Table 3: *BIAS between MWP retrieval and NWP forecast at selected height levels*

Station	Mean Dev. of Temperature (MWP-Model) (K)				
	0 m	500 m	1000 m	2500 m	Used %
Chilbolton	-	-	-	-	
Jülich	0.71	0.59	0.87	0.90	76
Kiel	-0.23	-0.04	0.37	0.91	81
Legnago	1.13	1.30	2.12	4.03	70
Lindenberg (NN)	0.09	-0.80	-1.36	-2.95	100
Lindenberg (REGobs)	0.17	0.18	-0.45	0.01	78
Payerne	0.60	0.38	0.10	-0.13	94
Potenza	0.83	-0.63	-0.71	-2.17	99
Potsdam	0.45	-0.35	-1.73	-2.21	91
	Mean Dev. of Vapor Density (VD) (g m^{-3})				
Chilbolton	0.86	0.69	0.40	-0.40	90
Jülich	0.80	0.64	0.49	-0.38	76
Kiel	0.08	0.02	-0.15	0.00	81
Legnago	0.18	0.46	0.49	0.07	70
Lindenberg (NN)	0.14	-0.04	-0.10	0.45	100
Lindenberg (REGobs)	-0.06	-0.06	-0.10	-0.22	78
Payerne	1.58	1.34	1.08	-0.02	94
Potenza	0.30	0.02	0.42	0.71	99
Potsdam	-0.13	-0.09	0.12	0.36	91

Additionally to the NN profiles an observation based regression method is applied for profiling. Simultaneous observations (Brightness Temperature) of the MWP and radiosondes from the past are used to calculate a regression operator. As the REGobs operator is not affected by errors in the absorption model or instrumental bias, systematic deviations are considerably reduced [3]. With respect to temperature a noticeable bias was found for Legnago and at higher levels >1000 m for Lindenberg (NN), Potsdam and Potenza. On the other hand, at Chilbolton, Jülich and Payerne an increased moist bias was detected.

3. HARMONISATION OF OBSERVATIONS

In addition to the analysis of observations in a network, the development of techniques to harmonise data was formulated as primary task of this study. Comparable results are the prerequisite for practical application in NWP and climatology. Radiosondes are available only at selected sites and the calculation of REGobs operators, successfully applied at the Lindenberg observatory, can't be performed to harmonise a multitude of network data. On this account, the suitability of forecast data is considered for reconciling MWP measurements. For this purpose data from Chilbolton, Jülich and Potsdam were selected to test the model-based regression method (REGmod). These stations were chosen because different radiometer types had been operated there inducing increased deviations in certain cases. For the experiment the remaining dataset was divided into two groups. One set, containing observations on odd-numbered days, was used for training of regression operators for each station. The other independent part was applied for validation. REGmod is a specific approach to the inversion of the radiative tranfer equation [3]. Profiles are calculated given by the solution:

$$\hat{\mathbf{x}} = x_o + C_{xy}\, C_{yy}^{-1} (y - y_o)$$

where $\mathbf{C_{xy}}$ and $\mathbf{C_{yy}}$ represent respectively the covariance matrix of the profiles **x**, extracted from the forecast model, and the simultaneous MWP measurements **y**, and the autocovariance matrix of **y**.

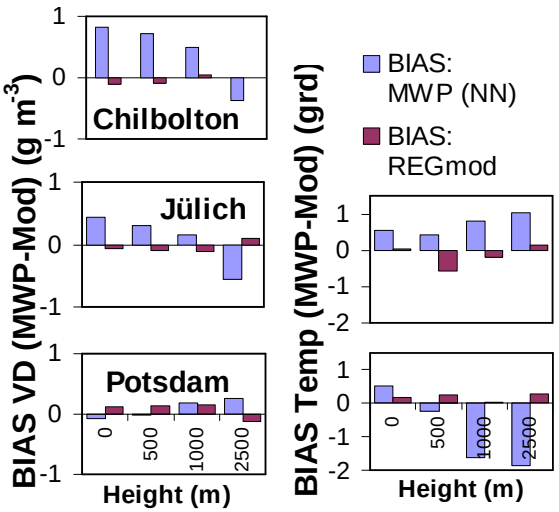

Figure 3: *Comparison of mean deviations before and after the harmonisation by a model-based regression.*

The results of the adjustments for the independent dataset are shown in Figure 3. The bias resulting from the NN-retrievals has been considerably improved by applying REGmod operators.

4. CONCLUSIONS

By means of a temporary network of 8 stations established during LUAMI in Nov 2008 it could be shown that microwave profilers are capable to provide reliable information of the atmospheric state continuously. In order to meet user requirements a method was proposed to produce comparable results at different observation sites. The usefulness of a model-based regression method has been successfully demonstrated.

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