

Table S1. As Table 3 but matching can only happen against a single front.

Training region	NWS			DWD			Both		
	CSI	POD	SR	CSI	POD	SR	CSI	POD	SR
Binary	44.7 %	56.7 %	67.8 %	63.8 %	74.6 %	81.5 %	62.7 %	72.6 %	82.2 %
Warm	21.5 %	24.3 %	65.3 %	51.3 %	61.3 %	75.9 %	50.8 %	61.5 %	74.6 %
Cold	39.0 %	49.2 %	65.3 %	57.2 %	69.7 %	76.1 %	56.2 %	68.2 %	76.1 %
Occlusion	34.6 %	42.3 %	65.6 %	52.0 %	68.3 %	68.6 %	51.3 %	65.7 %	70.1 %
Stationary		–			–			–	

Table S2. As Table 4 but matching can only happen against a single front.

Training region	NWS			DWD			Both		
	CSI	POD	SR	CSI	POD	SR	CSI	POD	SR
Binary	59.6 %	72.0 %	77.6 %	39.9 %	44.8 %	78.3 %	58.5 %	71.1 %	76.8 %
Warm	37.6 %	55.4 %	53.9 %	20.4 %	41.8 %	28.6 %	35.6 %	54.1 %	51.1 %
Cold	53.1 %	68.1 %	70.6 %	37.4 %	45.9 %	67.0 %	53.1 %	69.1 %	69.5 %
Occlusion	48.0 %	68.6 %	61.5 %	35.3 %	53.0 %	51.3 %	47.7 %	68.6 %	61.0 %
Stationary	40.8 %	53.4 %	63.4 %		–		39.3 %	50.9 %	63.3 %

S1 Evaluation against individual fronts

Additional evaluation of the CSI, POD and SR score, where each front is only allowed to match against one front of the corresponding type, rather than the complete set. Table S1 displays the scores for the DWD, Table S2 for the NWS dataset.

S2 Cross Sections on NWS Data

5 Additional Cross Sections (Fig. S1) evaluated on the NWS Dataset.

S3 Video Supplement

The provided video supplement shows the predicted and classified fronts for January 2016 at each hour. The background consists of the normalized specific humidity at surface level (level 137). Color channels are chosen as follows:

- red: warm front
- 10 – blue: cold front
- pink: occlusion
- green: stationary front

15 For a clear distinction of the fronts from the background we used a threshold of 0.3 to the network output after application of the softmax activation. All values lower than the threshold are set to 0 while all others are set to 1. With this threshold a classification may not be exclusive for a pixel, resulting in a potential overlap in the color channels. This effect often occurs when one type of front transitions into another. E.g. a transition from a warm to a cold front may appear pink, due to mixing in the blue and red color channel. Weakly expressed fronts may appear fragmented, due to the filtering.

Average value of variables at surface level accross Front in direction of wind
NWS

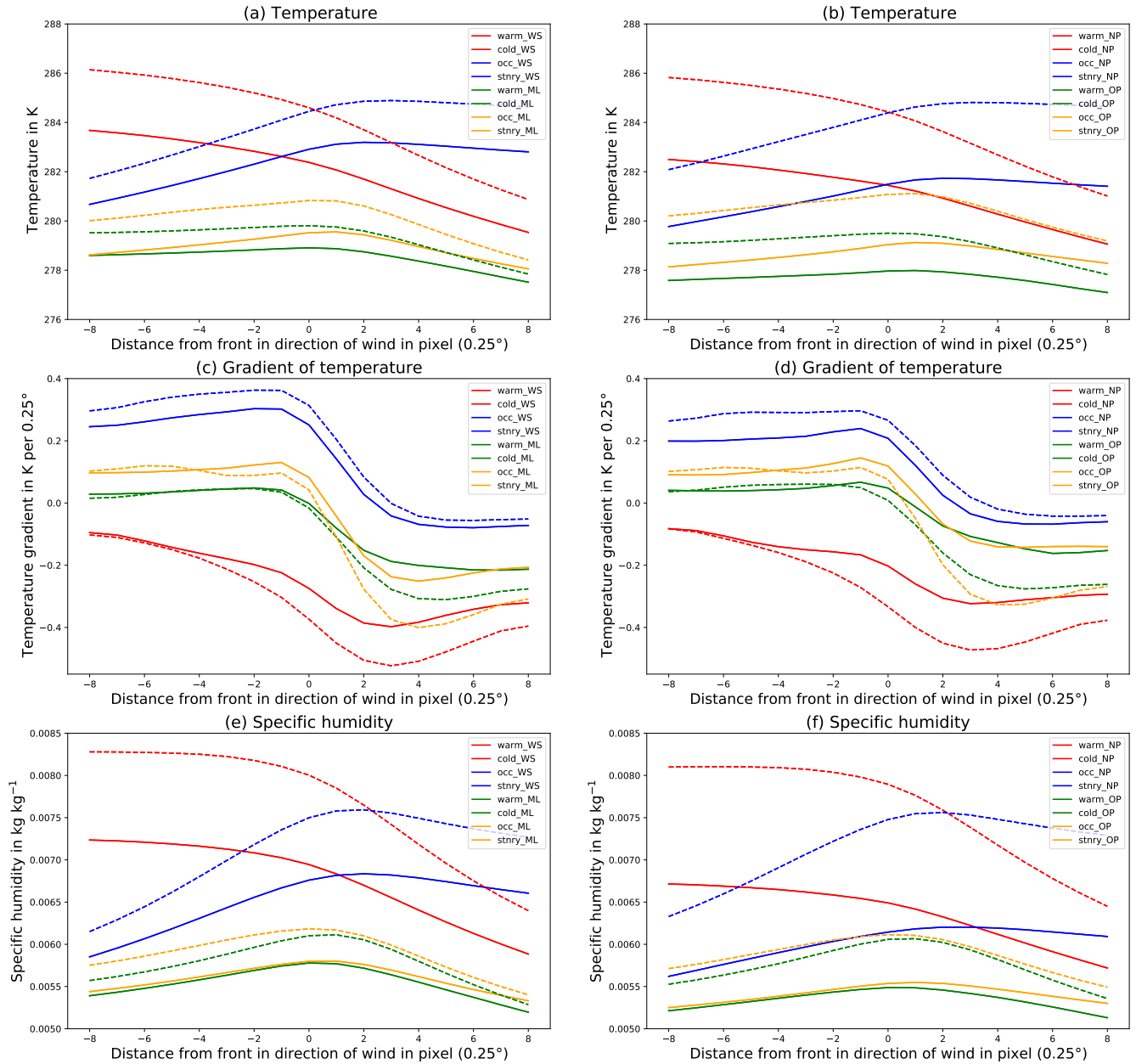


Figure S1. (a) Mean of the temperature, (c) temperature gradient and (e) specific humidity of provided (solid, WS) and network generated (dashed, ML) front labels for the NWS Data. (b),(d),(f): The same for not-predicted (solid, NP) or over-predicted (dashed, OP) front labels.