ACQUISITION AND POST-PROCESSING OF AIRBORNE THERMAL DATA IN URBAN AREA

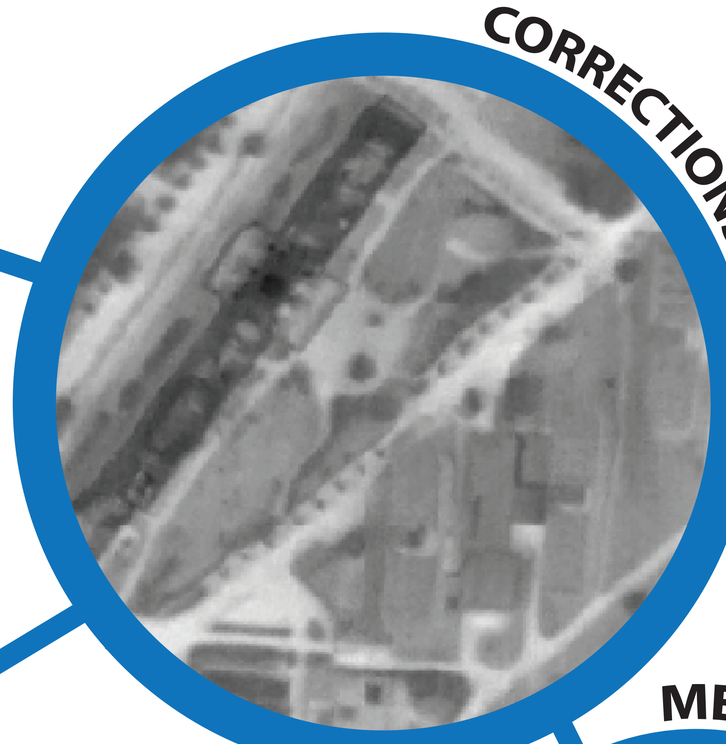
THERMAL IMAGING

On 10th July 2016, the flight took place over the city of Olomouc, Czech Republic. Overall 22 flight axis were required to take images of the whole 100 thousand people large city. Each flight took 3 hours. First flight started at 5 a.m. and the second one at 3 p.m. Along with the thermal camera, RGB camera was also attached to the airplane to provide auxiliary data and visual orthophoto. During the flight, ground measurements of different materials was performed using hand-held FLIR E60 thermal camera.

VIGNETTING

Thermal camera used for imaging (FLIR Tau2) was calibrated by the manufacturer. However, laboratory testing measurements were performed at our department. After the flight, one of the most obvious errors was vignetting. Due to the sensor structure, the angle of imaging results in much higher error than with other convention remote sensing methods.

CORRECTIONS



METEO DATA

During both flights, weather conditions including air temperature, air pressure and humidity were measured every 5 minutes at a dGPS station operated by our department and amateur meteorological station. These data as well as orthophoto mosaic, ground measurements and data from the airplane serve to produce best possible thermal image taking into account most of the errors that might occur during imaging.

EMISSIVITY MOSAIC

Emissivity poses one of the biggest challenges in thermal remote sensing. The precise knowledge of the material characteristics is crucial for accurate estimation of its temperature. However, when imaging heterogenic urban environment at such detail, the precise emissivity is hard to estimate. For this study, we combined the data from the multispectral satellite QuickBird with RUIAN database. RUIAN is a governmental system consisting of data from different sources - census, cadastre, governmental institutions etc. This allowed us to compensate emissivity for four most common urban classes - vegetation, water, buildings and roads.

THERMAL MOSAIC

SMOG DISPERSION, MICRO-CLIMATE

URBAN PLANNING

SURFACE URBAN HEAT ISLAND STRUCTURE

DEPARTMENT OF GEOINFORMATICS
Palacký University in Olomouc | Faculty of Science

Palacký University in Olomouc, Faculty of Science, Department of Geoinformatics, Olomouc, Czech Republic
Tomáš Pour (tomas.pour@gmail.com)
Dr. Jakub Miřijovský (jakub.mirijovsky@upol.cz)