Measurements of the Forest Radio Emission Dynamics during the Rain

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Introduction

The measurements of radiobrightness evolution of the forest at wavelength 3 cm during the rain (mesoscale storm) have been carried out from the platform on the watch-tower (above the forest at height 28 m) at elevation angle 50^o. The results of these measurements are very important because the forest radioemission is widely in use for calibration procedure (see [1,2]) where it is supposed that the forest brightness temperature is equal to the air temperature. Of course, the largest calibration errors can be related with the rains.

Measurements

Measurement results of radiation dynamics of the oak forest during the rain are presented in Fig.1. The radiometer sensitivity was 0.1 K ; the beam width was 20^o. The influence of the reflected and scattered atmosphere radioemission is negligible in this case.

It is clear that the rain decreases the brightness temperature of the forest because the decrease of wet foliage temperature and its emissivity. Otherwise, the wind increases the radiobrightness because it reduces the water cover on the leaves and, hence, enlarges the emissivity. It is also interesting that after the rain stop (after 55-th minute in Fig.1) the brightness temperature remains still less than the air temperature (the difference is about 1K) and then increases very slowly.

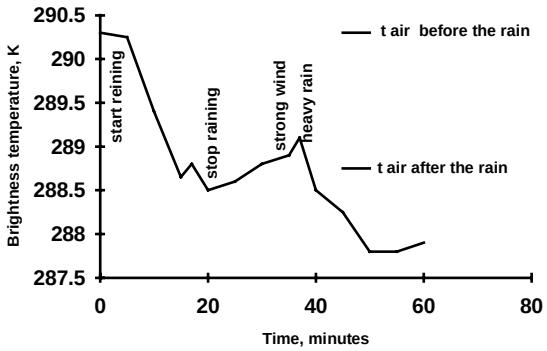

Fig.1. Forest radiobrightness dynamics

On the basis of these results it is possible to estimate errors of airborn and spaceborn radiometric measurements in which forests are used as calibration sources.

Conclusion

One can see that variations of the brightness temperature related with the rain do not exceed 2 K and corresponding calibration errors are about 1 K.

References

[1] K.P.Gaikovich, A.V.Troitsky, L.M.Snopik. Helicopter radiometry of oil pollutions on lakes and soils. 24-th General Assambly of U.R.S.I., Kioto, Japan, 1993, p.237.

[2] K.P.Gaikovich, A.V.Troitsky, L.M.Snopik. Lake ice helicopter radiometry. 24-th General Assambly of U.R.S.I., Kioto, Japan, 1993, p.225.