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WATER VAPOUR RADIOMETER DATA COMPARED TO VLBI DATA

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Summary

A method recently applied in VLBI-post-processing is Kalman filtering (Herring, personal communication 1985), which makes it possible to estimate the residual tropospheric delay for each observing epoch during a VLBI experiment. If the pressure variations at the ground are taken into account the hydrostatic path delay will be determined and the remaining residual will be an estimate of the wet path delay. The disadvantage of solving for the wet path delay instead of using Water Vapour Radiometer (WVR) measurements is larger formal errors of the other unknowns determined in the solve process. The technique will, however, give an independent estimate of the wet path delay which can be compared with the results from WVR observations.

An example of the wet path delay estimated by the VLBI-post-processing is shown in Fig. 1 for the Onsala site during a VLBI-experiment across the North-Atlantic Ocean in May, 1984. An estimate of the wet path delay is of course also done for the Haystack Observatory site at the other end of the baseline. Fig. 2 shows the measured wet path delay using the WVR at Onsala. Even though all estimates and observations are made in the direction of the sources, all values are referred to the zenith direction in the two figures.

It is clear from this example that most of the variations of the wet path delay predicted by the post-processing are also detected by the real WVR measurements. The difference has a mean of 7 mm and an rms of 9 mm.

It should be mentioned that it is important to have high absolute accuracy of the measurements of the ground pressure (an error of 1 mbar in the pressure corresponds to an error of 2.3 mm in the zenith path

delay) when the wet path delay are determined in the post-processing. Since the hydrostatic term has approximately the same elevation dependence as the wet term, the accuracy of the residual wet path delay will be degraded by uncertainties of the ground pressure.

The developed method used to predict the wet path delay is of great importance in order to verify the result from WVR observations.

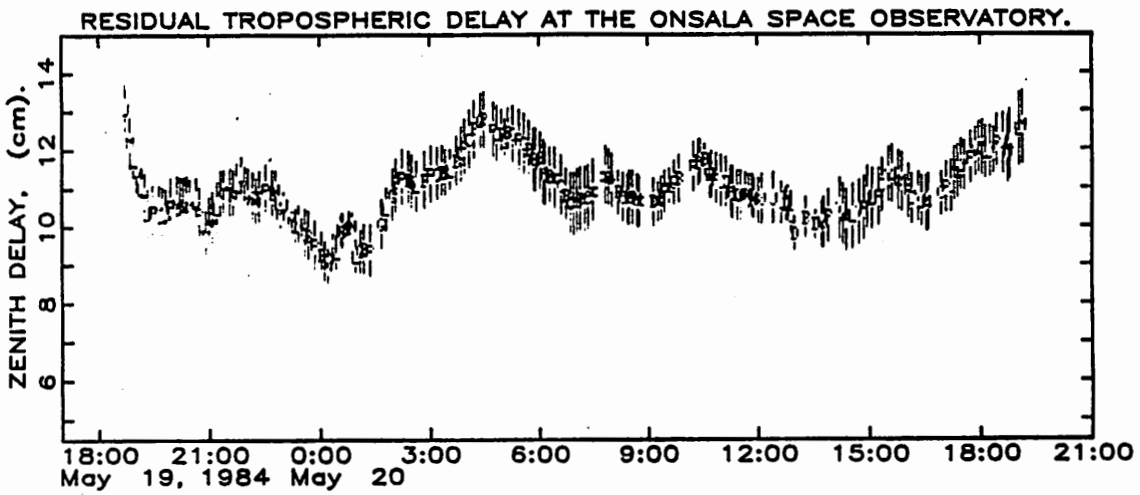

Figure 1. Estimated equivalent zenith wet path delays at the Onsala Space Observatory.

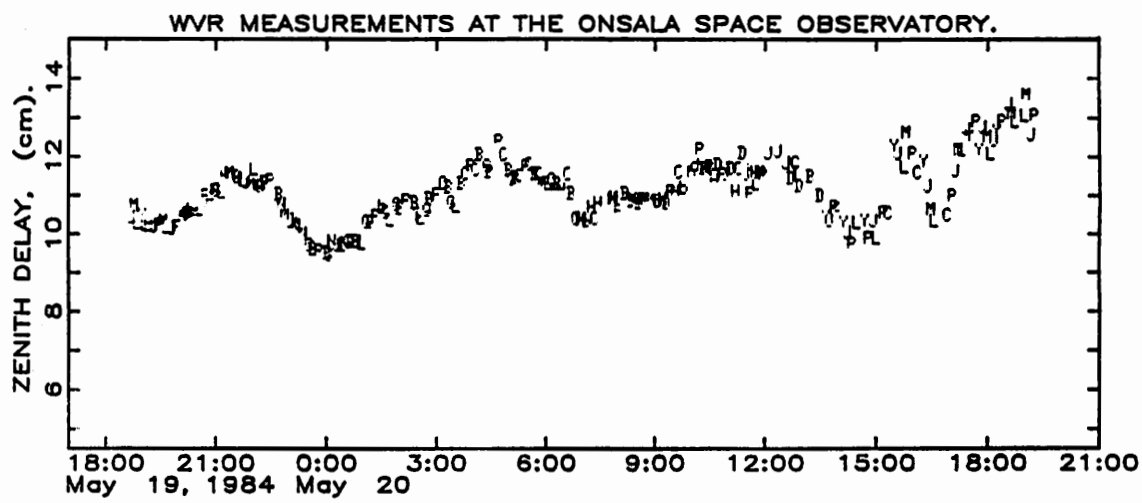

Figure 2. Equivalent zenith wet path delays determined from WVR measurements at the Onsala Space Observatory.