

It Looks Like



Front-End Opened

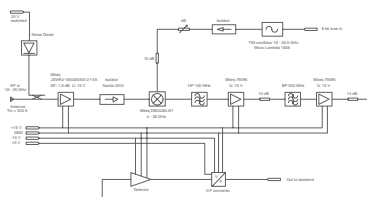


WVR is mounted on Effelsberg focus cabin roof looking skywards along optical axis



It Works

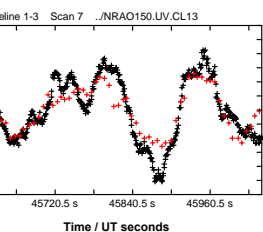
18 GHz to 26 GHz with $T_{sys} = 190$ K
 oscillator sweeps 18.8 GHz to 25.7 GHz across water line
 24 channels sequentially, 1 GHz each, 6 s per sweep
 continuum and line profiles to the spectrum
 spectrum and fit results in an SQL database
 interface for data inspection and download
 for phase correction of high-frequency VLBI to improve sensitivity
 for opacity correction of single-dish and VLBI measurements
 for geodesy and astrometry to measure zenith wet delay



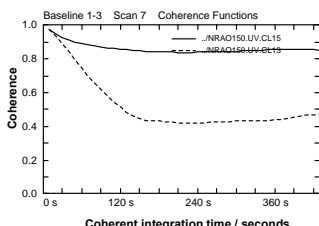
Block diagram of WVR front end

Measured Performance:
 Thermal noise 12 mK rms in 3 s
 Gain stability: 2.7×10^{-4} in 300 s
 Absolute calibration: 5 %

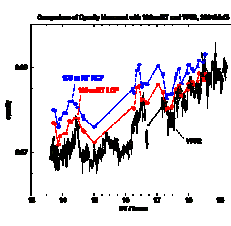
Its of Validation Tests



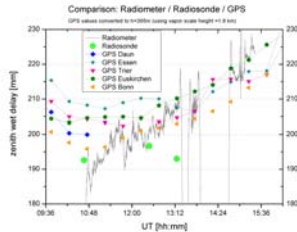
NRAO150, VLBI at 86 GHz, 7 min scan, 04apr17
 Pico Veleta baseline
 (x): Effelsberg radiometer corrections
 (k): VLBI phase
 radiometer corrections track VLBI phase well



Correcting the VLBI phase using the WVR data improves coherence by a factor two

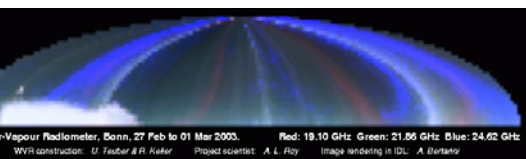


Atmospheric opacity measured by WVR (black) agrees within the errors with opacity measured using the Effelsberg 100 m telescope using T_{sys} vs elevation (red & blue)

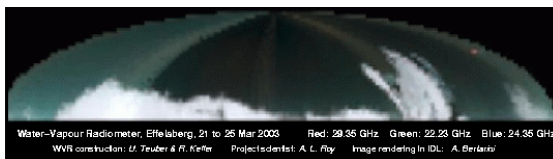


Absolute zenith wet delay measured by WVR, WVR radiometers and GPS agree well. Thus, WVR measurements of the troposphere can be for used for astrometric VLBI

WVR's view of the Sky: Bonn and Effelsberg



Vapour Radiometer, Bonn, 27 Feb to 01 Mar 2003. Red: 19.10 GHz; Green: 21.05 GHz; Blue: 24.62 GHz
 WVR construction: U. Trubel & R. Kellner Project scientist: A. L. Rley Image rendering in IDL: A. Bierbrauer
 Coloured stripes appearing in sky are due to RFI from Bonn
 Green between stripes is water vapour emission peaking at 22.2 GHz
 White is thermal emission from buildings
 White spot above buildings on left is the sun



Water-Vapour Radiometer, Effelsberg, 21 to 26 Mar 2003. Red: 20.95 GHz; Green: 22.23 GHz; Blue: 24.36 GHz
 WVR construction: U. Trubel & R. Kellner Project scientist: A. L. Rley Image rendering in IDL: A. Bierbrauer
 Sky in Effelsberg appears green due to water vapour and no RFI
 Sky brightness changes due to changing weather during the imaging
 White is thermal emission from hills, buildings and telescope
 Telescope appears in stripes because it moved during the imaging
 Red spot in sky at right is a geostationary satellite



Bonn panorama from location of water vapour radiometer on UDRF roof, 07 Apr 2003



Effelsberg panorama from location of water vapour radiometer on control building roof, 04 Apr 2003

Movie show
 water line
 correspond
 sky conditio