ABSTRACT - Using the 94 GHz - radiometers situated on board of a helicopter and on a measuring tower, there were investigated radiating properties of various surface types of soil and sea under their different states and season-weather conditions. The measurements were accompanied with controlling biogeophysical parameters of the surfaces and atmosphere. The plotted dependencies and the interrelations noticed in the process of discussion of the results of our work may be used when working out and estimating efficiency of the operation algorithms of the systems providing remote sensing of the surround medium.

Development and creation of new radio engineering systems and methods of remote sensing (RS) become more closely connected with using the short millimeter waves (SMW) used both independently and as an additional information channel. At the same time, for interpreting RS-data and also for a grounded choice of apparatus parameters of projected RS- systems and for working out algorithms of their operation, it is necessary to have reliable knowledge of radiating properties of surrounding medium. Our analysis of the papers dealing with this question (at 94 GHz) shows deficiency of
data on angular and polarization dependencies of radio brightness temperature ($T_b$) of various soil types, on seasonal $T_b$-dependencies of vegetation (especially at nadir and middle sighting angles), and also sea surface at middle sighting-angles and those close to glancing sighting angles ($\theta^\circ$). In this respect, carrying out additional investigations improving this deficiency is necessary and urgent.

Taking all this into account, we conducted a cycle of experimental investigations of radiating properties and their season-weather stability of such terrain-surface types as sea, soils, vegetation, snow, asphalt-concrete cover, vertical profiles of the ionosphere absorption were studied as well.

The experiments were accompanied with controlling the investigated surface-areas, being conducted using the radiometer 94 GHz with sensitivity < 0.3°K and situated on a measuring tower, a seashore precipice and helicopter.

For an easy discussion we shall consider the obtained results for Earth-cover groups having similar radiating properties.

QUASISMOOTH SURFACES. A state of the atmosphere may have the greatest effect on sea $T_b$-variations ($T_{bs}$), including the situation of changing an azimuth sighting direction. Fig. 1 shows some calculations of a contribution of the atmosphere radiation rereflected by water to the $T_{bs}$, $T_{ar}$ for winter and summer.

![Fig. 1. Part of the rereflected sky radiation ($T_{ar}$) in $T_b$ sea.](image)

1,3 - summer,

\[ Q = 16 \text{ kG/m} \]

2,4 - winter,

\[ Q = 3 \text{ kG/m} \]