

2.13. BIRD/WEATHER/RADAR WORK IN SWITZERLAND

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Abstract

1. Observations with the surveillance radar at Zurich airport show that the prevailing part of migration in northern Switzerland takes place on a broad front. The horizontal distribution of echoes is nearly homogeneous in day and night migration. The principal direction of migration is SW in autumn and NE in spring.
2. As an exception, rooks sometimes seem to use topographic features as guiding lines. Species using guiding lines need further study with respect to the bird hazard problem. Guiding lines have not the character of a rout; the term "migration rout" should therefore be used very cautiously.
3. The use of a tracking radar of the type "Superfledermaus" allowed to sample quantitative and qualitative data on spring migration in northern Switzerland.
4. The qualitative analysis of migration was based on automatic tracking of single targets and comprises: a) measurements of ground speed, height and track, b) recording of echo signatures based on AGC-signals, c) measurements of upper winds with radar-tracked balloons, d) calculation of air speed and heading with the help of the measured wind data.
5. The quantitative analysis was based on a vertical beam method improved by measurements with low elevation of the beam. The frequency of bird targets could be determined between 30 m and 4000 m above ground. Density of migration was calculated with the help of the measured ground speed of migration.
6. The echo signatures allow to eliminate unwanted echoes, to discern single birds and groups, to determine the size of single birds and flocks and to establish a provisional classification of bird targets according to their flight characteristics.
7. Most of the birds are small ones, only 14% were of medium and only 4% of large size.
8. Analysis of echo signatures show that night migration, opposite to the flocked day migration, consists of single birds separated from each other

by spaces of 100 to 300 m. It seems that a part of these birds are hold together, perhaps by some sort of social relationship.

9. The air speed of night migrants increases with height (more than could be explained with the decrease of air density). Air speed decreases in tail winds and increases in head winds.

10. The average altitude distribution shows that 90% of all birds fly below 2000 m. 50% of night migrants fly below 700 m, the same percentage of day migrants fly below 400 m. Large birds seem to have a tendency for higher flight levels.

11. Altitude distribution and intensity of migration vary on a large scale according to the weather development. Highest density of migration occurs with a high pressure area to the right and (or) a low pressure area to the left of the main vector of migration.

Highest levels of migration occur far away from the disturbance zones of low pressure areas especially with following winds.