Supplementary Materials:

Table S1. The ensemble of WERR Models used for the 2021 forecast. All terms are listed, however only those in bold were used for prediction. Columns: Rank – order of selection of term in model; Term – linear or quadratic term in variables NAO, LSST or SMB (North Atlantic Oscillation, Labrador Sea Surface Temperature or the Surface Mass Balance of the Greenland Ice Sheet), with lags, in x months, given by '(t-x)'; ERR – error reduction per term; Coefficient – multiplying factor for term. For example of the model structure, the first term for the sliding window January 1979 to December 2008 is 22.54386.NAO(t-15)^2. Then add the second term etc. until the ERR is below 0.02. Note that only models with the 8 month prediction constraint were used here (see [7] for details on why this was done).

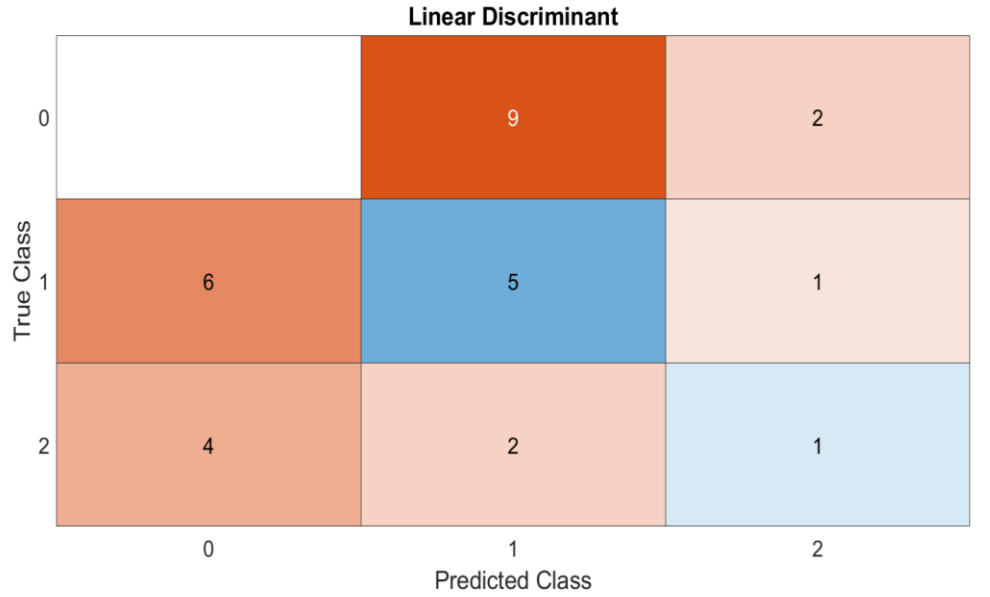
Rank	Term	ERR	Coefficient
1979-Jan to 2008-Dec			
1	**NAO(t-15)*NAO(t-15)**	**0.36292**	**22.54386**
2	**LSST(t-9)**	**0.06819**	**-70.76018**
3	**LSST(t-8)*LSST(t-9)**	**0.05564**	**80.73332**
4	**NAO(t-28)*NAO(t-29)**	**0.03827**	**14.7938**
5	**NAO(t-15)*NAO(t-39)**	**0.03215**	**13.46352**
6	**SMB(t-9)*SMB(t-21)**	**0.02603**	**0.01171**
7	**SMB(t-8)*SMB(t-46)**	**0.0353**	**-0.01422**
8	NAO(t-40)*LSST(t-38)	0.01844	44.47945
9	SMB(t-35)*NAO(t-38)	0.01536	0.54795
10	NAO(t-15)*LSST(t-15)	0.01609	28.32399
11	NAO(t-14)*NAO(t-47)	0.01414	14.75576
12	SMB(t-35)*NAO(t-14)	0.01377	-0.56135
13	NAO(t-14)*LSST(t-41)	0.01414	-37.87206
14	NAO(t-17)*NAO(t-29)	0.013	13.62479
15	SMB(t-9)*NAO(t-35)	0.01145	0.40612
1980-Jan to 2009-Dec			
1	**NAO(t-15)*NAO(t-15)**	**0.36127**	**20.05216**
2	**NAO(t-28)*NAO(t-28)**	**0.06116**	**9.24127**
3	**LSST(t-9)**	**0.05229**	**-72.82291**
4	**LSST(t-8)*LSST(t-9)**	**0.03991**	**89.56479**
5	**SMB(t-8)*SMB(t-46)**	**0.03371**	**-0.0175**
6	**SMB(t-9)*SMB(t-21)**	**0.0483**	**0.01255**
7	**NAO(t-15)*LSST(t-14)**	**0.02701**	**29.19803**
8	**NAO(t-40)*LSST(t-38)**	**0.02608**	**39.73453**
9	NAO(t-17)*NAO(t-29)	0.01626	16.87268
10	SMB(t-35)*NAO(t-38)	0.01357	0.43758
11	NAO(t-14)*LSST(t-41)	0.01363	-44.02547
12	**SMB(t-35)*NAO(t-14)**	**0.02171**	**-0.56654**
13	LSST(t-21)*LSST(t-28)	0.01304	-62.2622
14	SMB(t-20)*NAO(t-41)	0.01225	0.3938

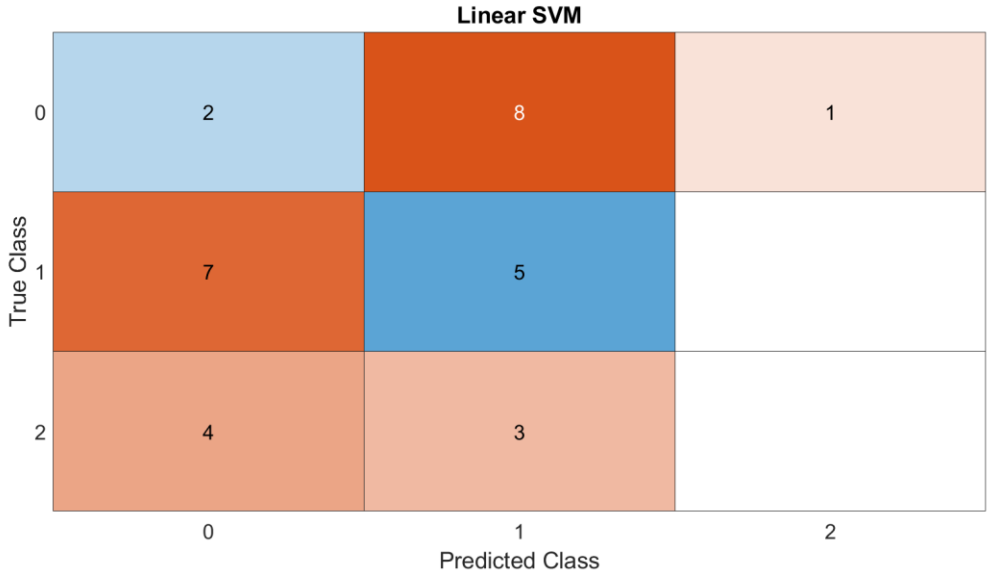
15	SMB(t-33)*NAO(t-40)	0.01305	-0.3572
1981-Jan to 2010-Dec			
1	**NAO(t-15)*NAO(t-15)**	**0.35175**	**22.48843**
2	**NAO(t-28)*NAO(t-29)**	**0.06108**	**15.24083**
3	**NAO(t-39)*NAO(t-39)**	**0.05227**	**15.07007**
4	**NAO(t-15)*NAO(t-16)**	**0.03661**	**18.08788**
5	**NAO(t-15)*NAO(t-47)**	**0.03002**	**22.31135**
6	**SMB(t-40)*NAO(t-27)**	**0.02655**	**0.62498**
7	**NAO(t-25)*NAO(t-28)**	**0.02787**	**23.96898**
8	**SMB(t-9)*LSST(t-21)**	**0.02465**	**-1.02514**
9	**SMB(t-8)*NAO(t-13)**	**0.02535**	**-0.50573**
10	SMB(t-46)*SMB(t-46)	0.01922	0.00887
11	NAO(t-15)*LSST(t-13)	0.01604	39.84936
12	NAO(t-37)*LSST(t-9)	0.01423	-26.86158
13	NAO(t-26)*NAO(t-29)	0.01223	18.05206
14	SMB(t-44)*NAO(t-27)	0.01233	-0.3173
15	SMB(t-8)*SMB(t-31)	0.01185	-0.00703
1982-Jan to 2011-Dec			
1	**NAO(t-15)*NAO(t-15)**	**0.27508**	**13.92661**
2	**SMB(t-29)*NAO(t-15)**	**0.09331**	**0.44737**
3	**NAO(t-28)*NAO(t-28)**	**0.06794**	**15.03671**
4	**SMB(t-8)*SMB(t-46)**	**0.04255**	**-0.01963**
5	**SMB(t-9)*SMB(t-9)**	**0.03728**	**0.00635**
6	**NAO(t-17)*NAO(t-29)**	**0.03936**	**18.49671**
7	**NAO(t-15)*NAO(t-41)**	**0.0275**	**29.05513**
8	**SMB(t-31)*SMB(t-35)**	**0.02058**	**0.00956**
9	NAO(t-28)*NAO(t-34)	0.01747	27.8608
10	NAO(t-37)*LSST(t-43)	0.01744	-31.56919
11	SMB(t-9)*NAO(t-25)	0.01639	0.35875
12	NAO(t-39)*LSST(t-16)	0.01723	32.54011
13	NAO(t-39)*LSST(t-8)	0.01654	-43.98501
14	SMB(t-24)*NAO(t-27)	0.01647	0.39752
15	NAO(t-15)*NAO(t-16)	0.01474	12.61278
1983-Jan to 2012-Dec			
1	**NAO(t-15)*NAO(t-15)**	**0.25965**	**23.22433**
2	**NAO(t-15)*LSST(t-15)**	**0.10281**	**56.57531**
3	**NAO(t-28)*NAO(t-28)**	**0.06036**	**7.75748**
4	**SMB(t-8)*SMB(t-46)**	**0.04467**	**-0.01339**
5	**SMB(t-9)*SMB(t-9)**	**0.04717**	**0.00704**
6	**NAO(t-17)*NAO(t-29)**	**0.03505**	**18.43852**
7	**SMB(t-15)*NAO(t-27)**	**0.02649**	**0.45616**
8	**LSST(t-8)*LSST(t-13)**	**0.02242**	**-51.99037**
9	SMB(t-35)*LSST(t-19)	0.01928	1.3139
10	SMB(t-35)*LSST(t-31)	0.01995	-1.07768
11	NAO(t-39)*NAO(t-47)	0.01926	23.17552

12	SMB(t-31)*NAO(t-39)	0.01653	0.2898
13	SMB(t-23)*NAO(t-13)	0.01365	0.39849
14	NAO(t-40)*LSST(t-38)	0.01545	35.97512
15	NAO(t-15)*NAO(t-47)	0.01358	18.63497
1984-Jan to 2013-Dec			
1	**NAO(t-15)*NAO(t-15)**	**0.26073**	**18.8801**
2	**NAO(t-15)*LSST(t-15)**	**0.12472**	**51.77163**
3	**NAO(t-28)*NAO(t-28)**	**0.04867**	**5.97852**
4	**NAO(t-40)*LSST(t-38)**	**0.04186**	**42.85402**
5	**SMB(t-8)*SMB(t-46)**	**0.02943**	**-0.01435**
6	**SMB(t-9)*SMB(t-9)**	**0.03366**	**0.00722**
7	**NAO(t-39)*LSST(t-26)**	**0.02725**	**33.35643**
8	**NAO(t-16)*NAO(t-29)**	**0.02344**	**17.05896**
9	NAO(t-15)*NAO(t-41)	0.01945	20.78917
10	**SMB(t-11)*NAO(t-38)**	**0.02181**	**0.45834**
11	NAO(t-14)*NAO(t-47)	0.01994	19.0679
12	NAO(t-28)*NAO(t-34)	0.0173	24.64092
13	LSST(t-19)*LSST(t-39)	0.01327	-79.55168
14	NAO(t-29)*NAO(t-29)	0.01393	10.40664
15	NAO(t-16)*NAO(t-43)	0.01313	16.68583
1985-Jan to 2014-Dec			
1	**NAO(t-15)*NAO(t-15)**	**0.23536**	**26.22621**
2	**NAO(t-15)*LSST(t-15)**	**0.11772**	**57.48812**
3	**NAO(t-14)*LSST(t-44)**	**0.08303**	**-44.64461**
4	**NAO(t-28)*NAO(t-28)**	**0.05376**	**13.7081**
5	**SMB(t-21)*LSST(t-21)**	**0.03382**	**-0.91717**
6	**SMB(t-30)*NAO(t-27)**	**0.02698**	**0.45883**
7	**NAO(t-15)*NAO(t-41)**	**0.02258**	**21.51814**
8	**SMB(t-35)*LSST(t-21)**	**0.02225**	**1.00672**
9	**SMB(t-8)*SMB(t-46)**	**0.0244**	**-0.00938**
10	**SMB(t-24)*NAO(t-27)**	**0.02232**	**0.37697**
11	NAO(t-25)*NAO(t-28)	0.01732	20.61168
12	SMB(t-8)*NAO(t-13)	0.01594	-0.29197
13	SMB(t-42)*LSST(t-38)	0.0128	0.84207
14	NAO(t-15)*NAO(t-47)	0.01381	20.0413
15	LSST(t-29)*LSST(t-37)	0.01582	-64.35686
1986-Jan to 2015-Dec			
1	**NAO(t-15)*NAO(t-15)**	**0.23001**	**24.57823**
2	**NAO(t-15)*LSST(t-15)**	**0.11673**	**79.44829**
3	**NAO(t-14)*LSST(t-44)**	**0.07637**	**-39.44514**
4	**SMB(t-21)*SMB(t-21)**	**0.05615**	**0.00648**
5	**NAO(t-25)*NAO(t-28)**	**0.04729**	**22.98647**
6	**SMB(t-8)*SMB(t-46)**	**0.04408**	**-0.01472**
7	**NAO(t-16)*LSST(t-21)**	**0.02465**	**-36.97192**
8	**NAO(t-15)*LSST(t-29)**	**0.02255**	**-44.99723**

9	**NAO(t-28)*NAO(t-29)**	**0.02514**	**22.9113**
10	**SMB(t-9)*NAO(t-25)**	**0.02224**	**0.34153**
11	SMB(t-42)*NAO(t-27)	0.01827	0.32732
12	NAO(t-30)*NAO(t-39)	0.01294	-17.41382
13	NAO(t-14)*NAO(t-18)	0.01598	20.91167
14	NAO(t-15)*NAO(t-47)	0.00919	18.25769
15	SMB(t-44)*LSST(t-32)	0.01046	0.60053
1987-Jan to 2016-Dec			
1	**NAO(t-15)*NAO(t-15)**	**0.22126**	**28.83026**
2	**NAO(t-15)*LSST(t-15)**	**0.12799**	**76.26225**
3	**NAO(t-14)*NAO(t-41)**	**0.06971**	**19.85428**
4	**SMB(t-21)*SMB(t-21)**	**0.05596**	**0.00747**
5	**SMB(t-8)*SMB(t-46)**	**0.05079**	**-0.01328**
6	**NAO(t-25)*NAO(t-28)**	**0.03681**	**22.82284**
7	**NAO(t-27)**	**0.03061**	**19.06752**
8	**NAO(t-16)*LSST(t-21)**	**0.02426**	**-41.07141**
9	**SMB(t-33)*NAO(t-25)**	**0.02072**	**0.30667**
10	LSST(t-29)*LSST(t-37)	0.01789	-58.94801
11	NAO(t-28)*NAO(t-37)	0.01708	18.53296
12	NAO(t-28)*NAO(t-29)	0.01646	16.22431
13	NAO(t-15)*LSST(t-29)	0.016	-39.75001
14	SMB(t-23)*NAO(t-13)	0.01302	0.38256
15	NAO(t-39)*NAO(t-47)	0.01138	16.57262
1988-Jan to 2017-Dec			
1	**SMB(t-21)*SMB(t-21)**	**0.17465**	**0.00274**
2	**SMB(t-8)*SMB(t-34)**	**0.16158**	**-0.01125**
3	**NAO(t-39)*NAO(t-39)**	**0.06454**	**0.75169**
4	**LSST(t-8)**	**0.03628**	**-130.24051**
5	**Const.**	**0.0624**	**96.53238**
6	**SMB(t-34)*NAO(t-15)**	**0.02786**	**-0.35014**
7	**NAO(t-15)**	**0.02645**	**22.04743**
8	**NAO(t-15)*LSST(t-8)**	**0.02614**	**-17.86106**
9	**SMB(t-44)*NAO(t-9)**	**0.02109**	**-0.27316**
10	**SMB(t-22)*NAO(t-10)**	**0.02029**	**-0.29914**
11	**SMB(t-8)*NAO(t-10)**	**0.02725**	**0.32247**
12	**SMB(t-21)**	**0.02098**	**-0.76746**
13	NAO(t-11)*NAO(t-17)	0.01616	5.05314
14	SMB(t-9)*NAO(t-43)	0.01415	-0.18014
15	SMB(t-8)*LSST(t-8)	0.01391	0.8745
1989-Jan to 2018-Dec			
1	**SMB(t-9)*SMB(t-9)**	**0.15921**	**0.00835**
2	**SMB(t-8)*SMB(t-46)**	**0.16535**	**-0.01443**
3	**NAO(t-39)*NAO(t-39)**	**0.05918**	**1.90957**
4	**LSST(t-8)**	**0.04041**	**-146.26204**
5	**Const.**	**0.06605**	**81.05327**

6	**SMB(t-8)*LSST(t-12)**	**0.02859**	**0.86102**
7	**SMB(t-22)*SMB(t-35)**	**0.02387**	**-0.00704**
8	SMB(t-21)*LSST(t-21)	0.01987	-1.3694
9	**LSST(t-8)*LSST(t-20)**	**0.0259**	**144.90364**
10	**SMB(t-9)*NAO(t-43)**	**0.02134**	**-0.26567**
11	**NAO(t-15)*LSST(t-35)**	**0.02035**	**26.38009**
12	SMB(t-34)*NAO(t-15)	0.01721	-0.19223
13	SMB(t-32)*NAO(t-8)	0.01577	-0.19769
14	NAO(t-13)*NAO(t-32)	0.01426	4.91804
15	NAO(t-15)*NAO(t-47)	0.01491	4.67722





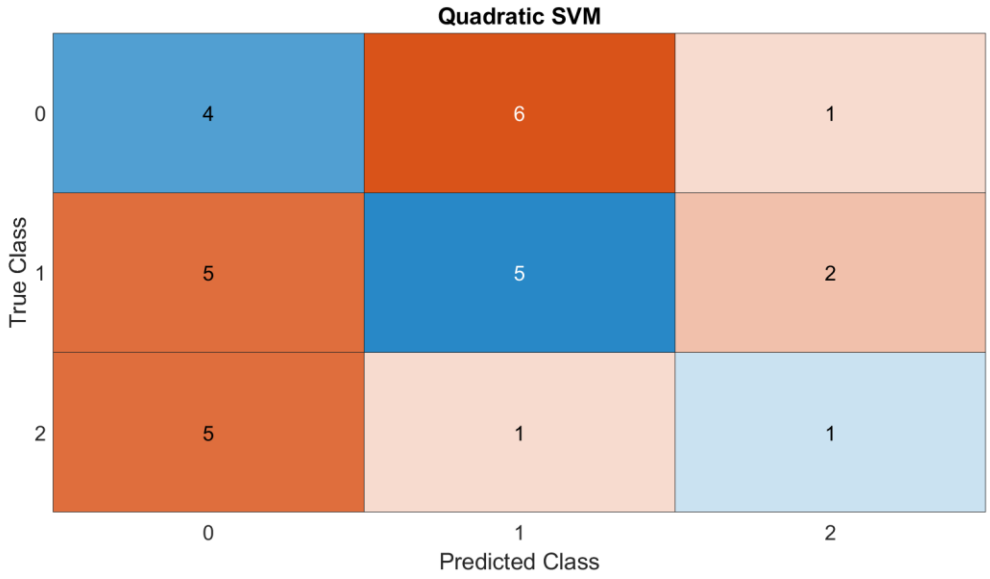
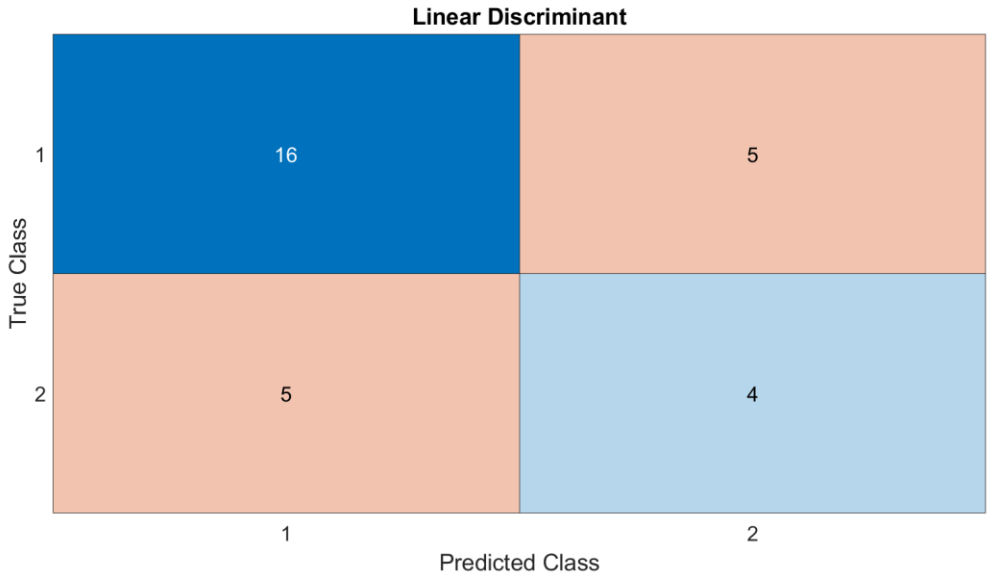
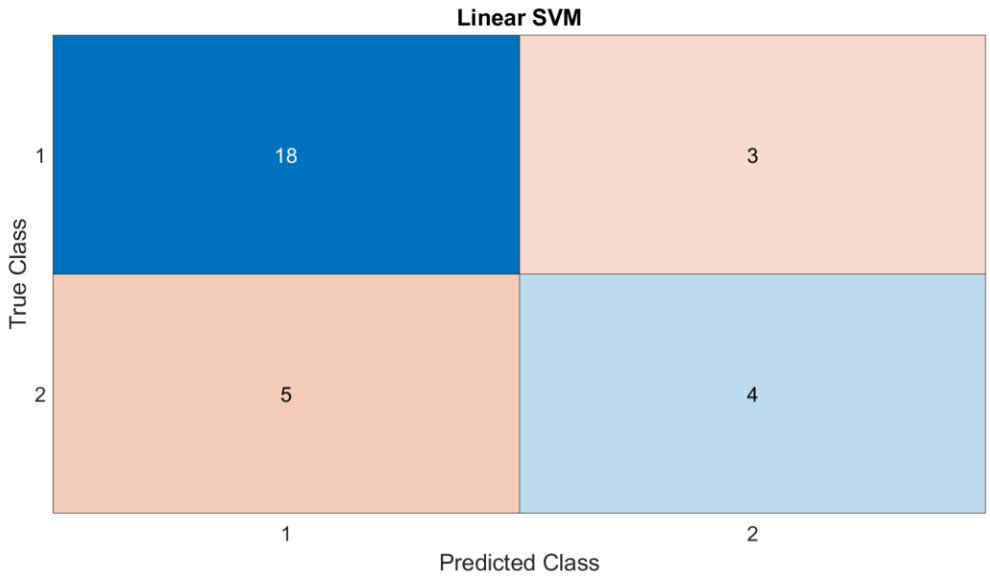


Figure S1. Showing the confusion matrices for the rate of change prediction.





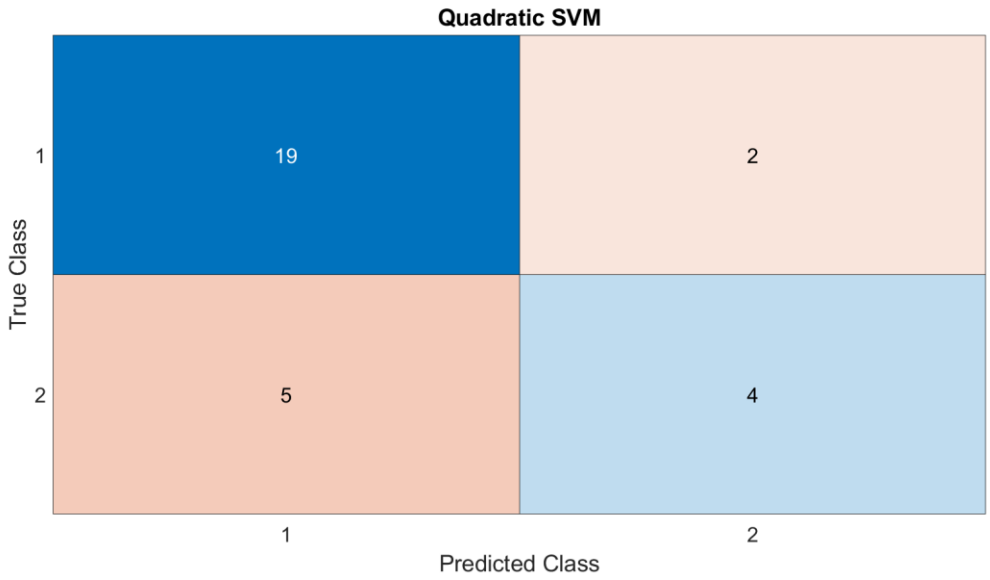
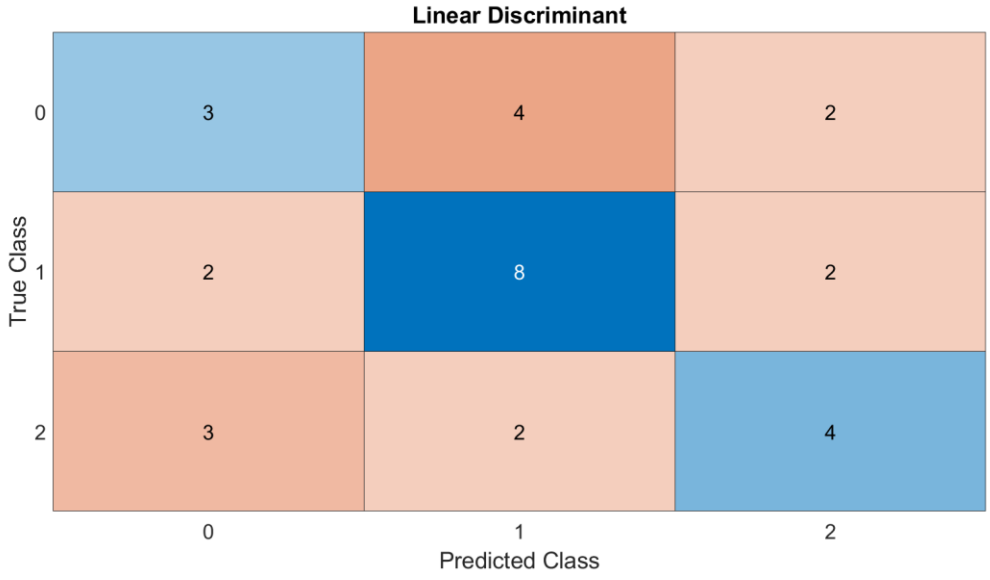
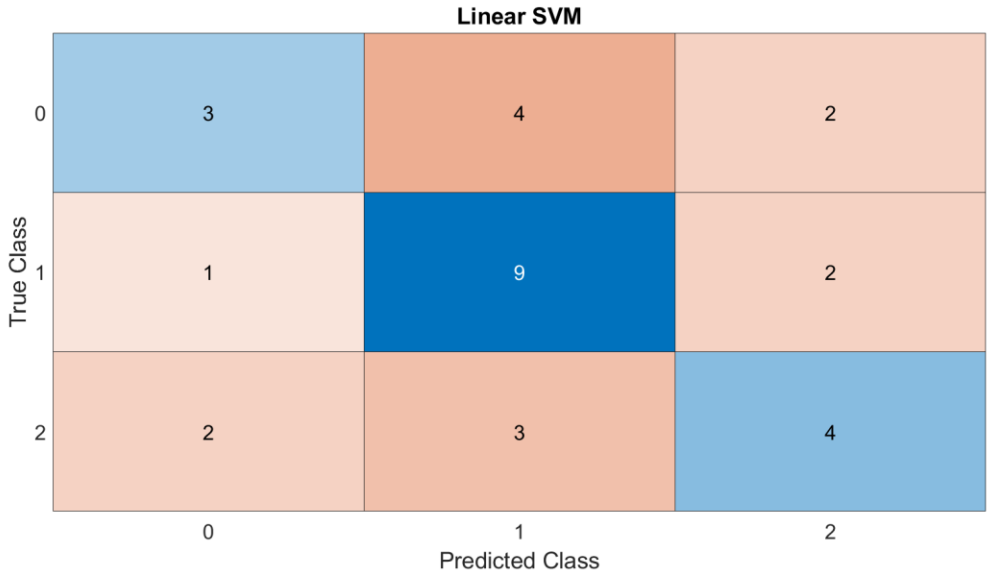


Figure S2. Showing the confusion matrices for the number of peaks prediction.





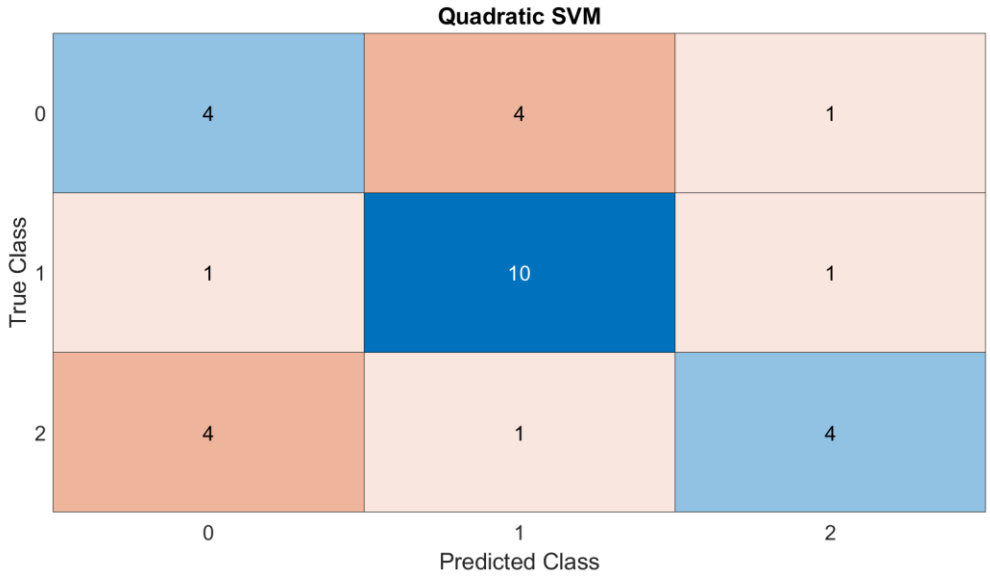
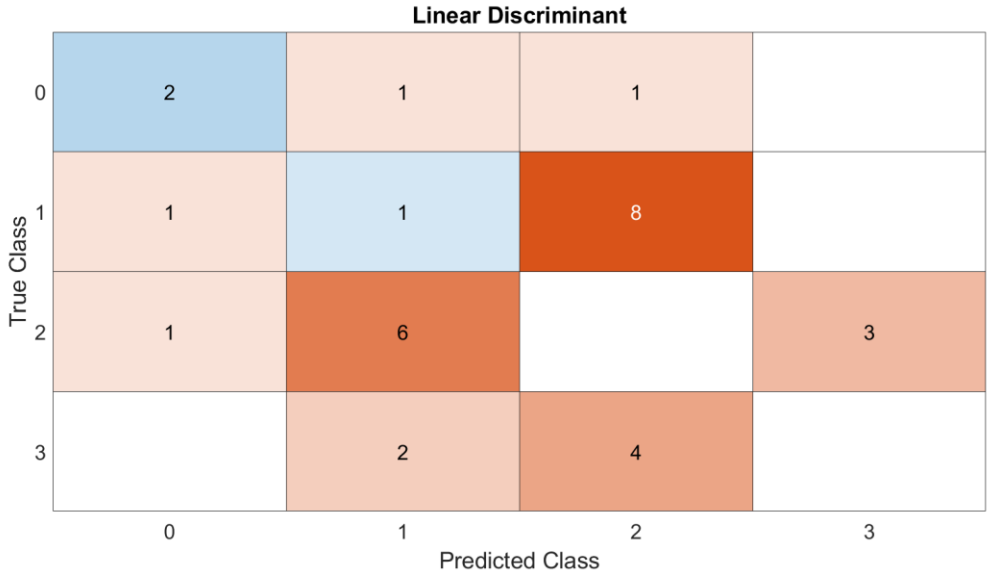
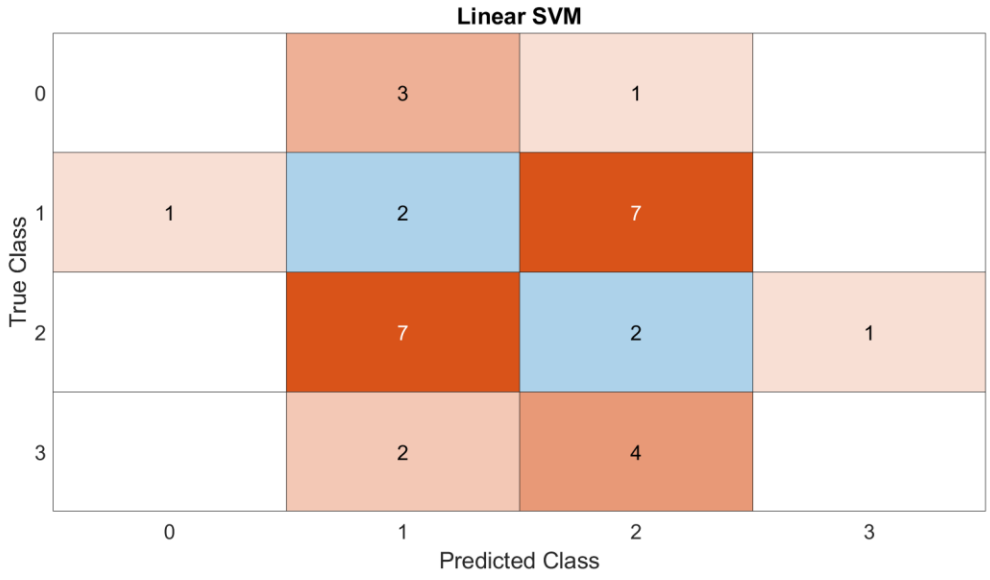


Figure S3. Showing the confusion matrices for the I48N prediction.





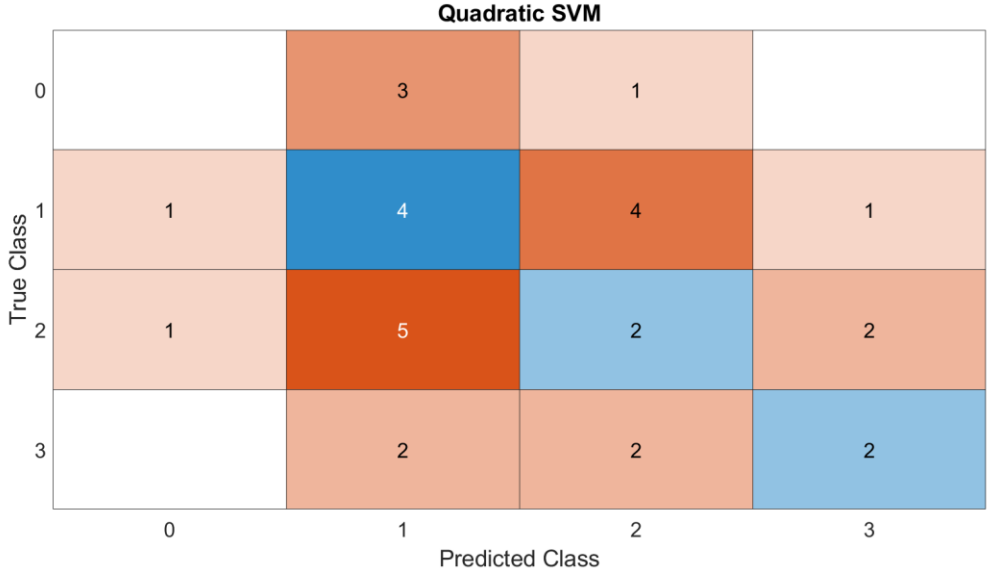


Figure S4. Showing the confusion matrices for the peak month prediction.

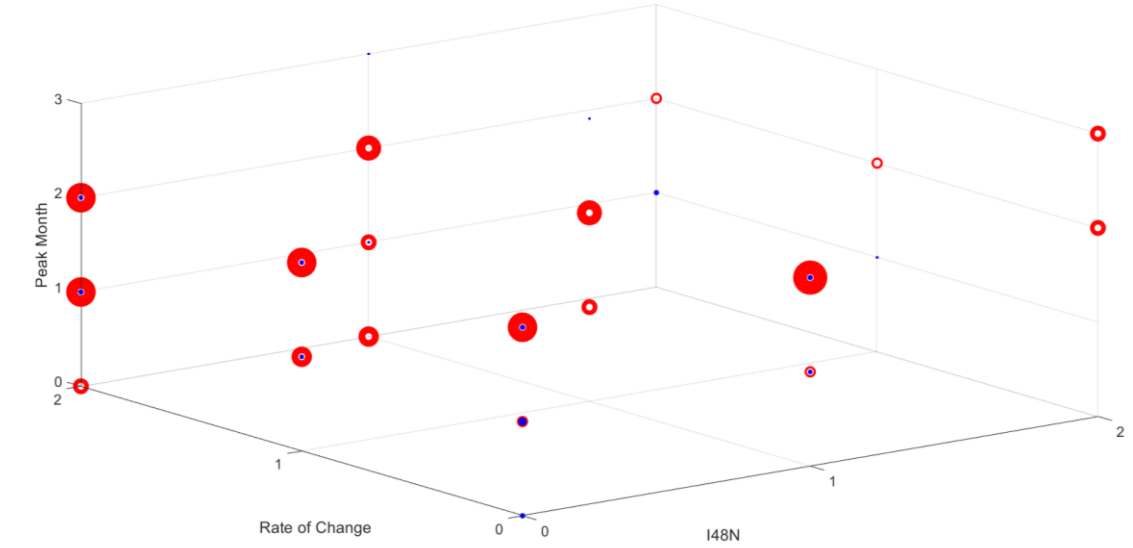


Figure S5. Plot of the linear SVM combinations from the testing period of 1931-2017, where I48N, the rate of change and the peak month are marked on the axis. A red circle corresponds to one peak, while blue represents multiple peaks. The larger the circle, the more times that combination has occurred.

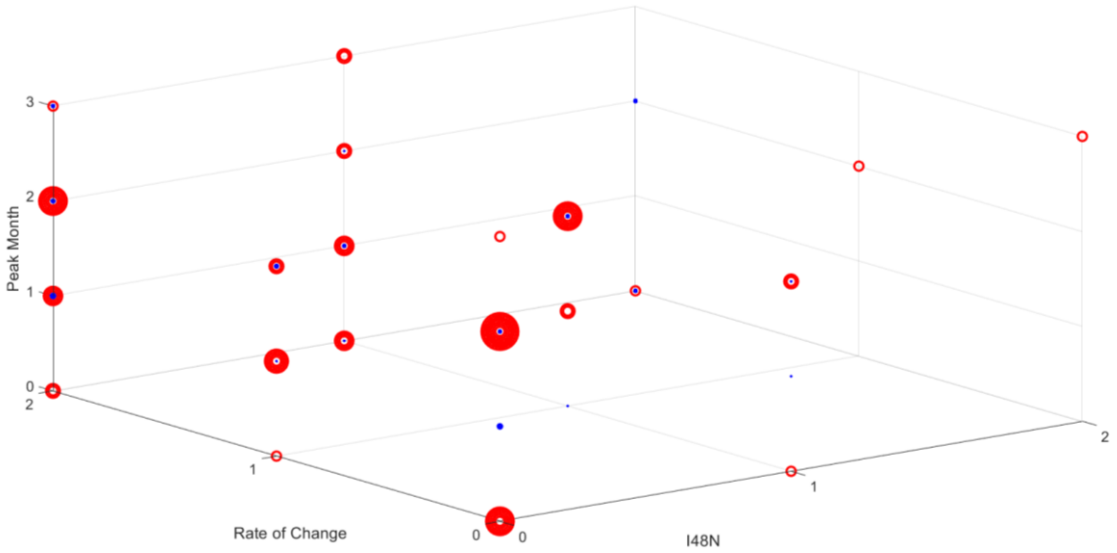


Figure S6. Plot of the quadratic SVM combinations from the testing period of 1931-2017, in the same format as Figure S5.