VI. CONCLUSIONS

Five months of measured 19.68 GHz satellite beacon data at a (geometric) elevation angle of 3.2º from Isfjord Radio, Svalbard, Norway, were compared with gaseous and cloud attenuation models with the goal of assessing the temporal variability of gaseous attenuation as well as the accuracy of three different models. The measured time series, which includes some additional cloud attenuation, showed up to 8 dB of variation over the course of a few tens of hours.

Comparison with the gaseous attenuation models revealed that changes in water vapor content along the path were responsible for large part of the observed variation. The dynamic range of the simulated gas attenuation was 4.4 dB. The simplified model based on meteorological data measurement at the site was unable to predict not only the absolute value but also the (relatively) fast variation of gaseous attenuation.

After cloud attenuation contribution was added to the NWP-based models, both the AROME Arctic and the ANS models showed excellent agreement with the measurements. Note that while ANS is based on re-analysis data that require additional simulation for increased resolution, AROME Arctic results in this work are based on openly available prediction data for 6–11 hours ahead of the prediction time.

The results show that for very low elevation angle slant paths gaseous attenuation cannot be regarded as being nearly constant. Instead it shows significant temporal variability that should be taken into account in system design and link budget calculation using appropriate modelling.

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