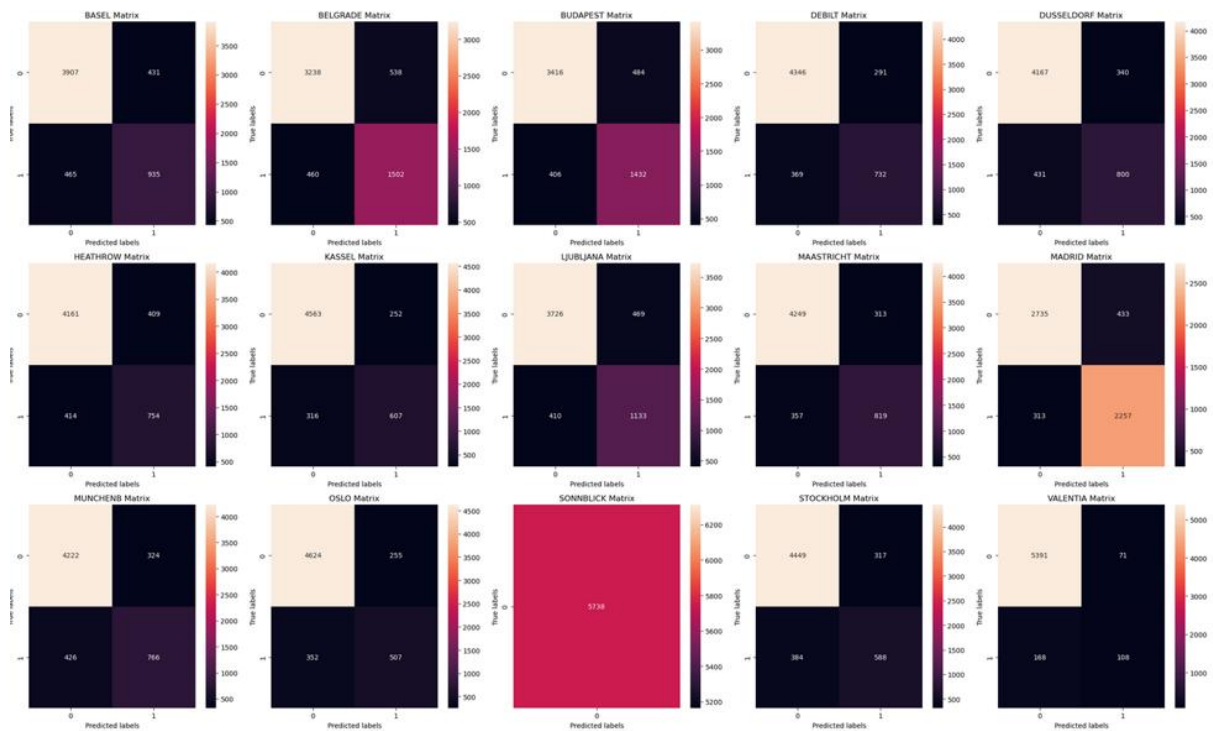Confusion Matrix

Table of results

	Weather Station	True Negatives (TN)	False Positives (FP)	False Negatives (FN)	True Positives (TP)	Accurate predictions	Accuracy rate
0	BASEL	3907	431	465	935	4842	84%
1	BELGRADE	3238	538	460	1502	4740	83%
2	BUDAPEST	3416	484	406	1432	4848	84%
3	DEBILT	4346	291	369	732	5078	88%
4	DUSSELDORF	4167	340	431	800	4967	87%
5	HEATHROW	4161	409	414	754	4915	86%
6	KASSEL	4563	252	316	607	5170	90%
7	LJUBLJANA	3726	469	410	1133	4859	85%
8	MAASTRICHT	4249	313	357	819	5068	88%
9	MADRID	2735	433	313	2257	4992	87%
10	MUNCHENB	4222	324	426	766	4988	87%
11	OSLO	4624	255	352	507	5131	89%
12	SONNBLICK	5738	0	0	0	5738	100%
13	STOCKHOLM	4449	317	384	588	5037	88%
14	VALENTIA	5391	71	168	108	5499	96%

The weather prediction model shows varying levels of accuracy across different European weather stations, with Sonnblick achieving perfect accuracy (100%), but only for identifying

"unpleasant" weather days. Across all stations, the model demonstrates a much higher ability to predict unpleasant weather (true negatives) compared to pleasant weather (true positives). This pattern suggests that the model is biased toward predicting the more common class in the dataset, which is "unpleasant" weather.

Key Points:

Accuracy Differences:
The number of true negatives (unpleasant days correctly predicted) is much higher than true positives (pleasant days correctly predicted) at every station. For example, in Basel, there are 3,907 true negatives compared to just 935 true positives. This suggests the model is primarily successful at detecting unpleasant weather, with limited ability to identify pleasant days.

Risk of Class Imbalance:
The model's strong performance in predicting unpleasant days likely reflects a class imbalance where there are more unpleasant days than pleasant ones in the dataset. This causes the model to "default" to predicting unpleasant weather more often, boosting overall accuracy but limiting practical usefulness for forecasting pleasant days.

Overfitting Concerns:
The perfect accuracy at Sonnblick, where all predictions are correct, may indicate overfitting to a station with little variety in weather outcomes. This could mean the model struggles to generalize to new data or locations with more varied weather patterns.

Generalization and Features:
Accuracy rates vary widely between stations (from 83% in Belgrade to 100% in Sonnblick), highlighting that some stations' weather patterns are easier for the model to learn. Stations with more balanced or varied weather may pose greater challenges, lowering prediction accuracy for pleasant days.

Improving Evaluation:
The reported overall accuracy of 88% may overstate the model's usefulness for predicting pleasant weather. Evaluating model performance separately for each class and across different stations may give a clearer picture of its limitations.

Summary:
While the model reliably predicts unpleasant weather due to class imbalance, its limited performance for pleasant weather highlights the need for better balance in the training data and more robust modeling techniques. Addressing these issues would improve the model's forecasting ability and reliability across different stations.