Supplementary material to *Combining Earth Observations with Ground Data to Assess River Topography and Morphologic Change: Case Study of the Lower Jamuna River.* Submitted to International Journal of Applied Earth Observations and Geoinformation (2024).

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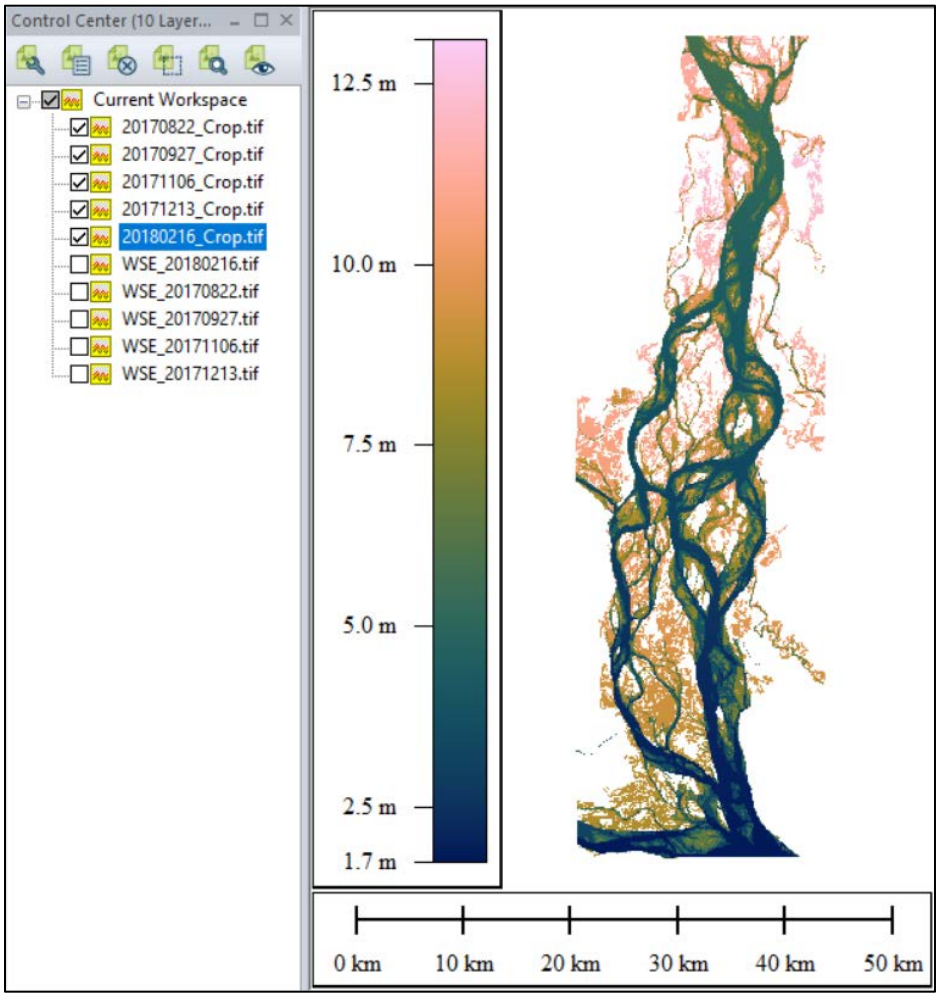
This supplementary material provides additional workflow details for the construction of waterline DEMs (see manuscript section 3.1, Step 5, also illustrated in Figure 4). The referenced files used for analysis are included in the project's GitHub repository: https://github.com/nvalsangkar/Waterline-Jamuna

All work was carried out in GlobalMapper V.25.1. using available DEM processing tools. The workflow can be completed manually as shown, or automatically with modifications to the GM scripting file included with the supplementary material.

Step 5a. Assemble set of sloping water masks for the year 2017

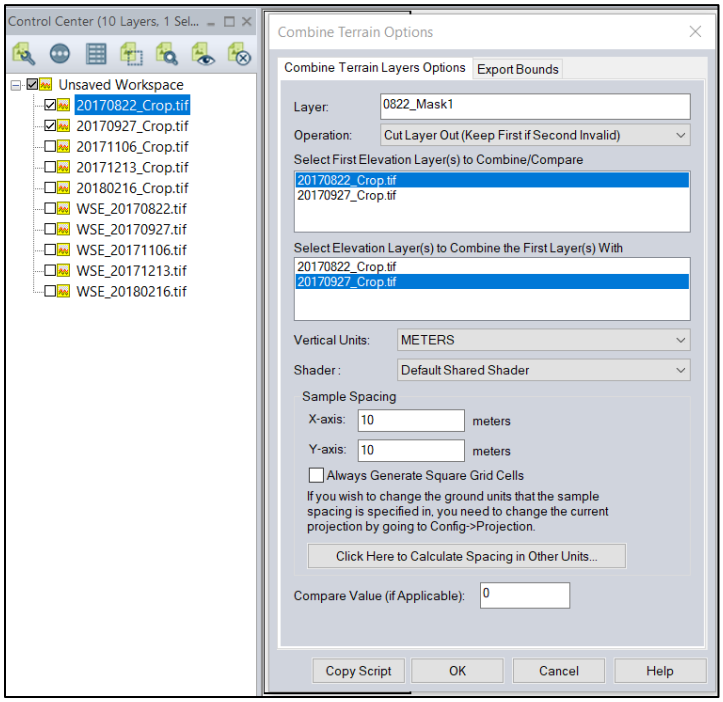
Figure illustrates the areal extents of the five (5) water masks used for 2017



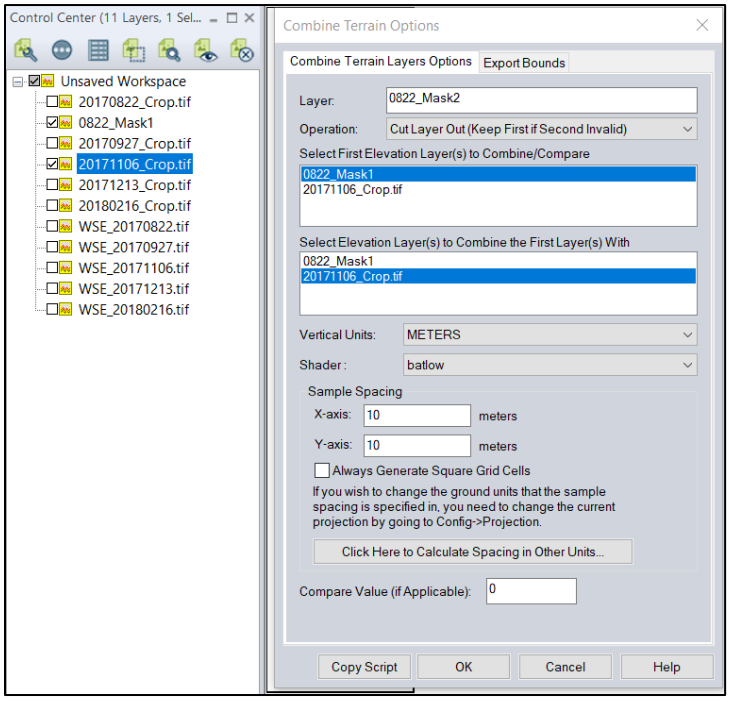
Step 5b. Develop initial “stepped” waterline DEM representation

1. Mask the highest elevation water mask using the areal extents of all lower-elevation water masks

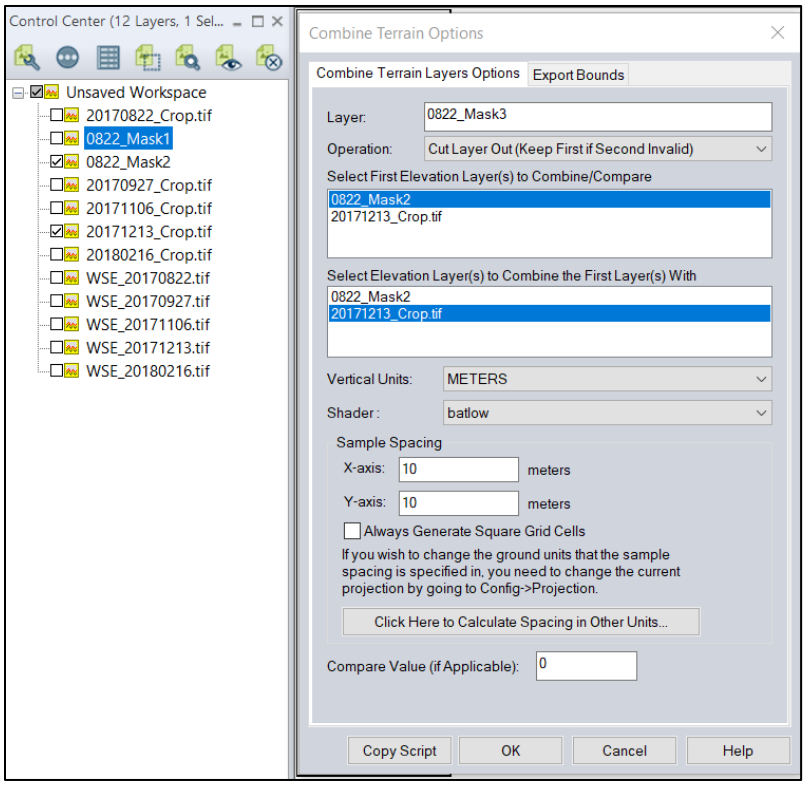
2017/08/22 water mask, masking extents from 2017/09/27. Export “Mask1”.



“Mask 1”, masking extents from 2017/11/06. Export “Mask 2”.



“Mask 2”, masking extents from 2017/12/13. Export “Mask 3”



“Mask 3”, masking extents from 2018/02/16. Export “Mask 4”

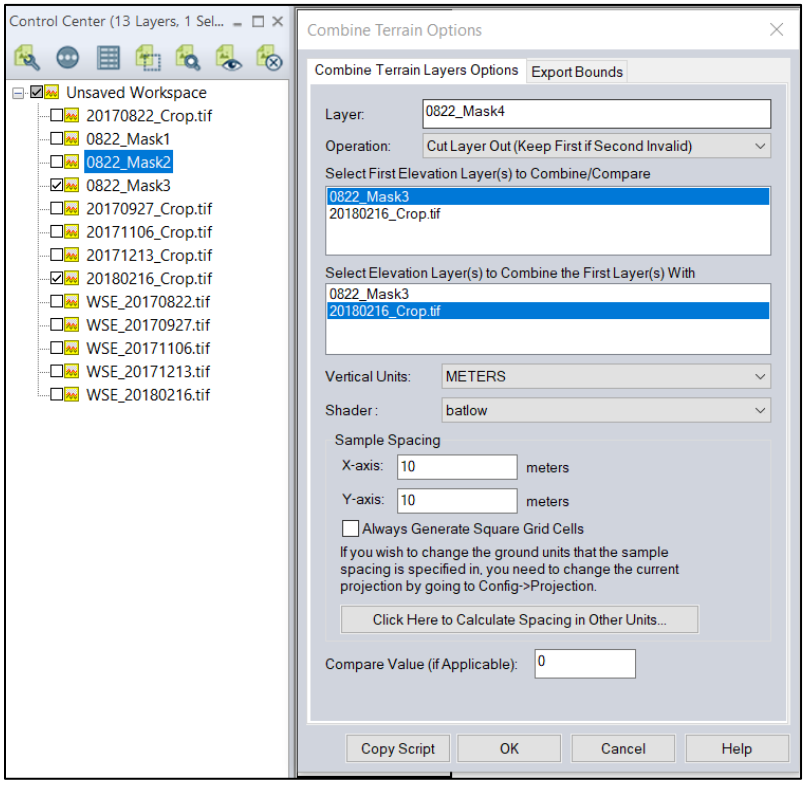
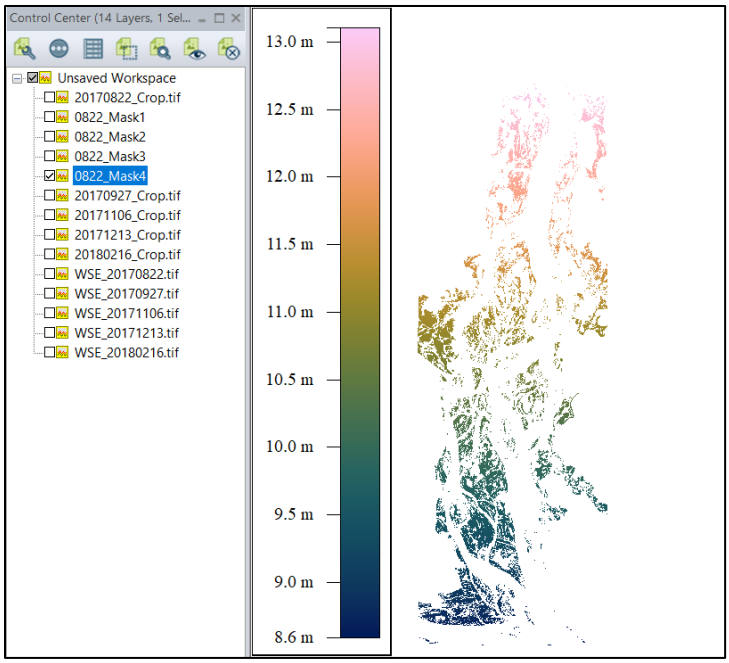
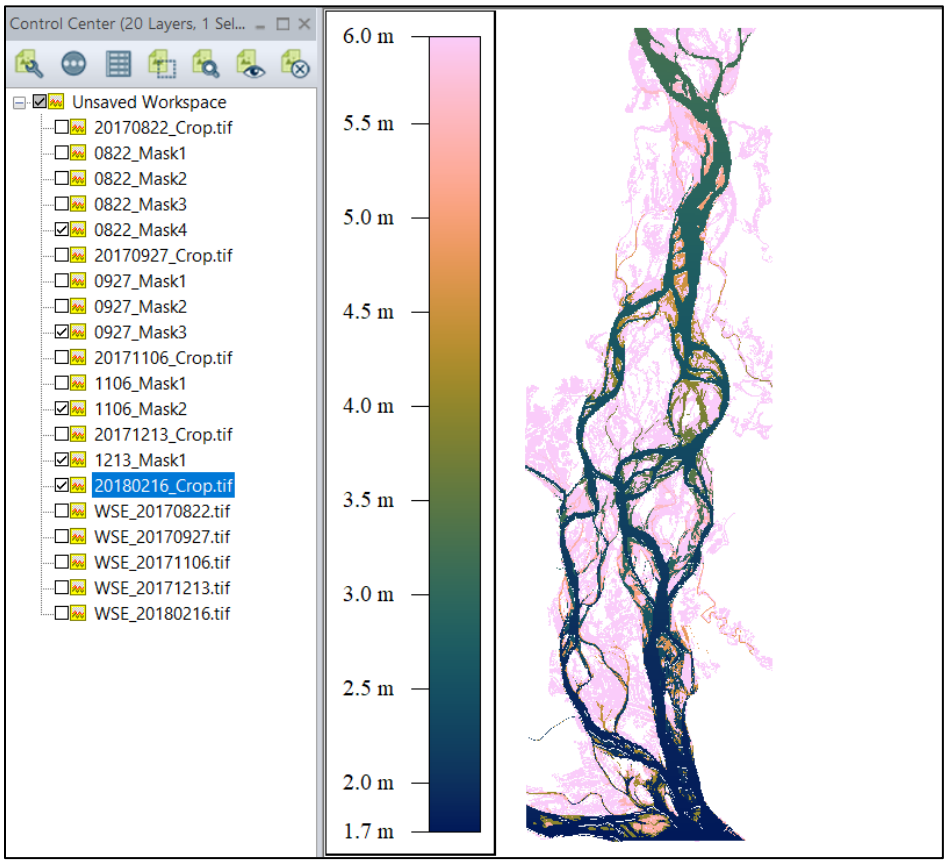


Figure illustrates the areal extents of "Mask 4"



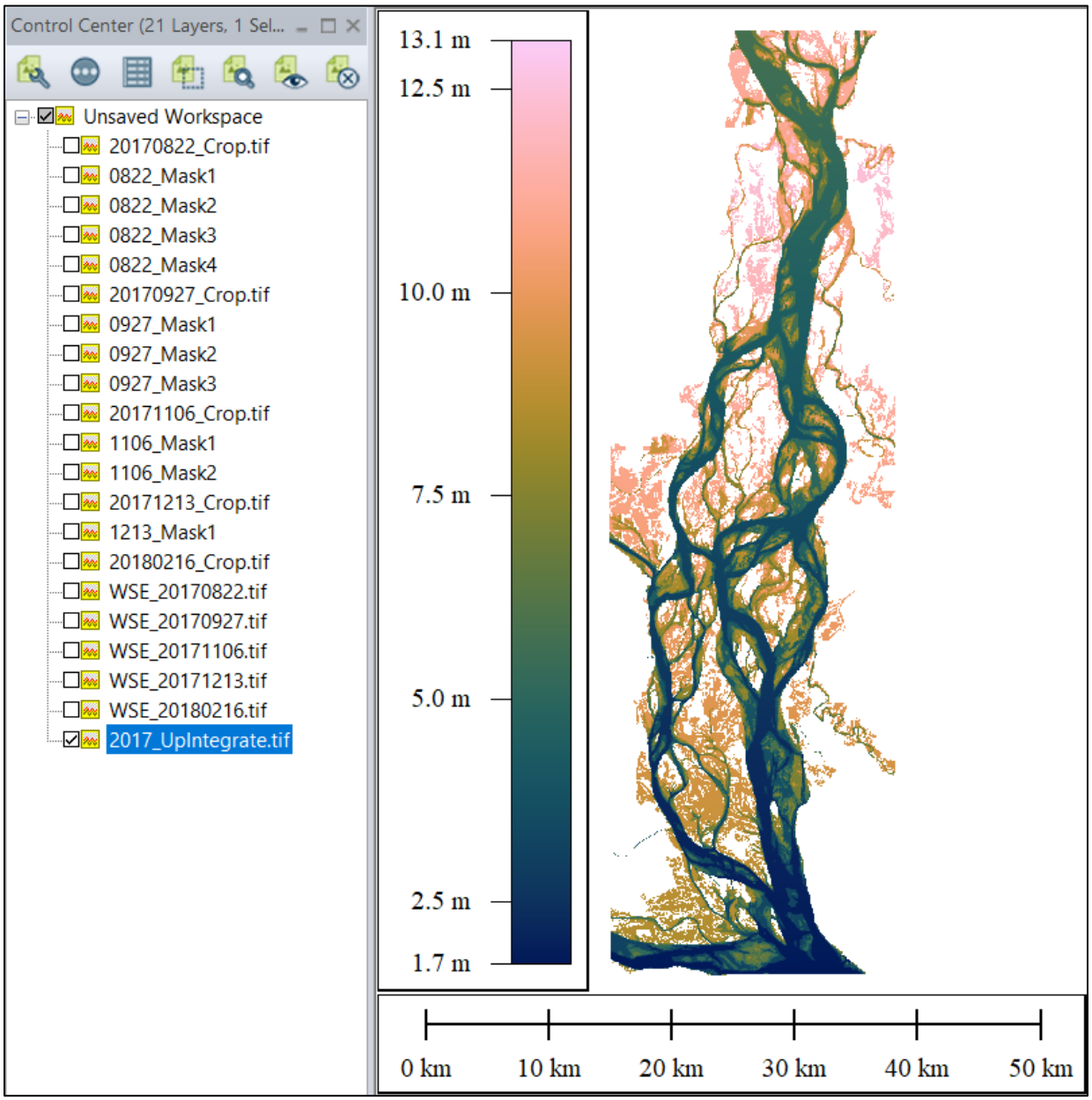
2. Repeat the masking workflow for 2017/09/27, 11/06, and 12/13.

Figure illustrates the final set of water masks, highlighted with check boxes



3. Select and export the set of water masks checked in the above figure, named as “2017 UpIntegrate” [LAYER > EXPORT > Select Export Format (geoTIFF)]

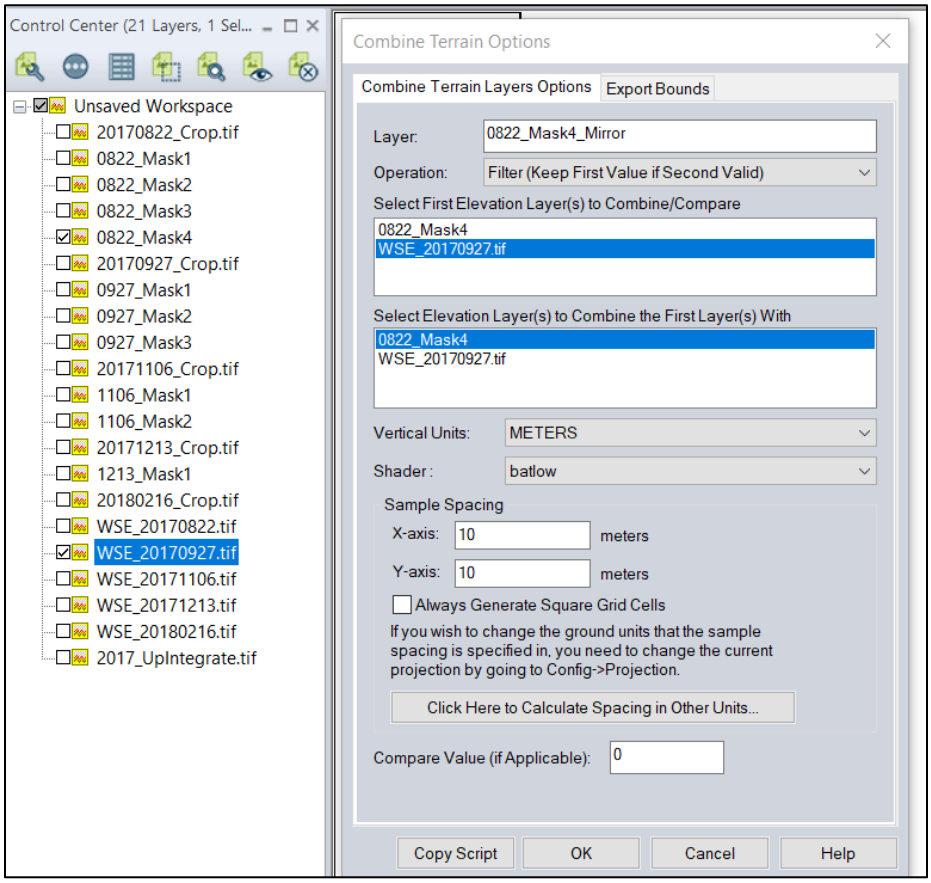
Figure illustrates the 2017_UpIntegrate DEM



Step 5c. Develop a “mirrored” DEM

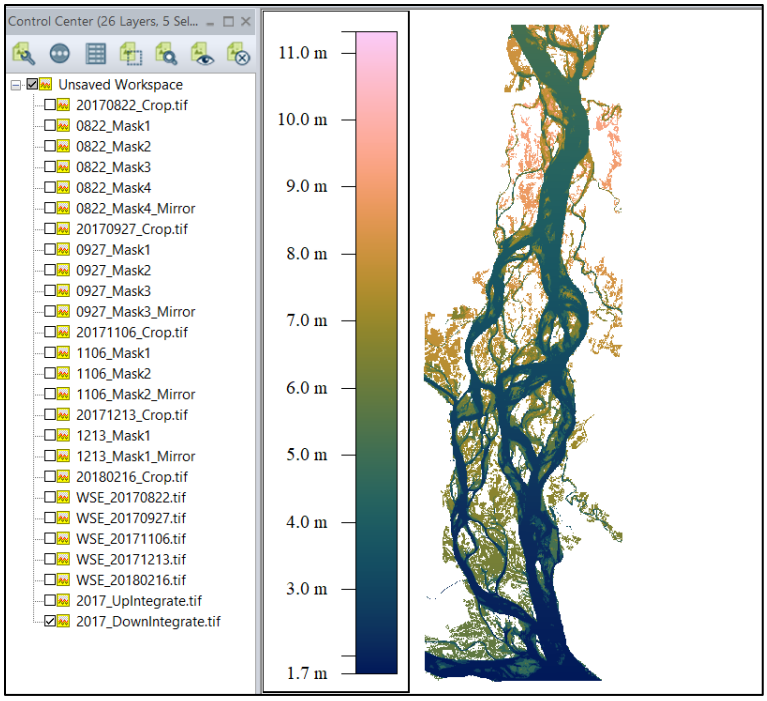
1. For each of the Step 5a. final water mask components (0822_Mask4, 0927_Mask3, 1106_Mask2, 1213_Mask1, 2018_0216_Crop), apply the elevation from the next-lowest slope water surface plane.

Example, applying the 2017/09/27 elevation to 0822_Mask4. Outputs have the suffix _Mirror.



2. Select and export the set of “Mirror” water masks, named as “2017 DownIntegrate” [LAYER > EXPORT > Select Export Format (geoTIFF)]

Figure illustrates the exported 2017_DownIntegrate file, comprising 0822_Mask4_Mirror, 0927_Mask3_Mirror, 1106_Mask2_Mirror, 1213_Mask1_Mirror, and 20180216_Crop.



Step 5d. Average the DEMs from Step 5b. and 5c. to produce the final waterline DEM.

Averaging command, using 2017_UpIntegrate and 2017_DownIntegrate.

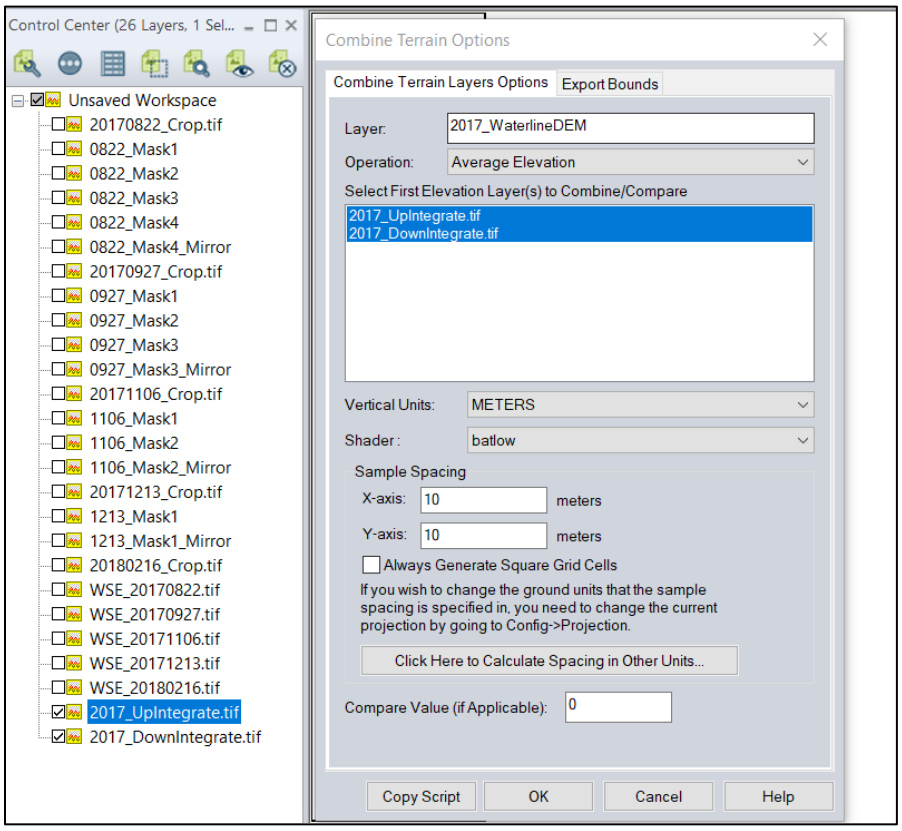


Figure illustrates the final 2017 Waterline DEM, including a cross-section view illustrating the DEMs from step 5b. (UpIntegrate), 5c. (DownIntegrate), and 5d. (WaterlineDEM).