
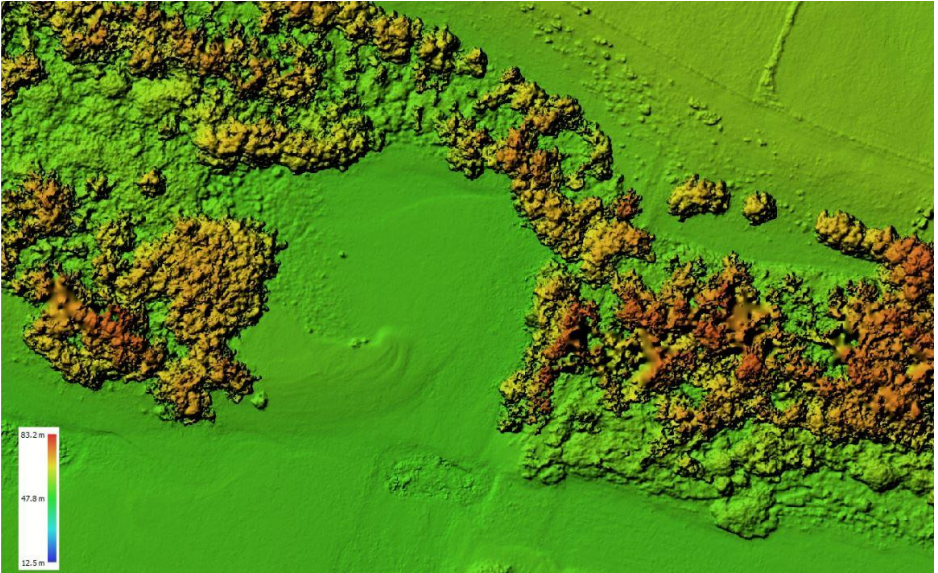


## RGB-Orthomosaic and digital surface model produced using a MAVinci Intel Sirius Pro RTK and DJI Phantom 4 Pro (UAS)

	<p>The data was produced within the scope of the project “mDRONES4rivers“ funded by the Modernity Fund („mFUND“, 19F2054A-D) of the German Federal Ministry for Digital and Transport (BMDV).</p>
<p><b>Short description</b></p>	<p>Georeferenced RGB-orthomosaics and digital surface models (DSM) of selected sites in riparian zones, which are situated along federal waterways in Germany with focus on the river Rhine.</p>
<p><b>Aims</b></p>	<p>The orthomosaics provides an overview of the corresponding sites and can be used to prepare field operations and to retrieve reference data for classification. The digital surface model can be used for classification and to identify hydromorphological structures.</p>
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<p><b>Input data / Data acquisition</b></p>	<p>RGB-data is collected using a DJI Phantom 4 Pro or in some cases the fixed-wing UAS MAVinci Intel Sirius Pro RTK. The latter is equipped with a Fuji-X-M1-18mm-PRO camera and the produced dataset is characterized by its high spatial precision, which is achieved by a RTK positioning system on board of the drone. The Phantom 4 Pro implies a RGB-camera (20 Mpix, f/2,8 broad angle lens, 24 mm focal length) and with the aid of a gimbal images can be taken from nadir view same as oblique angles. Flight altitude was 70 meters.</p>
<p><b>Processing / Methods</b></p>	<p>Depending on the area of the project site more than 2000 single images are stitched during the generation of one orthomosaic. Relevant RGB-images are processed photogrammetrically in Agisoft Metashape. First, a „Sparse Point Cloud“ and therefore a first coarse model of the study area is built. Next, images of Ground Control Points (GCP), which were deployed in advance, are being localized and assigned to coordinates. Concerning data produced with the fixed-wing UAS this step is not necessary, as single images are collected with RTK-precision. Afterwards a dense point cloud is generated based on the previous point cloud and a digital surface model (DSM) is generated. As a last step an orthomosaic is generated in Agisoft Metashape based on the DSM. The resulting orthomosaics are rescaled to a common raster with a spatial resolution of 25 cm/pixel. The raster values of the new 25 cm cells represent the mean of the original values. DEMs are exported from Agisoft Metashape and are provided in the original resolution.</p>
<p><b>Limitations</b></p>	<ul style="list-style-type: none"> <li>• Changing illumination and shadow can lead to dark patches in the orthomosaics</li> <li>• Strong noise in the area of water surfaces due the absence of a relief and disturbances such as sunglint, movement of the water surface and variation in optical properties of water</li> </ul>

<p><b>Data format</b></p>	<p><b>Orthomosaic</b></p> <ul style="list-style-type: none"> <li>• GeoTiff</li> <li>• Resampled to 25 cm/pixel resolution (based on an original resolution of 1.3-3 cm/pixel)</li> <li>• CRS: ETRS89 / UTM Zone 32N (EPSG:25832)*</li> </ul> <p><b>Digital Surface Model</b></p> <ul style="list-style-type: none"> <li>• GeoTiff</li> <li>• Original resolution of ca. 3-12 cm/pixel (no resampling)</li> <li>• CRS: ETRS89 / UTM Zone 32N (EPSG:25832)* and DHHN2016 as vertical reference system</li> </ul> <p>*except for the project site Reitwein, here the suitable reference system is: UTM Zone 33 N (EPSG: 25833)</p>
<p><b>Example</b></p>	 <p>Figure 1: Orthomosaic (MAVinci Intel Sirius Pro RTK, 25 cm/pixel), Emmericher Ward, July 2019.</p>  <p>Figure 2: Subset of a Digital Surface Model (MAVinci Intel Sirius Pro RTK, 8 cm/Pixel), Emmericher Ward, July 2019.</p>
<p><b>Further Information</b></p>	<ul style="list-style-type: none"> <li>• MAVinci Intel Sirius Pro RTK: <a href="https://www.topconpositioning.com/aerial-mapping-mass-data-collection/aerial-mapping/sirius-pro#panel-product-info">https://www.topconpositioning.com/aerial-mapping-mass-data-collection/aerial-mapping/sirius-pro#panel-product-info</a></li> <li>• DJI Phantom 4 Pro: <a href="https://www.dji.com/de/phantom-4-pro">https://www.dji.com/de/phantom-4-pro</a></li> <li>• For images with original resolution of 1.3 -12 cm please contact Dr. Björn Baschek, +49 (0)261 1306 5395, <a href="mailto:baschek@bafg.de">baschek@bafg.de</a></li> </ul>