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2016 Aerial Imagery Acquired to Monitor the Distribution and Abundance of Submerged Aquatic Vegetation in Chesapeake Bay and Coastal Bays

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Complete dataset available for download [HERE](), or [https://doi.org/10.21220/V5Q14R]() under "Data Access" Link **

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Description:

The 2016 aerial photography was obtained primarily by Air Photographics (Martinsburg, West Virginia) from multispectral digital imagery. The multispectral imagery was acquired using a ZI DMC-II 230 multispectral (RGB,NIR) digital mapping camera and IMU with a 92 mm focal length, a 5.6 µm pixel size, and a 15552 x 14144 image size. That imagery was acquired at an approximate altitude of 13,200 feet, yielding a ground sample distance (GSD) of approximately 24 cm.

The 170 flight lines, which cover 3,937 flight line kilometers, were flown. These lines were designed to include land features necessary to establish control points for accurate mapping, augmenting and checking the IMU data. The flight lines used to obtain the photography were positioned to include all areas known to have SAV, as well as most areas that could potentially have SAV (i.e., all areas where water depths were less than two meters at mean low water).

Flight lines were prioritized by sections and flights were timed during the peak growing season of species known to inhabit each area. In addition, specific areas with significant SAV coverage were given priority.

Guidelines for acquisition of aerial imagery address tidal stage, plant growth, sun angle, atmospheric transparency, turbidity, wind, sensor operation, and land features. Adherence to the guidelines assured acquisition of imagery under nearly optimal conditions for detection of SAV, thus ensuring accurate photo interpretation. Deviation from any of these guidelines required prior approval by VIMS staff. Quality assurance and calibration procedures were consistently followed. The altimeter was calibrated annually by the Federal Aviation Administration and the aerial camera was calibrated by USGS.

Camera settings were selected by automatic exposure control. To minimize image degradation due to sun glint, lines and frames were designed 60% line overlap and 20% sidelap. The scale, altitude, camera settings, and focal length combination was coordinated so that SAV patches of one square meter could be resolved. Ground-level wind speed was monitored hourly. Under normal operating conditions, flights were usually conducted under wind speeds less than 10 mph. Above this speed, wind-generated waves stir bottom sediments, which can easily obscure SAV beds in less than one hour. The pilot used experiential knowledge to determine the acceptable level of turbidity that would allow complete delineation of SAV beds. During optimum flight conditions the pilot was able to distinguish bottom features such as SAV or algae at low tide. Excessively turbid conditions precluded photography. Determination of maximum cloud cover level was based on pilot experience. Records of this parameter were kept in a flight notebook. Every attempt was made to acquire imagery when there was no cloud cover below 13,000 feet. Cloud cover did not exceed 5% of the area covered by the camera frame. A thin haze layer above 13,000 feet was generally acceptable. Experience with the Chesapeake Bay has shown that optimal atmospheric conditions generally occur two to three days following passage of a cold front, when winds have shifted from north-northwest to south and have moderated to less than 10 mph. Within the guidelines for prioritizing and executing the photography, the flights were planned to coincide with these atmospheric conditions when possible. Air Photographics coordinated the processing of all imagery. Digital imagery was delivered on a portable hard drive.

Digital multispectral imagery is georectified and orthographically corrected to produce a seamless series of aerial mosaics following the standard operating procedures (SOP). ERDAS IMAGINE Photogrammetry image processing software is used to orthographically correct the individual flight lines using a bundle block solution. Camera lens calibration data is used to define the interior camera model. Control points from USGS DOQQ, National Agriculture Imagery Program (NAIP), MD Dept. of IT, Virginia Base Mapping Program (VBMP), and ESRI Word imagery provide the exterior control, which is enhanced by a large number of image-matching tie points produced automatically by the software when IMU data were not available. The exterior and interior models are combined with a 10-meter resolution digital elevation model (DEM) from the USGS National Elevation Dataset (NED) to produce an orthophoto for each aerial photograph.

The orthophotographs are combined using a set of ArcGIS mosaic datasets for each flight line that are mosacked into a single Baywide mosiac dataset that is shared as an ArcGIS image service.

Files Include:

Files in the originals folder are the raw geotif imagery with a rough georectification.

Files in the orthos folder are in JPEG 2000 format and have been orthorectified.

All files are organized by flightline. Filenames follow this format:

Section_Line-Frame_MonthDay-Year

Ex: 01_10-02_aug23-16.tif