

Supplementary material, ESSD-2022-57

Additional figures and results for *essd-2022-57: Tropospheric water vapor: A comprehensive high resolution data collection for the transnational Upper Rhine Graben region*, by Benjamin Fersch, Andreas Wagner, Bettina Kamm, Endrit Shehaj, Andreas Schenk, Peng Yuan, Alain Geiger, Gregor Moeller, Bernhard Heck, Stefan Hinz, Hansjörg Kutterer, and Harald Kunstmann

GNSS/InSAR combination vs. GNSS only

In addition to the results presented in Sec. 4, we performed a comparison of ZTD fields obtained by processing of GNSS-only and GNSS/InSAR observations. The results are presented in Fig. S1. Obviously, the two main affected

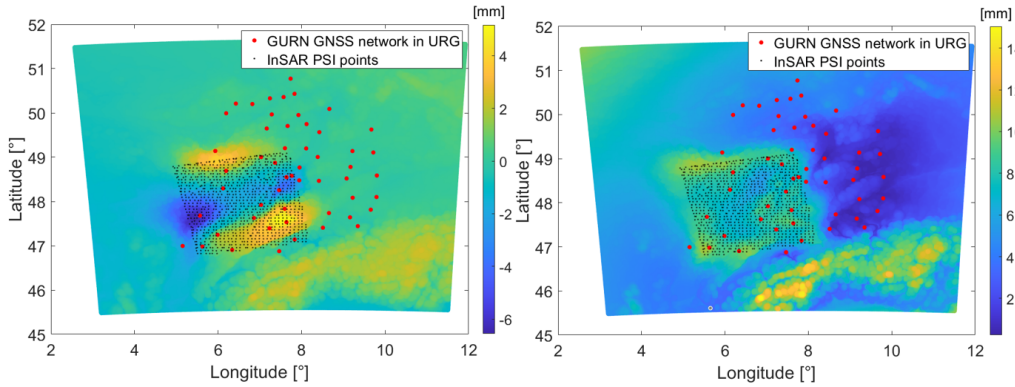


Figure S1: Differences between GNSS-only and GNSS/InSAR processed ZTDs using software COMEDIE (left plot mean and right plot standard deviation over 168 InSAR acquisition epochs).

areas are the InSAR footprint area and the lower-right area where the mountains are located. The first area is affected because of many InSAR observations included in the collocation process, which changes also the relative weighting of the observation compared to GNSS-only. The differences in the mountainous area, are mainly caused by the fact that all the InSAR points are located in the flat area, thus the parameters estimated in the collocation approach are tuned for this area, which leads to larger extrapolation errors in the mountainous areas.

In Fig. S2, the differences in refractivity are displayed. For the lower layers the differences are similar as in the

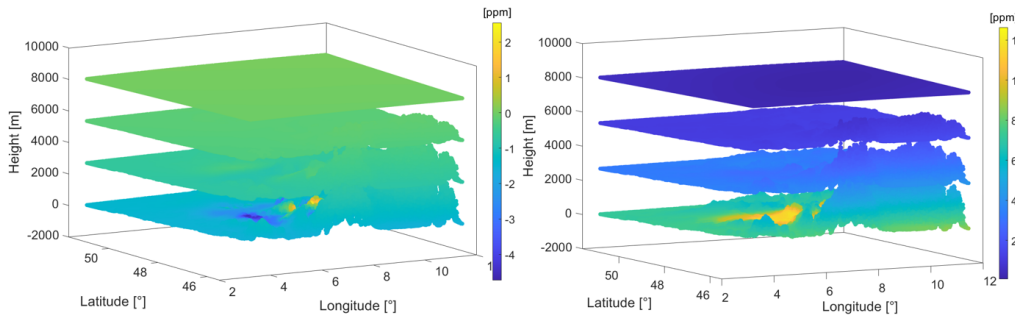


Figure S2: Differences between GNSS-only and GNSS/InSAR processed refractivity fields using software COMEDIE (left plot mean and right plot standard deviation over 168 InSAR acquisition epochs).

ZTDs fields comparison, however these differences do not affect the highest layers of the model where the mean value and standard deviation over all InSAR acquisition epochs are minimal.

Fig. S3 displays the histograms of ddSTDs obtained by InSAR processing and GNSS/InSAR combination in COMEDIE. The histograms for InSAR PSI points are not included in the collocation process. We can see that the shape of the histograms shows a good agreement of combined products and InSAR only products. This is also expected because the high number of included InSAR observations describes quite well the atmospheric condition with the study area in terms of ddSTDs.

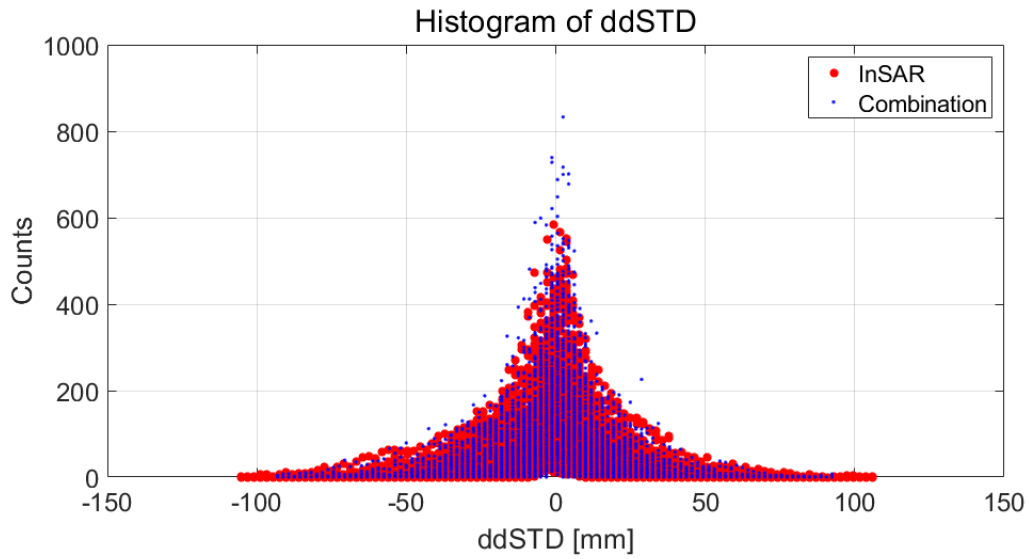


Figure S3: Histograms of ddSTDs retrieved by InSAR, and GNSS/InSAR combination.

InSAR scenes overview

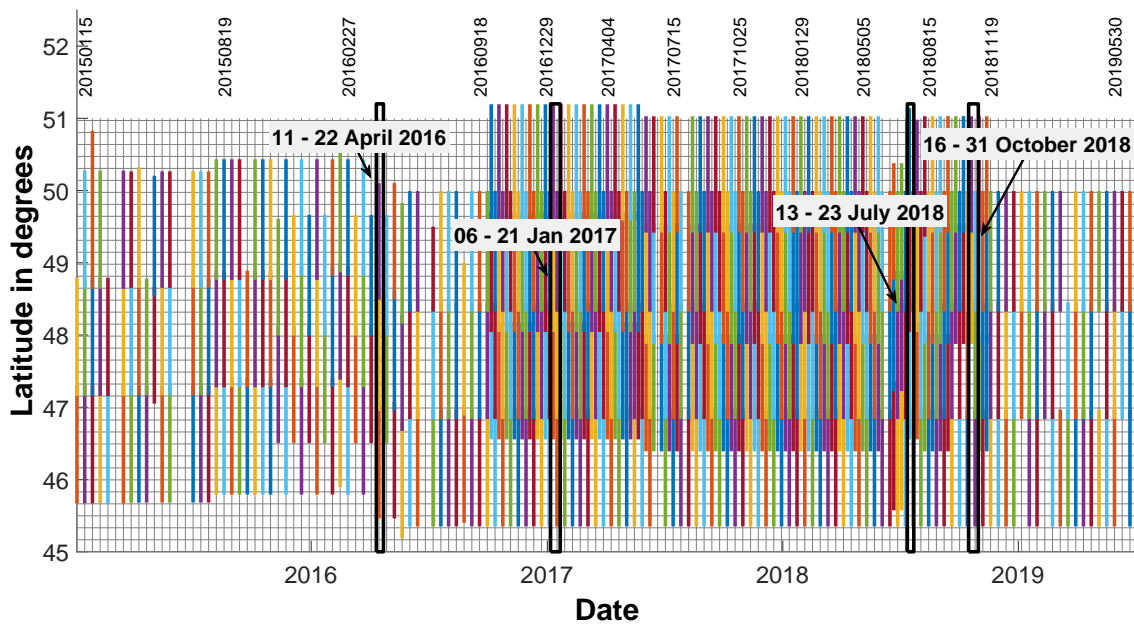


Figure S4: Datasets included in the InSAR processing. Each scene is marked in a different color. The four specific study events are displayed in boxes.