



Detection and classification of channel bedforms observed using the visual-light camera mounted to the unmanned aerial vehicle

Jacek Ślopek, Małgorzata Wieczorek, Piotr Migoń, Marek Kasprzak, Justyna Jeziorska, Matylda Witek, Waldemar Spallek, and Tomasz Niedzielski

Institute of Geography and Regional Development, University of Wrocław, Wrocław, Poland
(tomasz.niedzielski@uni.wroc.pl)

High-resolution aerial photographs and the resulting orthophoto images, obtained using unmanned aerial vehicles (UAVs), may offer spatial resolution of 3 cm/px, exceeding the available resolution of remote sensing satellites. Such an unprecedentedly small size of the grid is very useful in fluvial geomorphology, in particular in investigations of small or moderate bedforms. These underwater landforms form spatially complex patterns which are difficult to observe and detect in the field, especially in the considerably long river channels. Since November 2012 we have performed a series of the UAV flights targeted at four rivers in the Kłodzko County (SW Poland). These rivers are: Nysa Kłodzka, Biała Łądecka, Bystrzyca Dusznicka and Ścinawka. We have limited our research flights to small fragments of these rivers, and we have gathered aerial photographs taken using the visual-light camera during all seasons. Although visual-light cameras have a limited ability to penetrate underwater features, we have found that at certain environmental conditions (e.g. autumn, low flow, highly transparent water, low albedo), it is possible to record a significant signal of the underwater channel bedforms. Such orthophoto images have been processed to numerically detect and classify the aforementioned landforms. The work serves as a feasibility study, the aim of which is to present that UAV-acquired photographs, even taken using the visual-light cameras, may be used to infer the spatial setting of channel bedforms.