	5	13	33
		10	10	34	10	14	33
		15	15	37	16	18	33
IMS_abs5	71	5	5	10	5	13	66
		10	10	34	10	14	66
		15	15	38	16	18	66
IMS_abs6	71	5	9	9	5	13	283
		10	10	0	10	14	283
		15	20	39	16	18	283
IMS_abs7	24	5	8	8	5	13	259
		10	0	0	10	14	259
		15	15	20	16	18	259
IMS_abs9	13	5	8	21	5	13	29
		10	14	22	10	14	29
		15	17	22	16	18	29
IMS_abs10	13	5	5	12	5	13	57
		10	10	22	10	14	57
		15	15	22	16	18	57
IMS_abs11	16	5	5	7	5	13	27
		10	10	19	10	14	27
		15	15	23	16	18	27
IMS_abs12	18	5	6	6	5	13	27
		10	16	21	10	14	27
		15	16	23	16	18	27
IMS_abs13	14	5	6	6	5	13	143
		10	10	21	10	14	143
		15	15	23	16	18	143
IMS_abs14	14	5	0	0	5	13	275
		10	10	22	10	14	275
		15	15	23	16	18	275
IMS_abs15	14	5	0	0	5	13	251
		10	18	18	10	14	251
		15	15	23	16	18	251
mean run time (sec)			1.266e-02	1.353e-02	1.136e-04	4.602e-04	3.220e-01
mean relative run time			111.480	119.146	1.000	4.052	2835.405

Table 39: Change found for each moving window. VanillaTableBaseline5.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	35.29	33.93	35.29	27.29	89.14
10	30.07	28.21	30.29	26.57	89.14
15	25.50	22.64	26.00	25.71	89.14

Table 40: MAE of each algorithm for VanillaTableBaseline5.

3 Grape

3.1 Baseline1

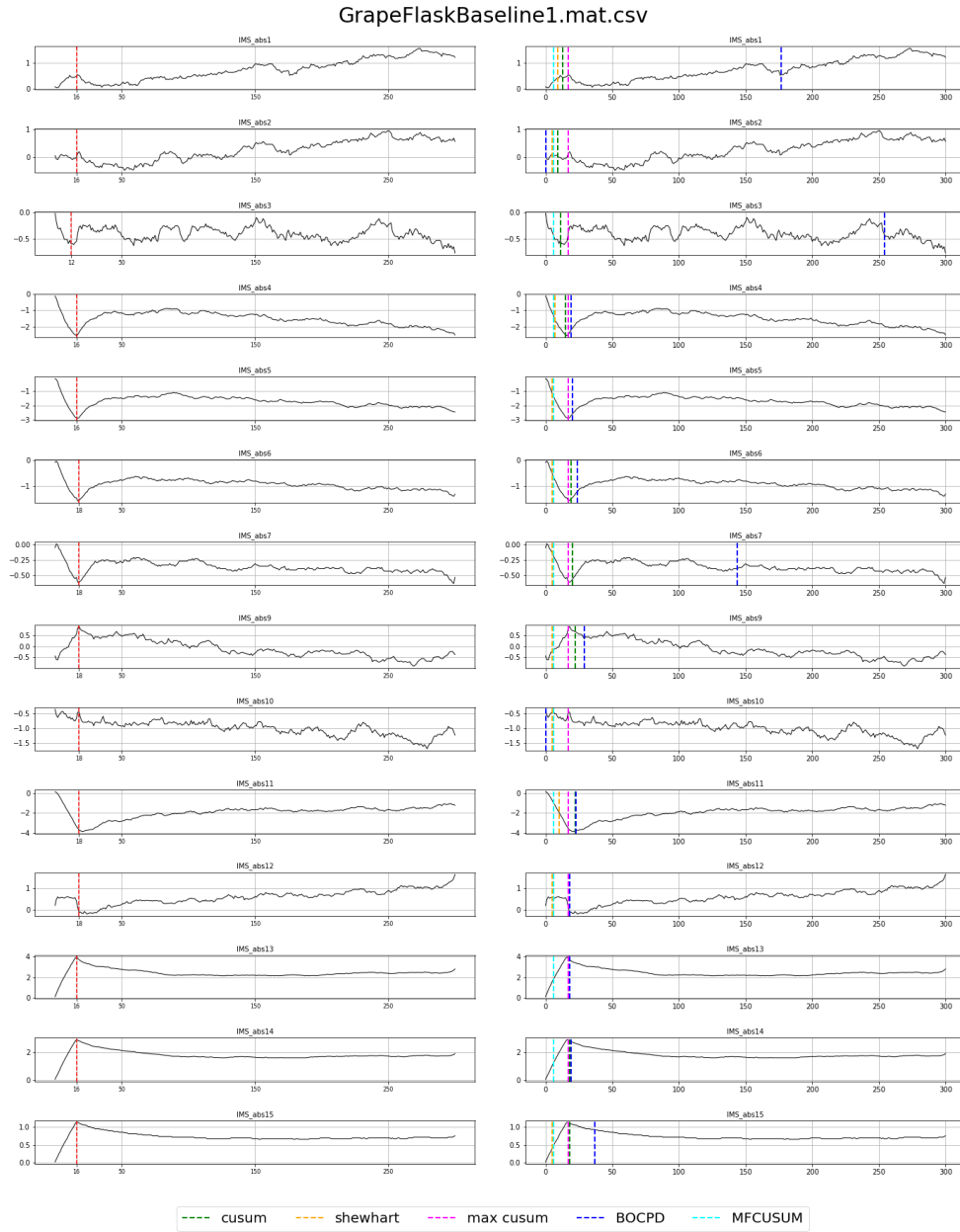


Figure 61: GrapeBaseline1. Window size 5.

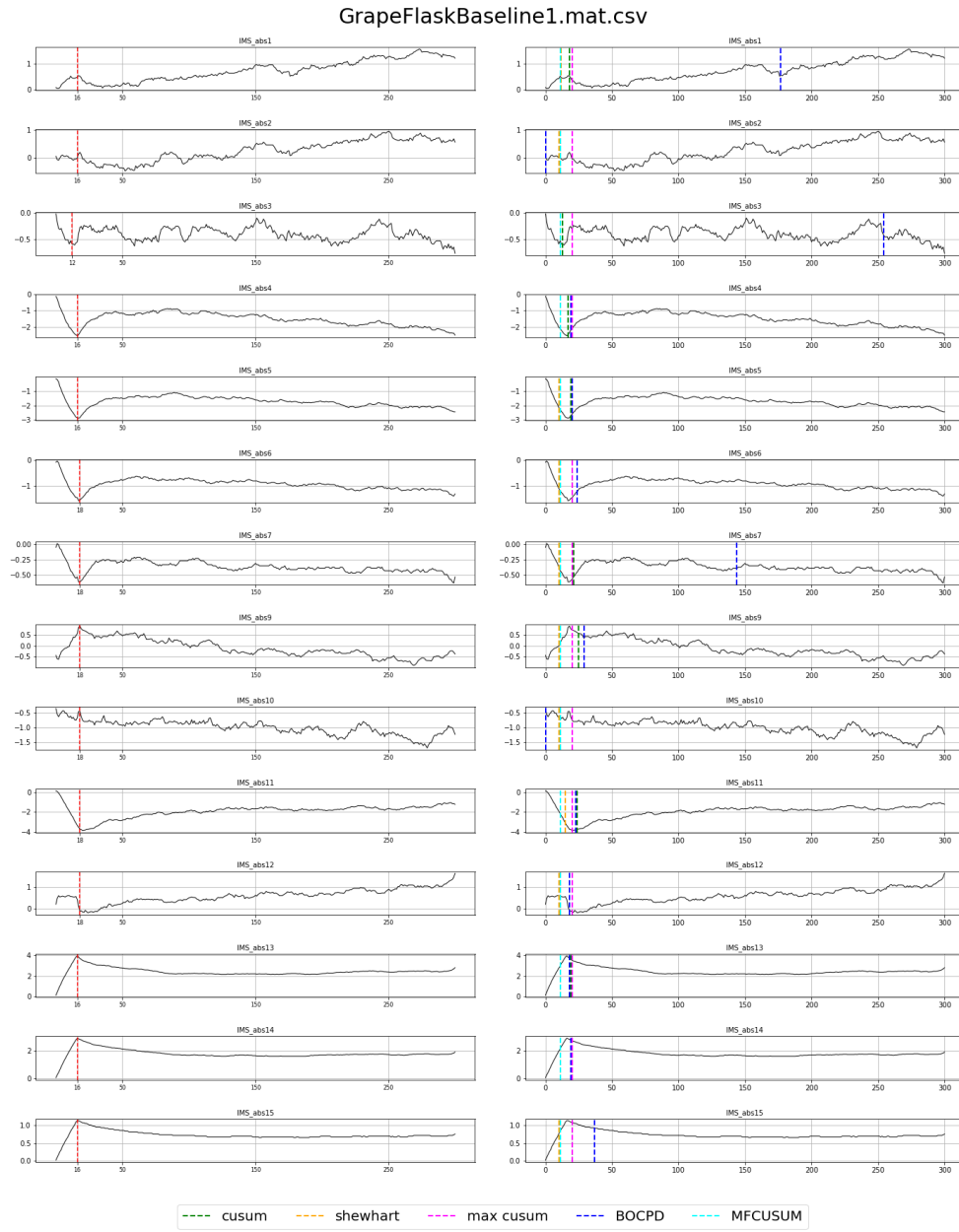


Figure 62: GrapeBaseline1. Window size 10.

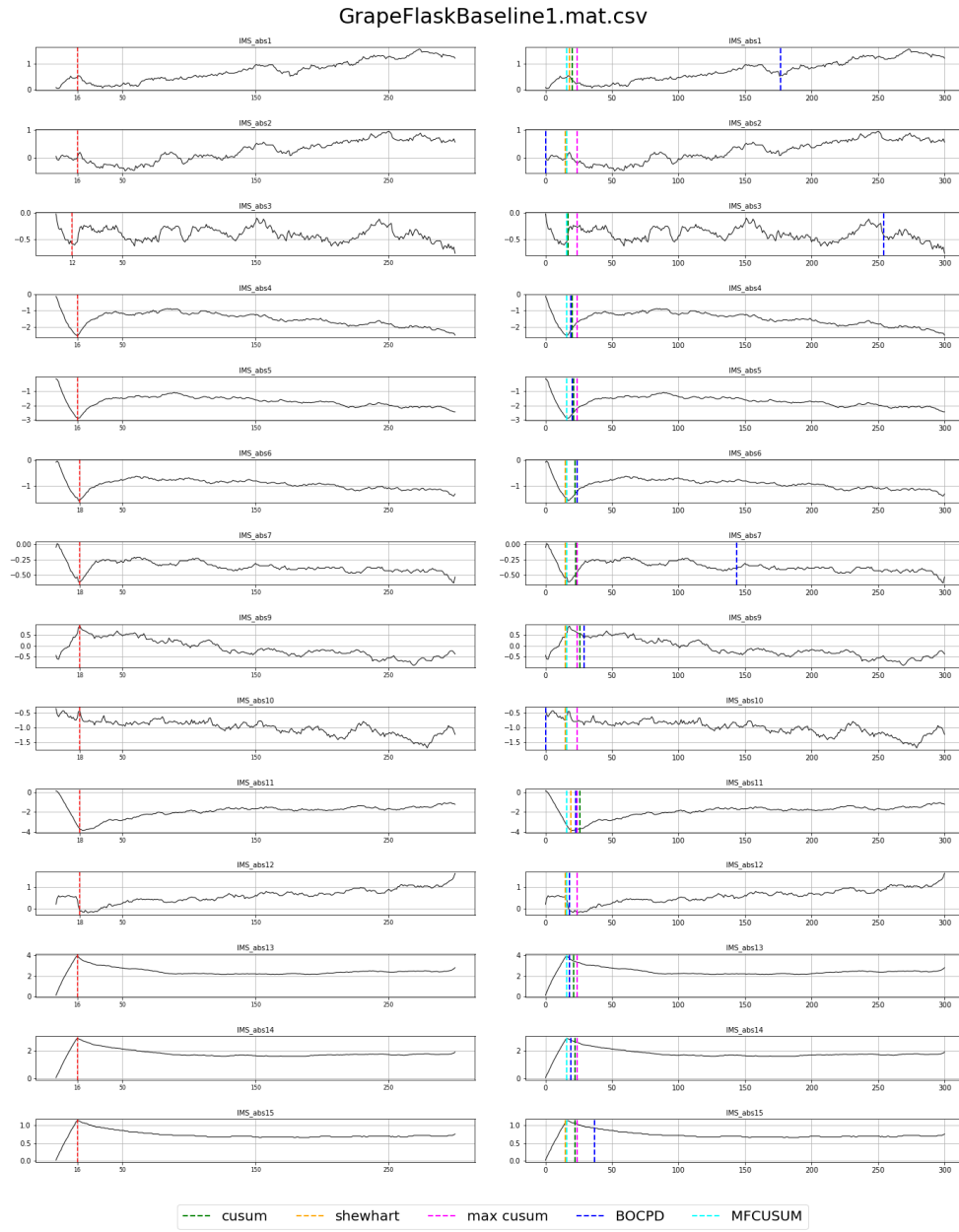


Figure 63: GrapeBaseline1. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	16	5	9	13	6	17	177
		10	12	18	11	20	177
		15	18	20	16	24	177
IMS_abs2	16	5	5	9	6	17	0
		10	10	11	11	20	0
		15	15	16	16	24	0
IMS_abs3	12	5	6	11	6	17	254
		10	11	13	11	20	254
		15	16	17	16	24	254
IMS_abs4	16	5	7	15	6	17	19
		10	11	17	11	20	19
		15	16	20	16	24	19
IMS_abs5	16	5	5	17	6	17	20
		10	10	19	11	20	20
		15	16	21	16	24	20
IMS_abs6	18	5	5	19	6	17	24
		10	10	20	11	20	24
		15	15	22	16	24	24
IMS_abs7	18	5	5	20	6	17	144
		10	10	21	11	20	144
		15	15	23	16	24	144
IMS_abs9	18	5	5	22	6	17	29
		10	10	25	11	20	29
		15	15	26	16	24	29
IMS_abs10	18	5	5	6	6	17	0
		10	10	11	11	20	0
		15	15	16	16	24	0
IMS_abs11	18	5	10	22	6	17	23
		10	15	24	11	20	23
		15	19	26	16	24	23
IMS_abs12	18	5	5	6	6	17	18
		10	10	11	11	20	18
		15	15	16	16	24	18
IMS_abs13	16	5	6	17	6	17	18
		10	11	19	11	20	18
		15	16	21	16	24	18
IMS_abs14	16	5	6	18	6	17	19
		10	11	20	11	20	19
		15	16	22	16	24	19
IMS_abs15	16	5	10	18	6	17	37
		10	20	20	11	20	37
		15	15	22	16	24	37
mean run time (sec)			1.619e-03	4.046e-03	1.283e-04	8.186e-04	2.894e-01
mean relative run time			12.625	31.540	1.000	6.382	2255.916

Table 41: Change found for each moving window. GrapeFlaskBaseline1.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	10.57	3.79	10.57	1.29	44.14
10	5.79	3.93	5.57	3.43	44.14
15	1.71	4.57	1.14	7.43	44.14

Table 42: MAE of each algorithm for GrapeFlaskBaseline1.

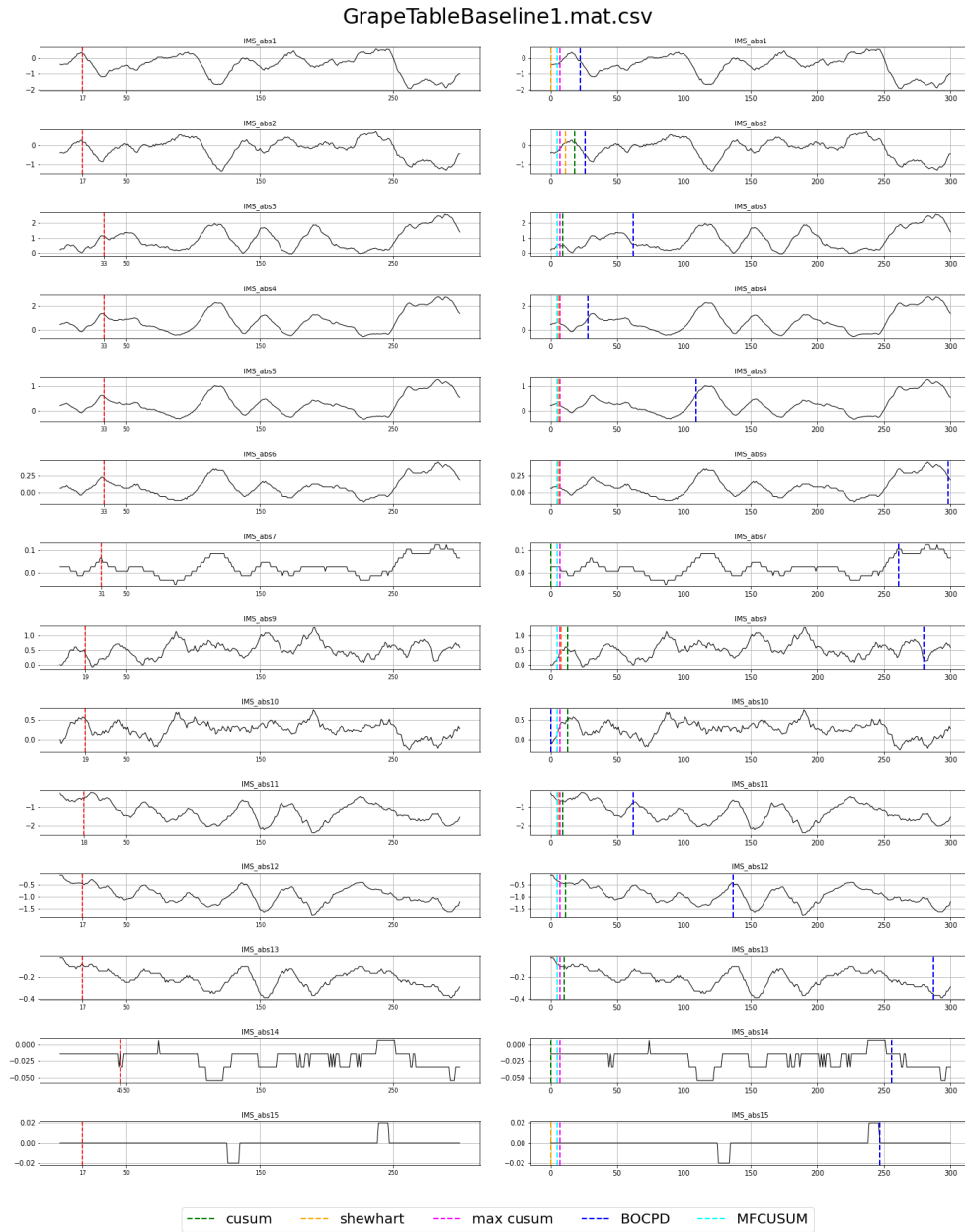


Figure 64: GrapeBaseline1. Window size 5.

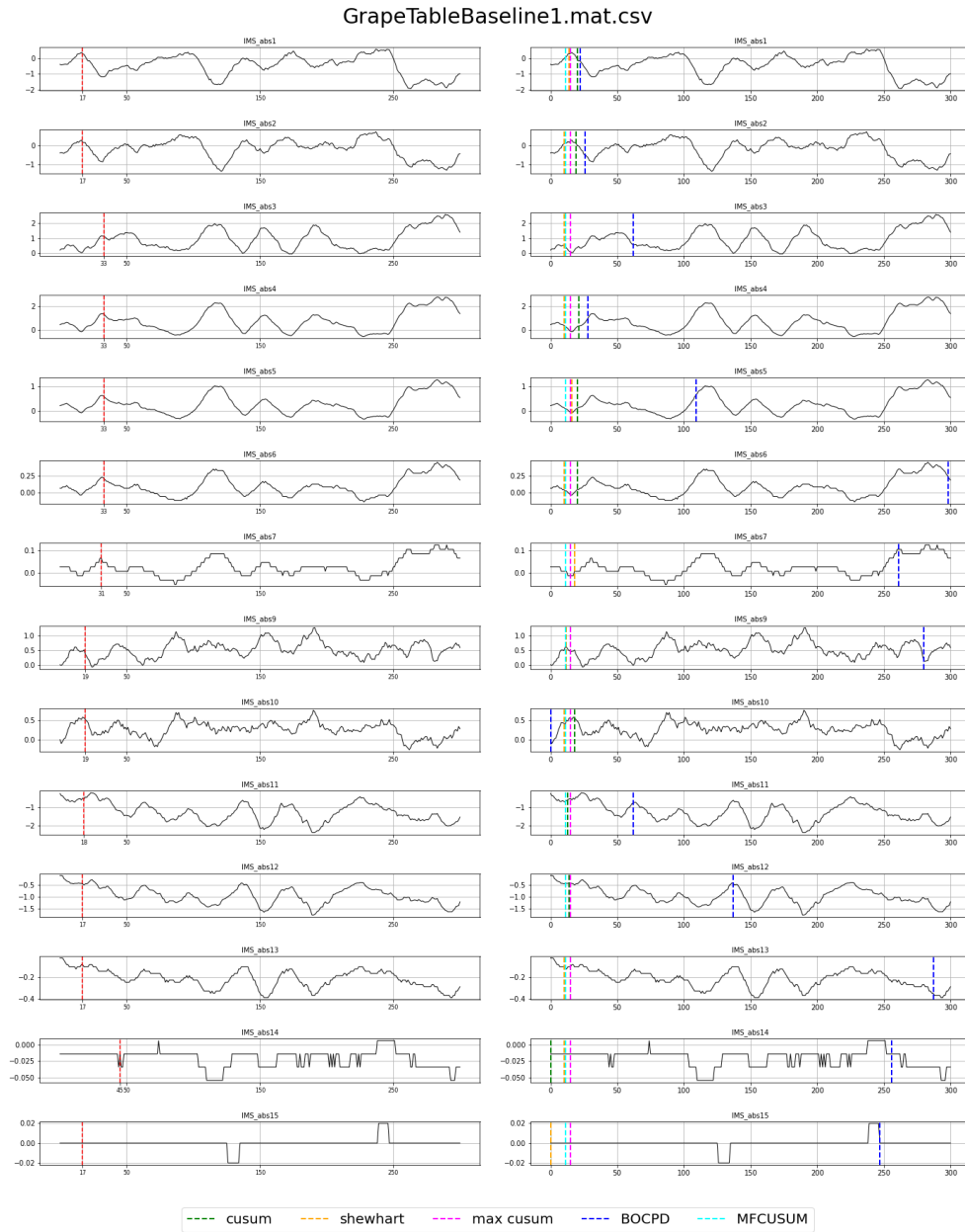


Figure 65: GrapeBaseline1. Window size 10.

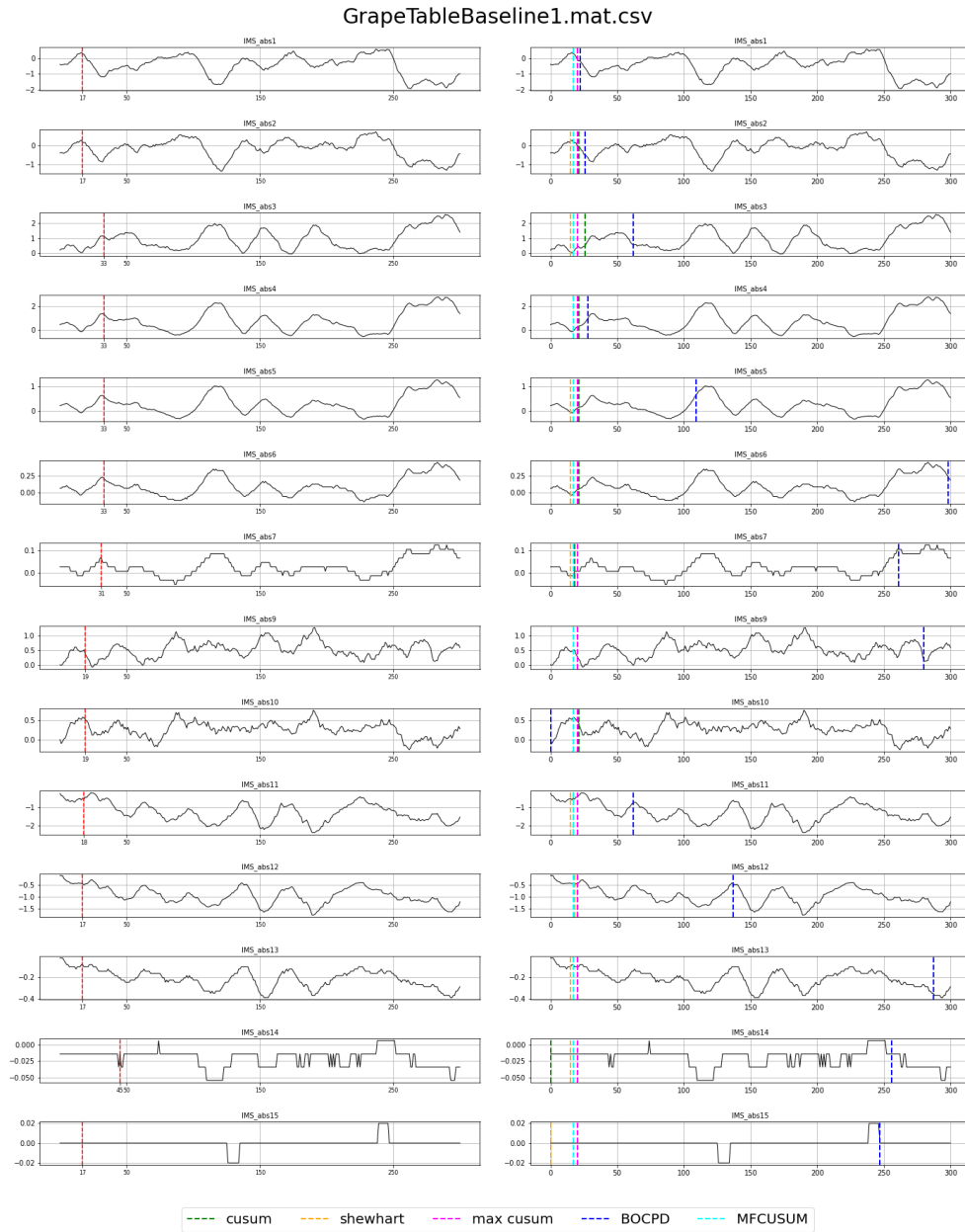


Figure 66: GrapeBaseline1. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	17	5	0	0	5	7	22
		10	14	20	11	15	22
		15	17	20	17	20	22
IMS_abs2	17	5	11	18	5	7	26
		10	10	19	11	15	26
		15	15	21	17	20	26
IMS_abs3	33	5	5	9	5	7	62
		10	10	11	11	15	62
		15	15	26	17	20	62
IMS_abs4	33	5	6	7	5	7	28
		10	10	21	11	15	28
		15	17	21	17	20	28
IMS_abs5	33	5	6	6	5	7	109
		10	16	20	11	15	109
		15	15	21	17	20	109
IMS_abs6	33	5	6	7	5	7	298
		10	10	20	11	15	298
		15	15	21	17	20	298
IMS_abs7	31	5	5	0	5	7	261
		10	18	18	11	15	261
		15	15	18	17	20	261
IMS_abs9	19	5	8	13	5	7	280
		10	12	15	11	15	280
		15	17	20	17	20	280
IMS_abs10	19	5	5	13	5	7	0
		10	10	18	11	15	0
		15	17	21	17	20	0
IMS_abs11	18	5	6	9	5	7	62
		10	11	13	11	15	62
		15	15	17	17	20	62
IMS_abs12	17	5	7	11	5	7	137
		10	11	14	11	15	137
		15	18	20	17	20	137
IMS_abs13	17	5	5	10	5	7	287
		10	10	15	11	15	287
		15	15	20	17	20	287
IMS_abs14	45	5	5	0	5	7	256
		10	10	0	11	15	256
		15	15	0	17	20	256
IMS_abs15	17	5	0	0	5	7	247
		10	0	0	11	15	247
		15	0	0	17	20	247
mean run time (sec)			9.934e-03	1.781e-02	1.277e-04	3.904e-04	4.928e-01
mean relative run time			77.785	139.459	1.000	3.057	3858.671

Table 43: Change found for each moving window. GrapeTableBaseline1.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	19.57	17.71	19.93	17.93	126.71
10	14.07	11.07	13.93	9.93	126.71
15	10.36	9.64	7.93	7.64	126.71

Table 44: MAE of each algorithm for GrapeTableBaseline1.

3.2 Baseline2

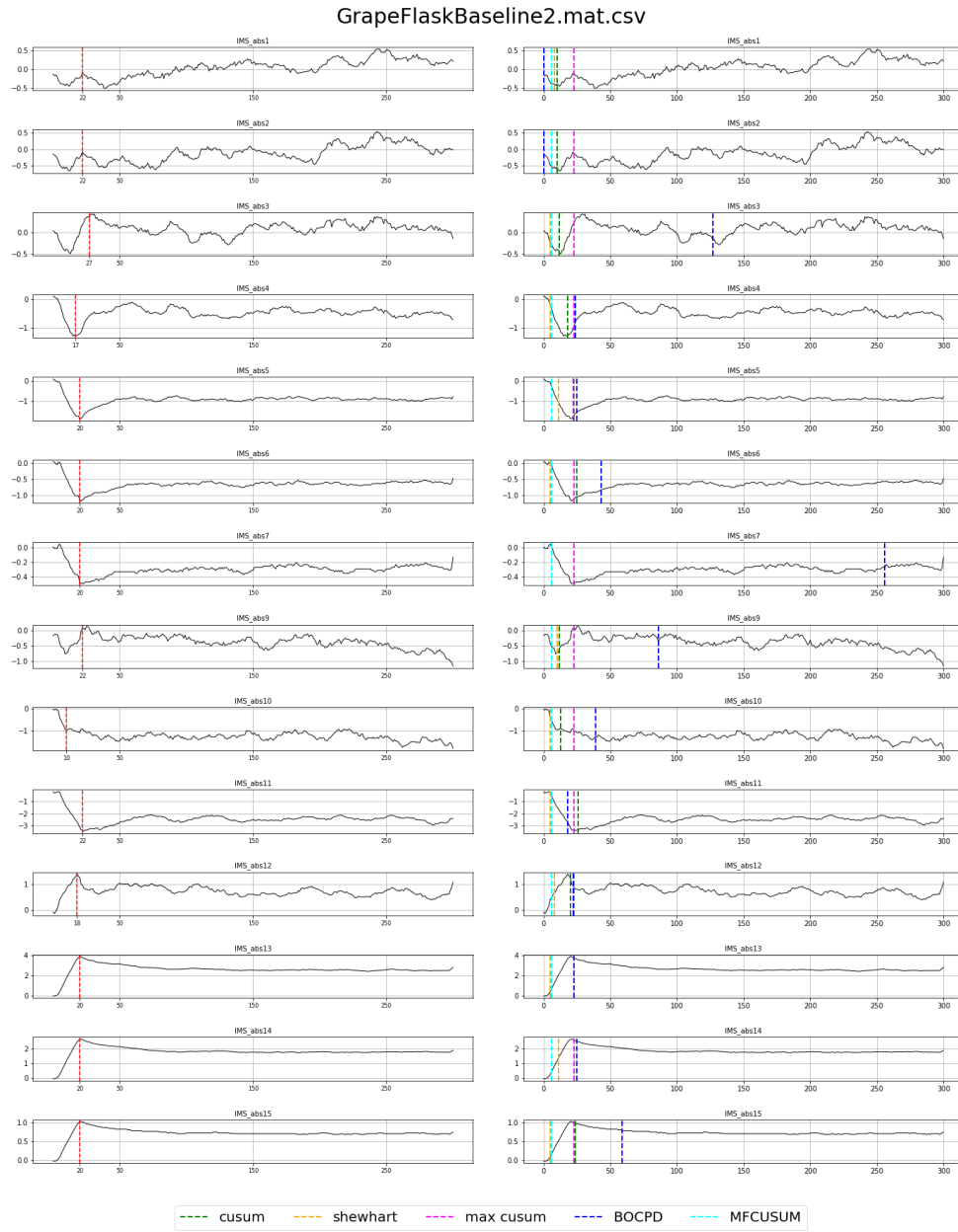


Figure 67: GrapeBaseline2. Window size 5.

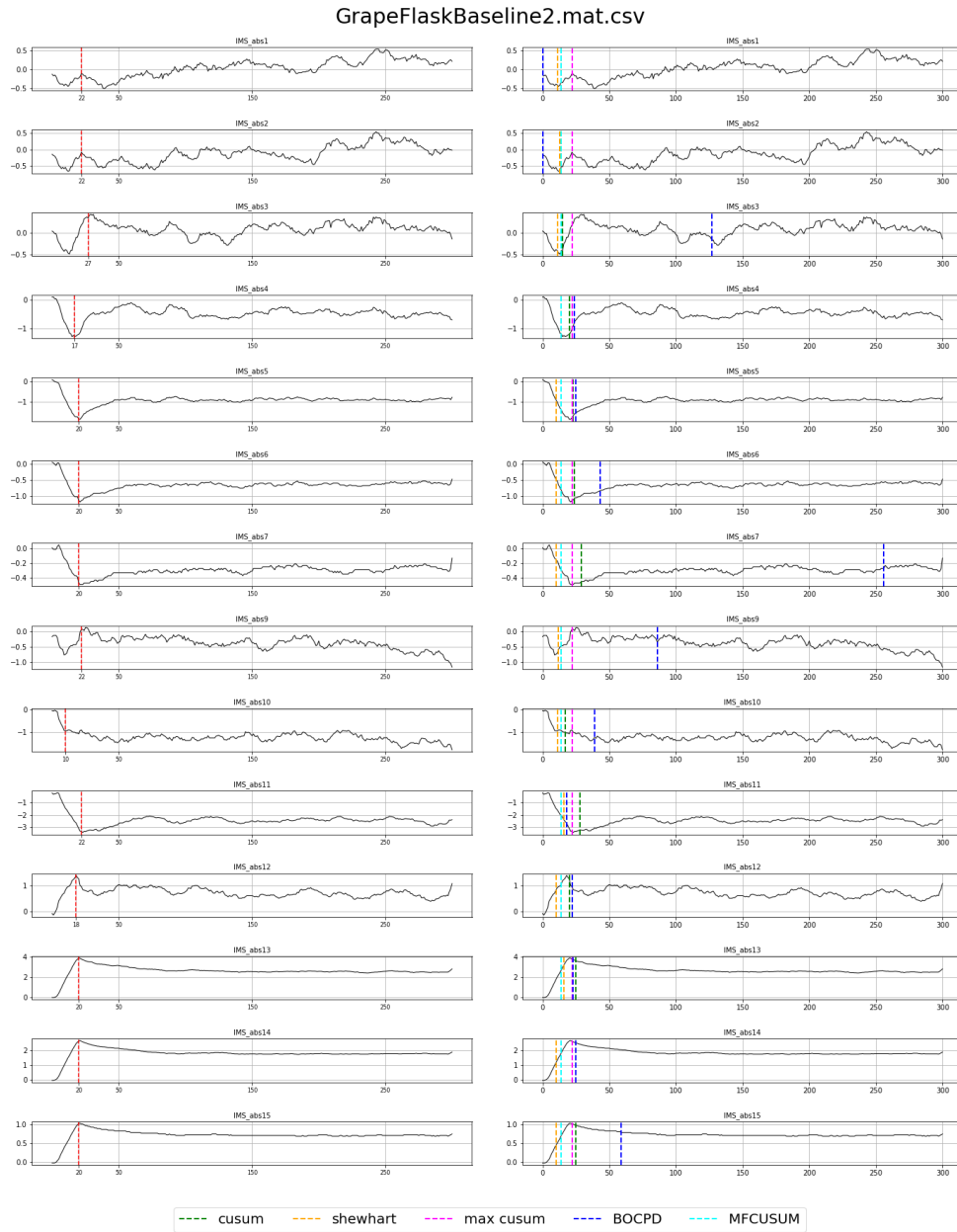


Figure 68: GrapeBaseline2. Window size 10.

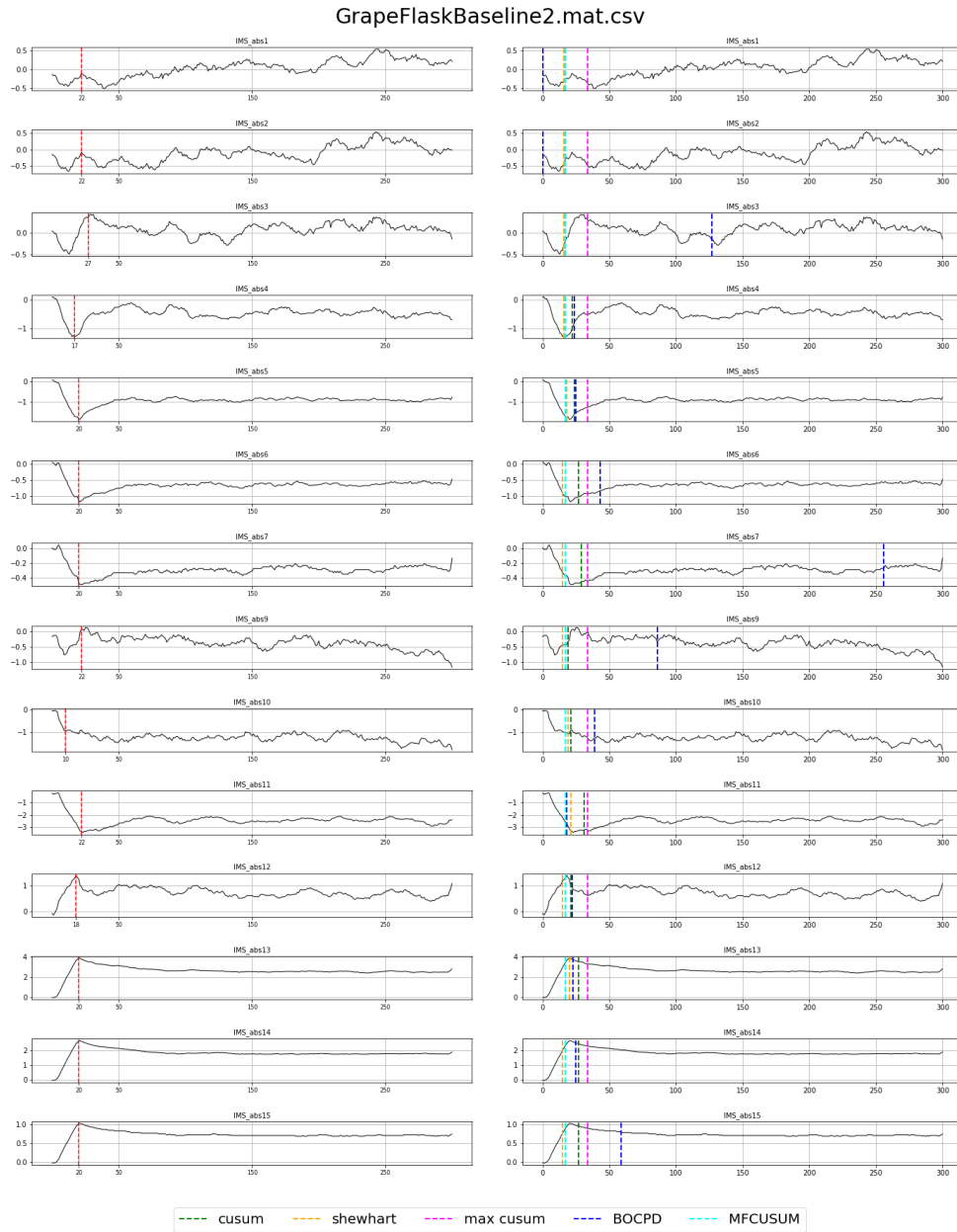


Figure 69: GrapeBaseline2. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	22	5	8	10	6	23	0
		10	11	14	14	22	0
		15	16	17	17	34	0
IMS_abs2	22	5	6	10	6	23	0
		10	13	14	14	22	0
		15	16	17	17	34	0
IMS_abs3	27	5	5	12	6	23	127
		10	11	15	14	22	127
		15	16	17	17	34	127
IMS_abs4	17	5	5	18	6	23	24
		10	14	20	14	22	24
		15	16	22	17	34	24
IMS_abs5	20	5	11	22	6	23	25
		10	10	23	14	22	25
		15	18	24	17	34	25
IMS_abs6	20	5	5	25	6	23	43
		10	10	24	14	22	43
		15	15	27	17	34	43
IMS_abs7	20	5	6	6	6	23	256
		10	10	29	14	22	256
		15	15	29	17	34	256
IMS_abs9	22	5	10	12	6	23	86
		10	12	14	14	22	86
		15	15	19	17	34	86
IMS_abs10	10	5	5	13	6	23	39
		10	11	17	14	22	39
		15	19	21	17	34	39
IMS_abs11	22	5	5	26	6	23	18
		10	16	28	14	22	18
		15	21	31	17	34	18
IMS_abs12	18	5	8	20	6	23	22
		10	10	20	14	22	22
		15	15	21	17	34	22
IMS_abs13	20	5	5	23	6	23	23
		10	16	25	14	22	23
		15	20	27	17	34	23
IMS_abs14	20	5	11	23	6	23	25
		10	10	25	14	22	25
		15	15	27	17	34	25
IMS_abs15	20	5	5	24	6	23	59
		10	10	25	14	22	59
		15	15	27	17	34	59
mean run time (sec)			1.859e-03	4.702e-03	1.554e-04	1.003e-03	2.810e-01
mean relative run time			11.959	30.248	1.000	6.452	1807.717

Table 45: Change found for each moving window. GrapeFlaskBaseline2.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	13.21	6.43	14.00	3.57	40.21
10	8.43	6.07	6.57	2.71	40.21
15	4.71	6.57	4.00	14.00	40.21

Table 46: MAE of each algorithm for GrapeFlaskBaseline2.

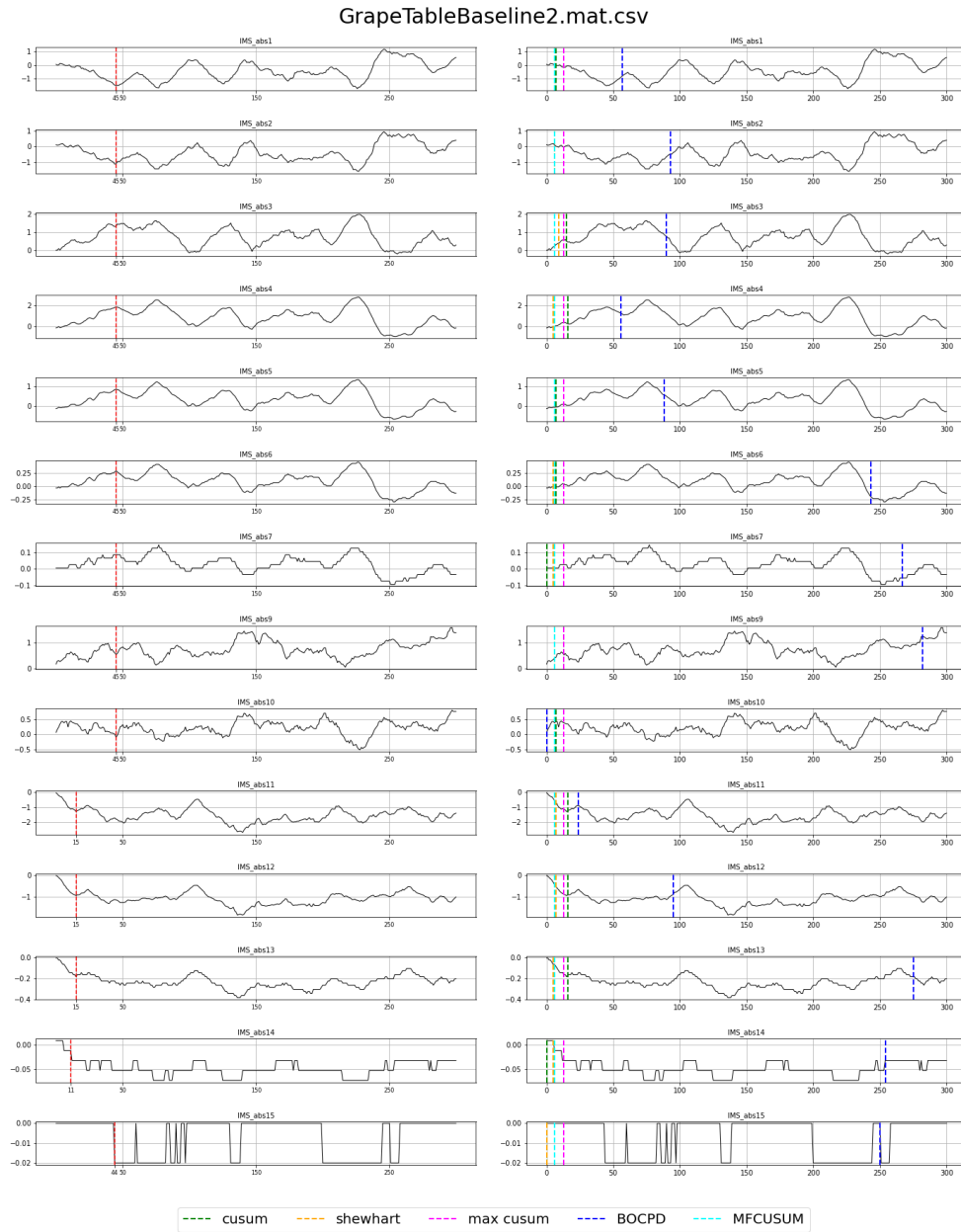


Figure 70: GrapeBaseline2. Window size 5.

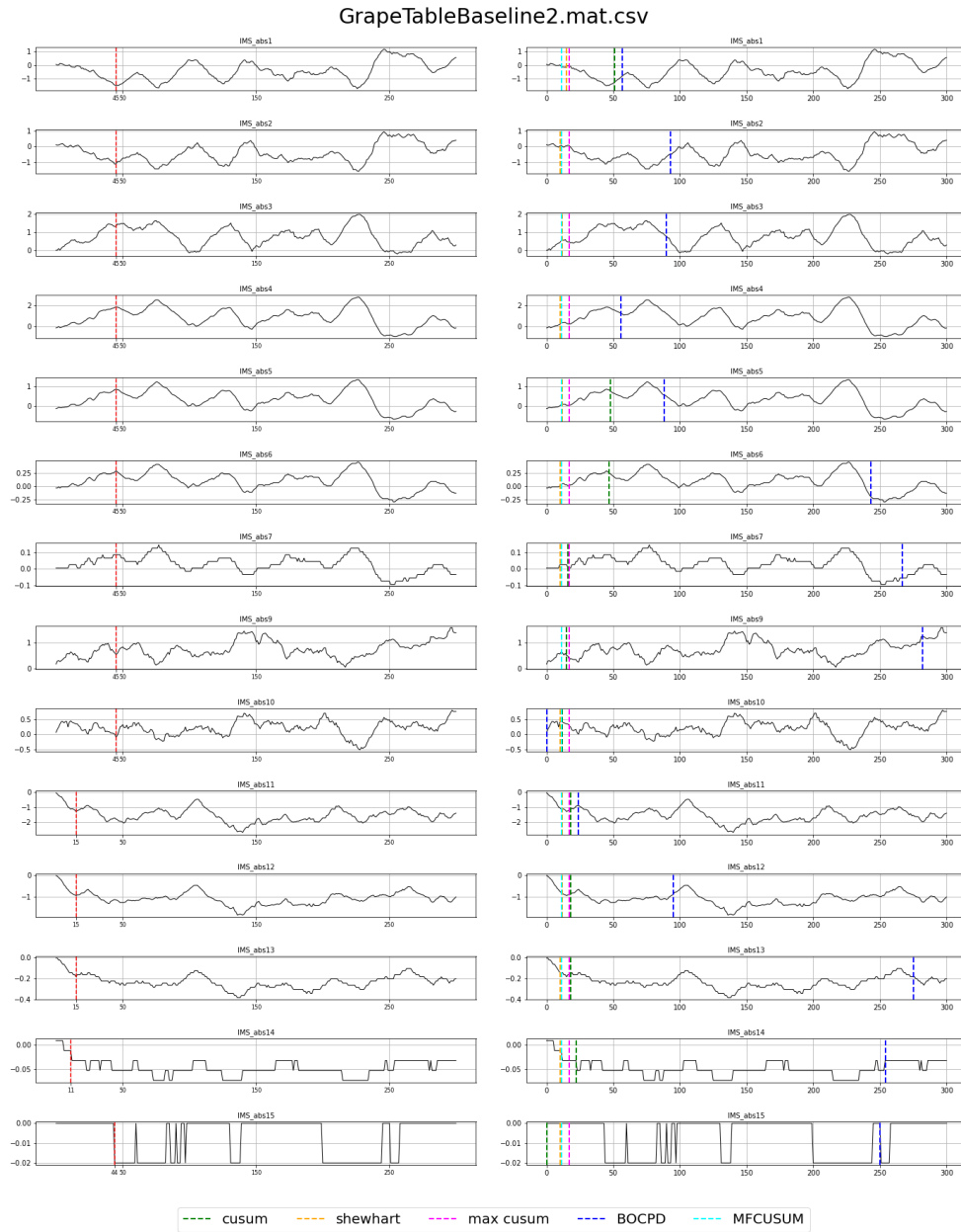


Figure 71: GrapeBaseline2. Window size 10.

GrapeTableBaseline2.mat.csv

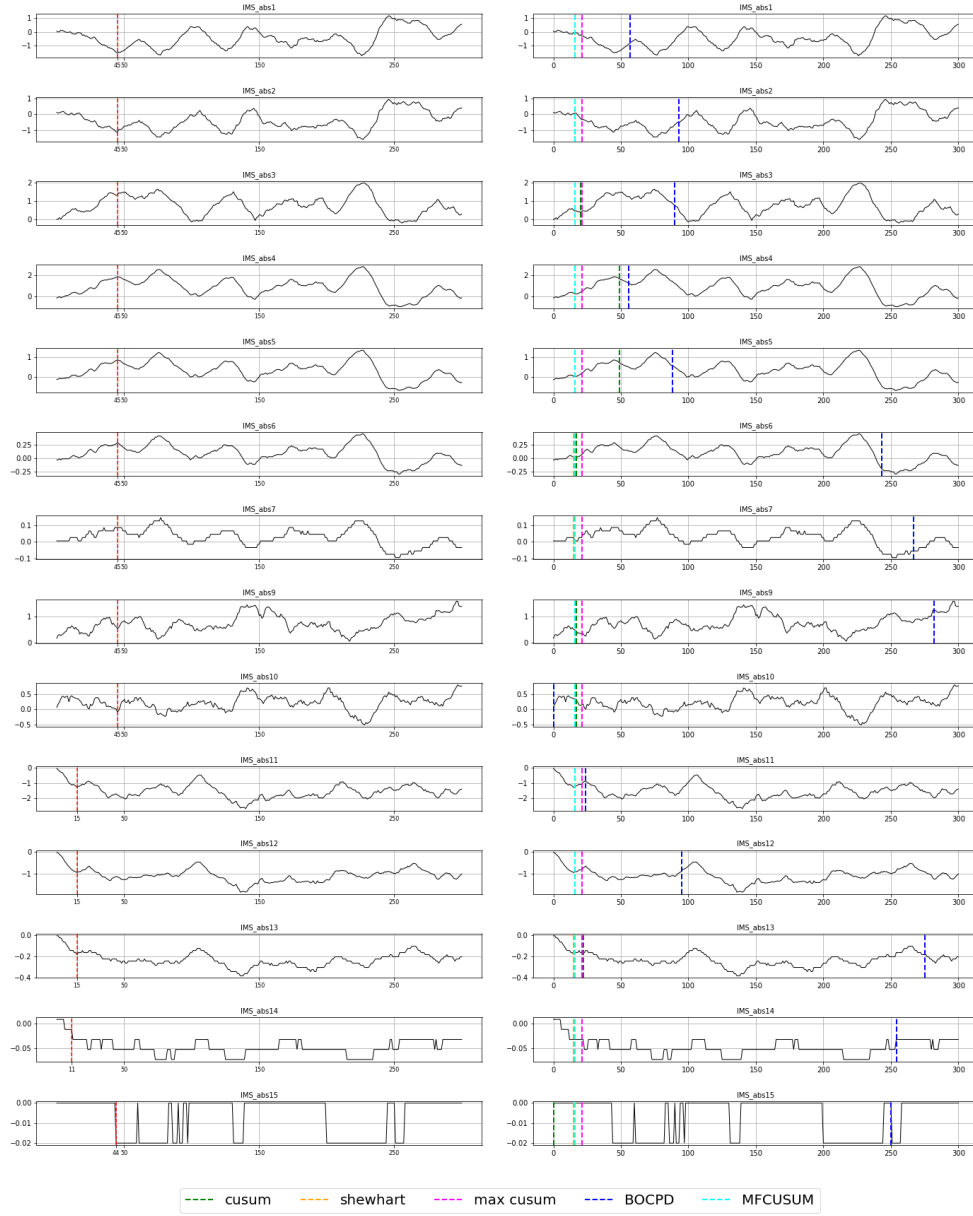


Figure 72: GrapeBaseline2. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	45	5	6	7	6	13	57
		10	15	51	11	17	57
		15	16	16	16	21	57
IMS_abs2	45	5	6	6	6	13	93
		10	10	11	11	17	93
		15	16	16	16	21	93
IMS_abs3	45	5	9	15	6	13	90
		10	12	17	11	17	90
		15	16	20	16	21	90
IMS_abs4	45	5	5	16	6	13	56
		10	10	17	11	17	56
		15	16	49	16	21	56
IMS_abs5	45	5	6	7	6	13	88
		10	12	48	11	17	88
		15	16	49	16	21	88
IMS_abs6	45	5	5	7	6	13	243
		10	10	47	11	17	243
		15	15	17	16	21	243
IMS_abs7	45	5	5	0	6	13	267
		10	10	16	11	17	267
		15	15	16	16	21	267
IMS_abs9	45	5	6	13	6	13	282
		10	11	15	11	17	282
		15	16	17	16	21	282
IMS_abs10	45	5	6	7	6	13	0
		10	10	12	11	17	0
		15	16	17	16	21	0
IMS_abs11	15	5	7	16	6	13	24
		10	12	18	11	17	24
		15	16	21	16	21	24
IMS_abs12	15	5	7	16	6	13	95
		10	12	18	11	17	95
		15	16	21	16	21	95
IMS_abs13	15	5	5	16	6	13	275
		10	10	18	11	17	275
		15	15	22	16	21	275
IMS_abs14	11	5	5	0	6	13	254
		10	10	22	11	17	254
		15	15	21	16	21	254
IMS_abs15	44	5	0	0	6	13	250
		10	10	0	11	17	250
		15	15	0	16	21	250
mean run time (sec)			4.237e-03	1.420e-02	1.296e-04	5.711e-04	4.894e-01
mean relative run time			32.689	109.513	1.000	4.406	3775.876

Table 47: Change found for each moving window. GrapeTableBaseline2.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	30.50	27.50	30.07	23.36	118.50
10	25.07	18.36	25.07	20.79	118.50
15	21.29	19.79	21.21	19.07	118.50

Table 48: MAE of each algorithm for GrapeTableBaseline2.

3.3 Baseline3

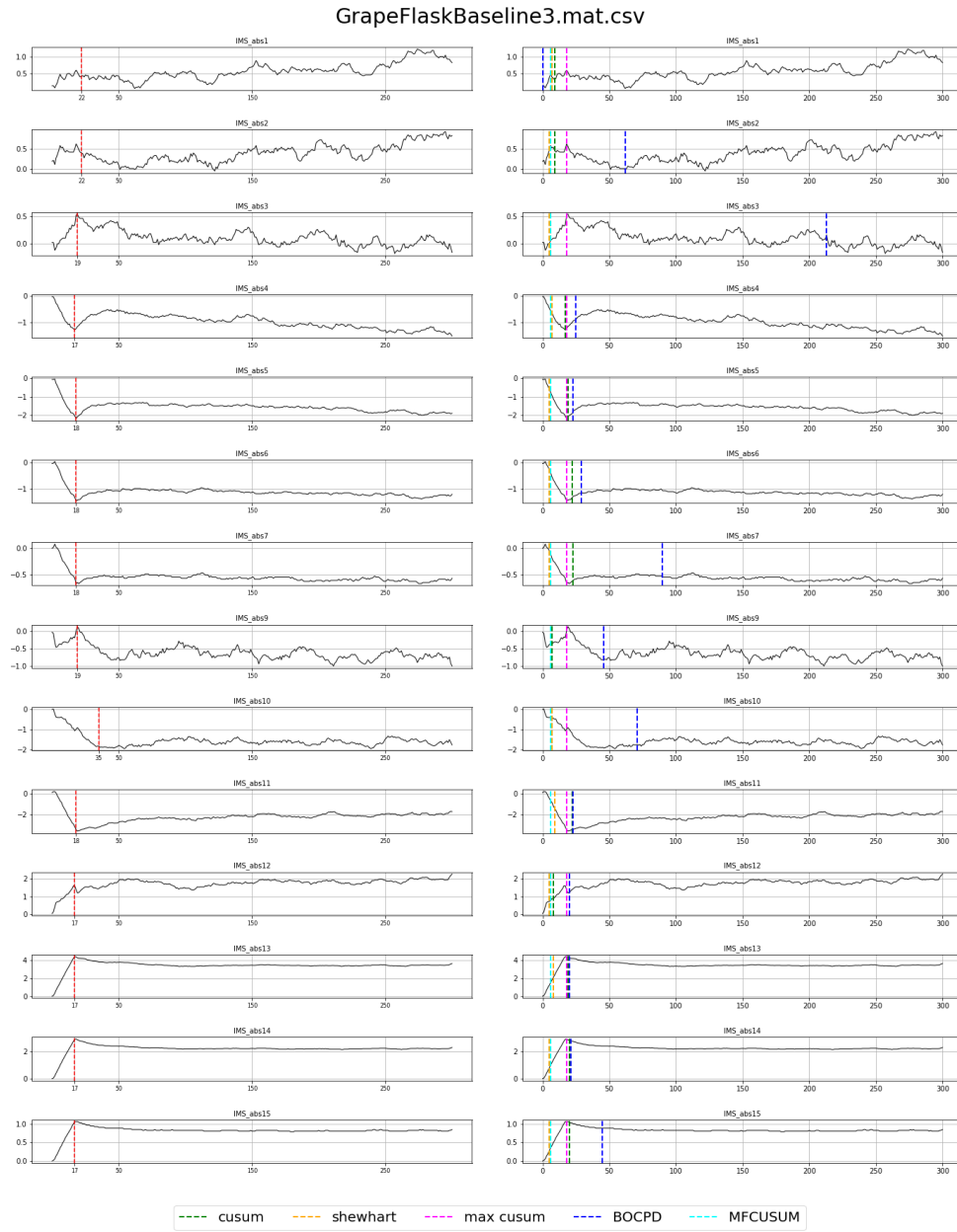


Figure 73: GrapeBaseline3. Window size 5.

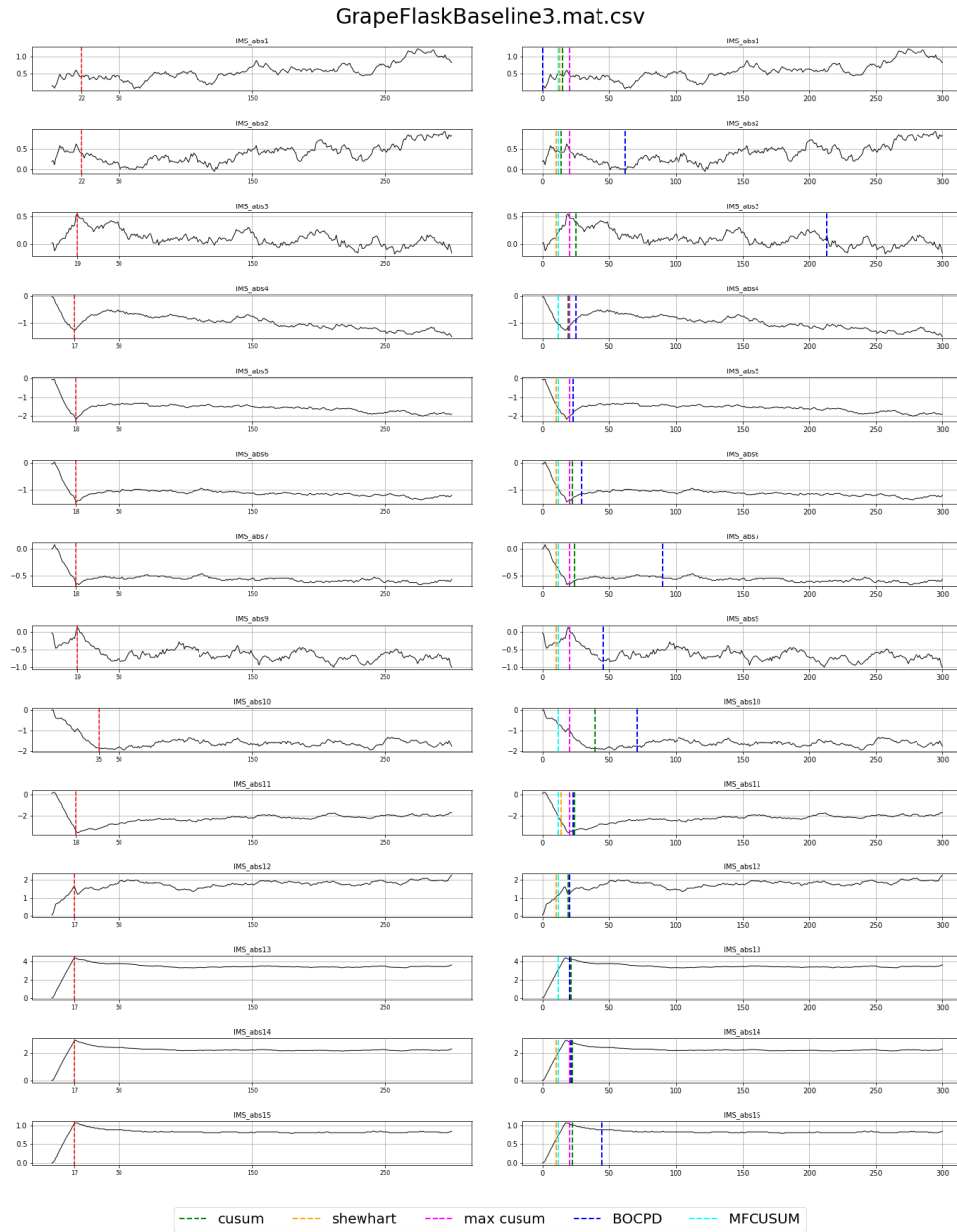


Figure 74: GrapeBaseline3. Window size 10.

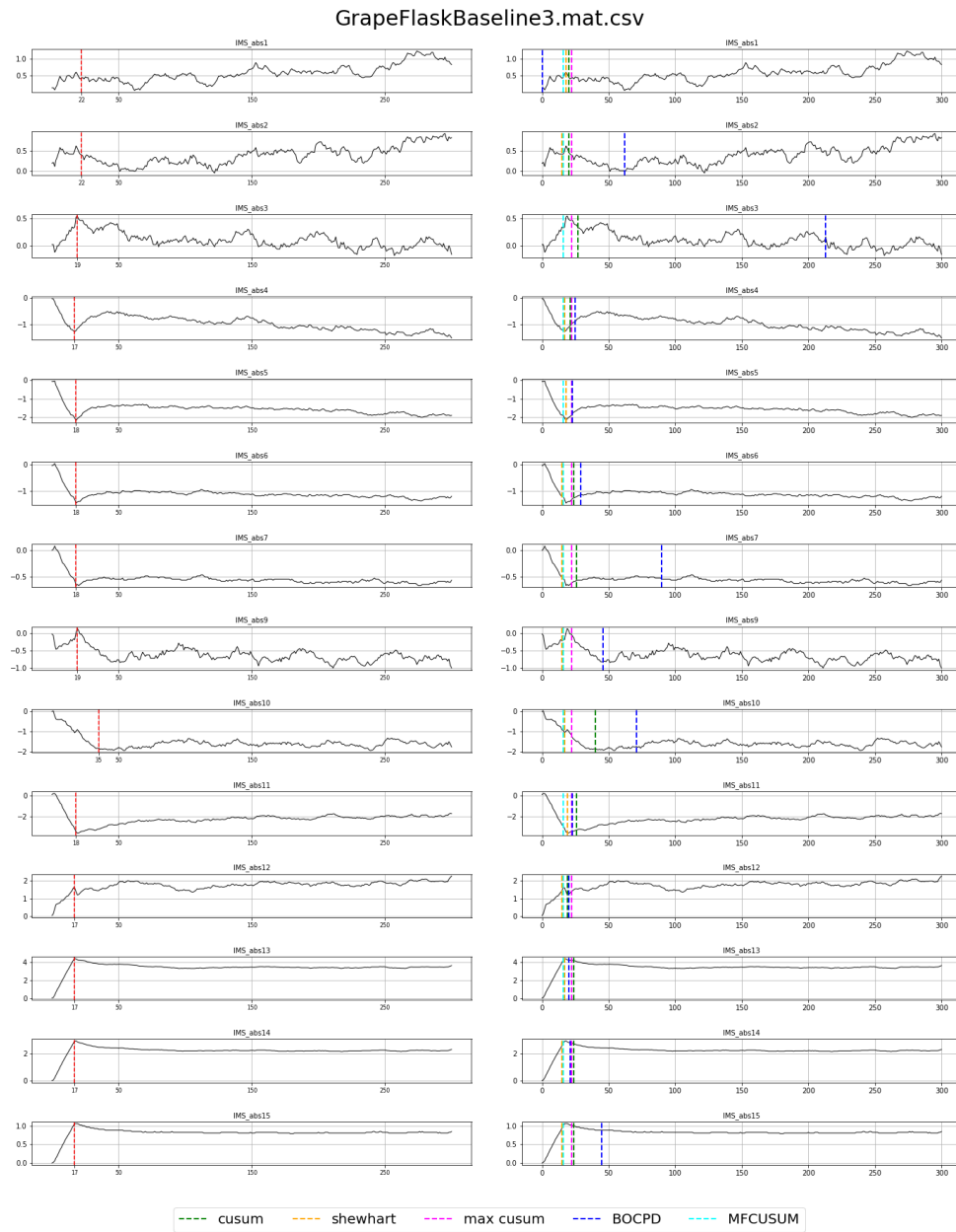


Figure 75: GrapeBaseline3. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	22	5	7	9	6	18	0
		10	13	15	12	20	0
		15	18	20	16	22	0
IMS_abs2	22	5	5	9	6	18	62
		10	10	14	12	20	62
		15	15	20	16	22	62
IMS_abs3	19	5	5	6	6	18	213
		10	10	25	12	20	213
		15	16	27	16	22	213
IMS_abs4	17	5	7	17	6	18	25
		10	12	19	12	20	25
		15	17	21	16	22	25
IMS_abs5	18	5	5	19	6	18	23
		10	10	20	12	20	23
		15	18	23	16	22	23
IMS_abs6	18	5	5	22	6	18	29
		10	10	22	12	20	29
		15	15	24	16	22	29
IMS_abs7	18	5	5	23	6	18	90
		10	10	24	12	20	90
		15	15	26	16	22	90
IMS_abs9	19	5	6	7	6	18	46
		10	10	12	12	20	46
		15	15	16	16	22	46
IMS_abs10	35	5	7	7	6	18	71
		10	12	39	12	20	71
		15	17	40	16	22	71
IMS_abs11	18	5	9	22	6	18	23
		10	14	24	12	20	23
		15	19	26	16	22	23
IMS_abs12	17	5	5	8	6	18	20
		10	10	19	12	20	20
		15	15	19	16	22	20
IMS_abs13	17	5	8	19	6	18	20
		10	12	21	12	20	20
		15	17	24	16	22	20
IMS_abs14	17	5	5	20	6	18	21
		10	10	22	12	20	21
		15	15	24	16	22	21
IMS_abs15	17	5	5	20	6	18	45
		10	10	22	12	20	45
		15	15	24	16	22	45
mean run time (sec)			1.705e-03	4.651e-03	1.357e-04	7.400e-04	1.904e-01
mean relative run time			12.571	34.281	1.000	5.455	1403.325

Table 49: Change found for each moving window. GrapeFlaskBaseline3.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	13.57	7.86	13.57	2.29	32.71
10	8.64	4.86	7.57	3.14	32.71
15	3.50	5.29	3.57	4.29	32.71

Table 50: MAE of each algorithm for GrapeFlaskBaseline3.

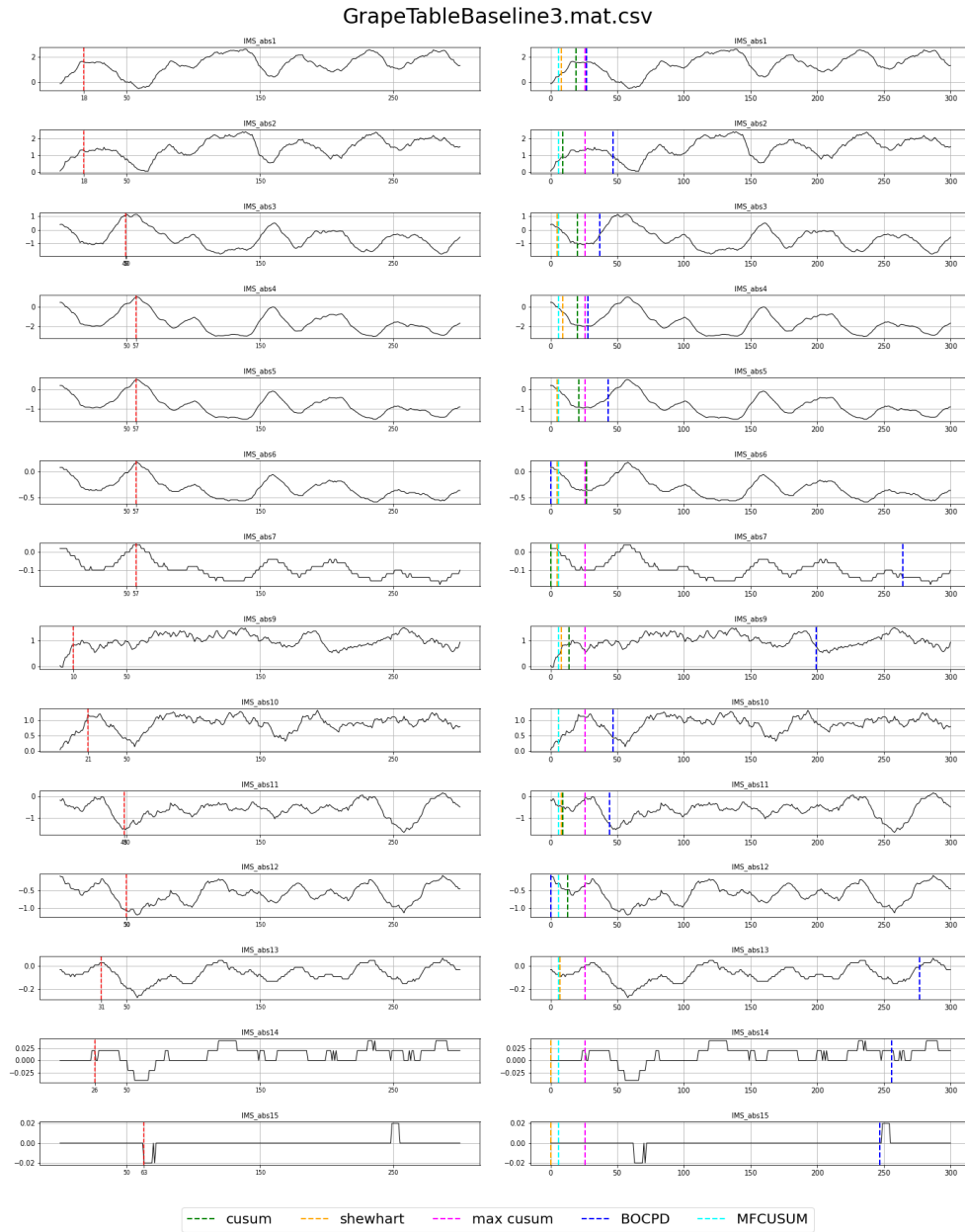


Figure 76: GrapeBaseline3. Window size 5.

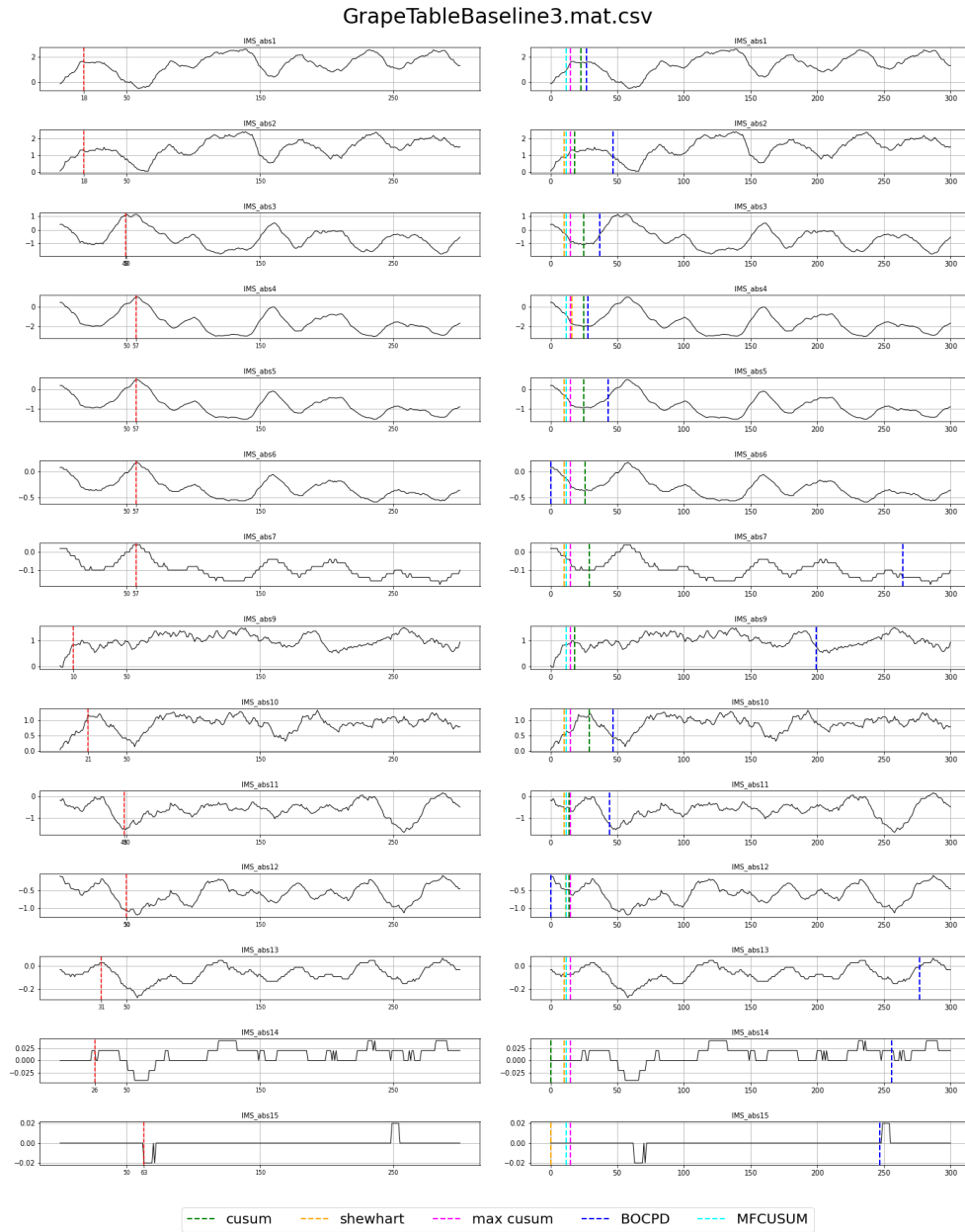


Figure 77: GrapeBaseline3. Window size 10.

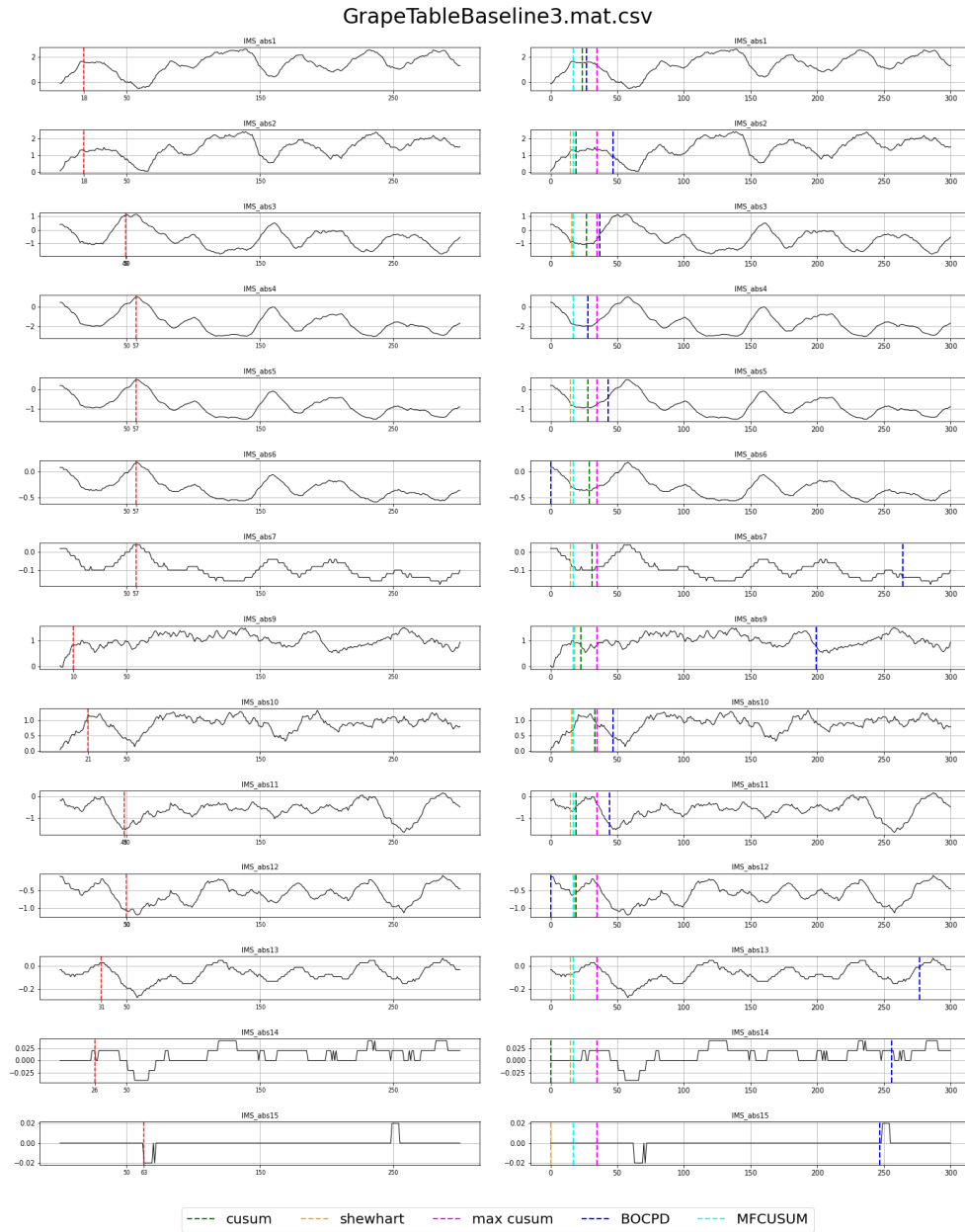


Figure 78: GrapeBaseline3. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	18	5	8	19	6	26	27
		10	12	23	12	15	27
		15	17	24	17	35	27
IMS_abs2	18	5	6	9	6	26	47
		10	10	18	12	15	47
		15	15	19	17	35	47
IMS_abs3	49	5	5	20	6	26	37
		10	10	25	12	15	37
		15	16	27	17	35	37
IMS_abs4	57	5	9	20	6	26	28
		10	16	25	12	15	28
		15	17	28	17	35	28
IMS_abs5	57	5	5	21	6	26	43
		10	10	25	12	15	43
		15	15	28	17	35	43
IMS_abs6	57	5	5	27	6	26	0
		10	10	26	12	15	0
		15	15	29	17	35	0
IMS_abs7	57	5	5	0	6	26	264
		10	10	29	12	15	264
		15	15	31	17	35	264
IMS_abs9	10	5	8	14	6	26	199
		10	12	18	12	15	199
		15	18	23	17	35	199
IMS_abs10	21	5	6	6	6	26	47
		10	10	29	12	15	47
		15	16	33	17	35	47
IMS_abs11	48	5	8	9	6	26	44
		10	10	14	12	15	44
		15	15	19	17	35	44
IMS_abs12	50	5	6	13	6	26	0
		10	11	14	12	15	0
		15	18	19	17	35	0
IMS_abs13	31	5	7	7	6	26	277
		10	10	12	12	15	277
		15	15	17	17	35	277
IMS_abs14	26	5	0	0	6	26	256
		10	10	0	12	15	256
		15	15	0	17	35	256
IMS_abs15	63	5	0	0	6	26	247
		10	0	0	12	15	247
		15	0	0	17	35	247
mean run time (sec)			1.118e-02	1.950e-02	1.536e-04	9.643e-04	4.923e-01
mean relative run time			72.768	126.913	1.000	6.277	3204.506

Table 51: Change found for each moving window. GrapeTableBaseline3.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	34.57	29.07	34.14	19.43	91.86
10	30.36	24.71	28.43	25.86	91.86
15	26.50	23.50	24.14	17.43	91.86

Table 52: MAE of each algorithm for GrapeTableBaseline3.

3.4 Baseline4

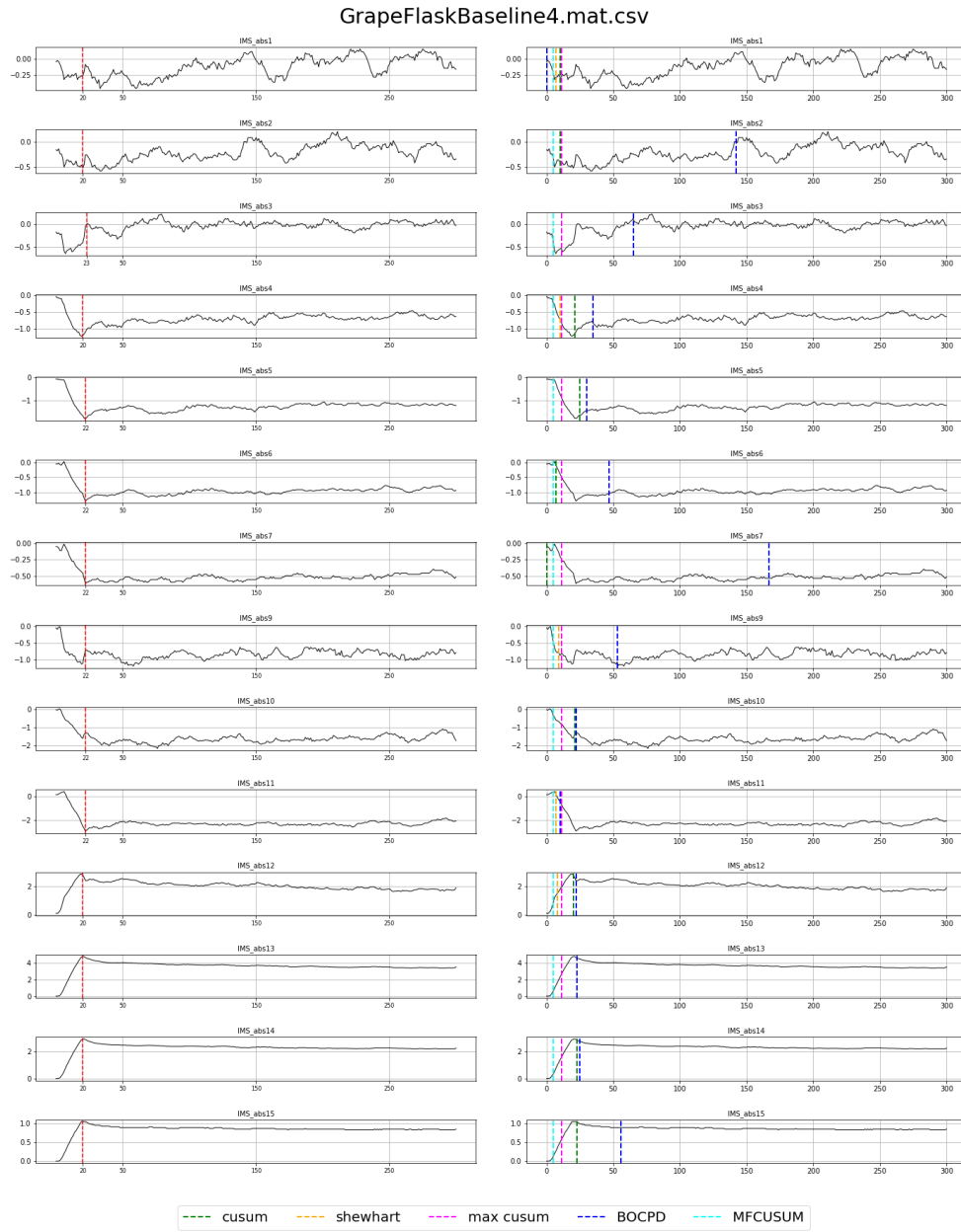


Figure 79: GrapeBaseline4. Window size 5.

GrapeFlaskBaseline4.mat.csv

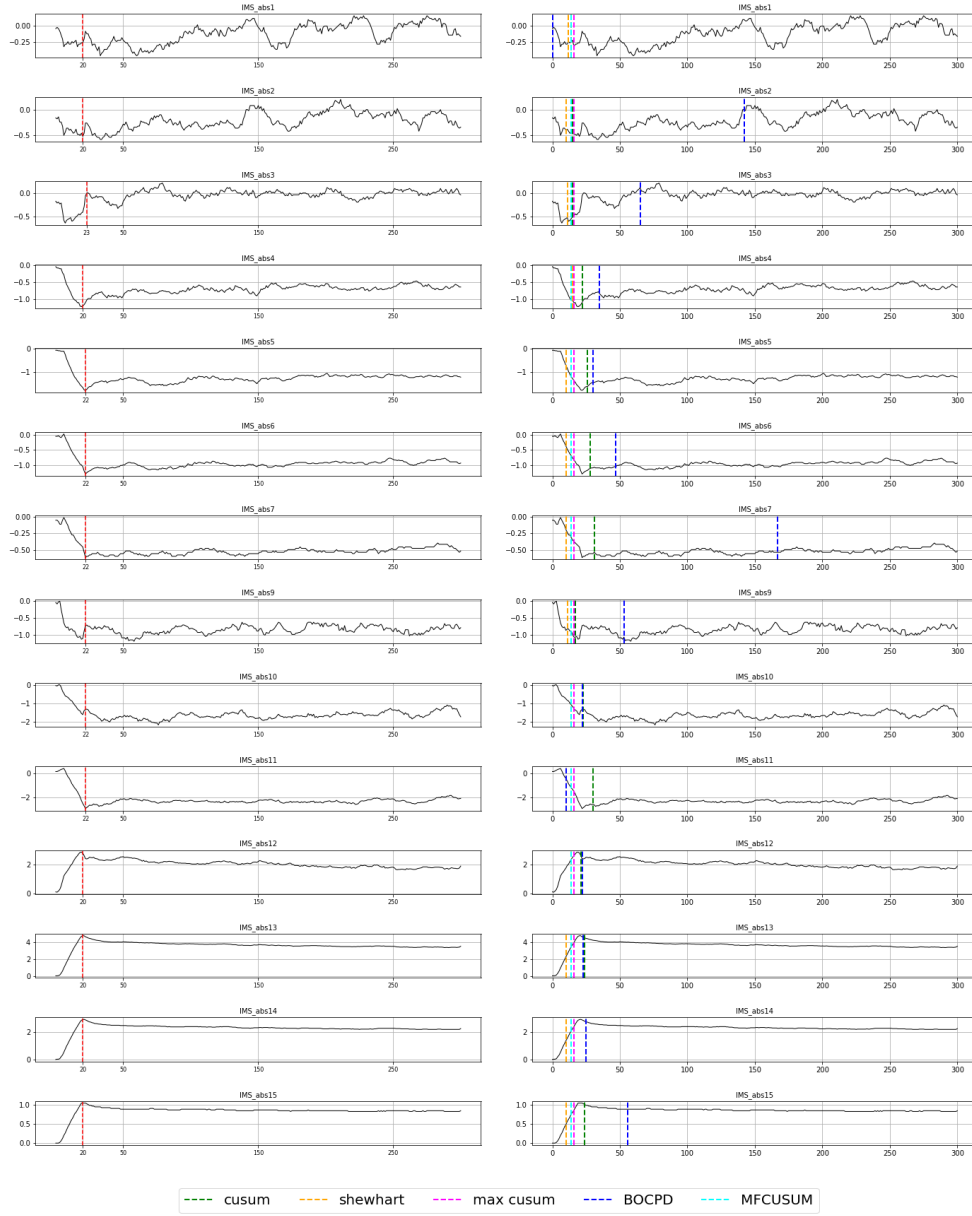


Figure 80: GrapeBaseline4. Window size 10.

GrapeFlaskBaseline4.mat.csv

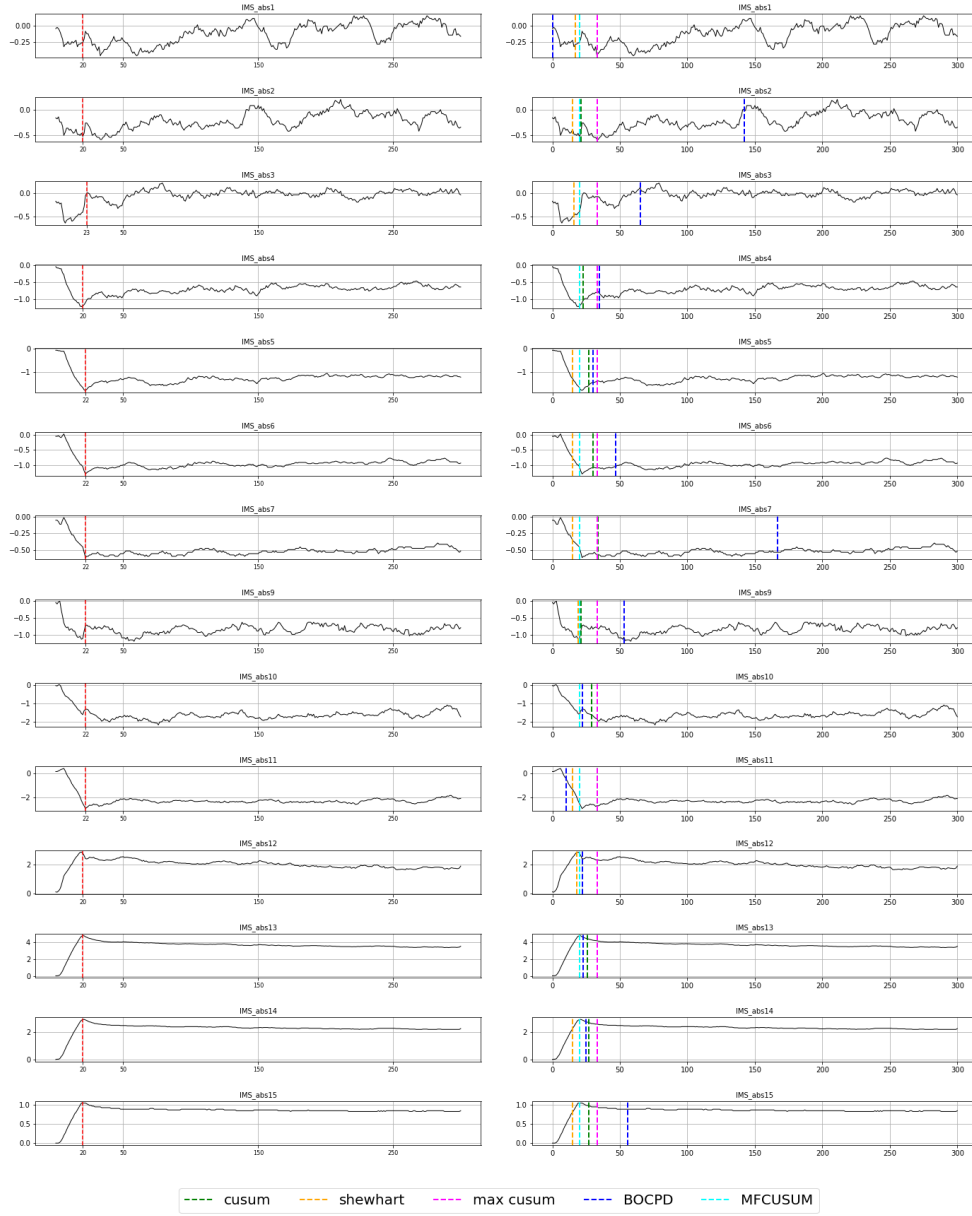


Figure 81: GrapeBaseline4. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	20	5	7	10	5	11	0
		10	12	14	14	16	0
		15	17	20	20	33	0
IMS_abs2	20	5	5	10	5	11	142
		10	10	15	14	16	142
		15	15	21	20	33	142
IMS_abs3	23	5	5	11	5	11	65
		10	11	15	14	16	65
		15	16	20	20	33	65
IMS_abs4	20	5	10	21	5	11	35
		10	15	22	14	16	35
		15	20	23	20	33	35
IMS_abs5	22	5	5	25	5	11	30
		10	10	26	14	16	30
		15	15	27	20	33	30
IMS_abs6	22	5	5	7	5	11	47
		10	10	28	14	16	47
		15	15	30	20	33	47
IMS_abs7	22	5	5	0	5	11	167
		10	10	31	14	16	167
		15	15	34	20	33	167
IMS_abs9	22	5	9	11	5	11	53
		10	11	17	14	16	53
		15	19	21	20	33	53
IMS_abs10	22	5	5	21	5	11	22
		10	14	23	14	16	22
		15	20	29	20	33	22
IMS_abs11	22	5	7	7	5	11	10
		10	10	30	14	16	10
		15	15	33	20	33	10
IMS_abs12	20	5	8	20	5	11	22
		10	14	21	14	16	22
		15	18	22	20	33	22
IMS_abs13	20	5	5	23	5	11	23
		10	10	24	14	16	23
		15	20	26	20	33	23
IMS_abs14	20	5	11	23	5	11	25
		10	10	25	14	16	25
		15	15	27	20	33	25
IMS_abs15	20	5	5	23	5	11	56
		10	10	24	14	16	56
		15	15	27	20	33	56
mean run time (sec)			1.867e-03	7.340e-03	1.837e-04	7.080e-04	1.947e-01
mean relative run time			10.167	39.965	1.000	3.855	1060.204

Table 53: Change found for each moving window. GrapeFlaskBaseline4.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	14.50	7.79	16.07	10.07	33.29
10	9.86	4.86	7.07	5.07	33.29
15	4.29	5.21	1.07	11.93	33.29

Table 54: MAE of each algorithm for GrapeFlaskBaseline4.

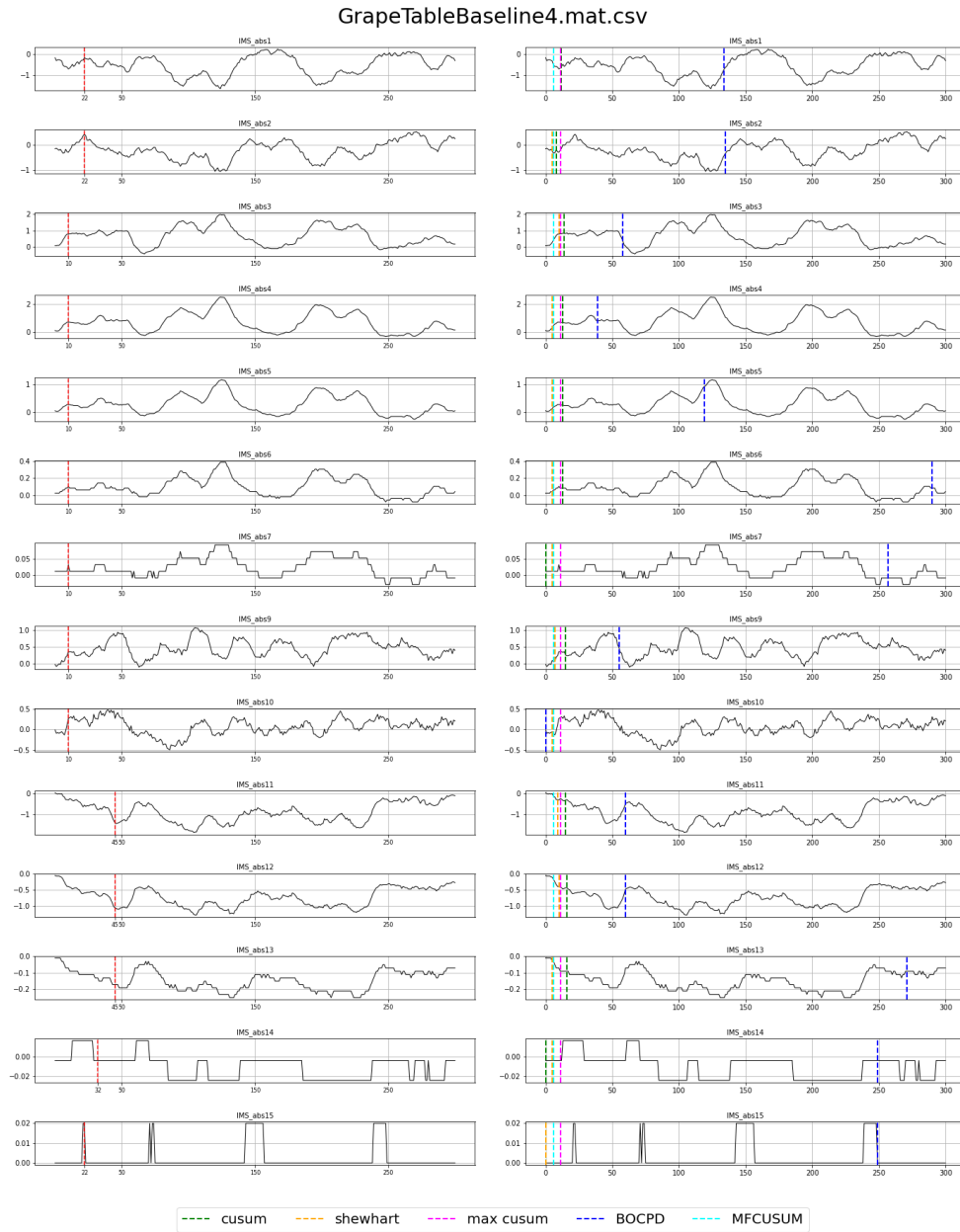


Figure 82: GrapeBaseline4. Window size 5.

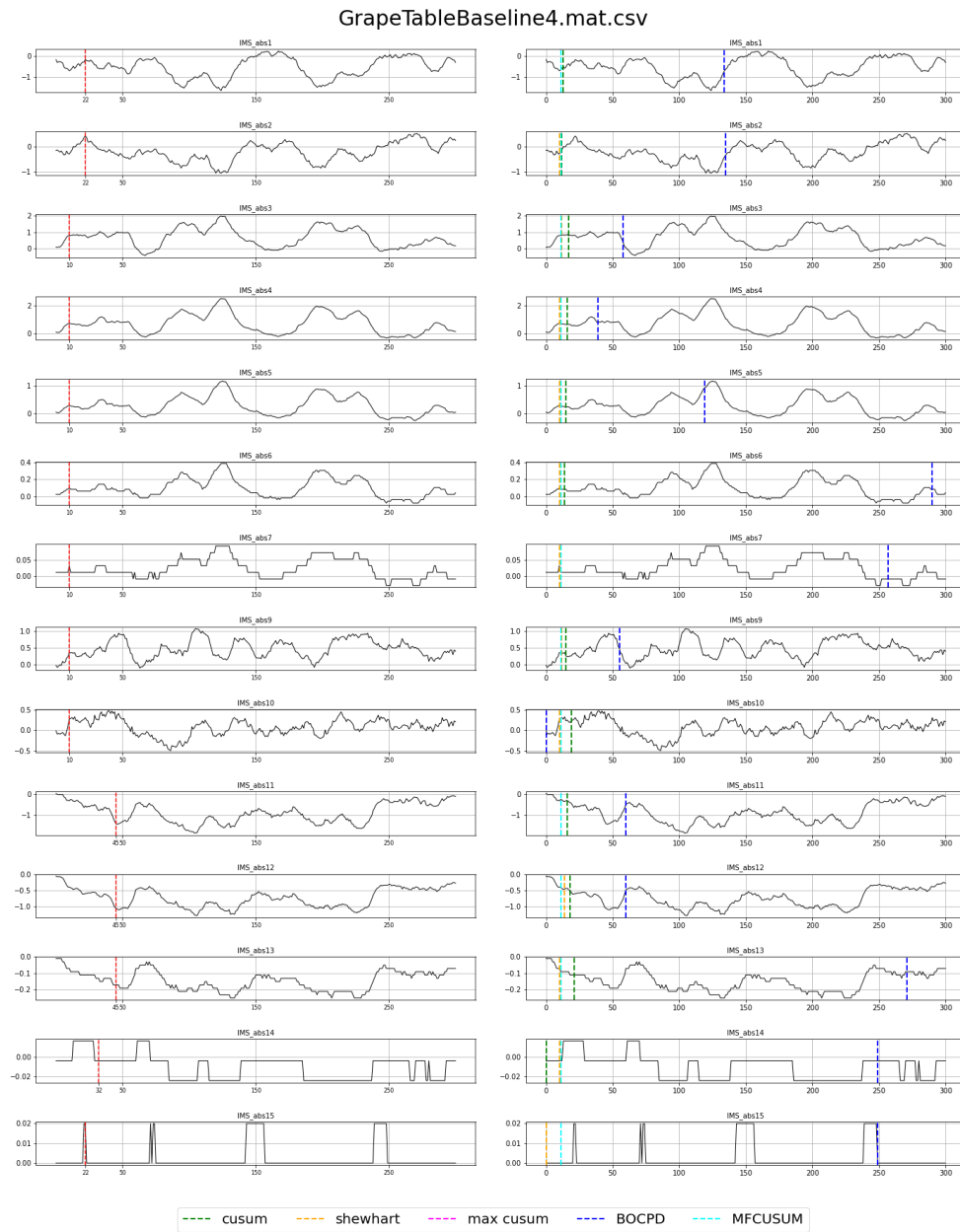


Figure 83: GrapeBaseline4. Window size 10.

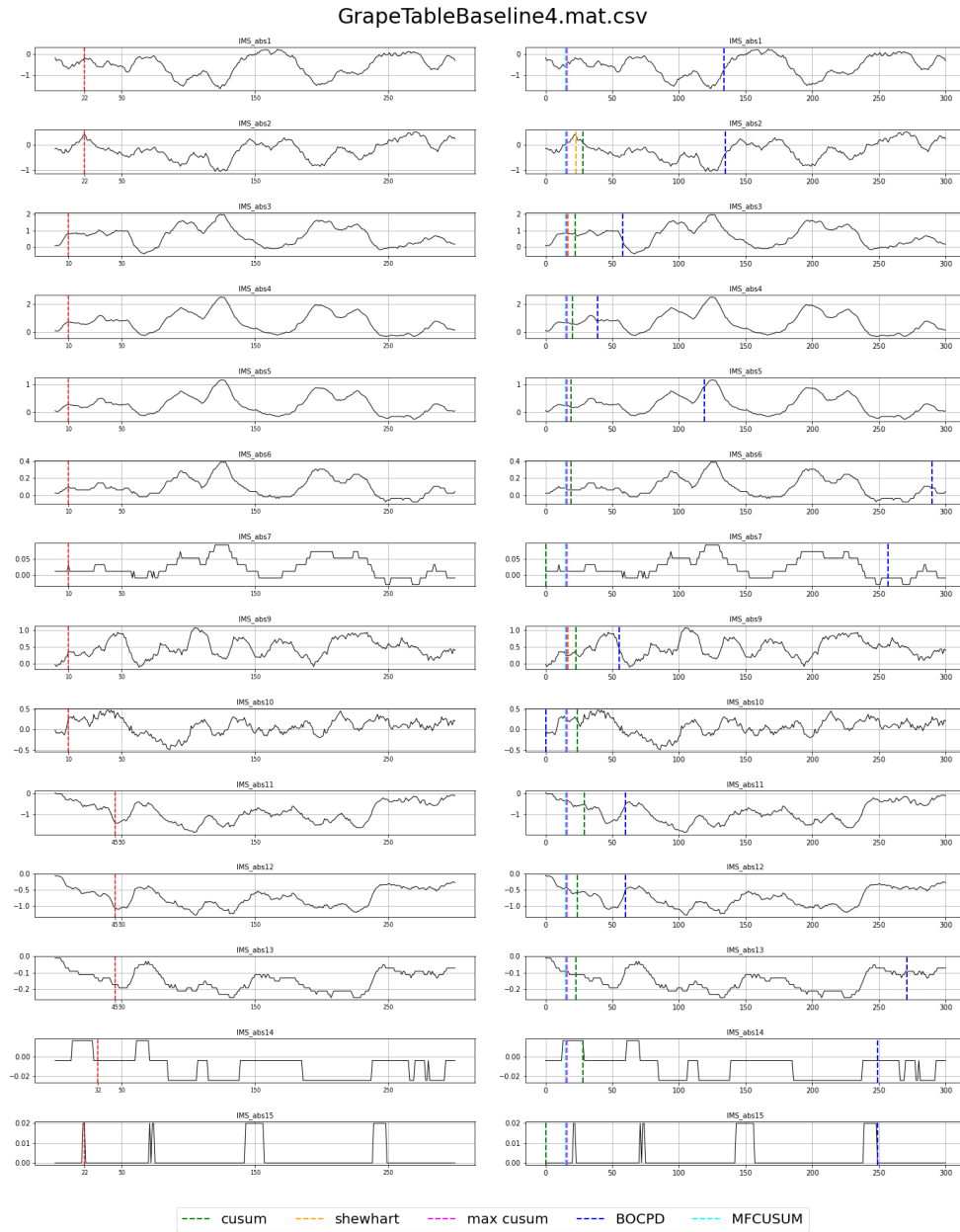


Figure 84: GrapeBaseline4. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	22	5	11	12	6	11	134
		10	11	13	11	11	134
		15	16	16	15	16	134
IMS_abs2	22	5	5	8	6	11	135
		10	10	12	11	11	135
		15	23	28	15	16	135
IMS_abs3	10	5	10	14	6	11	58
		10	12	17	11	11	58
		15	17	22	15	16	58
IMS_abs4	10	5	5	13	6	11	39
		10	10	16	11	11	39
		15	15	20	15	16	39
IMS_abs5	10	5	5	13	6	11	119
		10	10	15	11	11	119
		15	15	19	15	16	119
IMS_abs6	10	5	5	13	6	11	290
		10	10	14	11	11	290
		15	15	19	15	16	290
IMS_abs7	10	5	5	0	6	11	257
		10	10	11	11	11	257
		15	15	0	15	16	257
IMS_abs9	10	5	7	15	6	11	55
		10	12	15	11	11	55
		15	17	23	15	16	55
IMS_abs10	10	5	5	6	6	11	0
		10	10	19	11	11	0
		15	15	24	15	16	0
IMS_abs11	45	5	9	15	6	11	60
		10	11	16	11	11	60
		15	16	29	15	16	60
IMS_abs12	45	5	10	16	6	11	60
		10	14	18	11	11	60
		15	16	24	15	16	60
IMS_abs13	45	5	5	16	6	11	271
		10	10	21	11	11	271
		15	15	23	15	16	271
IMS_abs14	32	5	5	0	6	11	249
		10	10	0	11	11	249
		15	15	28	15	16	249
IMS_abs15	22	5	0	0	6	11	249
		10	0	0	11	11	249
		15	15	0	15	16	249
mean run time (sec)			6.373e-03	1.845e-02	1.218e-04	3.741e-04	4.881e-01
mean relative run time			52.310	151.477	1.000	3.070	4006.569

Table 55: Change found for each moving window. GrapeTableBaseline4.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	15.43	14.14	15.64	11.64	120.93
10	12.21	13.57	11.64	11.64	120.93
15	11.29	12.43	11.64	11.64	120.93

Table 56: MAE of each algorithm for GrapeTableBaseline4.

3.5 Baseline5

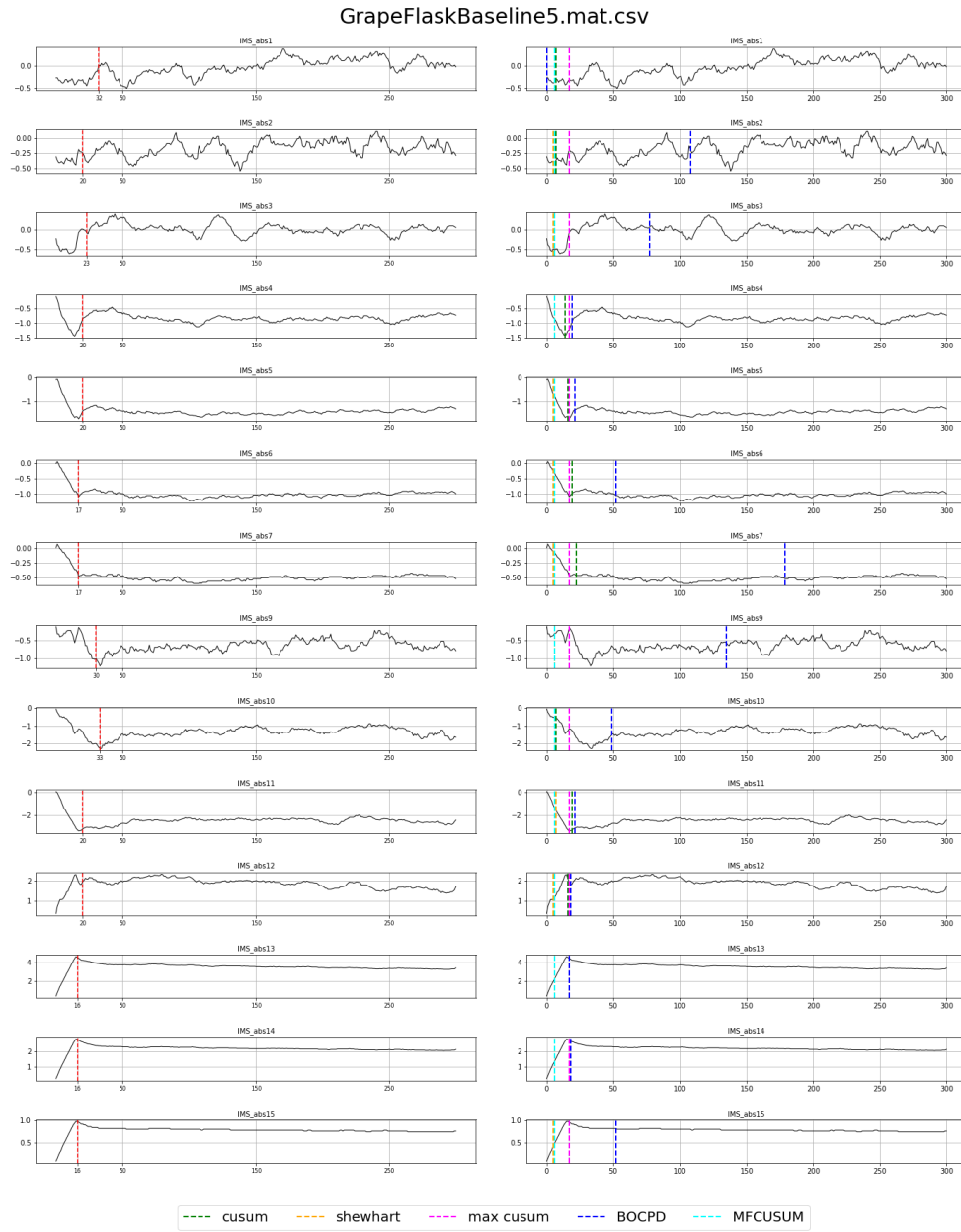


Figure 85: GrapeBaseline5. Window size 5.

GrapeFlaskBaseline5.mat.csv

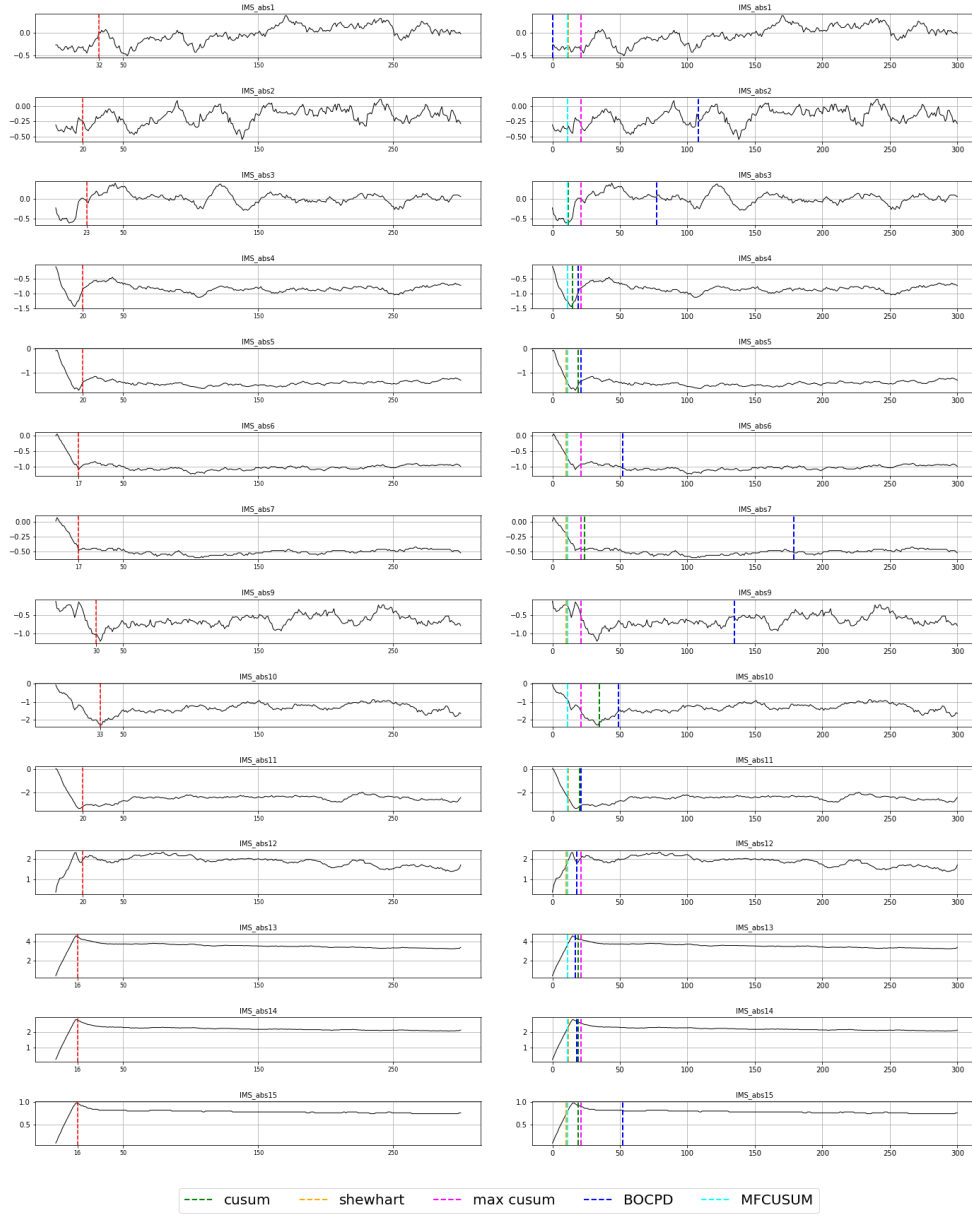


Figure 86: GrapeBaseline5. Window size 10.

GrapeFlaskBaseline5.mat.csv

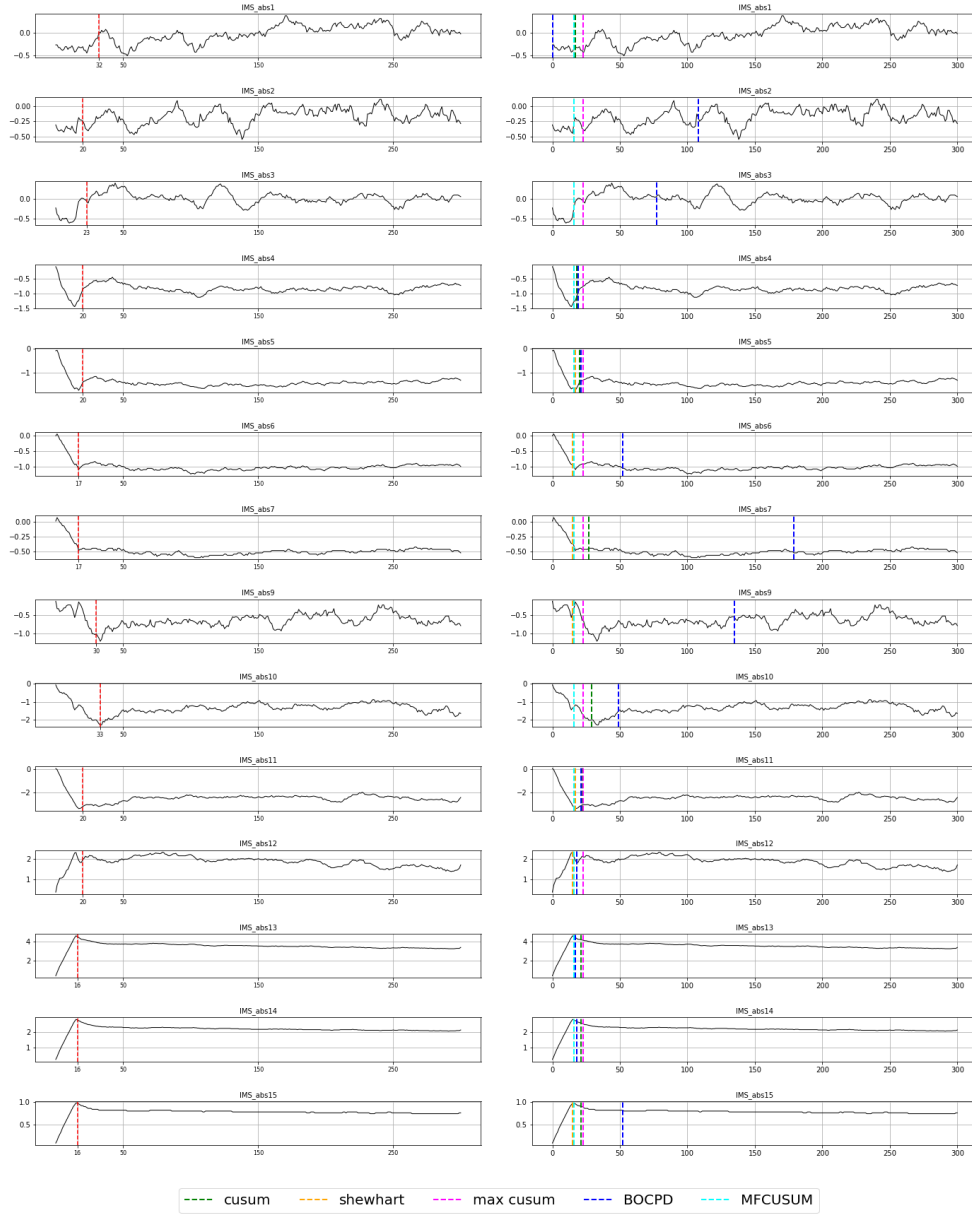


Figure 87: GrapeBaseline5. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	32	5	6	7	6	17	0
		10	12	12	11	21	0
		15	16	17	16	23	0
IMS_abs2	20	5	5	7	6	17	108
		10	11	11	11	21	108
		15	16	16	16	23	108
IMS_abs3	23	5	5	6	6	17	77
		10	11	12	11	21	77
		15	16	16	16	23	77
IMS_abs4	20	5	6	14	6	17	19
		10	11	15	11	21	19
		15	16	18	16	23	19
IMS_abs5	20	5	5	16	6	17	21
		10	10	19	11	21	21
		15	17	20	16	23	21
IMS_abs6	17	5	5	19	6	17	52
		10	10	21	11	21	52
		15	15	23	16	23	52
IMS_abs7	17	5	5	22	6	17	179
		10	10	24	11	21	179
		15	15	27	16	23	179
IMS_abs9	30	5	6	6	6	17	135
		10	10	11	11	21	135
		15	15	16	16	23	135
IMS_abs10	33	5	6	7	6	17	49
		10	11	35	11	21	49
		15	16	29	16	23	49
IMS_abs11	20	5	7	19	6	17	21
		10	12	20	11	21	21
		15	17	22	16	23	21
IMS_abs12	20	5	5	16	6	17	18
		10	10	18	11	21	18
		15	15	18	16	23	18
IMS_abs13	16	5	6	17	6	17	17
		10	11	19	11	21	17
		15	16	21	16	23	17
IMS_abs14	16	5	6	17	6	17	18
		10	12	19	11	21	18
		15	16	21	16	23	18
IMS_abs15	16	5	5	17	6	17	52
		10	10	19	11	21	52
		15	15	21	16	23	52
mean run time (sec)			1.568e-03	3.450e-03	1.938e-04	1.214e-03	3.544e-01
mean relative run time			8.094	17.807	1.000	6.264	1828.890

Table 57: Change found for each moving window. GrapeFlaskBaseline5.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	15.86	9.29	15.43	4.86	38.29
10	10.64	6.36	10.43	4.43	38.29
15	5.64	5.79	5.43	5.29	38.29

Table 58: MAE of each algorithm for GrapeFlaskBaseline5.

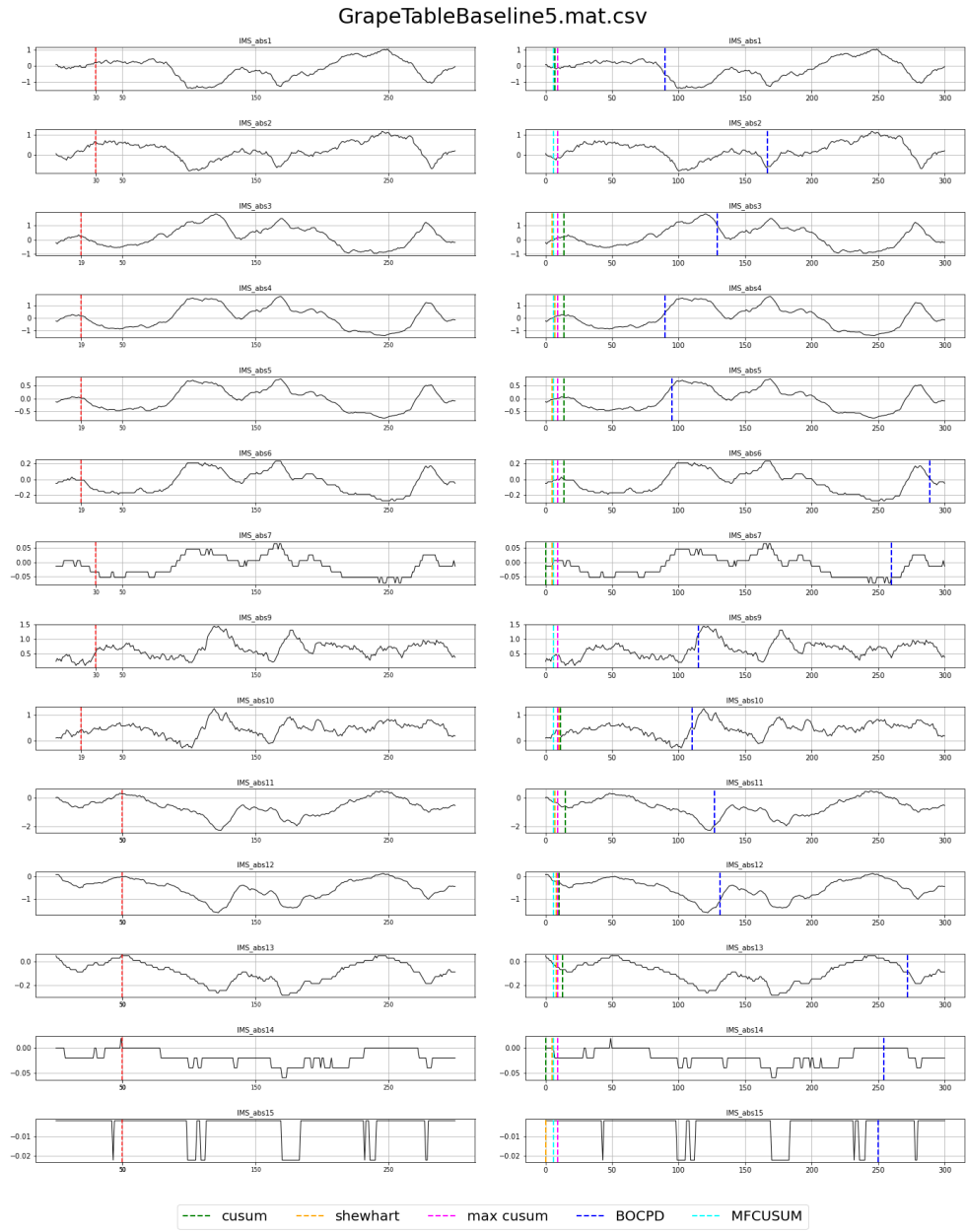


Figure 88: GrapeBaseline5. Window size 5.

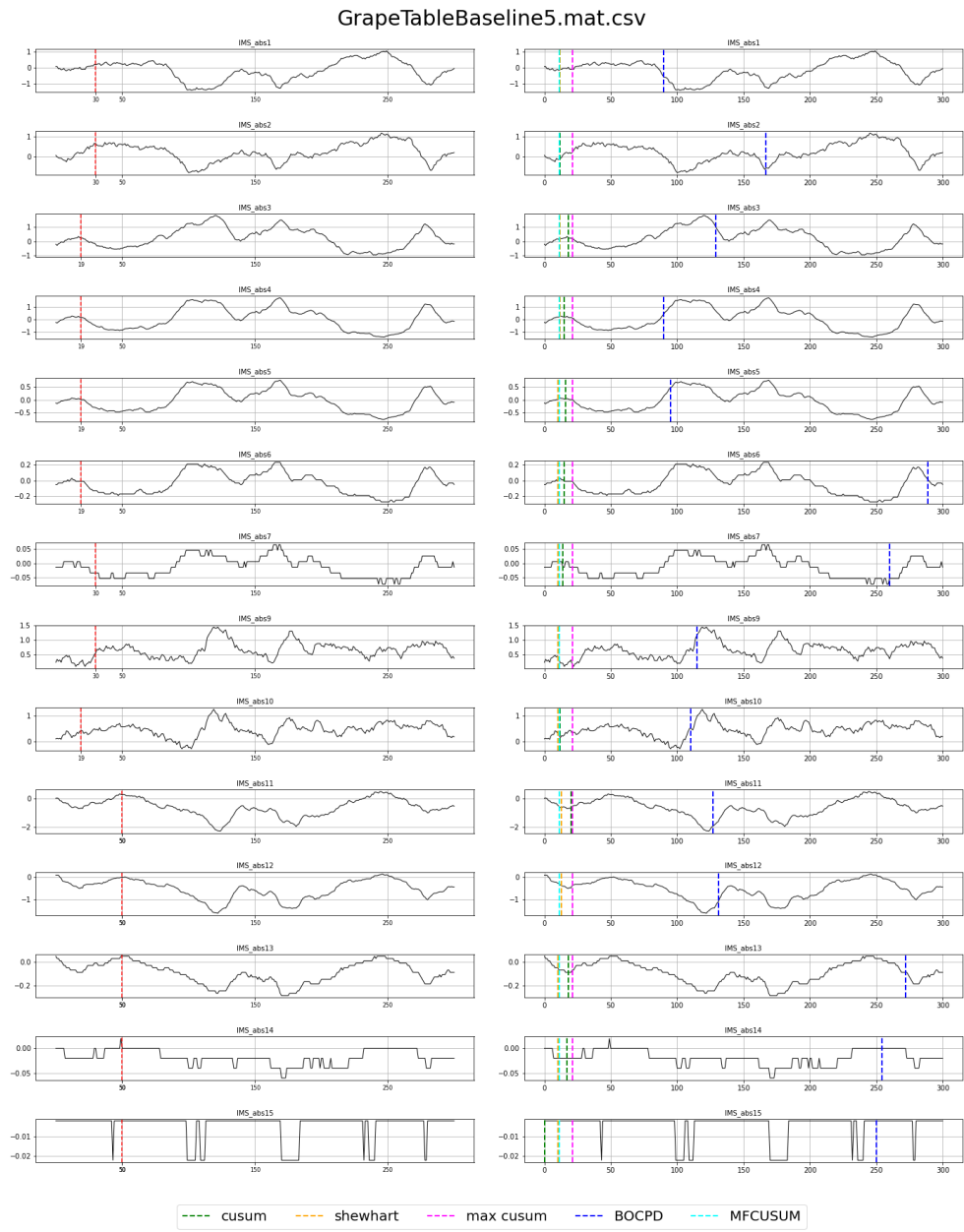


Figure 89: GrapeBaseline5. Window size 10.

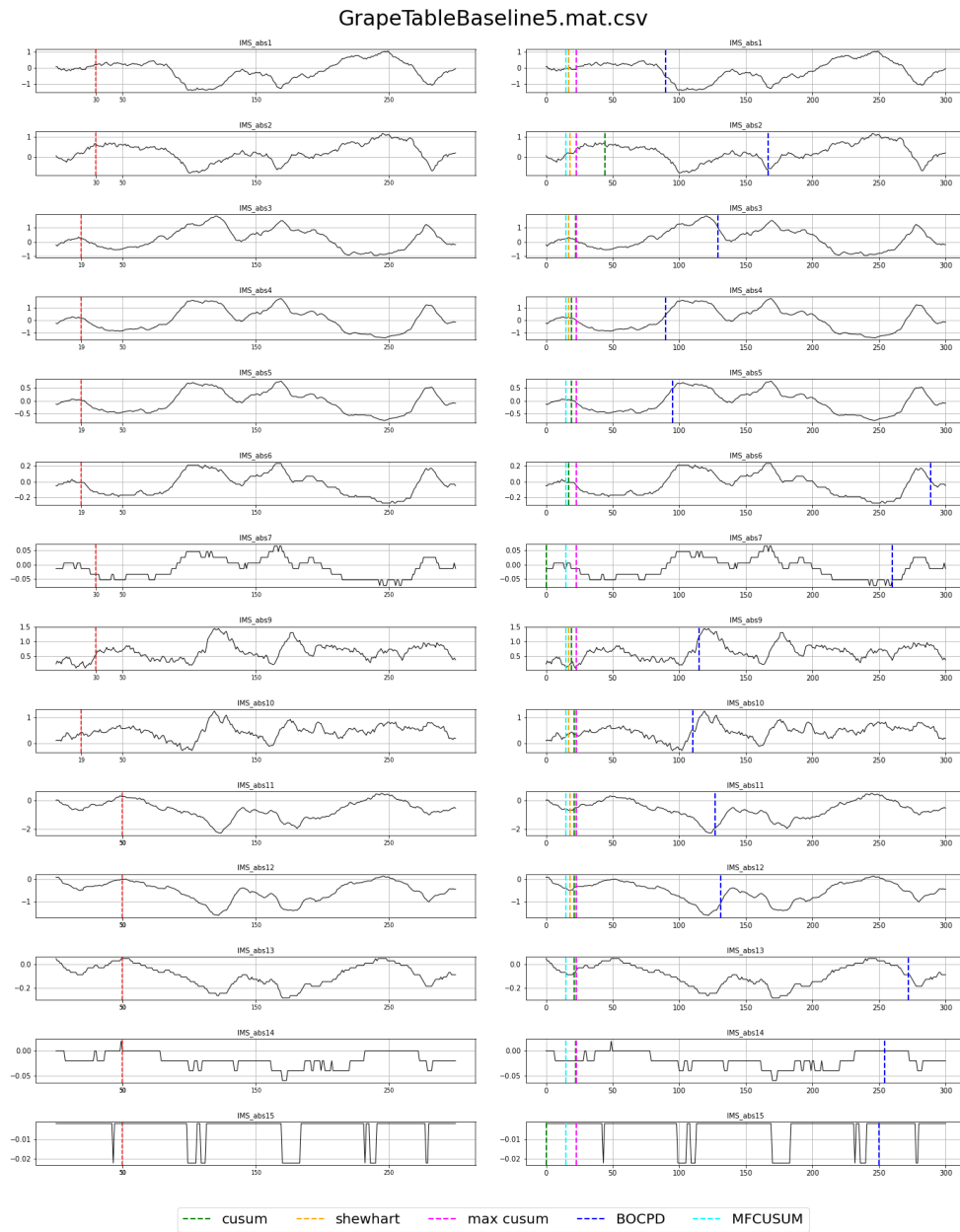


Figure 90: GrapeBaseline5. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	30	5	6	7	6	9	90
		10	12	12	11	21	90
		15	17	17	15	23	90
IMS_abs2	30	5	6	9	6	9	167
		10	11	12	11	21	167
		15	18	44	15	23	167
IMS_abs3	19	5	5	14	6	9	129
		10	12	18	11	21	129
		15	17	22	15	23	129
IMS_abs4	19	5	7	14	6	9	90
		10	12	15	11	21	90
		15	17	19	15	23	90
IMS_abs5	19	5	5	14	6	9	95
		10	10	16	11	21	95
		15	15	19	15	23	95
IMS_abs6	19	5	5	14	6	9	289
		10	10	15	11	21	289
		15	15	17	15	23	289
IMS_abs7	30	5	5	0	6	9	260
		10	10	14	11	21	260
		15	15	0	15	23	260
IMS_abs9	30	5	6	6	6	9	115
		10	10	11	11	21	115
		15	17	19	15	23	115
IMS_abs10	19	5	10	11	6	9	110
		10	10	12	11	21	110
		15	17	21	15	23	110
IMS_abs11	50	5	7	15	6	9	127
		10	13	20	11	21	127
		15	18	21	15	23	127
IMS_abs12	50	5	8	10	6	9	131
		10	13	21	11	21	131
		15	18	21	15	23	131
IMS_abs13	50	5	8	13	6	9	272
		10	10	18	11	21	272
		15	15	21	15	23	272
IMS_abs14	50	5	5	0	6	9	254
		10	10	17	11	21	254
		15	15	22	15	23	254
IMS_abs15	50	5	0	0	6	9	250
		10	10	0	11	21	250
		15	15	0	15	23	250
mean run time (sec)			3.909e-03	1.569e-02	1.692e-04	6.003e-04	5.271e-01
mean relative run time			23.103	92.742	1.000	3.548	3115.048

Table 59: Change found for each moving window. GrapeTableBaseline5.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	27.29	24.14	27.21	24.21	136.71
10	22.29	18.86	22.21	13.64	136.71
15	16.86	17.14	18.21	13.07	136.71

Table 60: MAE of each algorithm for GrapeTableBaseline5.

4 Jasmine

4.1 Baseline1

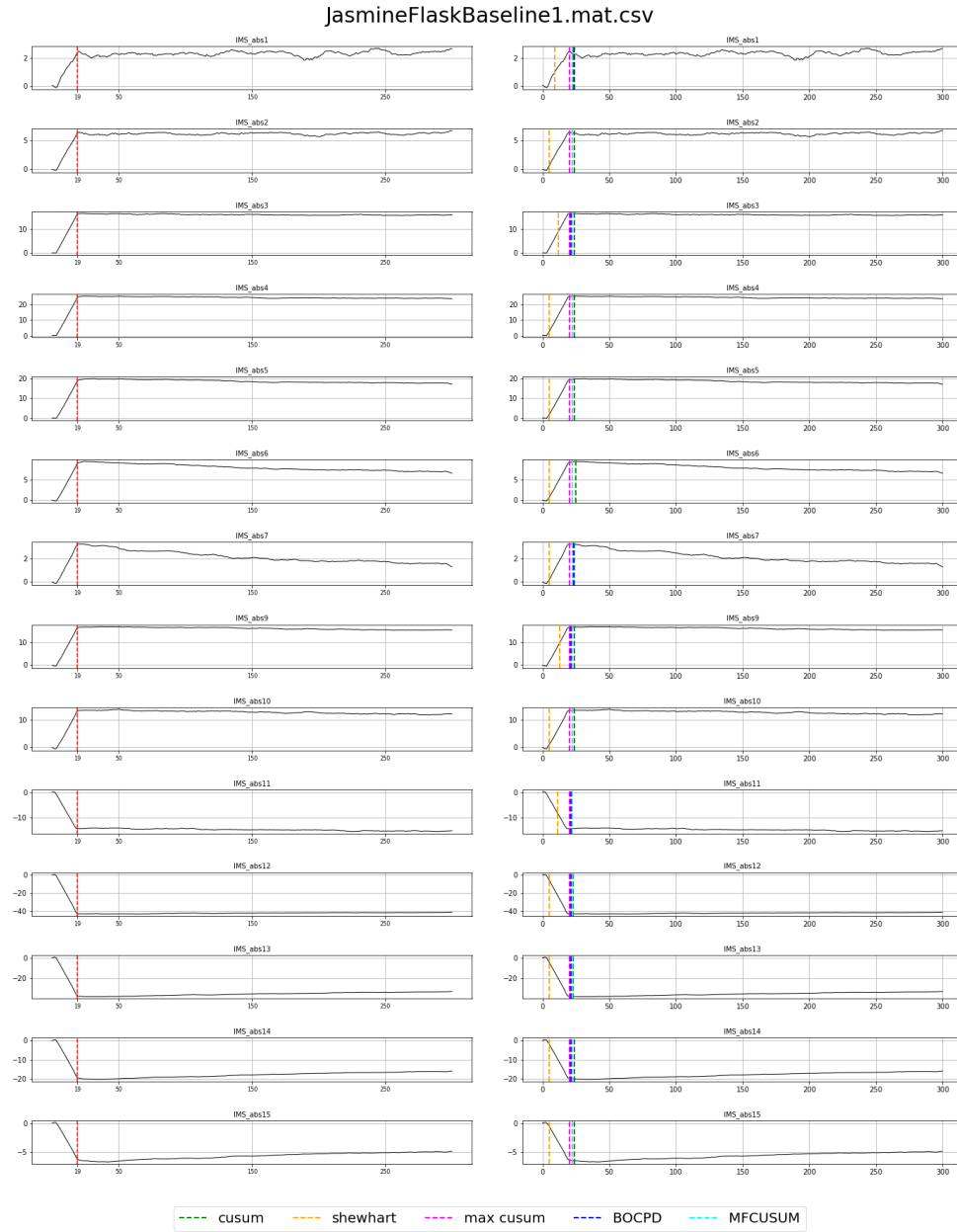


Figure 91: JasmineBaseline1. Window size 5.

JasmineFlaskBaseline1.mat.csv

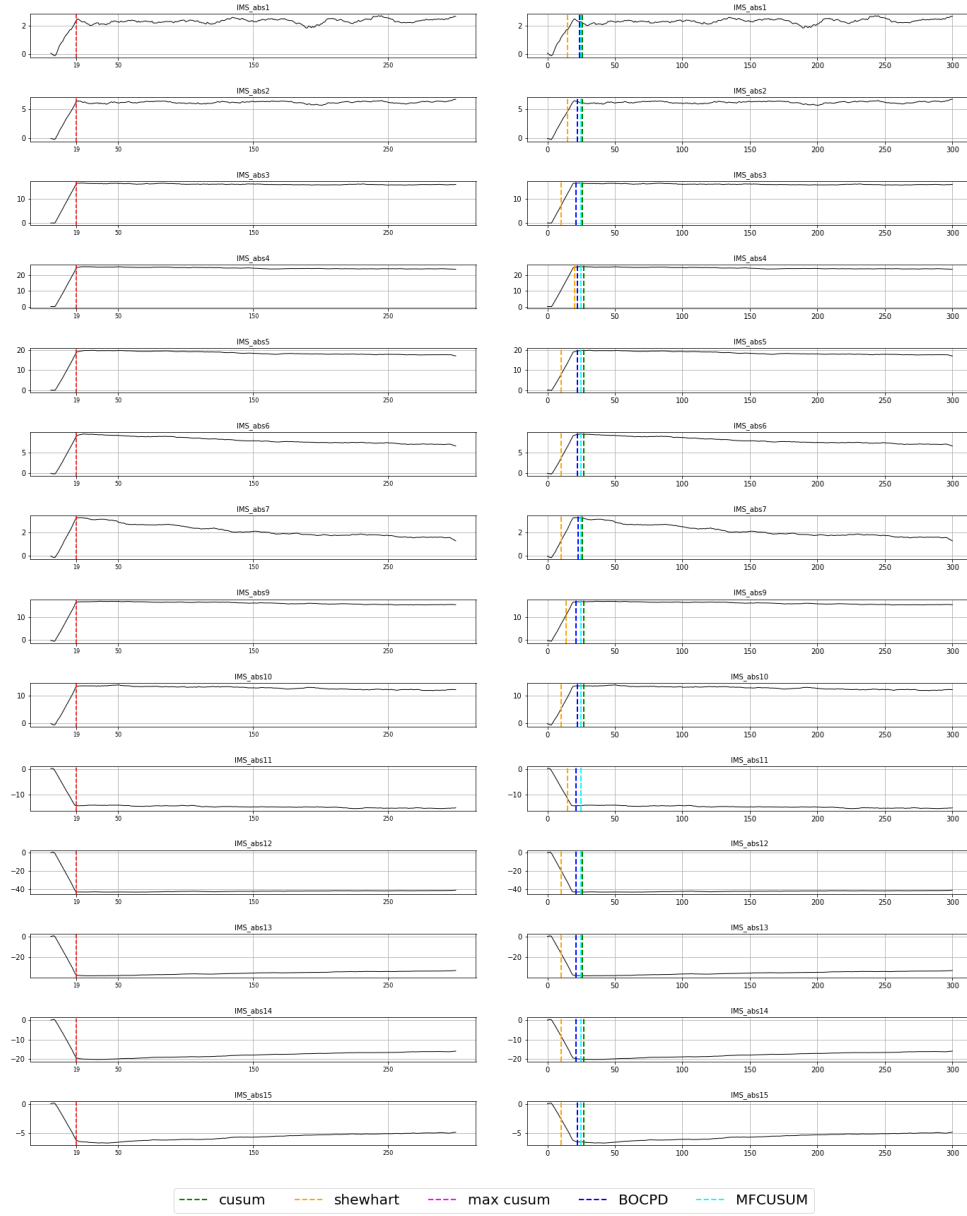


Figure 92: JasmineBaseline1. Window size 10.

JasmineFlaskBaseline1.mat.csv

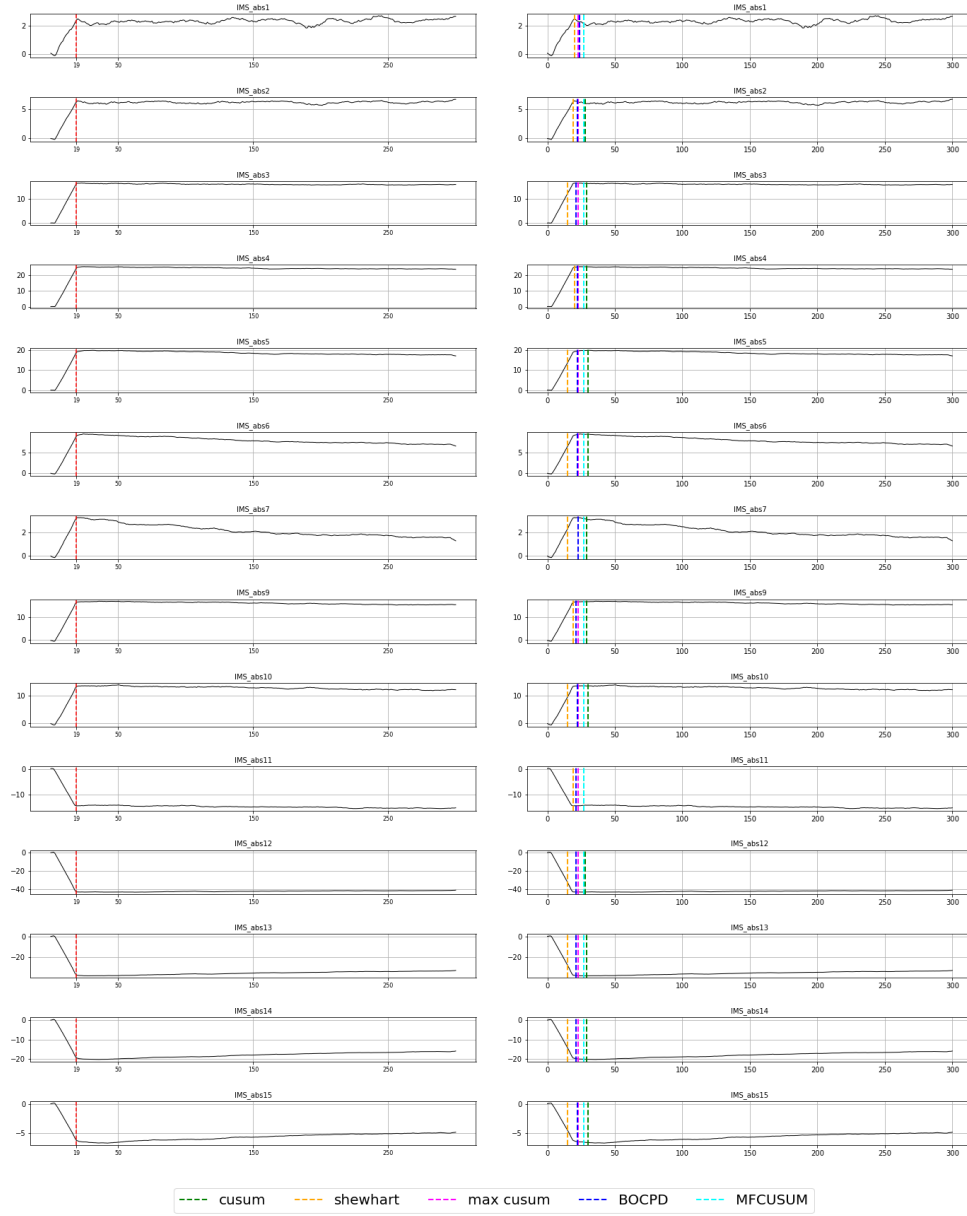


Figure 93: JasmineBaseline1. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes	
IMS_abs1	19	5	9	23	22	20	24	
		10	15	26	25	25	24	
		15	20	27	27	23	24	
IMS_abs2	19	5	5	24	22	20	22	
		10	15	26	25	25	22	
		15	19	28	27	23	22	
IMS_abs3	19	5	12	24	22	20	21	
		10	10	26	25	25	21	
		15	15	29	27	23	21	
IMS_abs4	19	5	5	24	22	20	22	
		10	20	27	25	25	22	
		15	20	29	27	23	22	
IMS_abs5	19	5	5	24	22	20	22	
		10	10	27	25	25	22	
		15	15	30	27	23	22	
IMS_abs6	19	5	5	25	22	20	22	
		10	10	27	25	25	22	
		15	15	30	27	23	22	
IMS_abs7	19	5	5	24	22	20	23	
		10	10	26	25	25	23	
		15	15	29	27	23	23	
IMS_abs9	19	5	13	24	22	20	21	
		10	14	27	25	25	21	
		15	19	29	27	23	21	
IMS_abs10	19	5	5	24	22	20	22	
		10	10	27	25	25	22	
		15	15	30	27	23	22	
IMS_abs11	19	5	11	22	22	20	21	
		10	15	25	25	25	21	
		15	19	27	27	23	21	
IMS_abs12	19	5	5	23	22	20	21	
		10	10	26	25	25	21	
		15	15	28	27	23	21	
IMS_abs13	19	5	5	23	22	20	21	
		10	10	26	25	25	21	
		15	15	29	27	23	21	
IMS_abs14	19	5	5	24	22	20	21	
		10	10	27	25	25	21	
		15	15	29	27	23	21	
IMS_abs15	19	5	5	24	22	20	22	
		10	10	27	25	25	22	
		15	15	30	27	23	22	
mean run time (sec)				2.504e-03	7.577e-03	4.350e-04	9.000e-04	5.276e-02
mean relative run time				5.756	17.416	1.000	2.069	121.284

Table 61: Change found for each moving window. JasmineFlaskBaseline1.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	12.21	4.71	3.00	1.00	2.79
10	7.07	7.43	6.00	6.00	2.79
15	2.71	9.86	8.00	4.00	2.79

Table 62: MAE of each algorithm for JasmineFlaskBaseline1.

JasmineTableBaseline1.mat.csv

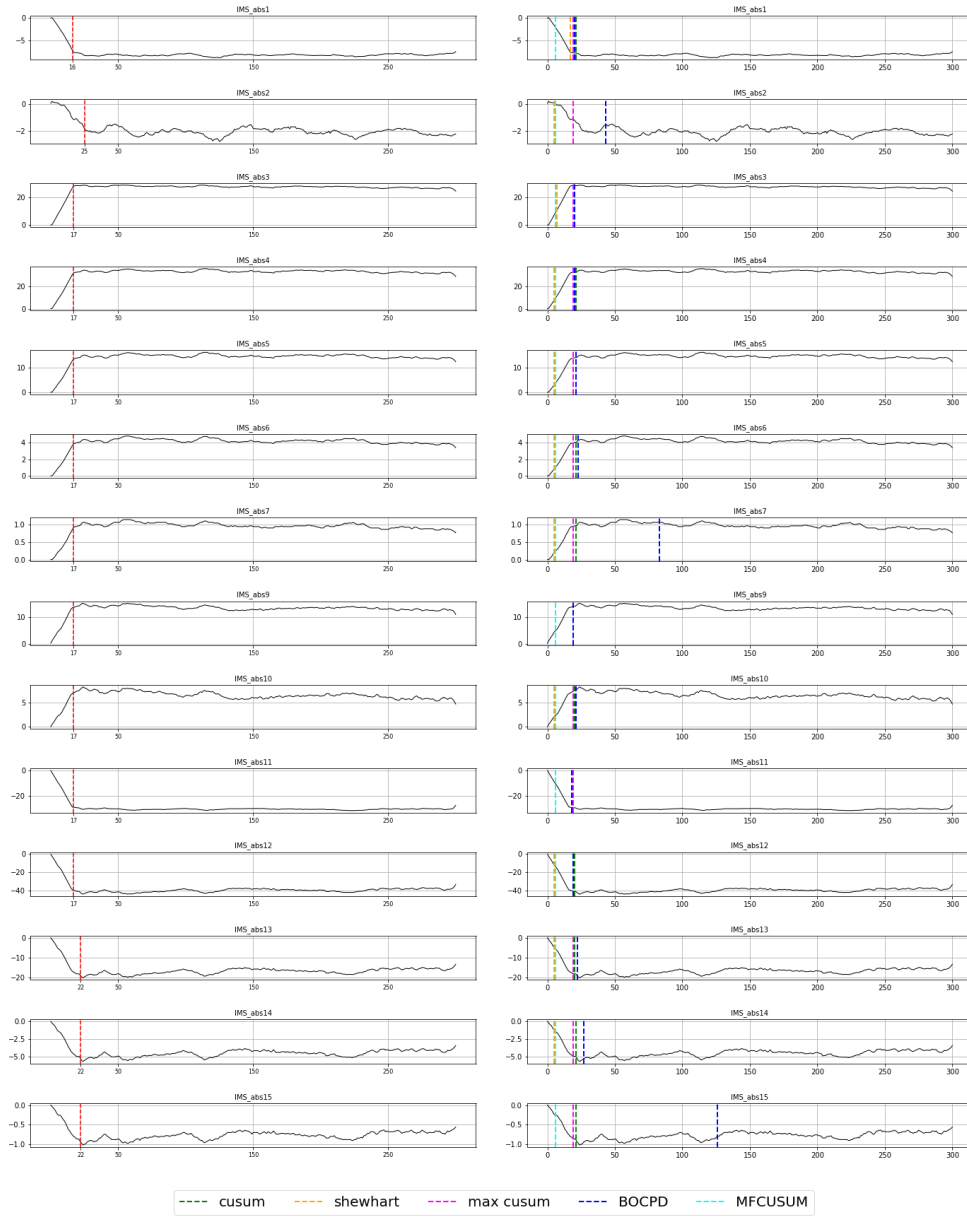


Figure 94: JasmineBaseline1. Window size 5.

JasmineTableBaseline1.mat.csv

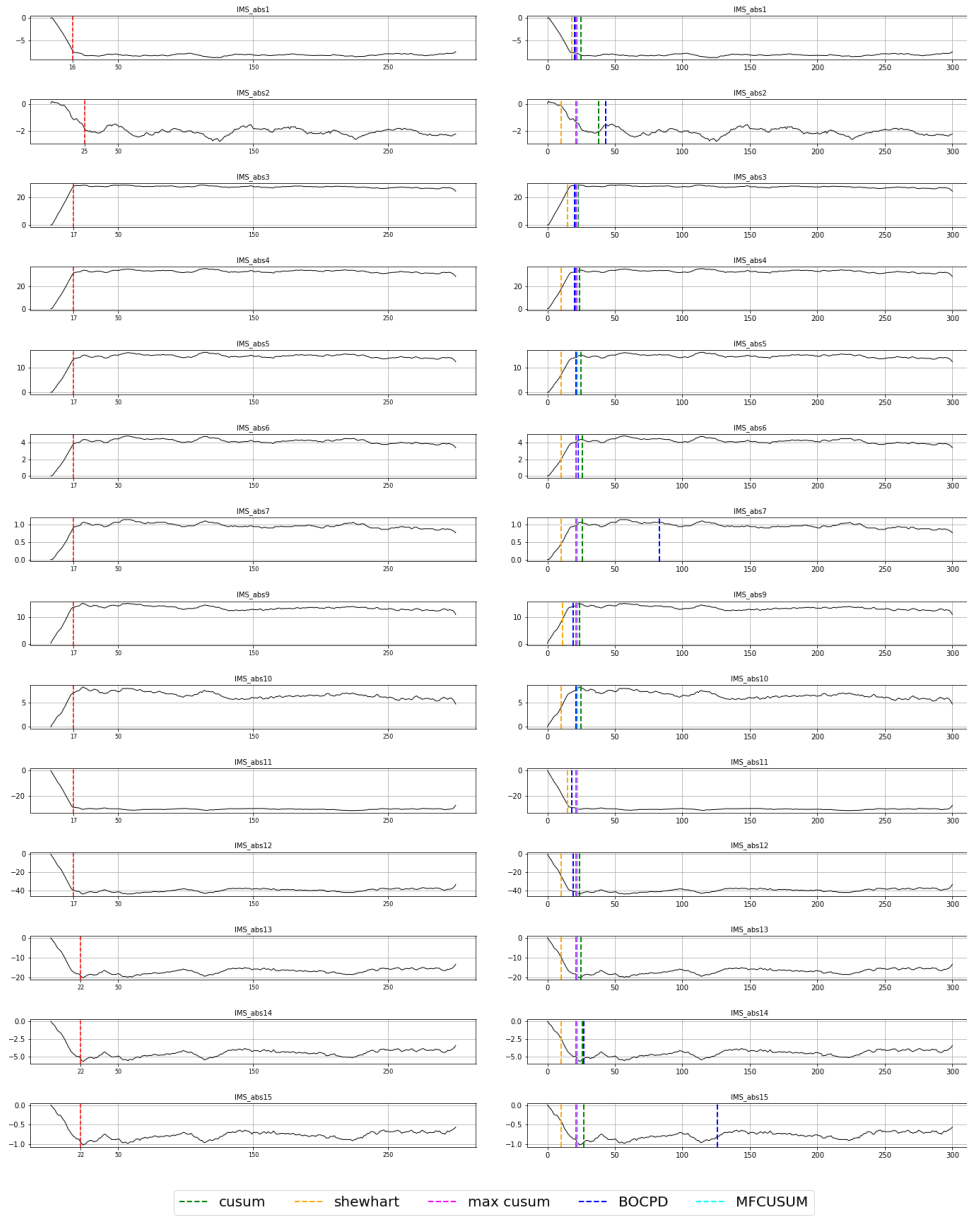


Figure 95: JasmineBaseline1. Window size 10.

JasmineTableBaseline1.mat.csv

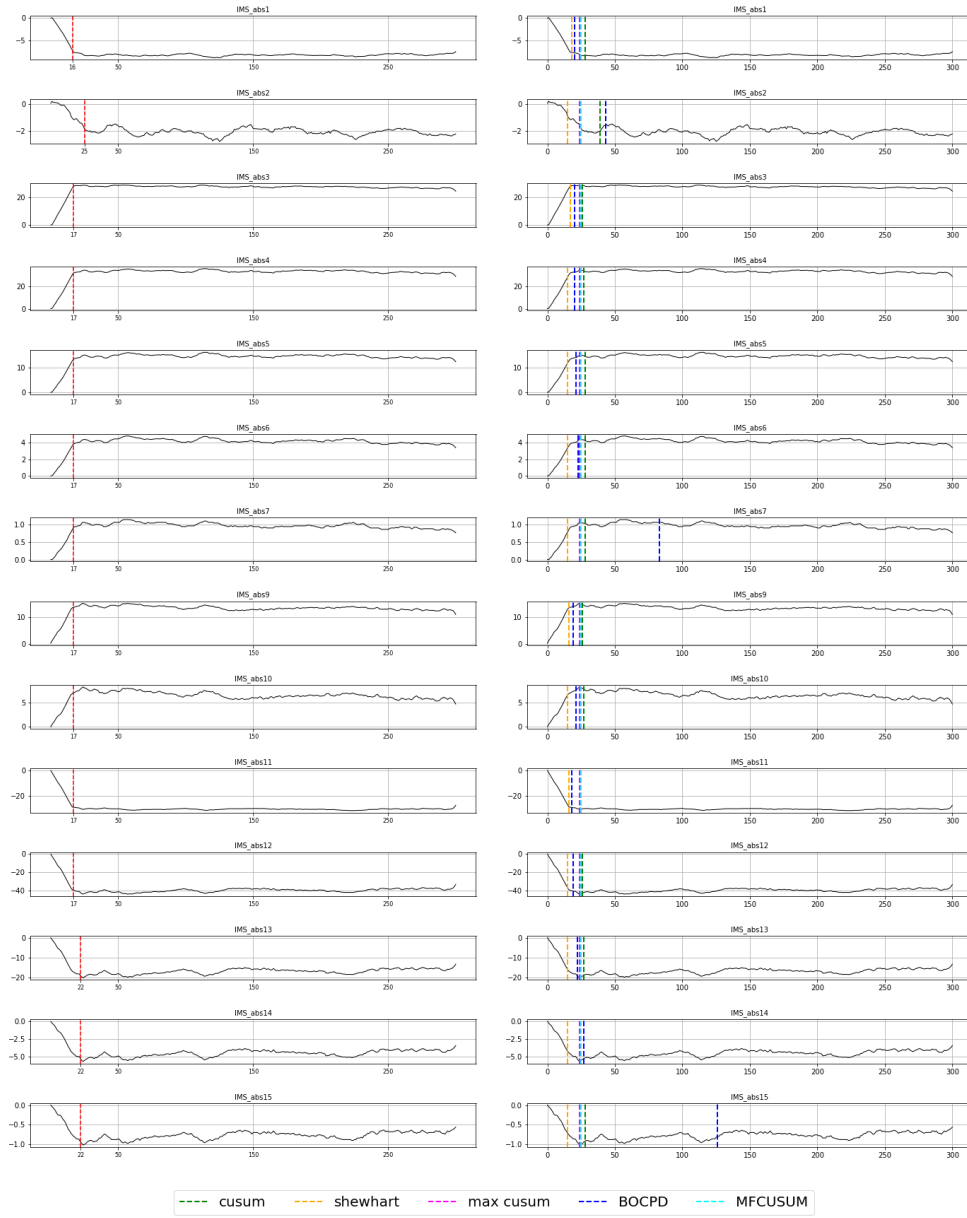


Figure 96: JasmineBaseline1. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	16	5	17	21	6	19	20
		10	18	25	22	21	20
		15	18	28	25	24	20
IMS_abs2	25	5	5	6	6	19	43
		10	10	38	22	21	43
		15	15	39	25	24	43
IMS_abs3	17	5	7	20	6	19	20
		10	15	23	22	21	20
		15	17	26	25	24	20
IMS_abs4	17	5	5	21	6	19	20
		10	10	24	22	21	20
		15	15	27	25	24	20
IMS_abs5	17	5	5	21	6	19	21
		10	10	25	22	21	21
		15	15	28	25	24	21
IMS_abs6	17	5	5	21	6	19	23
		10	10	26	22	21	23
		15	15	28	25	24	23
IMS_abs7	17	5	5	21	6	19	83
		10	10	26	22	21	83
		15	15	28	25	24	83
IMS_abs9	17	5	6	19	6	19	19
		10	11	24	22	21	19
		15	16	26	25	24	19
IMS_abs10	17	5	5	20	6	19	21
		10	10	25	22	21	21
		15	15	27	25	24	21
IMS_abs11	17	5	6	19	6	19	18
		10	15	22	22	21	18
		15	16	25	25	24	18
IMS_abs12	17	5	5	20	6	19	19
		10	10	24	22	21	19
		15	15	26	25	24	19
IMS_abs13	22	5	5	20	6	19	22
		10	10	25	22	21	22
		15	15	27	25	24	22
IMS_abs14	22	5	5	21	6	19	27
		10	10	26	22	21	27
		15	15	27	25	24	27
IMS_abs15	22	5	6	21	6	19	126
		10	10	27	22	21	126
		15	15	28	25	24	126
mean run time (sec)			1.391e-03	5.242e-03	2.687e-04	7.673e-04	8.169e-02
mean relative run time			5.178	19.510	1.000	2.856	304.030

Table 63: Change found for each moving window. JasmineTableBaseline1.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	12.50	4.07	12.57	2.57	15.86
10	7.50	7.14	3.86	3.43	15.86
15	3.36	9.29	6.43	5.57	15.86

Table 64: MAE of each algorithm for JasmineTableBaseline1.

4.2 Baseline2

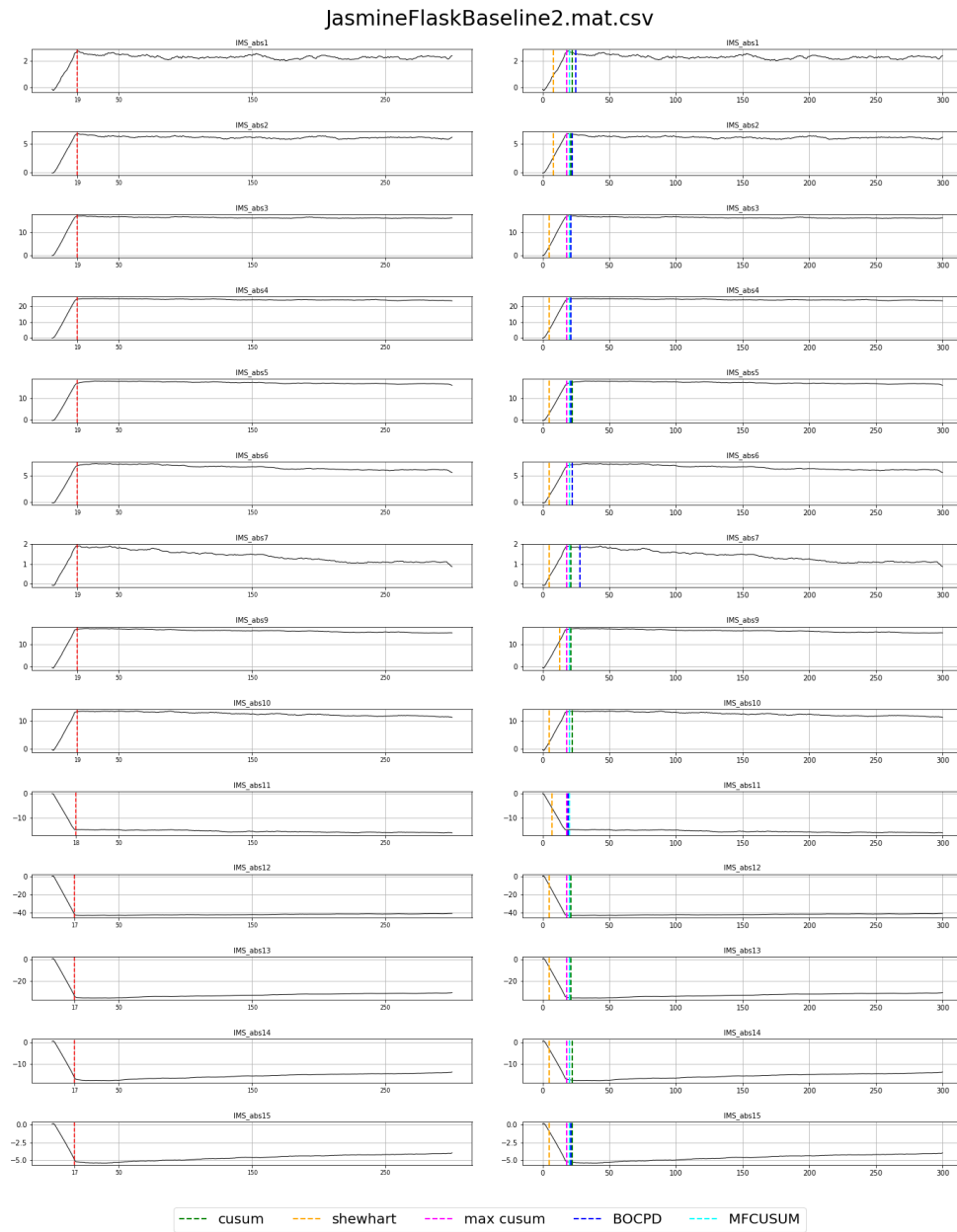


Figure 97: JasmineBaseline2. Window size 5.

JasmineFlaskBaseline2.mat.csv

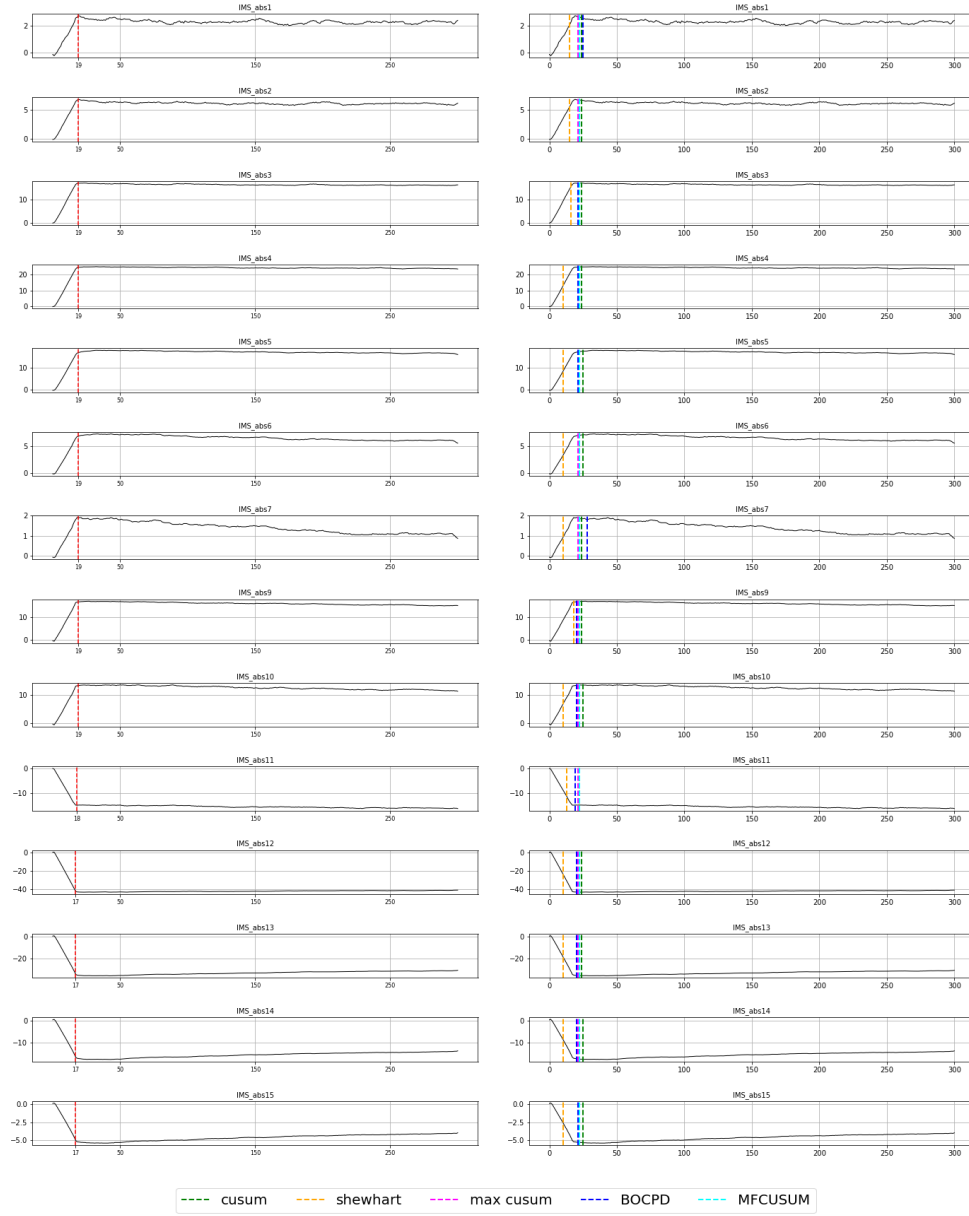


Figure 98: JasmineBaseline2. Window size 10.

JasmineFlaskBaseline2.mat.csv

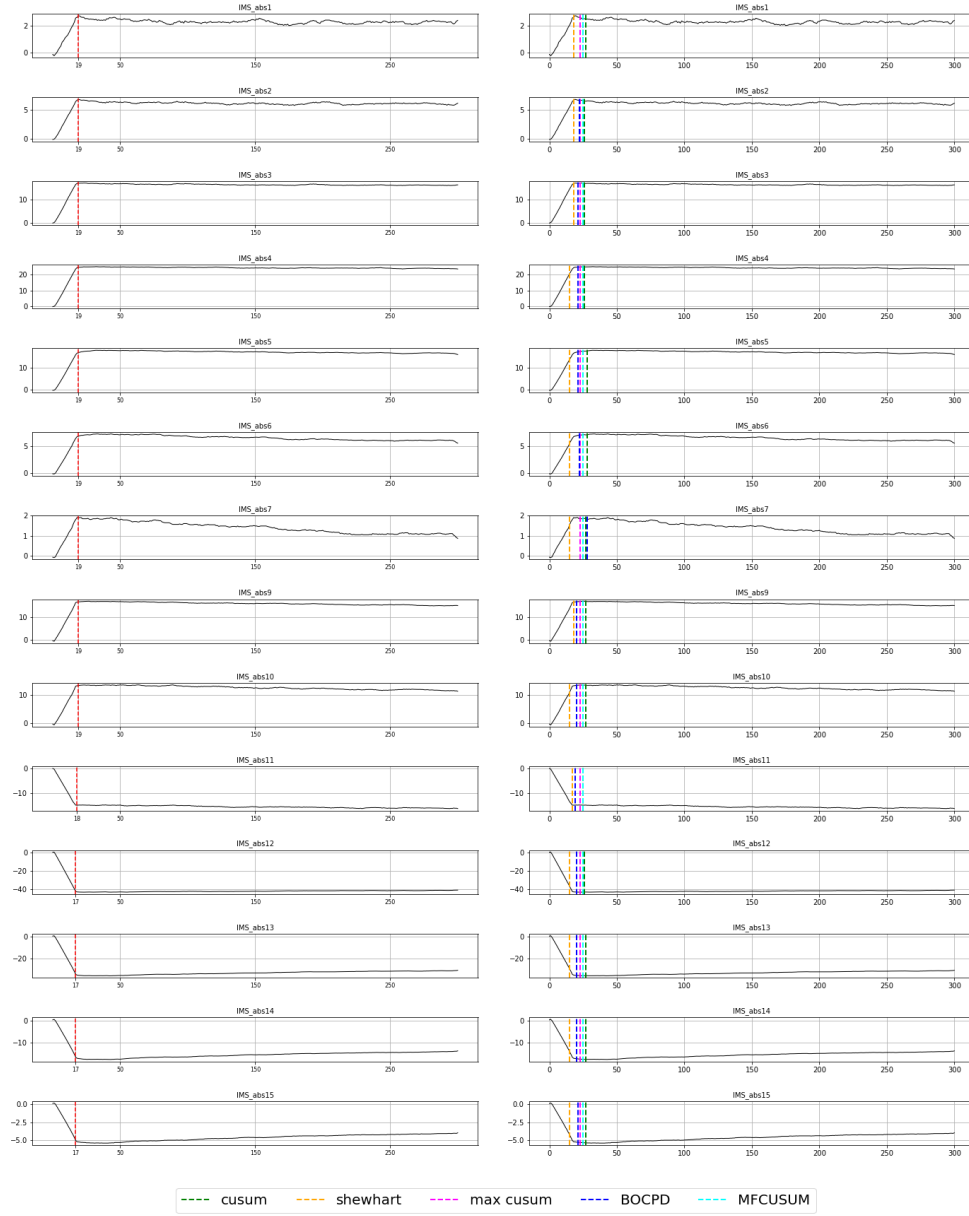


Figure 99: JasmineBaseline2. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	19	5	8	22	20	18	25
		10	15	24	22	21	25
		15	18	27	25	23	25
IMS_abs2	19	5	8	21	20	18	22
		10	15	24	22	21	22
		15	18	26	25	23	22
IMS_abs3	19	5	5	21	20	18	21
		10	16	24	22	21	21
		15	18	26	25	23	21
IMS_abs4	19	5	5	21	20	18	21
		10	10	24	22	21	21
		15	15	26	25	23	21
IMS_abs5	19	5	5	22	20	18	21
		10	10	25	22	21	21
		15	15	28	25	23	21
IMS_abs6	19	5	5	22	20	18	22
		10	10	25	22	21	22
		15	15	28	25	23	22
IMS_abs7	19	5	5	21	20	18	28
		10	10	24	22	21	28
		15	15	27	25	23	28
IMS_abs9	19	5	13	21	20	18	20
		10	18	24	22	21	20
		15	18	27	25	23	20
IMS_abs10	19	5	5	22	20	18	20
		10	10	25	22	21	20
		15	15	27	25	23	20
IMS_abs11	18	5	7	20	20	18	19
		10	13	22	22	21	19
		15	17	25	25	23	19
IMS_abs12	17	5	5	21	20	18	20
		10	10	24	22	21	20
		15	15	26	25	23	20
IMS_abs13	17	5	5	21	20	18	20
		10	10	24	22	21	20
		15	15	27	25	23	20
IMS_abs14	17	5	5	22	20	18	20
		10	10	25	22	21	20
		15	15	27	25	23	20
IMS_abs15	17	5	5	22	20	18	21
		10	10	25	22	21	21
		15	15	27	25	23	21
mean run time (sec)			1.124e-03	4.905e-03	3.437e-04	7.683e-04	4.807e-02
mean relative run time			3.270	14.271	1.000	2.235	139.843

Table 65: Change found for each moving window. JasmineFlaskBaseline2.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	12.21	3.00	1.64	0.93	3.07
10	6.43	5.86	3.64	2.64	3.07
15	2.36	8.36	6.64	4.64	3.07

Table 66: MAE of each algorithm for JasmineFlaskBaseline2.

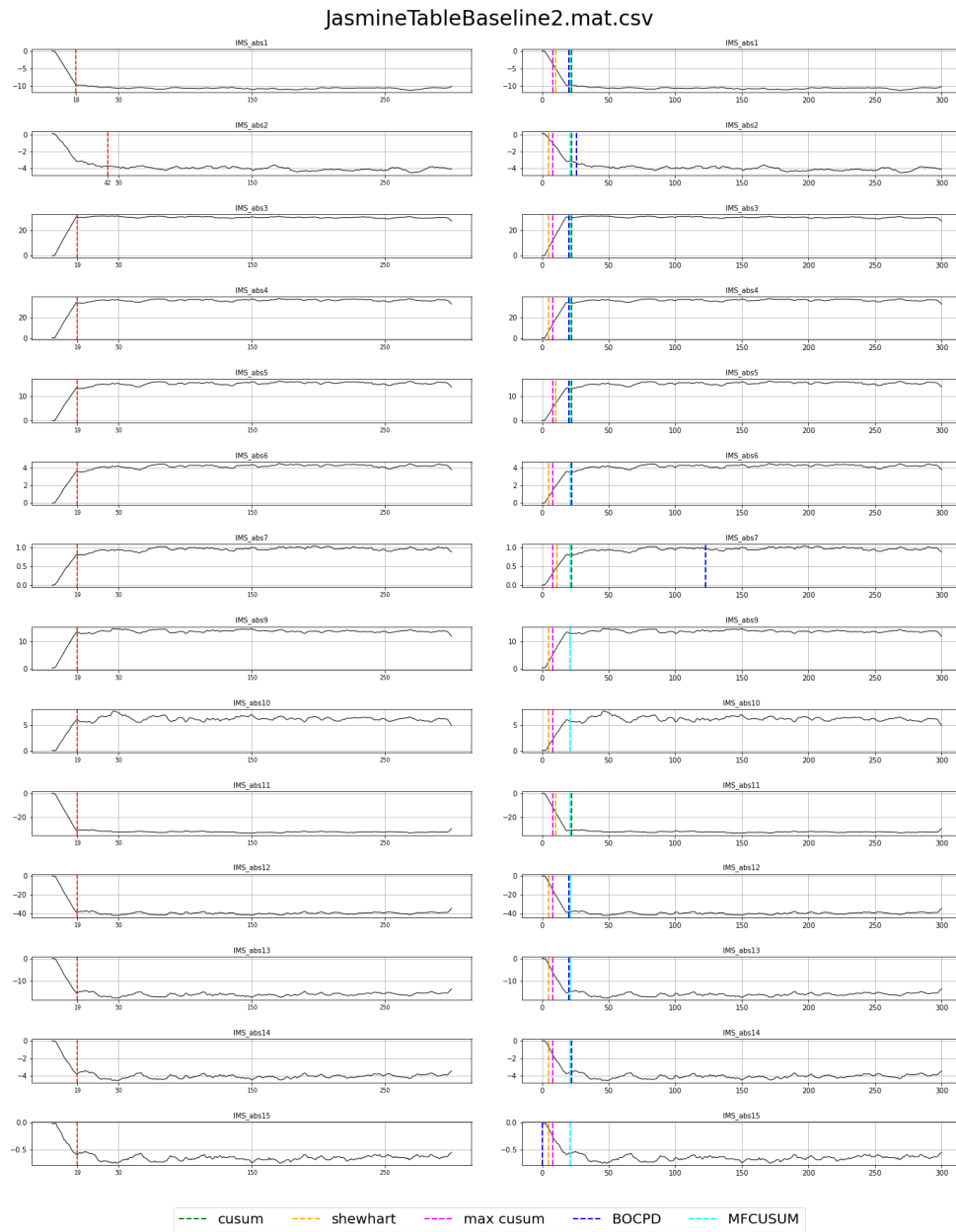


Figure 100: JasmineBaseline2. Window size 5.

JasmineTableBaseline2.mat.csv

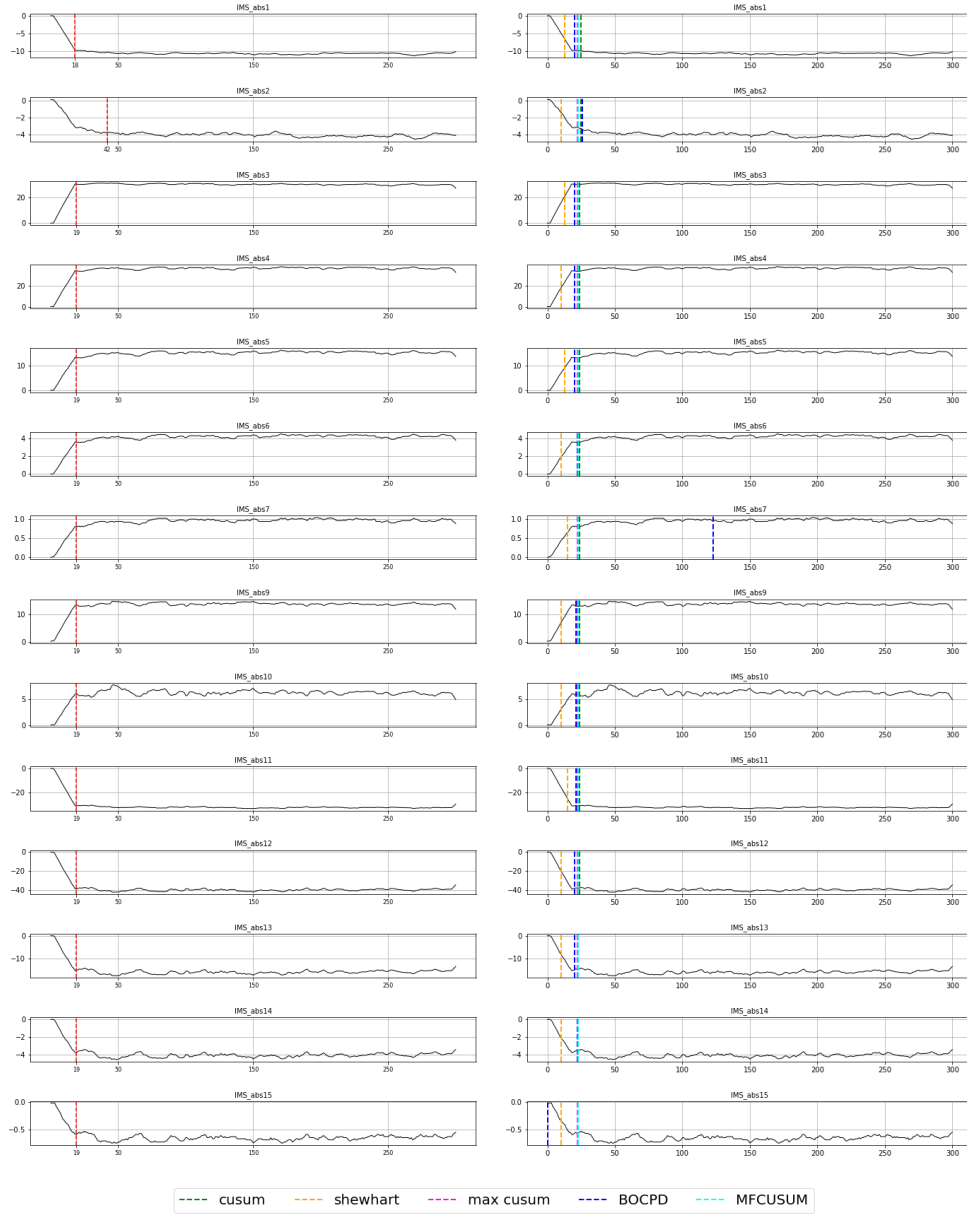


Figure 101: JasmineBaseline2. Window size 10.

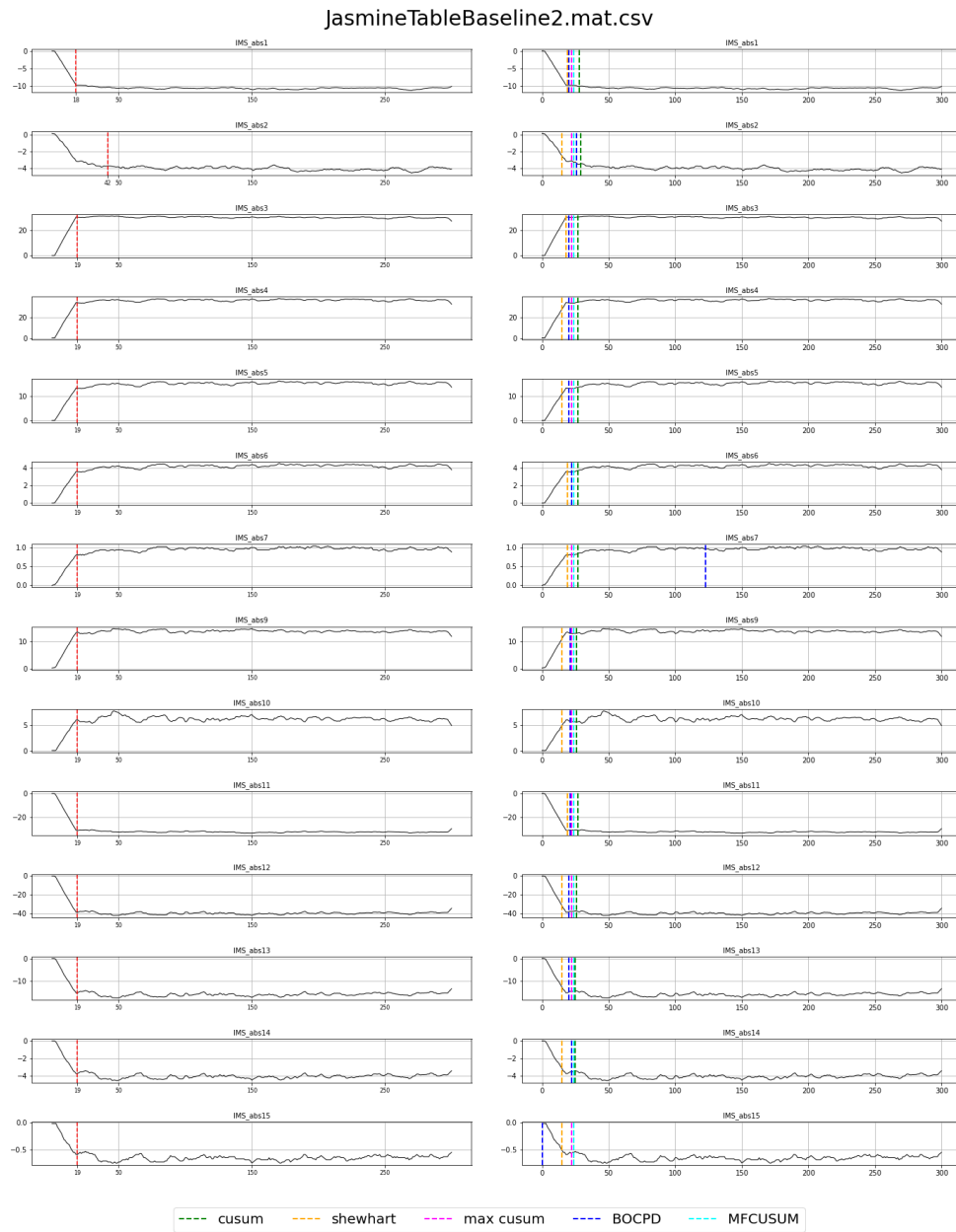


Figure 102: JasmineBaseline2. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	18	5	10	22	21	8	20
		10	13	25	23	22	20
		15	19	28	24	22	20
IMS_abs2	42	5	5	22	21	8	26
		10	10	25	23	22	26
		15	15	29	24	22	26
IMS_abs3	19	5	5	22	21	8	20
		10	13	24	23	22	20
		15	18	27	24	22	20
IMS_abs4	19	5	5	22	21	8	20
		10	10	24	23	22	20
		15	15	27	24	22	20
IMS_abs5	19	5	10	22	21	8	20
		10	13	24	23	22	20
		15	15	27	24	22	20
IMS_abs6	19	5	5	22	21	8	22
		10	10	24	23	22	22
		15	19	27	24	22	22
IMS_abs7	19	5	11	22	21	8	123
		10	15	24	23	22	123
		15	19	27	24	22	123
IMS_abs9	19	5	5	21	21	8	21
		10	10	24	23	22	21
		15	15	26	24	22	21
IMS_abs10	19	5	5	21	21	8	21
		10	10	24	23	22	21
		15	15	26	24	22	21
IMS_abs11	19	5	10	22	21	8	21
		10	15	24	23	22	21
		15	19	27	24	22	21
IMS_abs12	19	5	5	21	21	8	20
		10	10	24	23	22	20
		15	15	26	24	22	20
IMS_abs13	19	5	5	21	21	8	20
		10	10	23	23	22	20
		15	15	25	24	22	20
IMS_abs14	19	5	5	21	21	8	22
		10	10	23	23	22	22
		15	15	25	24	22	22
IMS_abs15	19	5	5	21	21	8	0
		10	10	23	23	22	0
		15	15	24	24	22	0
mean run time (sec)			1.121e-03	4.976e-03	3.826e-04	8.047e-04	1.518e-01
mean relative run time			2.930	13.006	1.000	2.103	396.670

Table 67: Change found for each moving window. JasmineTableBaseline2.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	14.07	3.86	3.43	12.57	11.29
10	9.21	5.79	5.14	4.29	11.29
15	4.36	7.79	6.00	4.29	11.29

Table 68: MAE of each algorithm for JasmineTableBaseline2.

4.3 Baseline3

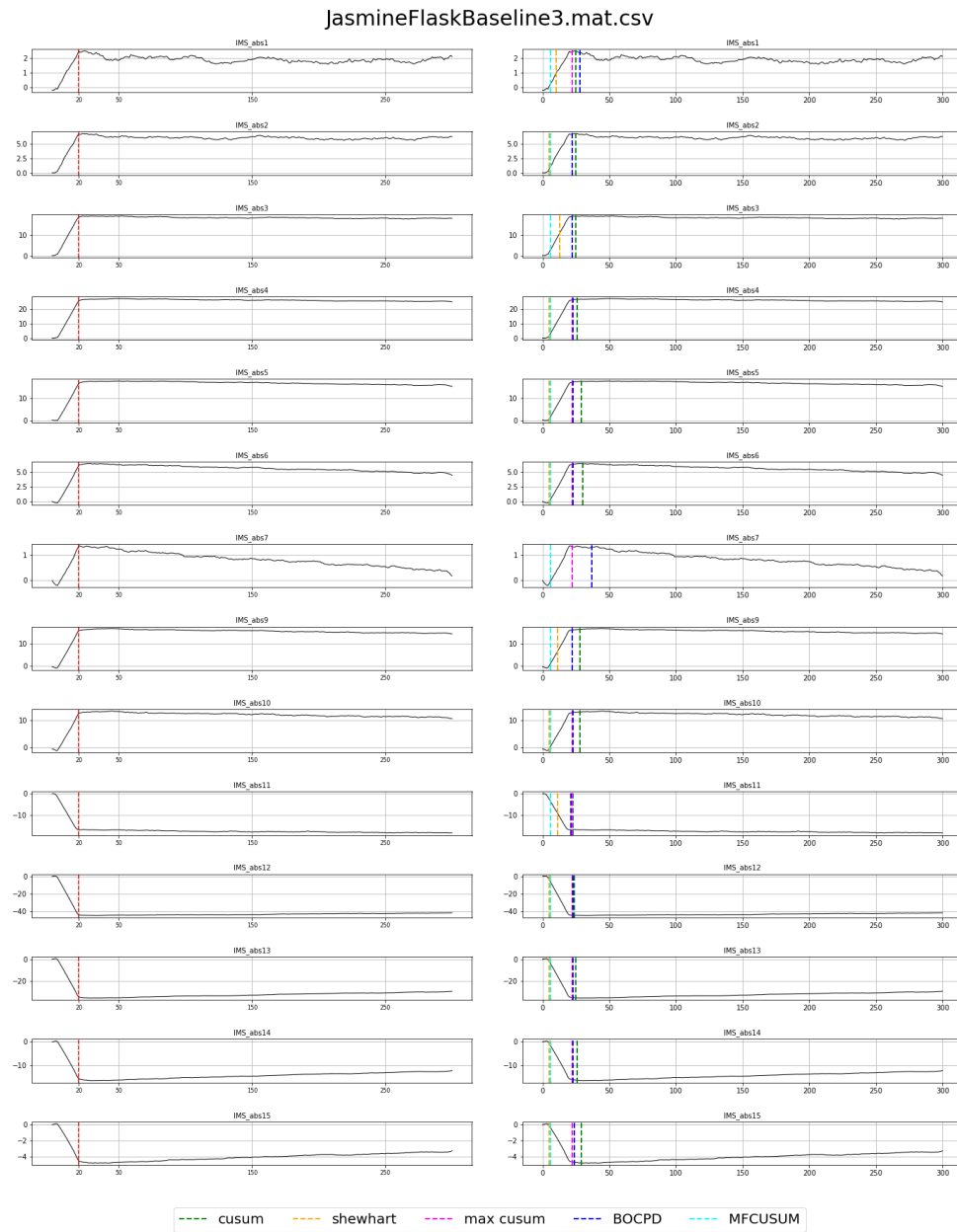


Figure 103: JasmineBaseline3. Window size 5.

JasmineFlaskBaseline3.mat.csv

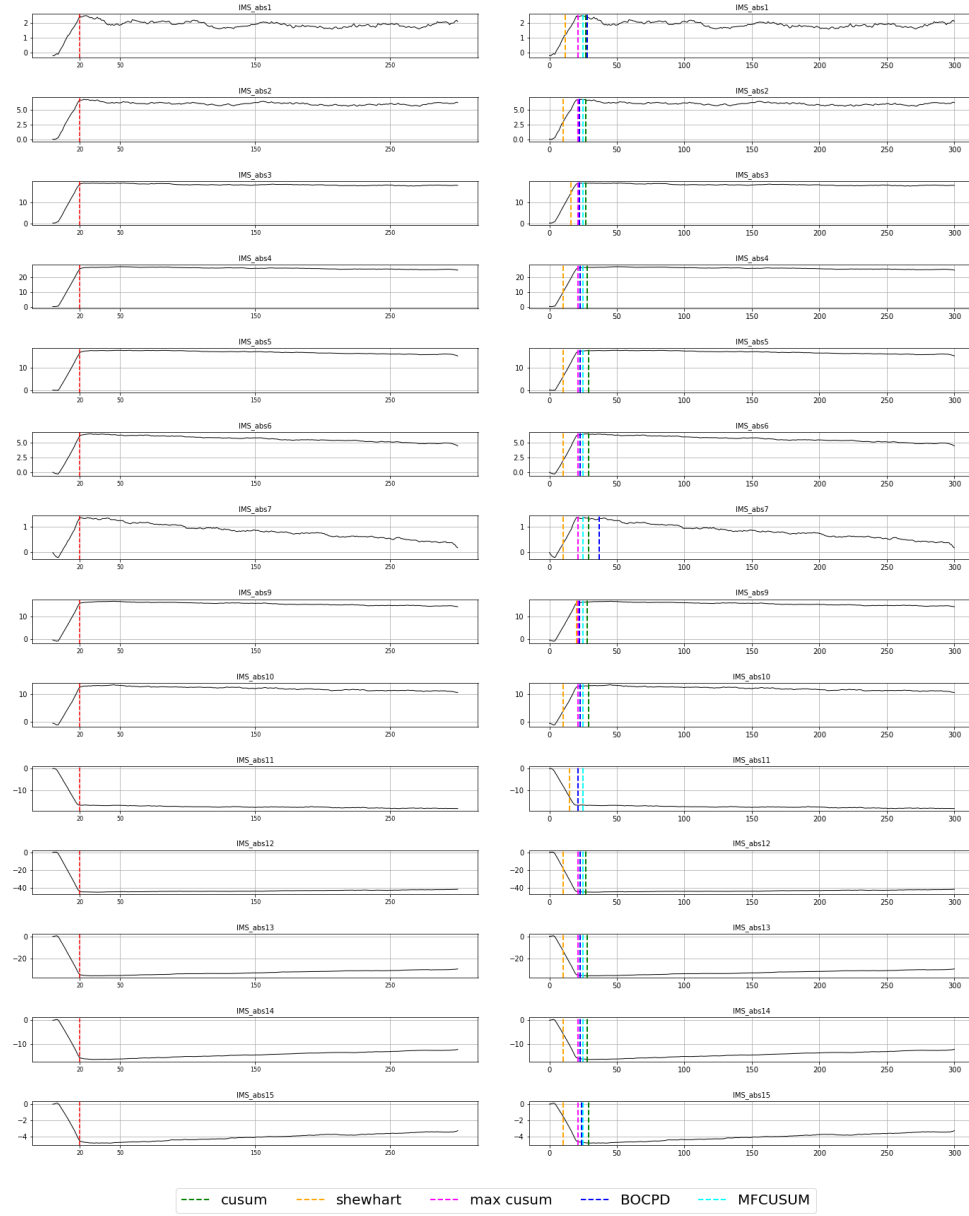


Figure 104: JasmineBaseline3. Window size 10.

JasmineFlaskBaseline3.mat.csv

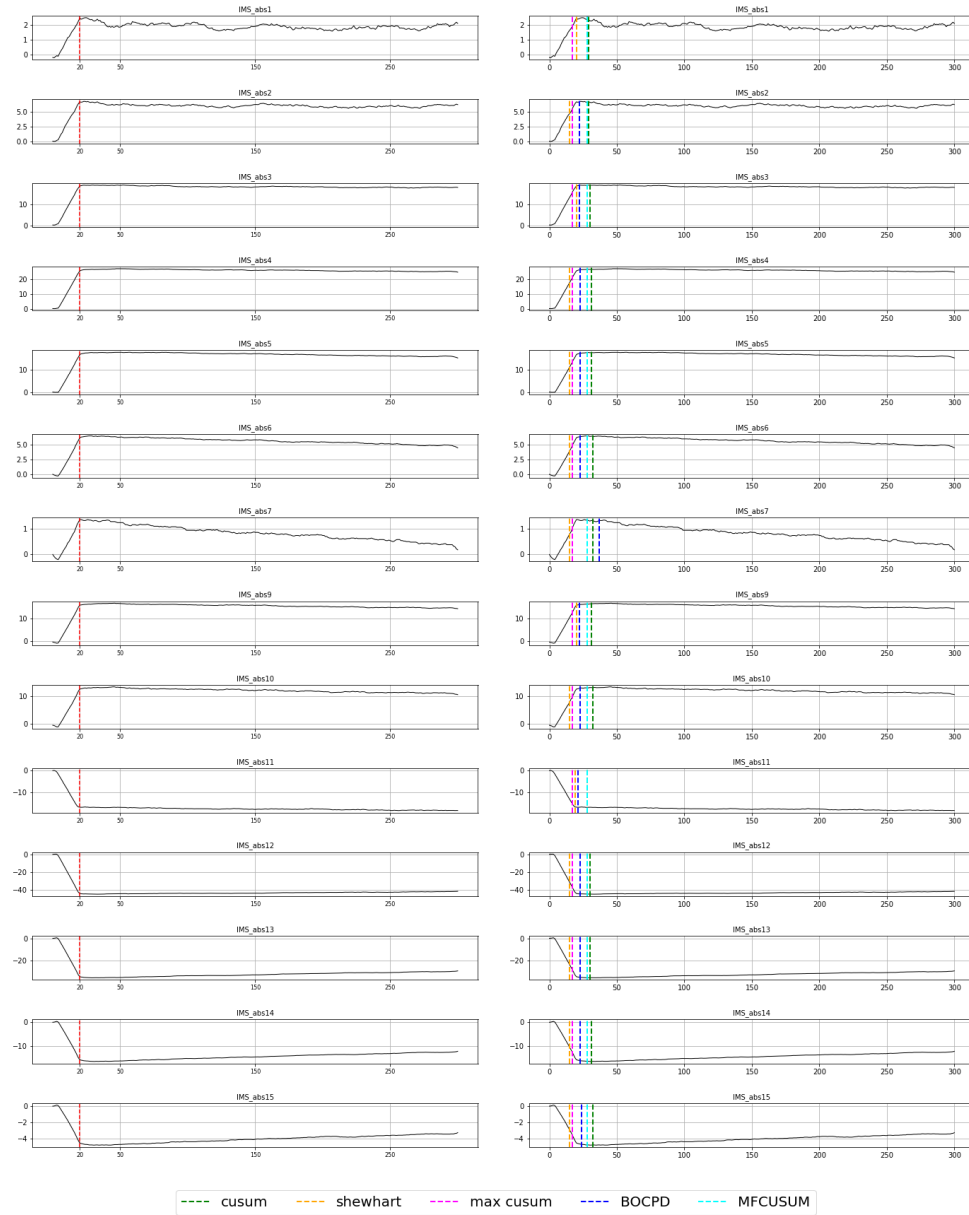


Figure 105: JasmineBaseline3. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	20	5	10	25	6	22	28
		10	12	27	25	21	28
		15	20	29	28	17	28
IMS_abs2	20	5	5	25	6	22	22
		10	10	27	25	21	22
		15	15	29	28	17	22
IMS_abs3	20	5	13	25	6	22	22
		10	16	27	25	21	22
		15	20	30	28	17	22
IMS_abs4	20	5	5	26	6	22	23
		10	10	28	25	21	23
		15	15	31	28	17	23
IMS_abs5	20	5	5	29	6	22	23
		10	10	29	25	21	23
		15	15	31	28	17	23
IMS_abs6	20	5	5	30	6	22	23
		10	10	29	25	21	23
		15	15	32	28	17	23
IMS_abs7	20	5	6	6	6	22	37
		10	10	29	25	21	37
		15	15	32	28	17	37
IMS_abs9	20	5	11	28	6	22	22
		10	20	28	25	21	22
		15	20	31	28	17	22
IMS_abs10	20	5	5	28	6	22	23
		10	10	29	25	21	23
		15	15	32	28	17	23
IMS_abs11	20	5	11	23	6	22	21
		10	15	25	25	21	21
		15	19	28	28	17	21
IMS_abs12	20	5	5	24	6	22	23
		10	10	27	25	21	23
		15	15	30	28	17	23
IMS_abs13	20	5	5	25	6	22	23
		10	10	28	25	21	23
		15	15	30	28	17	23
IMS_abs14	20	5	5	26	6	22	23
		10	10	28	25	21	23
		15	15	31	28	17	23
IMS_abs15	20	5	5	29	6	22	24
		10	10	29	25	21	24
		15	15	32	28	17	24
mean run time (sec)			1.193e-03	6.032e-03	2.909e-04	7.296e-04	5.610e-02
mean relative run time			4.103	20.737	1.000	2.508	192.874

Table 69: Change found for each moving window. JasmineFlaskBaseline3.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	13.14	6.93	14.00	2.00	4.07
10	8.36	7.86	5.00	1.00	4.07
15	3.64	10.57	8.00	3.00	4.07

Table 70: MAE of each algorithm for JasmineFlaskBaseline3.

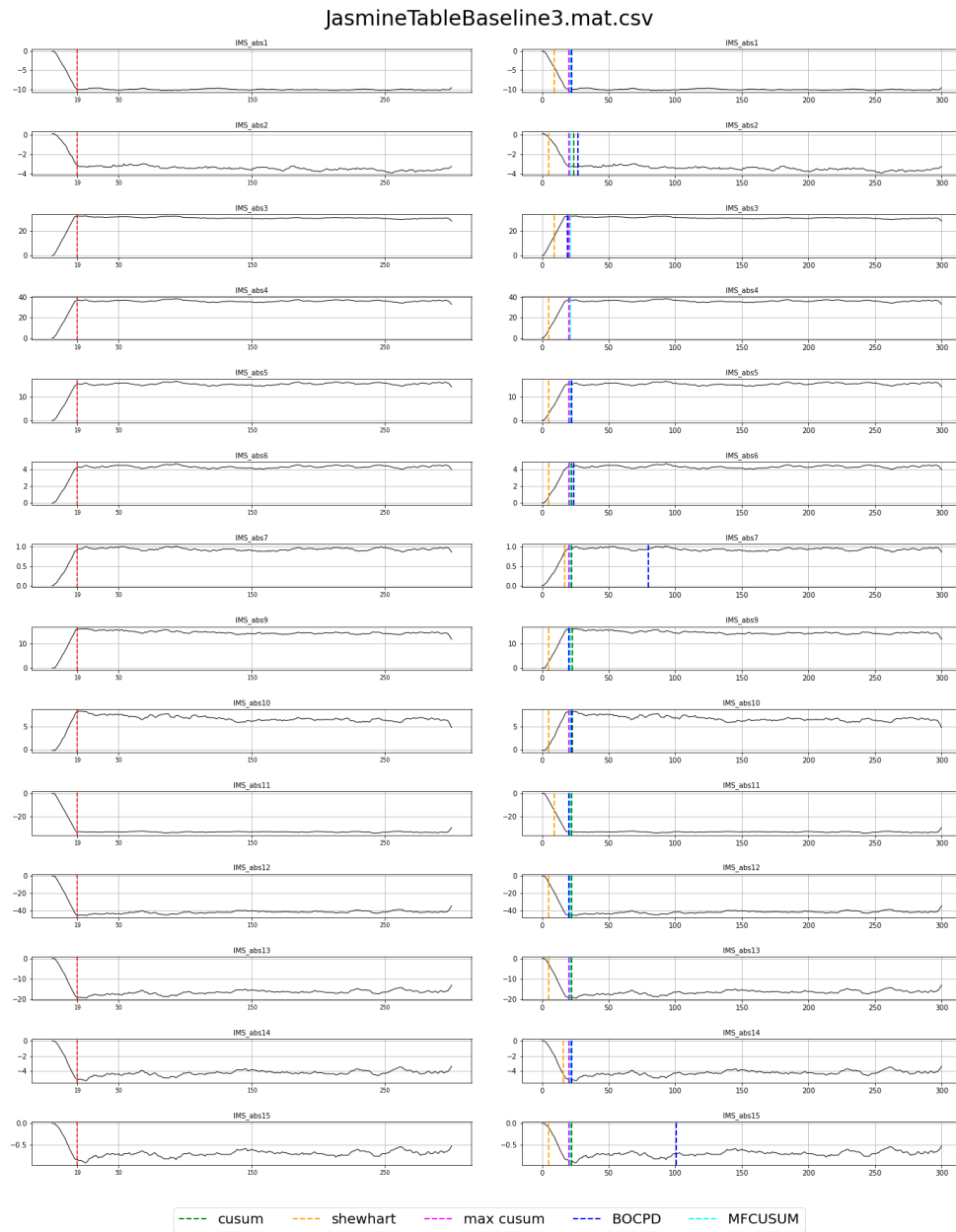


Figure 106: JasmineBaseline3. Window size 5.

JasmineTableBaseline3.mat.csv

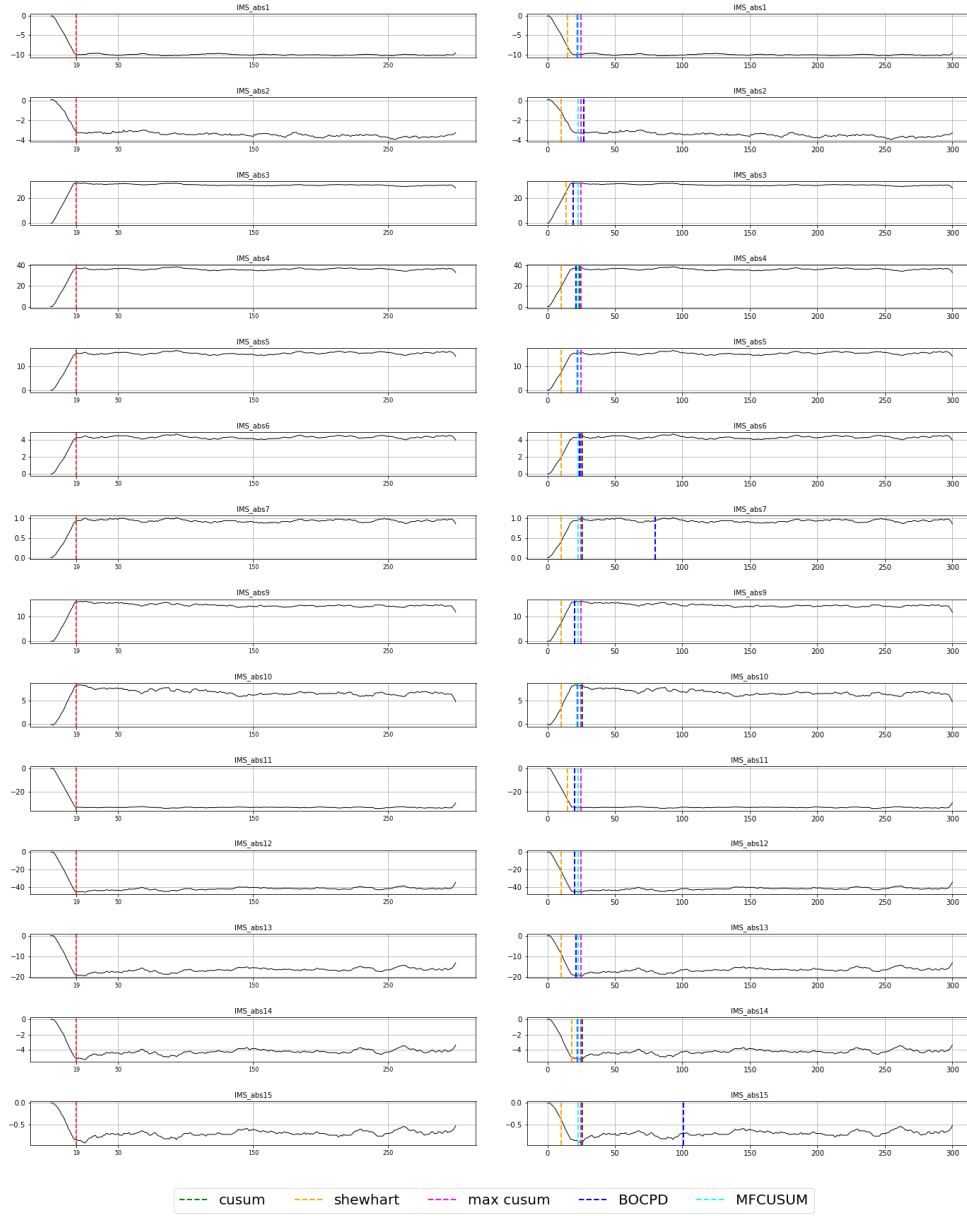


Figure 107: JasmineBaseline3. Window size 10.

JasmineTableBaseline3.mat.csv

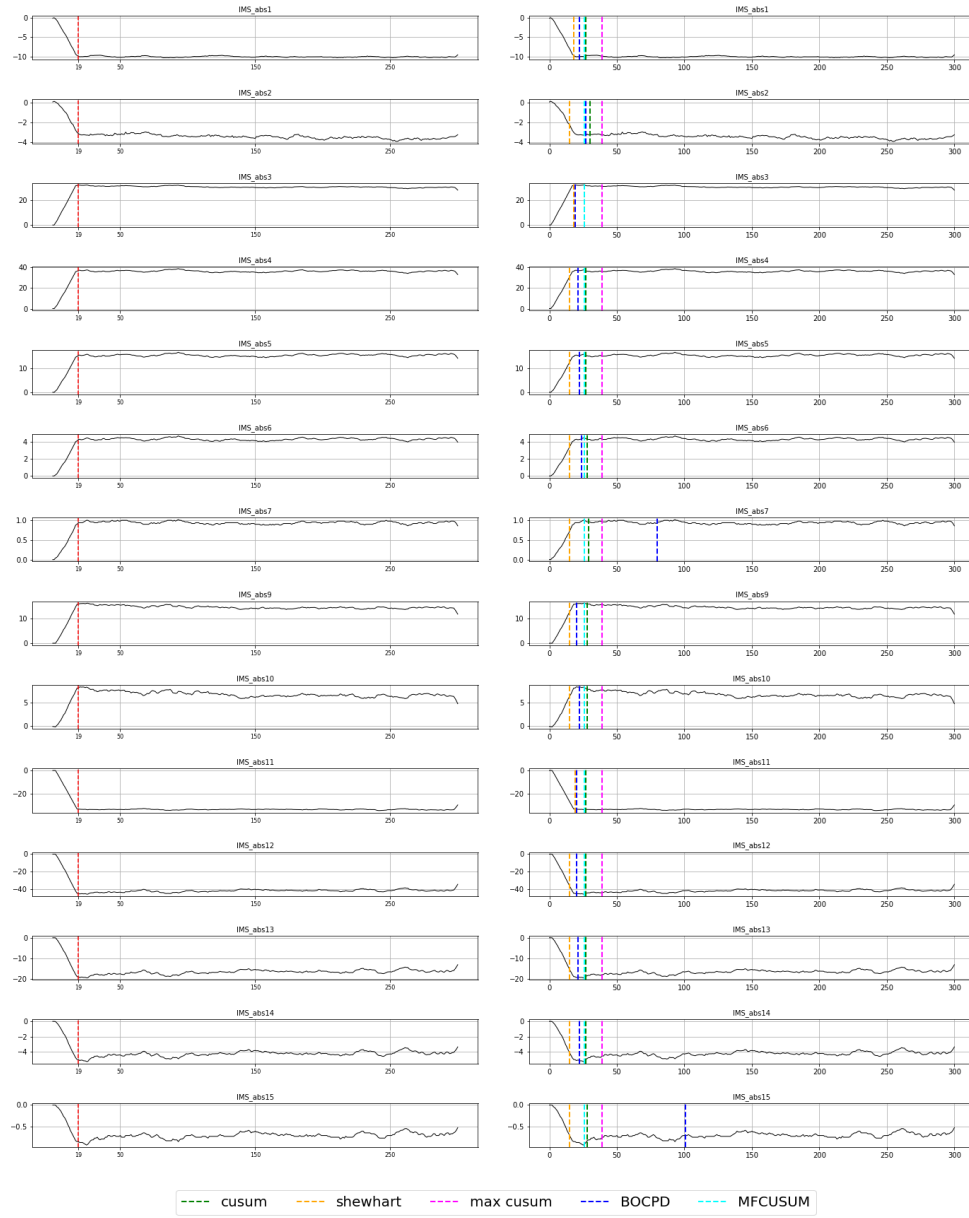


Figure 108: JasmineBaseline3. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	19	5	9	22	21	20	22
		10	15	25	23	25	22
		15	18	27	26	39	22
IMS_abs2	19	5	5	24	21	20	27
		10	10	27	23	25	27
		15	15	30	26	39	27
IMS_abs3	19	5	9	21	21	20	19
		10	14	23	23	25	19
		15	18	26	26	39	19
IMS_abs4	19	5	5	21	21	20	21
		10	10	24	23	25	21
		15	15	27	26	39	21
IMS_abs5	19	5	5	22	21	20	22
		10	10	25	23	25	22
		15	15	27	26	39	22
IMS_abs6	19	5	5	22	21	20	24
		10	10	26	23	25	24
		15	15	28	26	39	24
IMS_abs7	19	5	17	22	21	20	80
		10	10	26	23	25	80
		15	15	29	26	39	80
IMS_abs9	19	5	5	23	21	20	20
		10	10	25	23	25	20
		15	15	28	26	39	20
IMS_abs10	19	5	5	23	21	20	22
		10	10	26	23	25	22
		15	15	28	26	39	22
IMS_abs11	19	5	9	22	21	20	20
		10	15	25	23	25	20
		15	19	27	26	39	20
IMS_abs12	19	5	5	22	21	20	20
		10	10	25	23	25	20
		15	15	27	26	39	20
IMS_abs13	19	5	5	22	21	20	21
		10	10	25	23	25	21
		15	15	27	26	39	21
IMS_abs14	19	5	16	22	21	20	22
		10	18	26	23	25	22
		15	15	27	26	39	22
IMS_abs15	19	5	5	22	21	20	101
		10	10	26	23	25	101
		15	15	28	26	39	101
mean run time (sec)			1.723e-03	6.278e-03	4.439e-04	1.067e-03	8.078e-02
mean relative run time			3.882	14.142	1.000	2.404	181.957

Table 71: Change found for each moving window. JasmineTableBaseline3.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	11.50	3.14	2.00	1.00	12.50
10	7.43	6.29	4.00	6.00	12.50
15	3.29	8.57	7.00	20.00	12.50

Table 72: MAE of each algorithm for JasmineTableBaseline3.

4.4 Baseline4

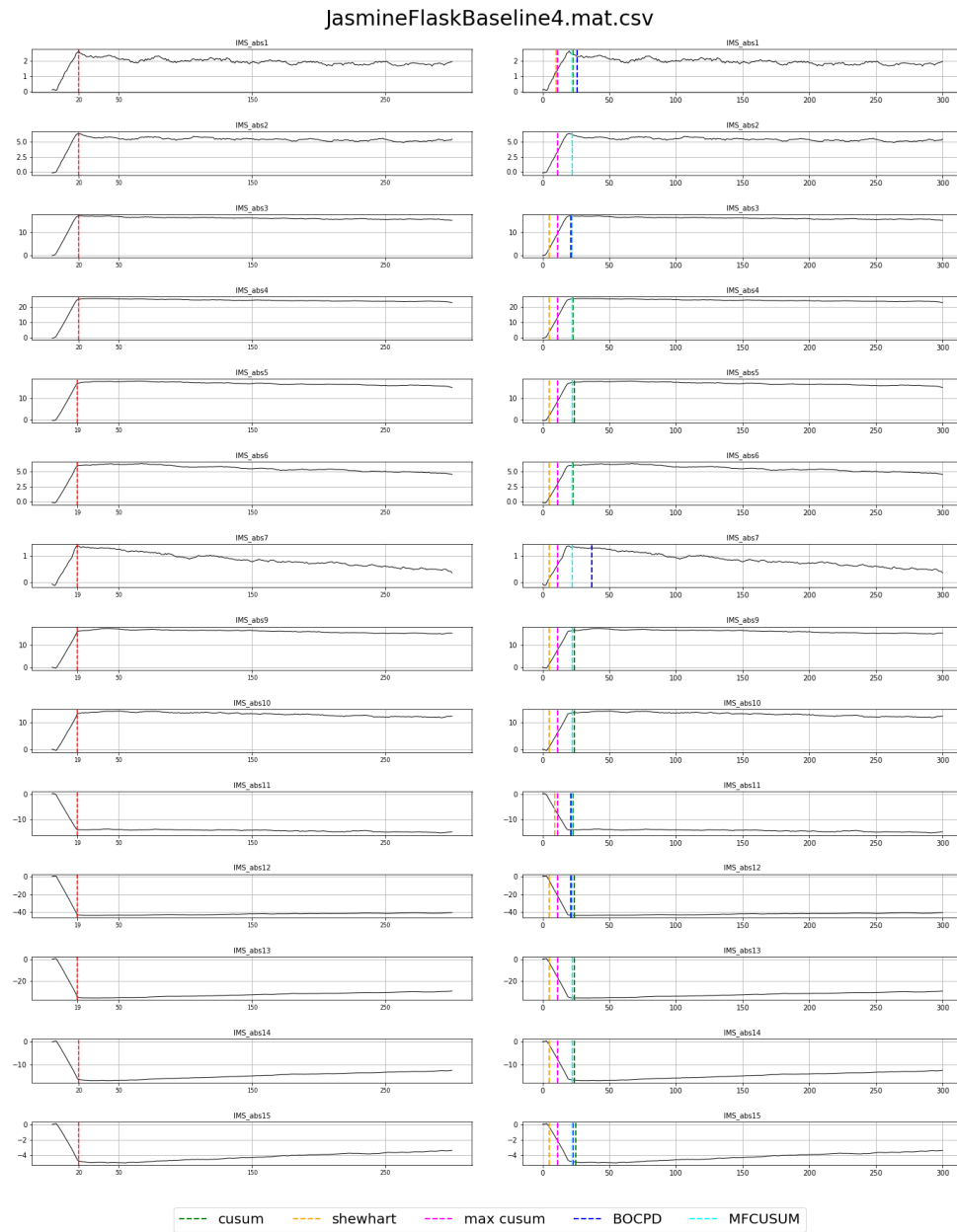


Figure 109: JasmineBaseline4. Window size 5.

JasmineFlaskBaseline4.mat.csv

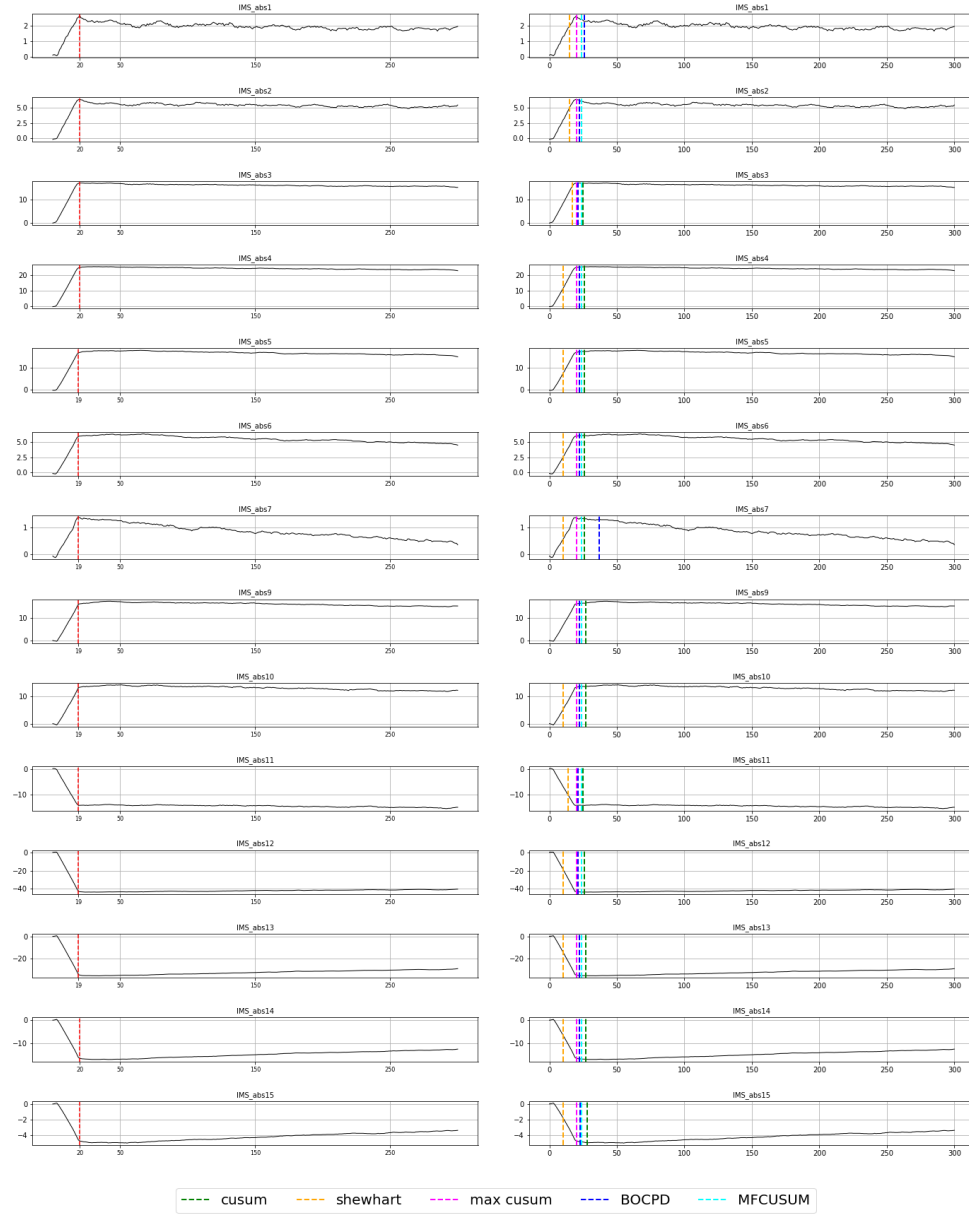


Figure 110: JasmineBaseline4. Window size 10.

JasmineFlaskBaseline4.mat.csv

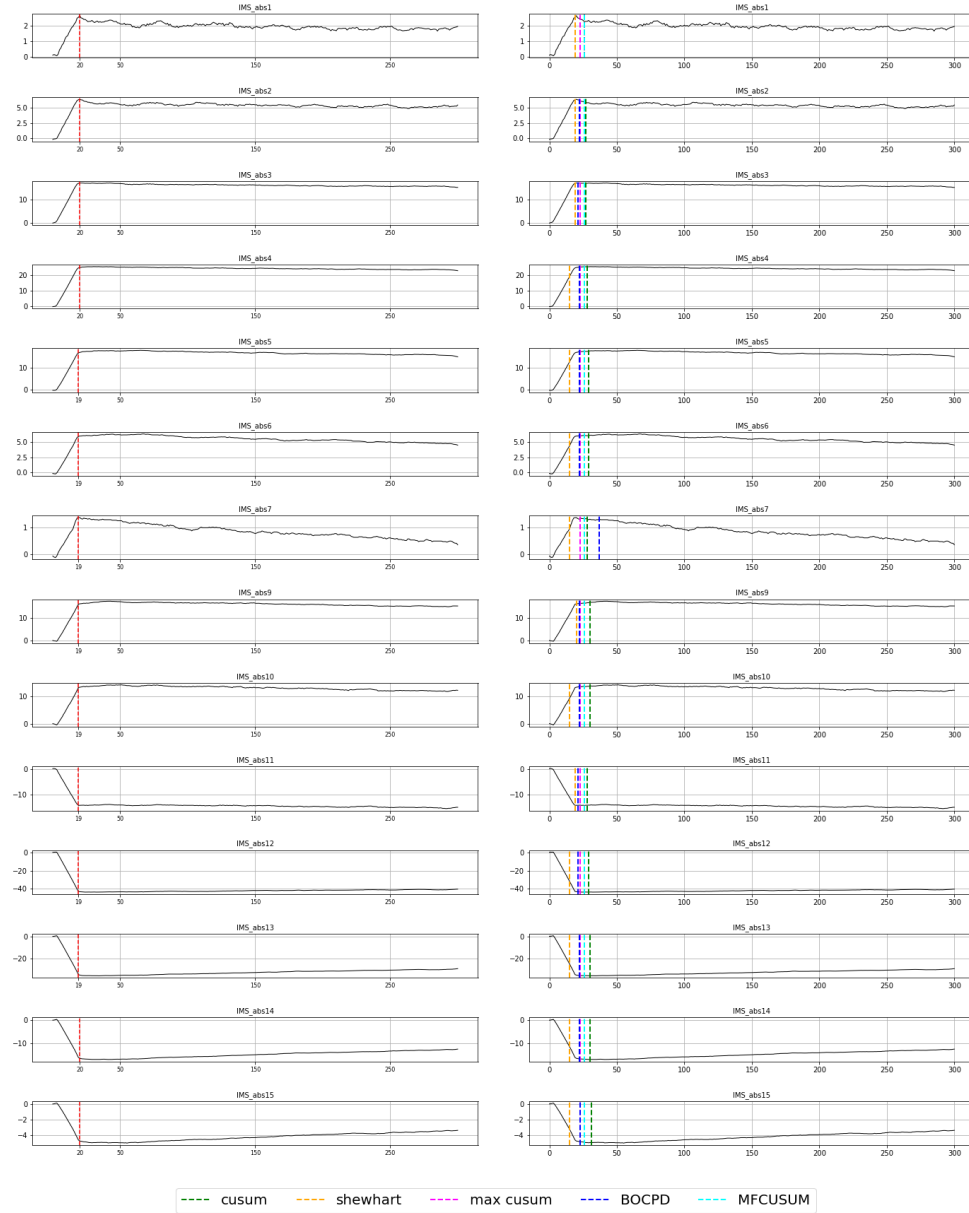


Figure 111: JasmineBaseline4. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	20	5	10	23	22	11	26
		10	15	24	24	20	26
		15	19	26	26	23	26
IMS_abs2	20	5	11	22	22	11	22
		10	15	24	24	20	22
		15	19	27	26	23	22
IMS_abs3	20	5	5	22	22	11	21
		10	17	25	24	20	21
		15	19	27	26	23	21
IMS_abs4	20	5	5	23	22	11	22
		10	10	26	24	20	22
		15	15	28	26	23	22
IMS_abs5	19	5	5	24	22	11	22
		10	10	26	24	20	22
		15	15	29	26	23	22
IMS_abs6	19	5	5	23	22	11	22
		10	10	26	24	20	22
		15	15	29	26	23	22
IMS_abs7	19	5	5	22	22	11	37
		10	10	26	24	20	37
		15	15	28	26	23	37
IMS_abs9	19	5	5	24	22	11	22
		10	20	27	24	20	22
		15	20	30	26	23	22
IMS_abs10	19	5	5	24	22	11	22
		10	10	27	24	20	22
		15	15	30	26	23	22
IMS_abs11	19	5	9	23	22	11	21
		10	14	25	24	20	21
		15	19	28	26	23	21
IMS_abs12	19	5	5	24	22	11	21
		10	10	26	24	20	21
		15	15	29	26	23	21
IMS_abs13	19	5	5	24	22	11	22
		10	10	27	24	20	22
		15	15	30	26	23	22
IMS_abs14	20	5	5	24	22	11	22
		10	10	27	24	20	22
		15	15	30	26	23	22
IMS_abs15	20	5	5	25	22	11	23
		10	10	28	24	20	23
		15	15	31	26	23	23
mean run time (sec)			1.507e-03	6.287e-03	5.489e-04	6.111e-04	6.298e-02
mean relative run time			2.745	11.454	1.000	1.113	114.738

Table 73: Change found for each moving window. JasmineFlaskBaseline4.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	13.36	3.93	2.57	8.43	3.79
10	7.36	6.57	4.57	0.57	3.79
15	3.07	9.29	6.57	3.57	3.79

Table 74: MAE of each algorithm for JasmineFlaskBaseline4.

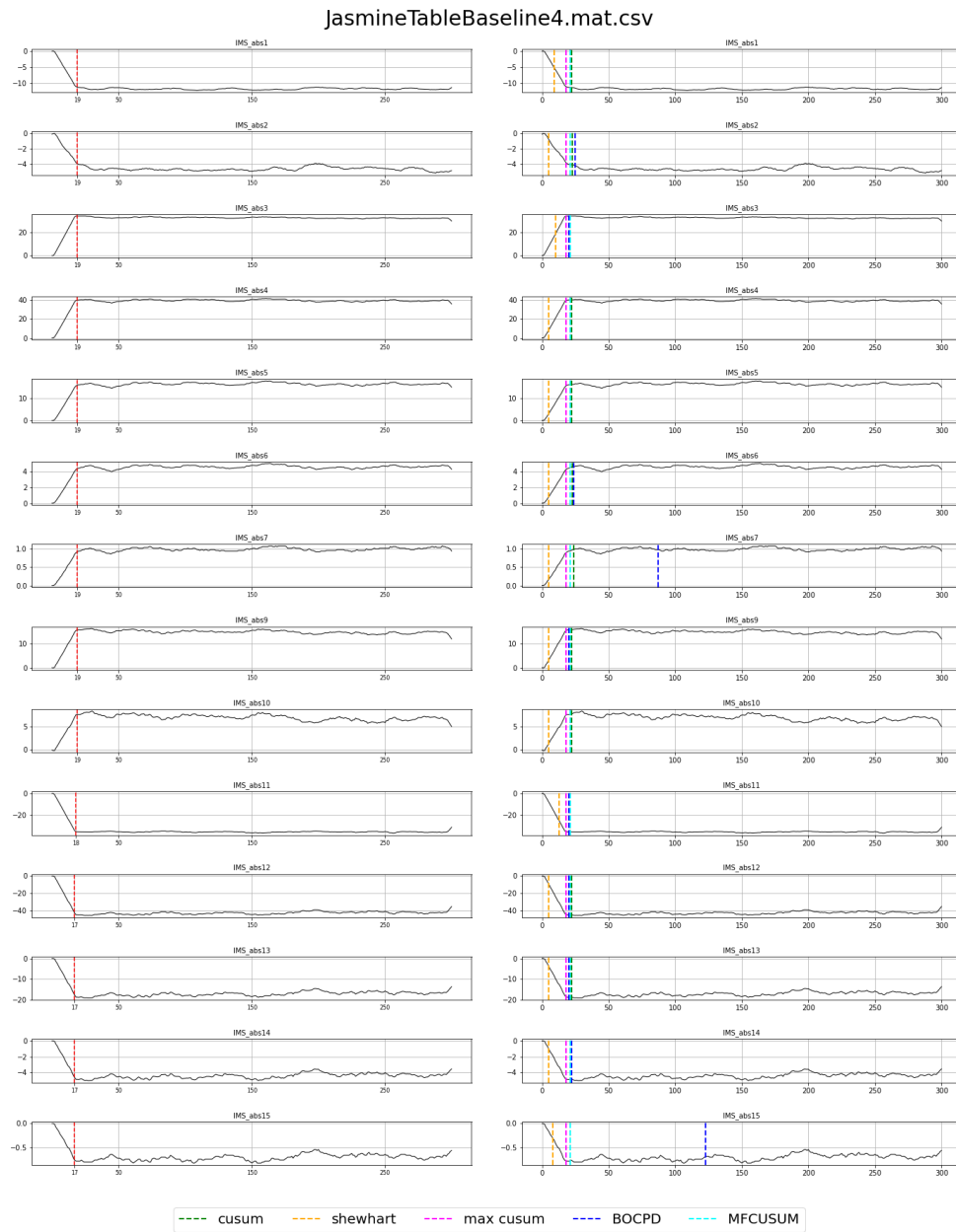


Figure 112: JasmineBaseline4. Window size 5.

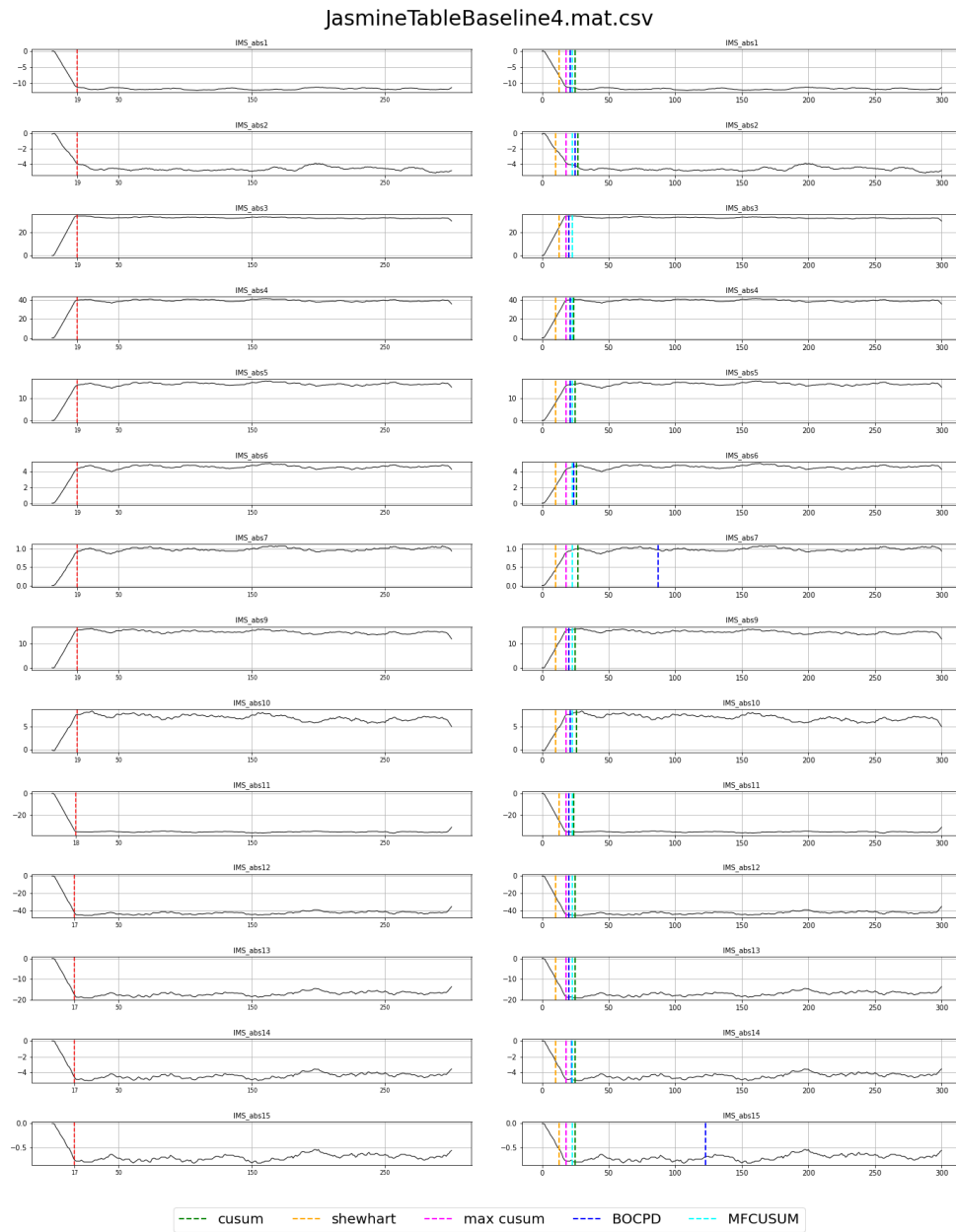


Figure 113: JasmineBaseline4. Window size 10.

JasmineTableBaseline4.mat.csv

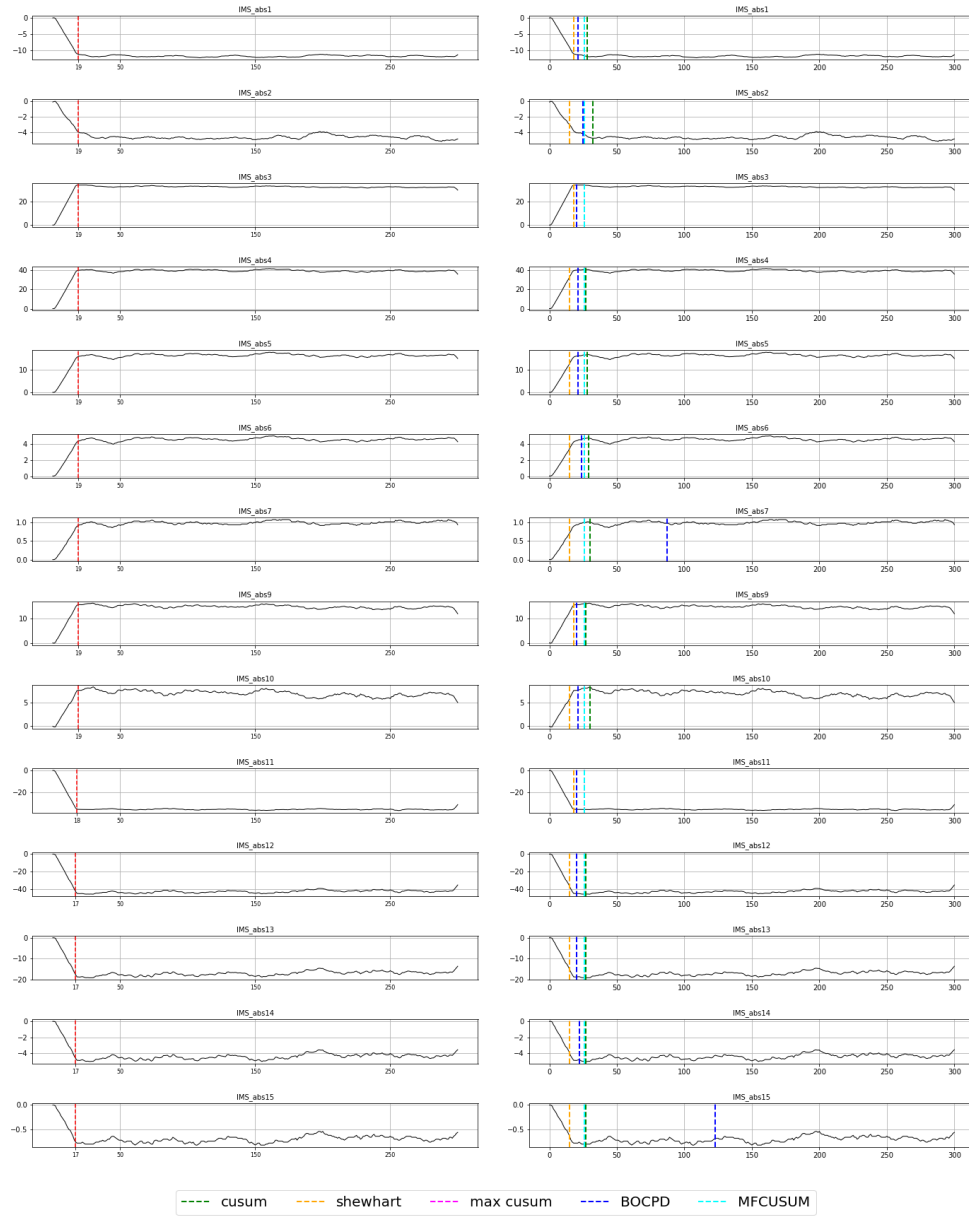


Figure 114: JasmineBaseline4. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	19	5	9	22	21	18	21
		10	13	25	23	18	21
		15	18	28	26	26	21
IMS_abs2	19	5	5	23	21	18	25
		10	10	27	23	18	25
		15	15	32	26	26	25
IMS_abs3	19	5	10	21	21	18	20
		10	13	23	23	18	20
		15	18	26	26	26	20
IMS_abs4	19	5	5	22	21	18	21
		10	10	24	23	18	21
		15	15	27	26	26	21
IMS_abs5	19	5	5	22	21	18	21
		10	10	25	23	18	21
		15	15	28	26	26	21
IMS_abs6	19	5	5	23	21	18	24
		10	10	26	23	18	24
		15	15	29	26	26	24
IMS_abs7	19	5	5	24	21	18	87
		10	10	27	23	18	87
		15	15	30	26	26	87
IMS_abs9	19	5	5	22	21	18	20
		10	10	25	23	18	20
		15	18	27	26	26	20
IMS_abs10	19	5	5	22	21	18	21
		10	10	26	23	18	21
		15	15	30	26	26	21
IMS_abs11	18	5	13	21	21	18	20
		10	13	24	23	18	20
		15	18	26	26	26	20
IMS_abs12	17	5	5	22	21	18	20
		10	10	25	23	18	20
		15	15	27	26	26	20
IMS_abs13	17	5	5	22	21	18	20
		10	10	25	23	18	20
		15	15	27	26	26	20
IMS_abs14	17	5	5	21	21	18	22
		10	10	25	23	18	22
		15	15	27	26	26	22
IMS_abs15	17	5	8	21	21	18	123
		10	13	25	23	18	123
		15	15	27	26	26	123
mean run time (sec)			1.545e-03	5.776e-03	3.621e-04	7.642e-04	7.790e-02
mean relative run time			4.266	15.953	1.000	2.111	215.144

Table 75: Change found for each moving window. JasmineTableBaseline4.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	11.93	3.64	2.64	0.93	14.86
10	7.50	6.79	4.64	0.93	14.86
15	2.50	9.57	7.64	7.64	14.86

Table 76: MAE of each algorithm for JasmineTableBaseline4.

4.5 Baseline5

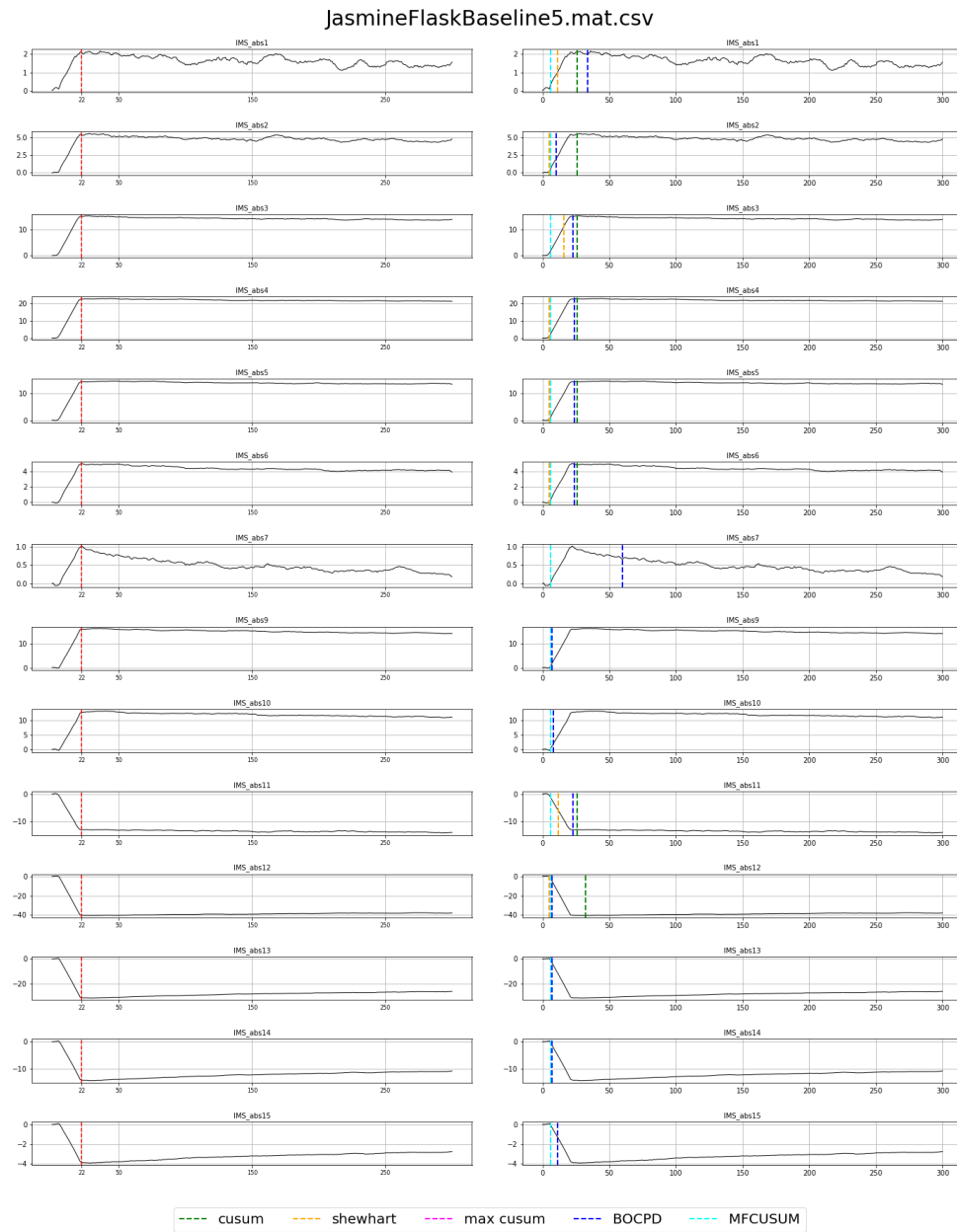


Figure 115: JasmineBaseline5. Window size 5.

JasmineFlaskBaseline5.mat.csv

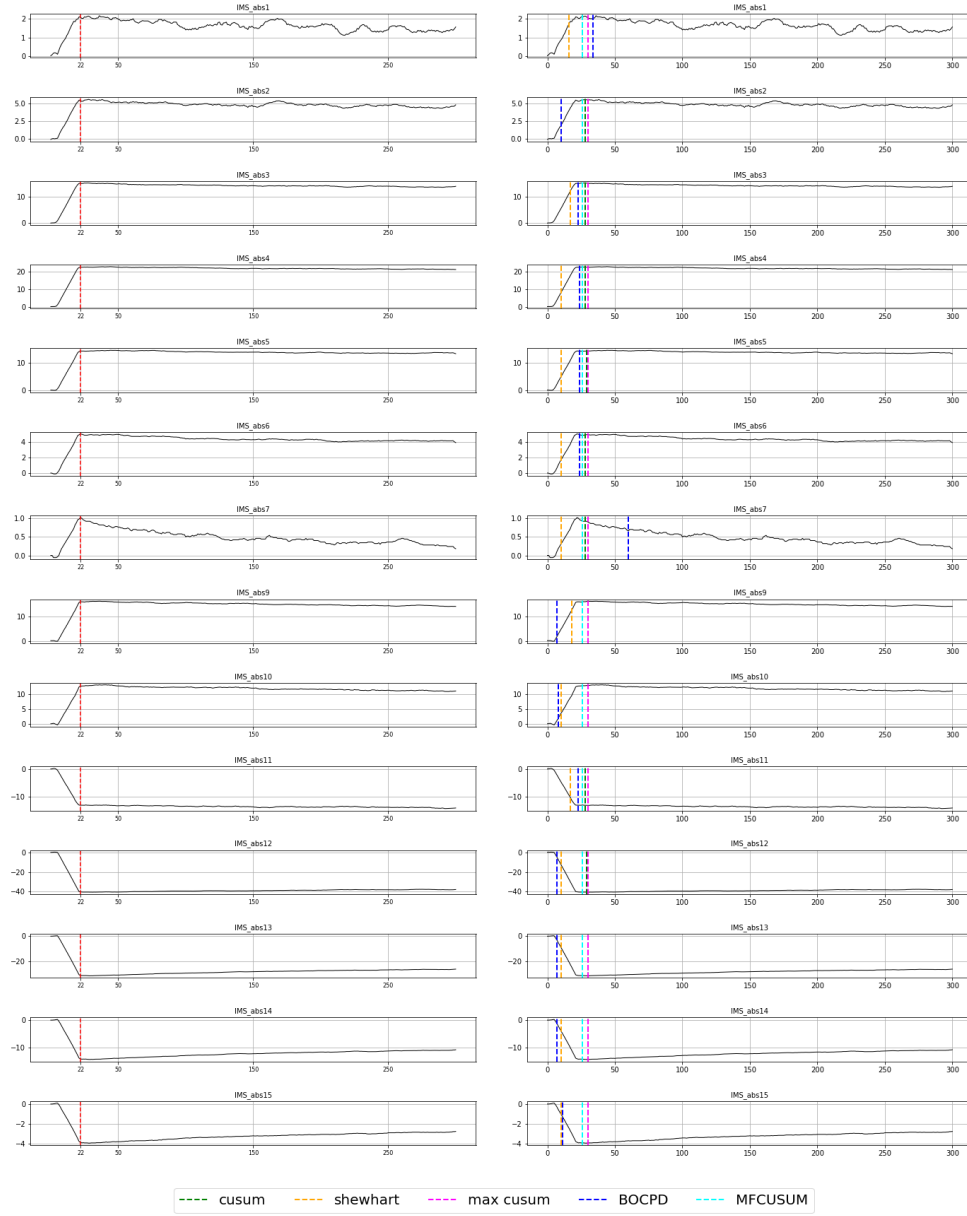


Figure 116: JasmineBaseline5. Window size 10.

JasmineFlaskBaseline5.mat.csv

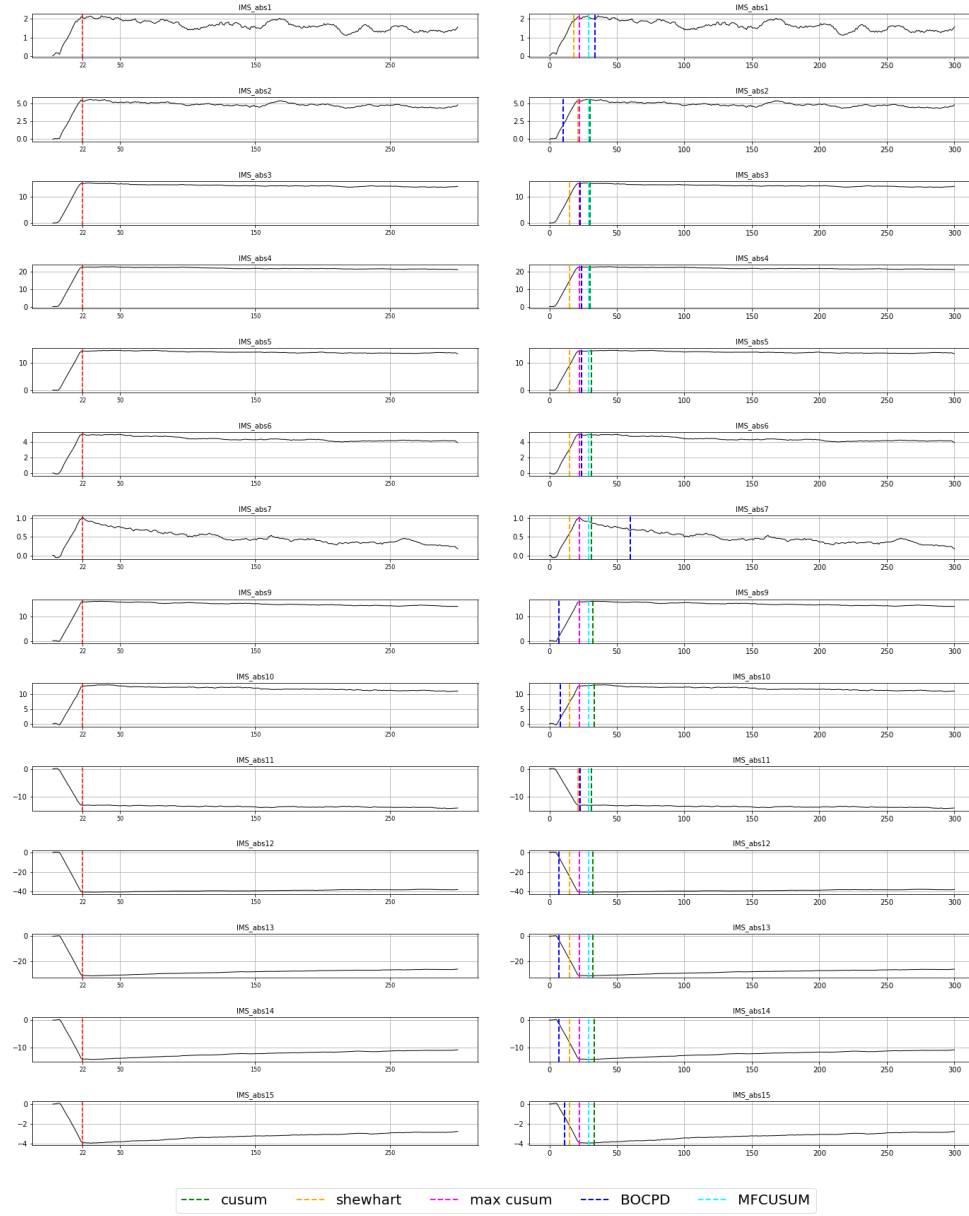


Figure 117: JasmineBaseline5. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	22	5	11	26	6	6	34
		10	16	26	26	30	34
		15	18	29	29	22	34
IMS_abs2	22	5	5	26	6	6	10
		10	10	28	26	30	10
		15	21	30	29	22	10
IMS_abs3	22	5	16	26	6	6	23
		10	17	28	26	30	23
		15	15	30	29	22	23
IMS_abs4	22	5	5	26	6	6	24
		10	10	28	26	30	24
		15	15	30	29	22	24
IMS_abs5	22	5	5	26	6	6	24
		10	10	29	26	30	24
		15	15	31	29	22	24
IMS_abs6	22	5	5	26	6	6	24
		10	10	28	26	30	24
		15	15	31	29	22	24
IMS_abs7	22	5	6	6	6	6	60
		10	10	28	26	30	60
		15	15	31	29	22	60
IMS_abs9	22	5	6	6	6	6	7
		10	18	30	26	30	7
		15	22	32	29	22	7
IMS_abs10	22	5	6	6	6	6	8
		10	10	30	26	30	8
		15	15	33	29	22	8
IMS_abs11	22	5	12	26	6	6	23
		10	17	28	26	30	23
		15	21	31	29	22	23
IMS_abs12	22	5	5	32	6	6	7
		10	10	29	26	30	7
		15	15	32	29	22	7
IMS_abs13	22	5	6	6	6	6	7
		10	10	30	26	30	7
		15	15	32	29	22	7
IMS_abs14	22	5	6	6	6	6	7
		10	10	30	26	30	7
		15	15	33	29	22	7
IMS_abs15	22	5	6	6	6	6	11
		10	10	30	26	30	11
		15	15	33	29	22	11
mean run time (sec)			1.501e-03	5.989e-03	3.384e-04	9.090e-04	5.347e-02
mean relative run time			4.434	17.699	1.000	2.686	157.997

Table 77: Change found for each moving window. JasmineFlaskBaseline5.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	14.86	9.57	16.00	16.00	11.07
10	10.00	6.71	4.00	8.00	11.07
15	5.43	9.29	7.00	0.00	11.07

Table 78: MAE of each algorithm for JasmineFlaskBaseline5.

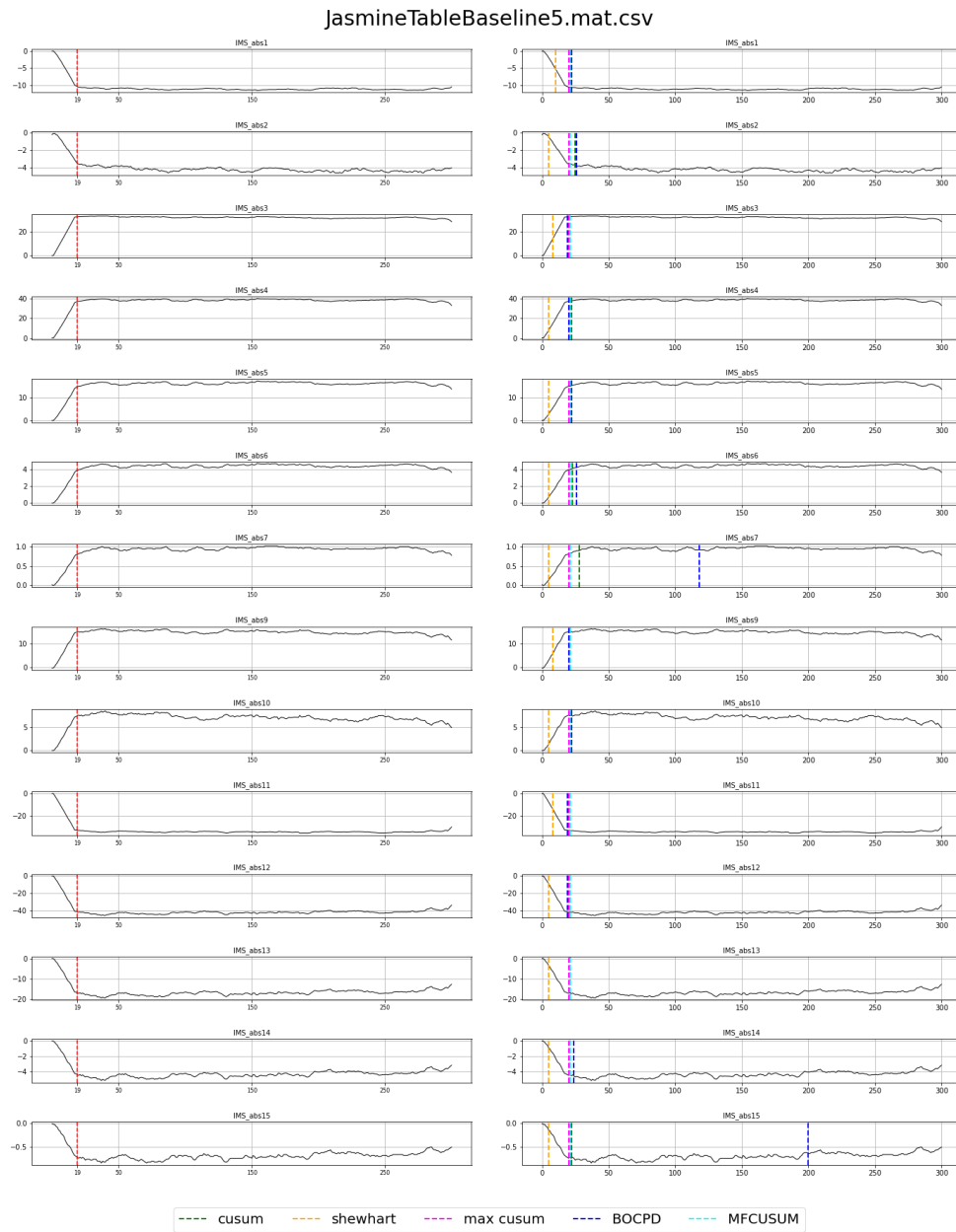


Figure 118: JasmineBaseline5. Window size 5.

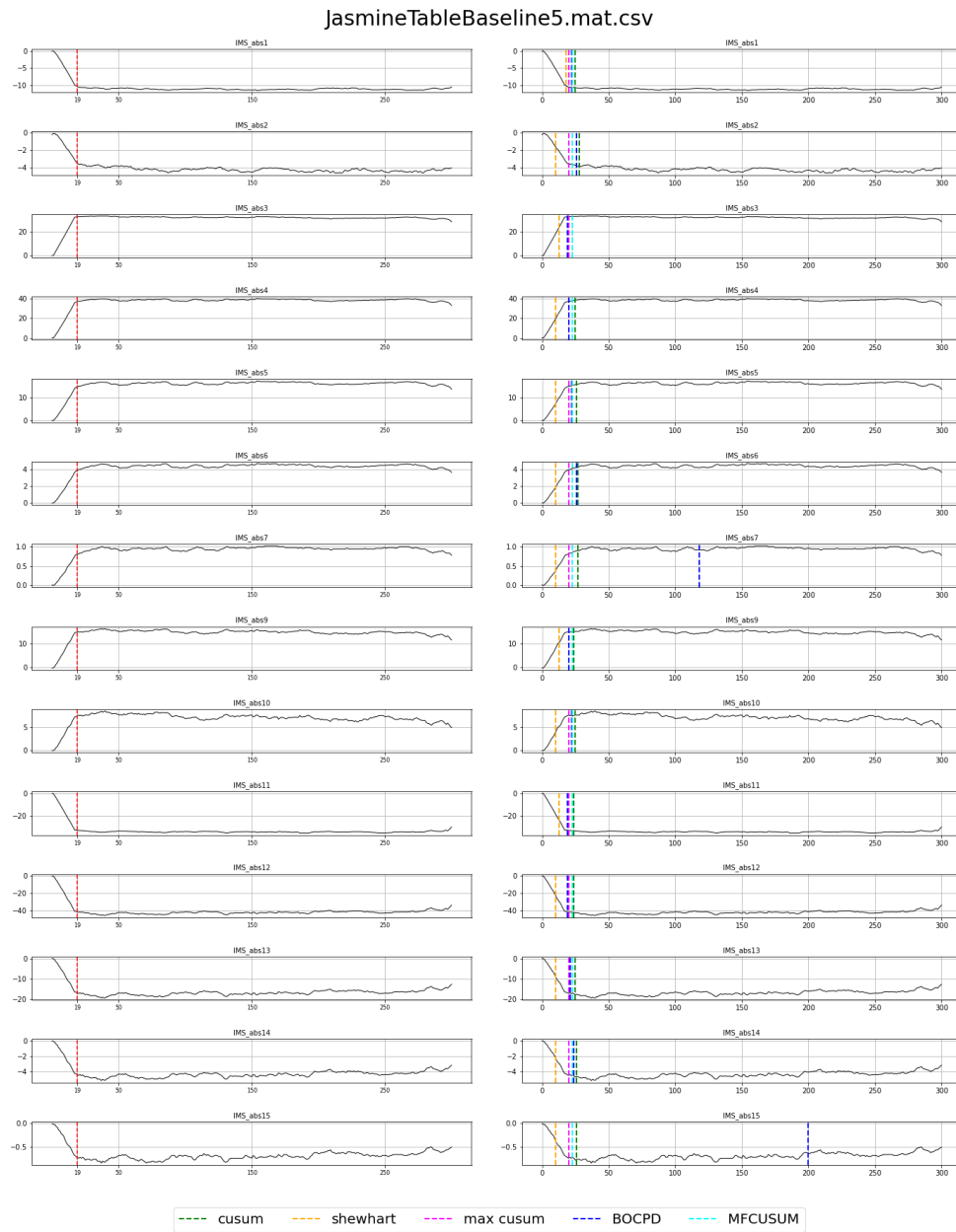


Figure 119: JasmineBaseline5. Window size 10.

JasmineTableBaseline5.mat.csv

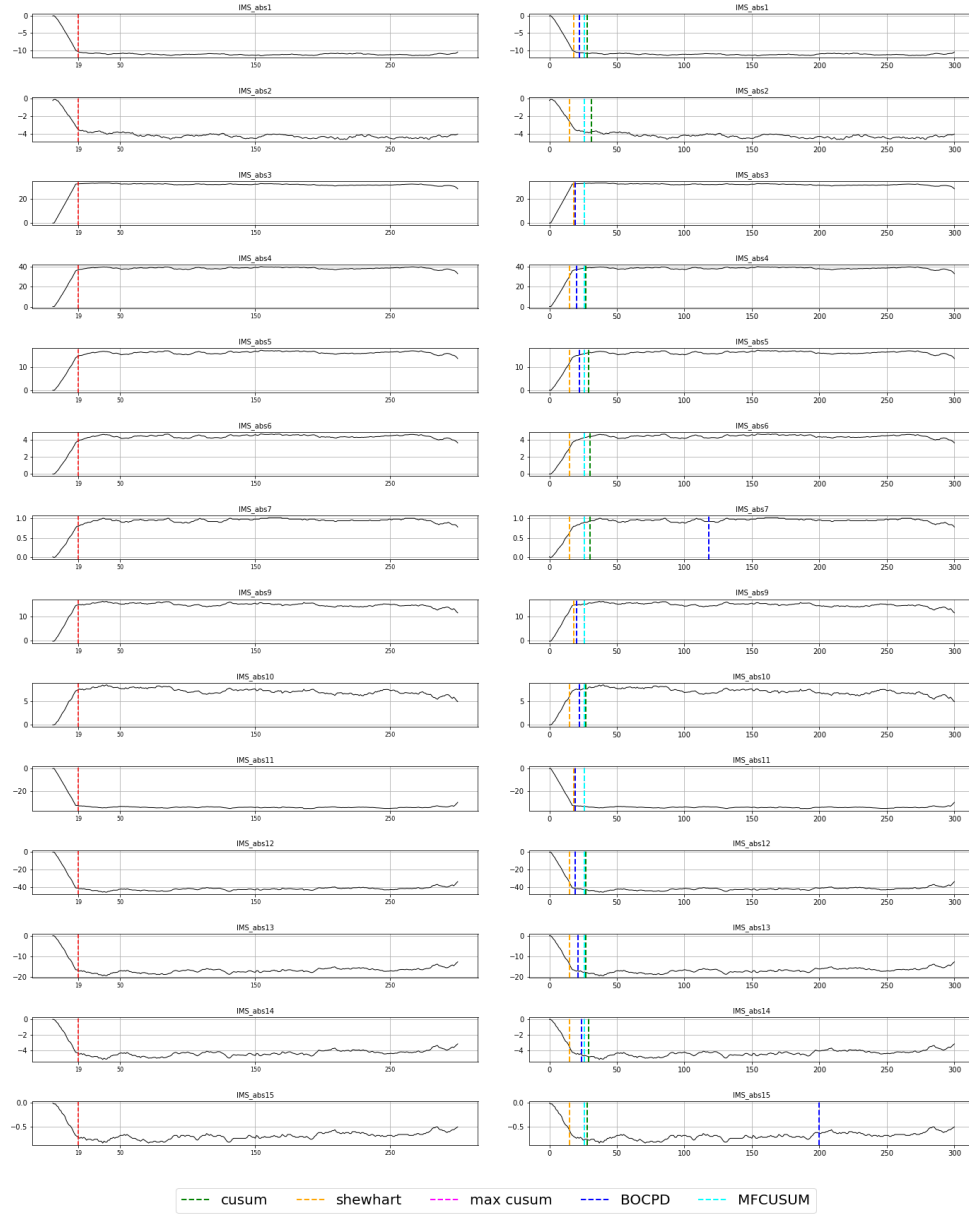


Figure 120: JasmineBaseline5. Window size 15.

reading	gt	window size	shewhart	cusum	mfcusum	max mcusum	bayes
IMS_abs1	19	5	10	22	21	20	22
		10	18	25	23	20	22
		15	18	28	26	26	22
IMS_abs2	19	5	5	25	21	20	26
		10	10	28	23	20	26
		15	15	31	26	26	26
IMS_abs3	19	5	8	21	21	20	19
		10	13	23	23	20	19
		15	18	26	26	26	19
IMS_abs4	19	5	5	22	21	20	20
		10	10	25	23	20	20
		15	15	27	26	26	20
IMS_abs5	19	5	5	22	21	20	22
		10	10	26	23	20	22
		15	15	29	26	26	22
IMS_abs6	19	5	5	23	21	20	26
		10	10	27	23	20	26
		15	15	30	26	26	26
IMS_abs7	19	5	5	28	21	20	118
		10	10	27	23	20	118
		15	15	30	26	26	118
IMS_abs9	19	5	8	21	21	20	20
		10	13	24	23	20	20
		15	18	26	26	26	20
IMS_abs10	19	5	5	22	21	20	22
		10	10	25	23	20	22
		15	15	27	26	26	22
IMS_abs11	19	5	8	21	21	20	19
		10	13	24	23	20	19
		15	18	26	26	26	19
IMS_abs12	19	5	5	21	21	20	19
		10	10	24	23	20	19
		15	15	27	26	26	19
IMS_abs13	19	5	5	21	21	20	21
		10	10	25	23	20	21
		15	15	27	26	26	21
IMS_abs14	19	5	5	21	21	20	24
		10	10	26	23	20	24
		15	15	29	26	26	24
IMS_abs15	19	5	5	22	21	20	200
		10	10	26	23	20	200
		15	15	28	26	26	200
mean run time (sec)			1.249e-03	5.902e-03	4.237e-04	1.081e-03	1.214e-01
mean relative run time			2.947	13.931	1.000	2.551	286.448

Table 79: Change found for each moving window. JasmineTableBaseline5.

moving window size	shewhart	cusum	mfcusum	max mcusum	bayes
5	13.00	3.29	2.00	1.00	22.29
10	7.79	6.36	4.00	1.00	22.29
15	3.14	8.93	7.00	7.00	22.29

Table 80: MAE of each algorithm for JasmineTableBaseline5.