

1.50 INVESTIGATION OF THE SPECTRAL DIFFERENTIAL PHASE IN THE CASE OF A S-BAND RADAR PROFILER

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The differential phase (Ψ_{dp}) is a radar observable, which consists of the differential propagation phase (Φ_{dp}) and the backscattering differential phase (δ_{co}). The slope of the differential propagation phase, specific differential phase (K_{dp}), is extensively used to estimate the rainfall rate at radar low elevations. K_{dp} is as well analysed for ice crystals in ice/mixed-phased clouds in the RHI mode.

The question asked in this work is: what is the potentiality of the spectral differential phase ($s\Psi_{dp}$)? This question is examined at S-band, using the Transportable Atmospheric Radar (TARA) at Cabauw (The Netherlands). To study relations between Doppler measurements containing size information and polarimetric measurements containing shape and density information, it is necessary to profile to an intermediate elevation between 0 and 90 deg. It is why TARA profiles at 45 deg. elevation.

Theoretically, we do not expect a size dependency for the spectral differential propagation phase ($s\phi_{dp}$). Consequently the spectral differential phase should vary versus range, but not versus Doppler velocity in the range-Doppler spectrogram. Unless there is a contribution of the spectral backscattering differential phase ($s\delta_{co}$). This contribution is not straightforward to be investigated at low frequency radars, like S-band. However this component may appear in case of unremoved clutter and in the melting layer.

After a small review of the potentiality of the spectral differential phase for clutter suppression, Doppler de-aliasing in the case of the polarimetric alternate mode, the purpose is to investigate whether spectral differential phase signatures, size dependent, are present at S-band.
