

## SNR and amplitude of radio occultation signal

The equivalent 1 second SNR (V/V) of the 50 Hz sampled L1 C/A radio occultation (RO) signal, generally, is the ratio of the RO signal amplitude and the mean amplitude of noise, multiplied by  $\sqrt{50}$ . However, when the RO signal amplitude tends to zero, the 50 Hz L1 C/A SNR tends to the background mean value of about  $\sim 10$  V/V (in COSMIC RO data). When the SNR substantially exceeds the background level, it can be used as the amplitude of RO signal.

The structure of RO signal deep below the horizon depends mainly on the amount and the distribution of water vapor in the lower troposphere. For the polar winter occultations the RO signal reduces below the noise level abruptly (upper panel) and the boundary can be clearly seen. For the tropical occultations the signal reduces below the noise level gradually (lower panel), and determination of the boundary may substantially depend on the user's algorithm.

For technical reasons, in the atmPhs files, the 50 Hz SNR is multiplied by 10.

