Abstract

This thesis deals with the use of Unmanned Aerial vehicles (UAV) in radiometric survey. The main goal of this work is to review characteristics of four selected UAV and parameters of employed detectors compared to the classical airborne and ground radiometric survey. Four selected UAV were assessed, hexacopter "Kingfisher" with the detector BGO ($Bi_4Ge_3O_{12}$) of the volume 0,2 cm^3, the octocopter „Arducopter" with the 1 cm^3 CTZ (CdZnTe) detector, helicopter „Yamaha RMAXG1" with 1,8 l NaI(Tl) detector and airship „ACC15X" with 2,7 l NaI(Tl) detector. Payload capacity, detector sensitivities, flight speed, flight altitude, endurance for one charged battery or full fuel tank and wind resistance were compared among the mini-airborne instruments. The estimation of UAV radiometric data quality was derived from the sensitivity of the detectors, the flight altitude and flight speed. Estimated UAV radiometric data quality was compared to classical airborne and ground typical radiometric data quality.

Three selected UAV with a certain altitude and flight speed would achieve a comparable data quality as a classical airborne survey in the altitude of 80 m and flight speed of 50 m/s. Specifically it is hexacopter „Kingfisher" with a scintillation detector D230A at altitude of 40 m and speed of 1m/s, helicopter "RMAXG1" with a 1,8 l NaI(Tl) detector flying at altitude of 40 m and speed of 5 m/s and airship "ACC15X" with a 2,7 l NaI(Tl) detector flying at altitude of 80 m and at speed of 5 m/s.

The measurement efficiency of each UAV instrument was also considered through the time needed to measure 50 km long profile. The efficiency of the selected unmanned airship and helicopter is estimated approximately ten times lower compared to classical airborne survey. Multicopters would measure the considered profile almost hundred times longer.