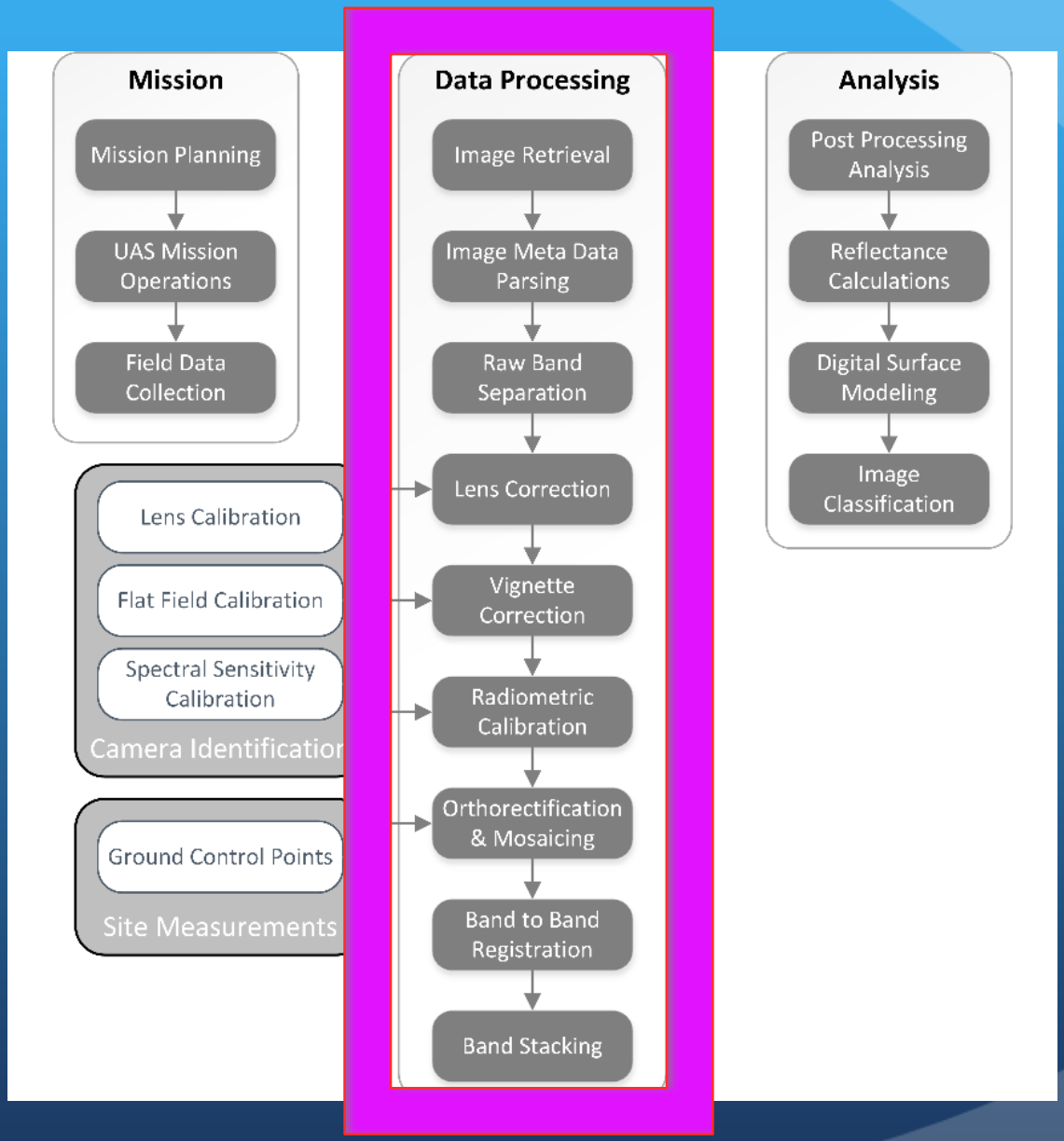
Agisoft PhotoScan

3D Image Stitching

Where I fit in the UAS workflow



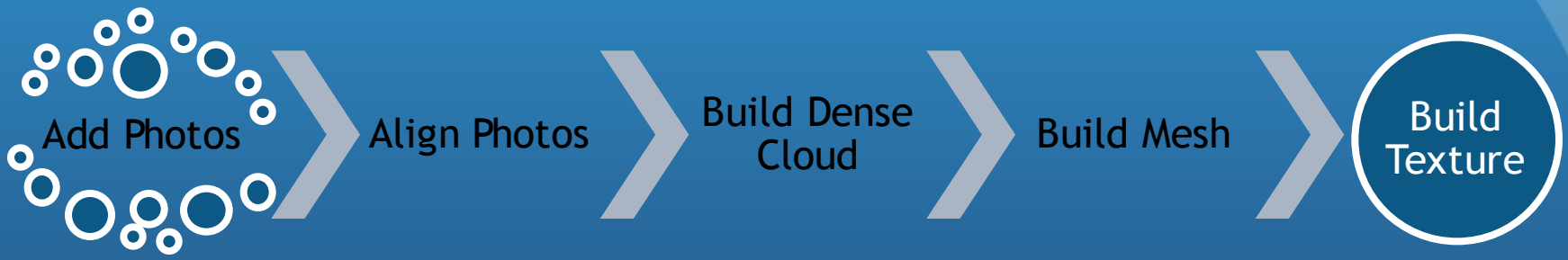
Common Acronyms & Jargon:

- UAS – Unmanned Aviation Systems
- NIR – Near Infrared
- RGB – Red Green Blue
- IRT – Thermal Imaging
- LIDAR – Advanced light reflection technology
- Georeferencing – associating something in location in physical space
- Georectifying – taking an image w/out a coordinate system and putting it onto a known coordinate system
- Orthorectification - the process of stretching the image to match the spatial accuracy of a map by considering location, elevation, and sensor information.

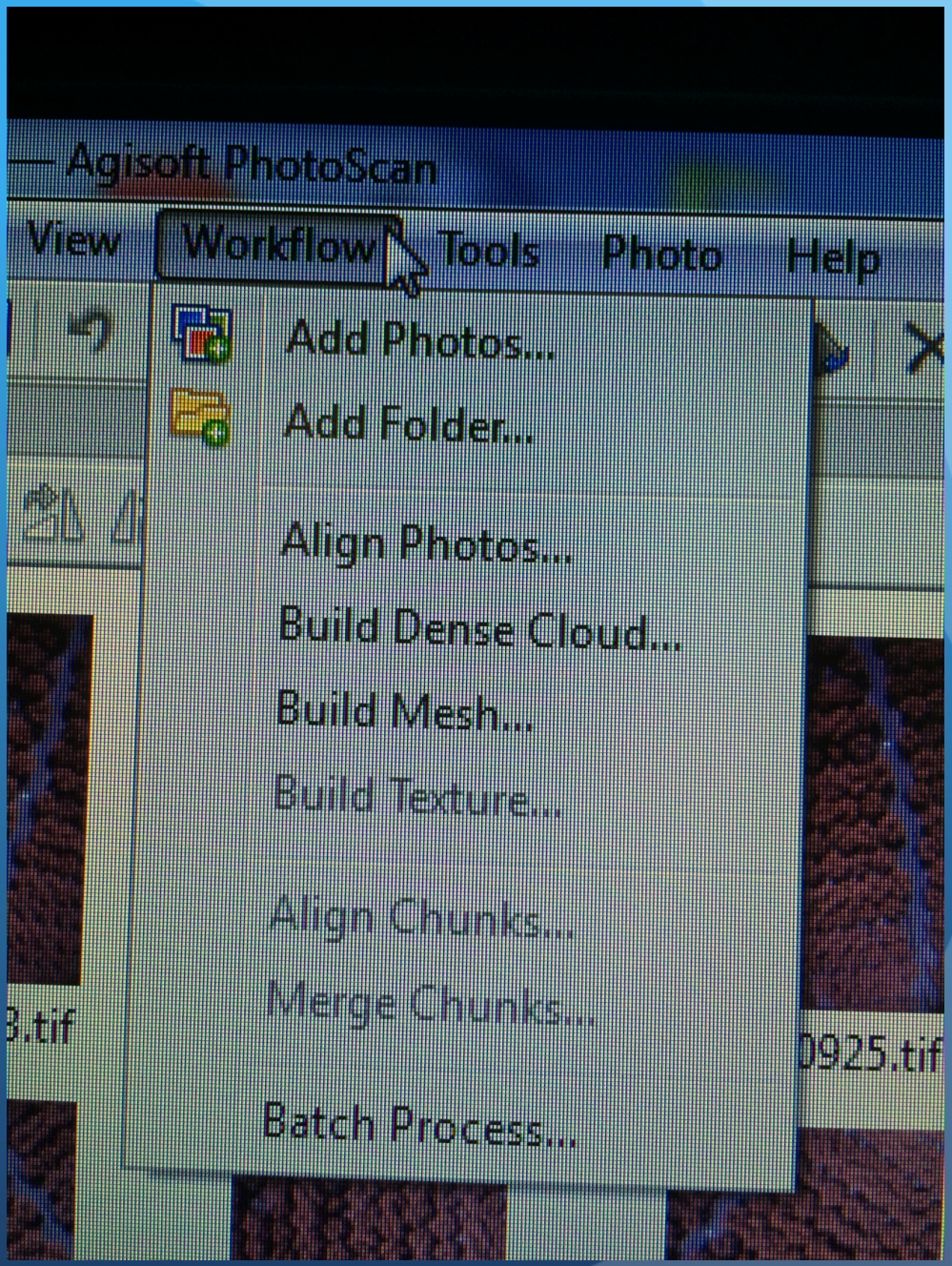


Agisoft PhotoScan is software that performs photogrammetric of digital images and generates 3D spatial data

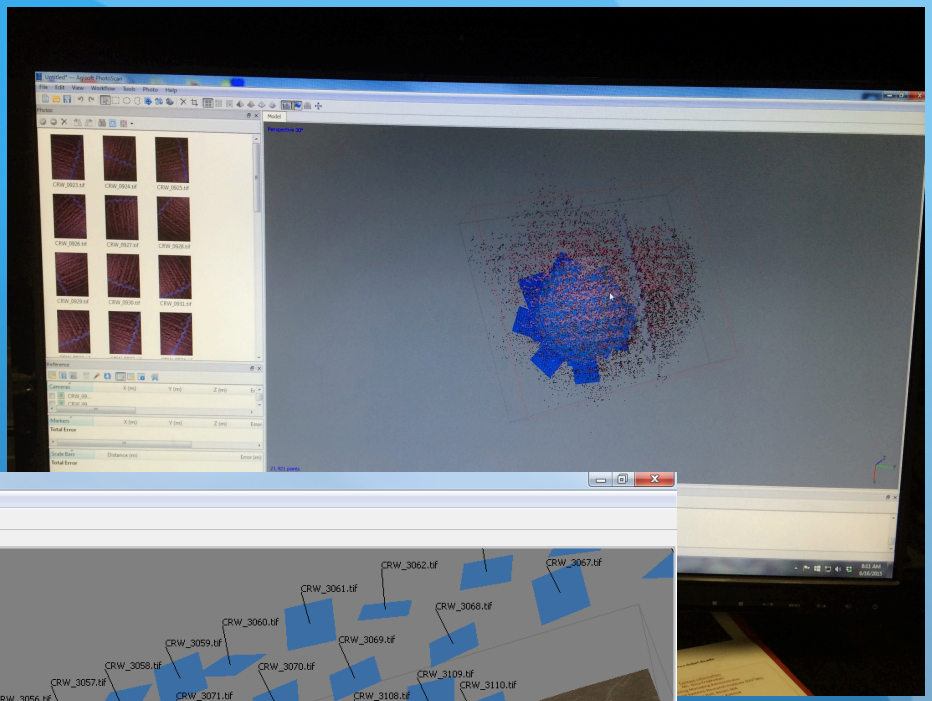
Agisoft PhotoScan Workflow

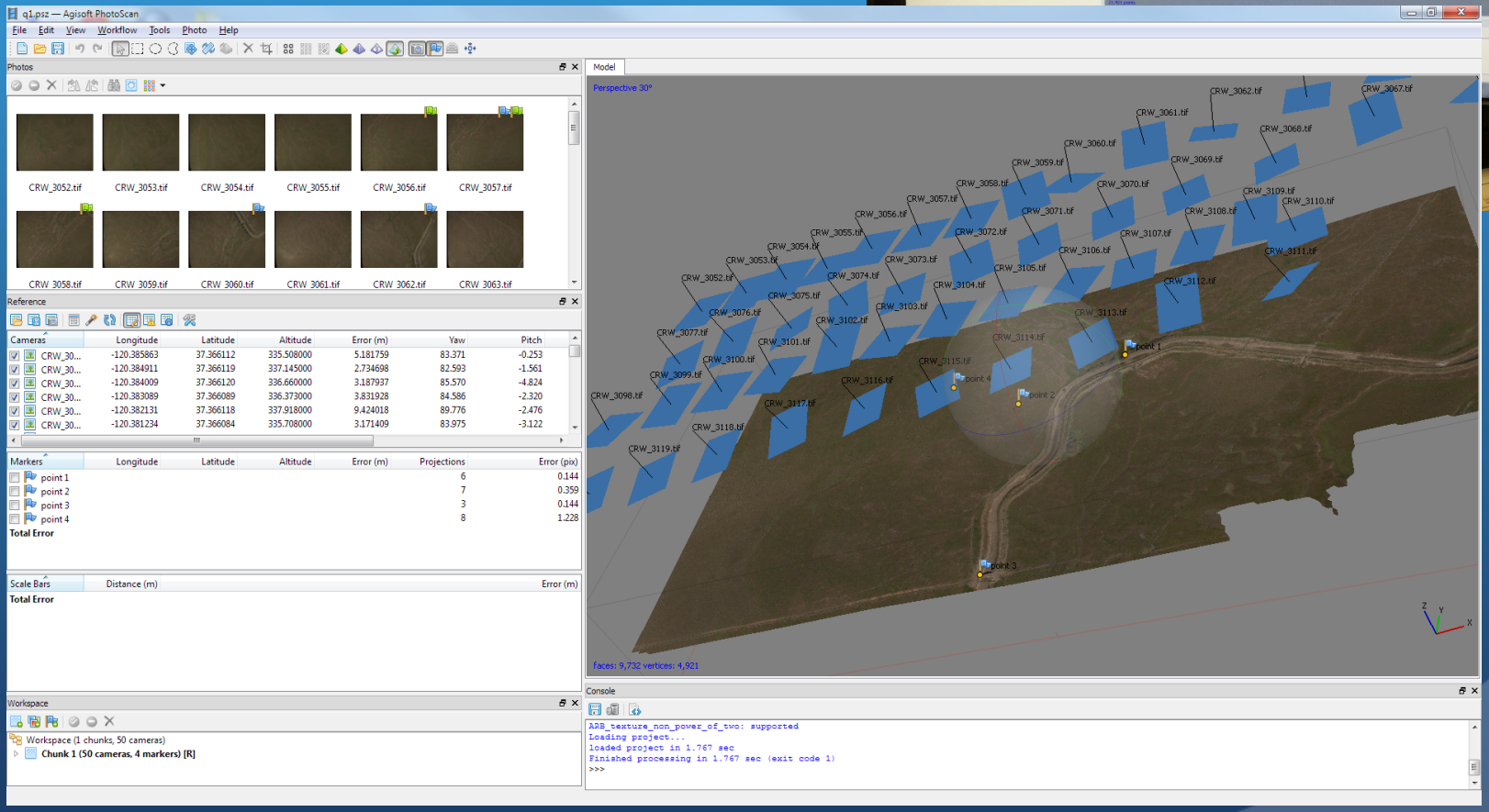


Adding Photos

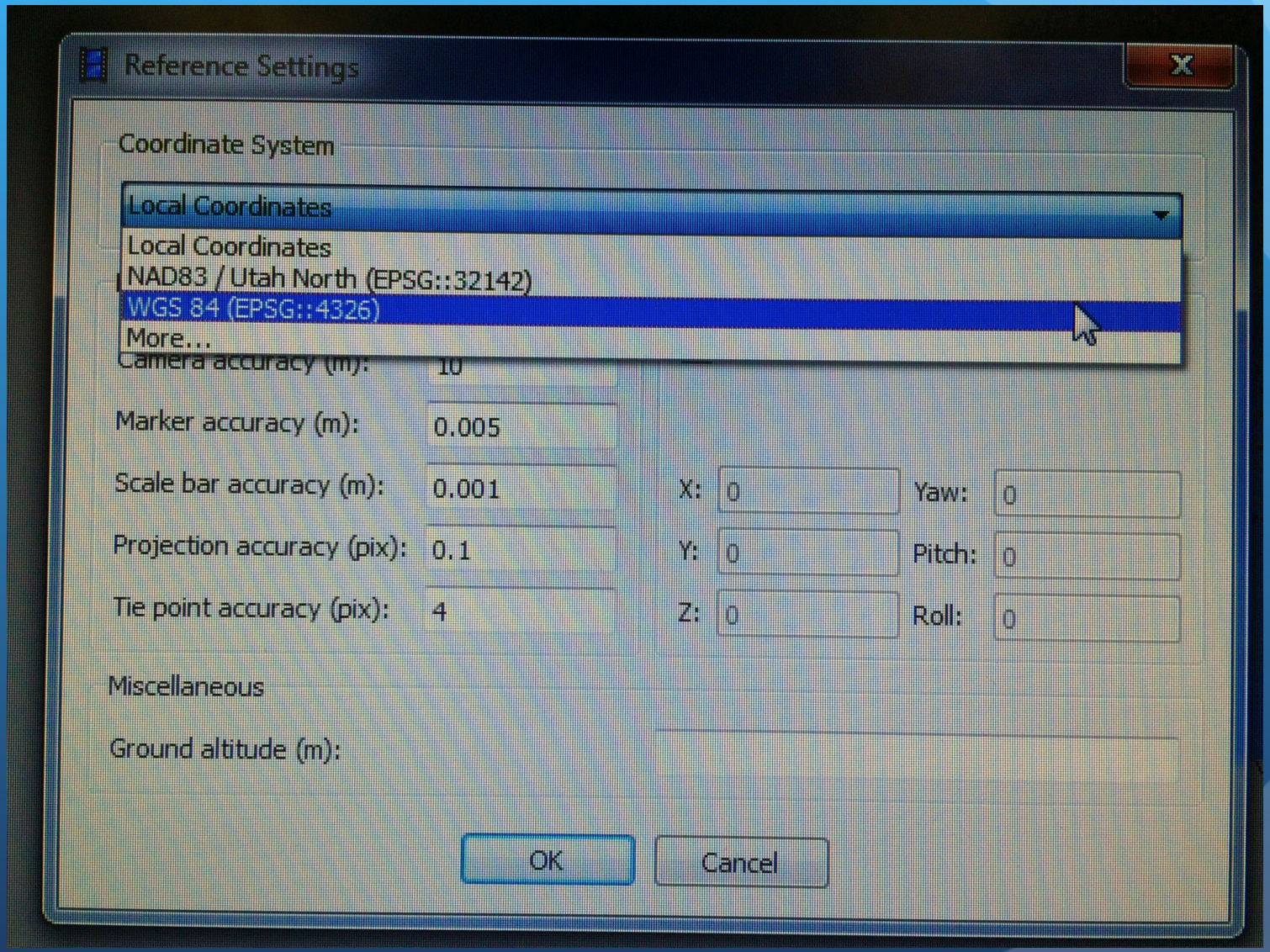


Aligning Photos

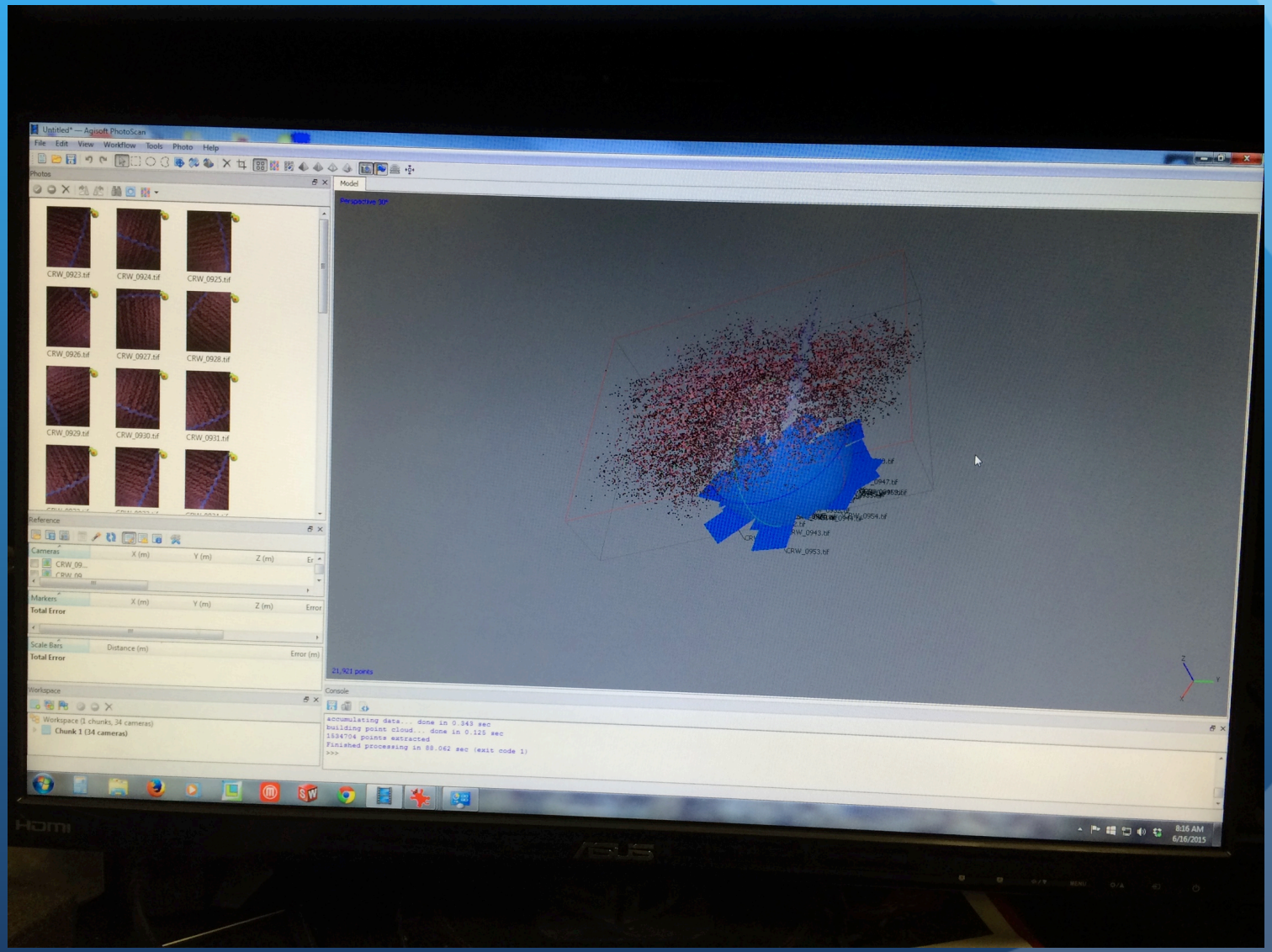




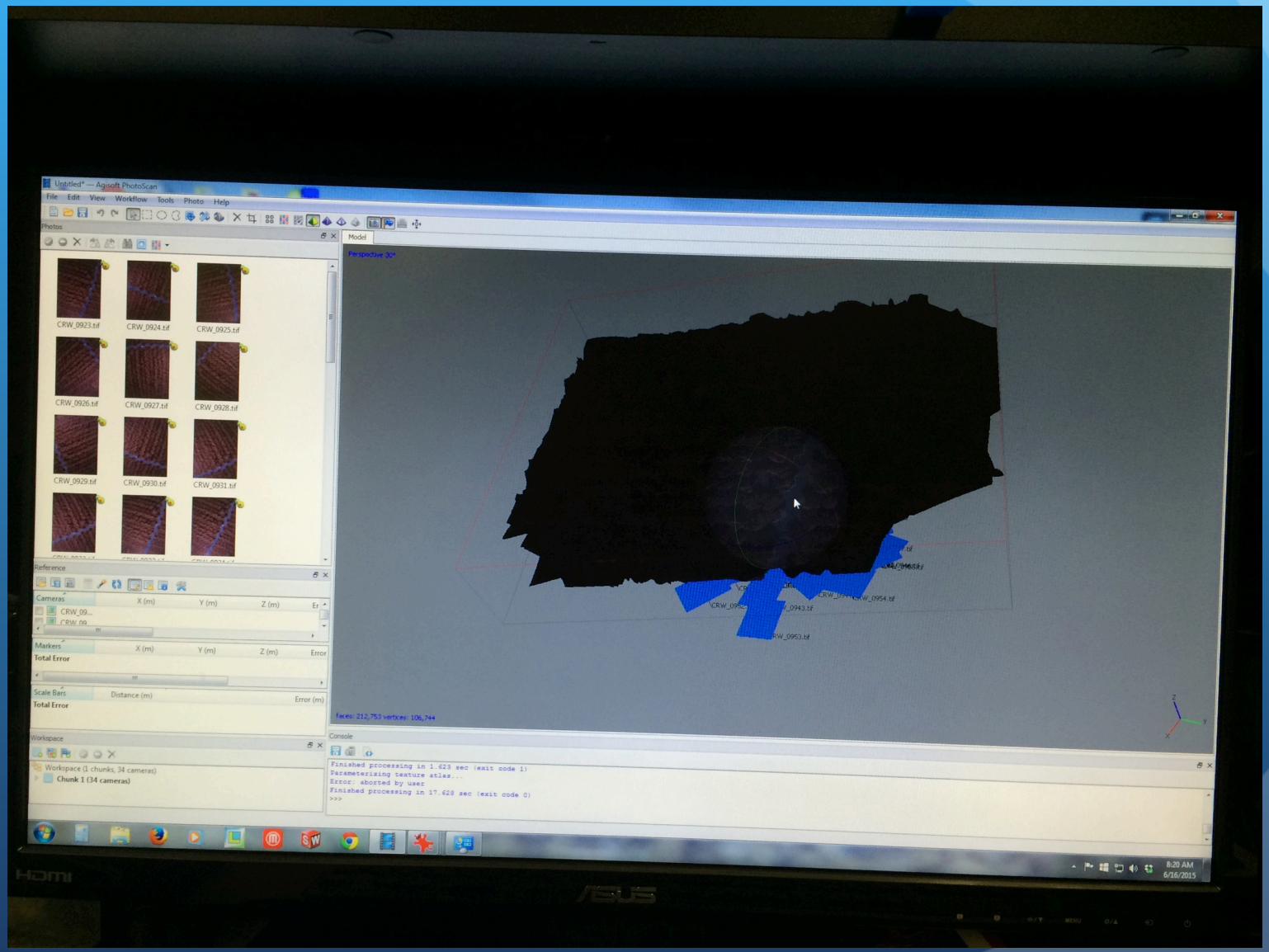
Importing Coordinates



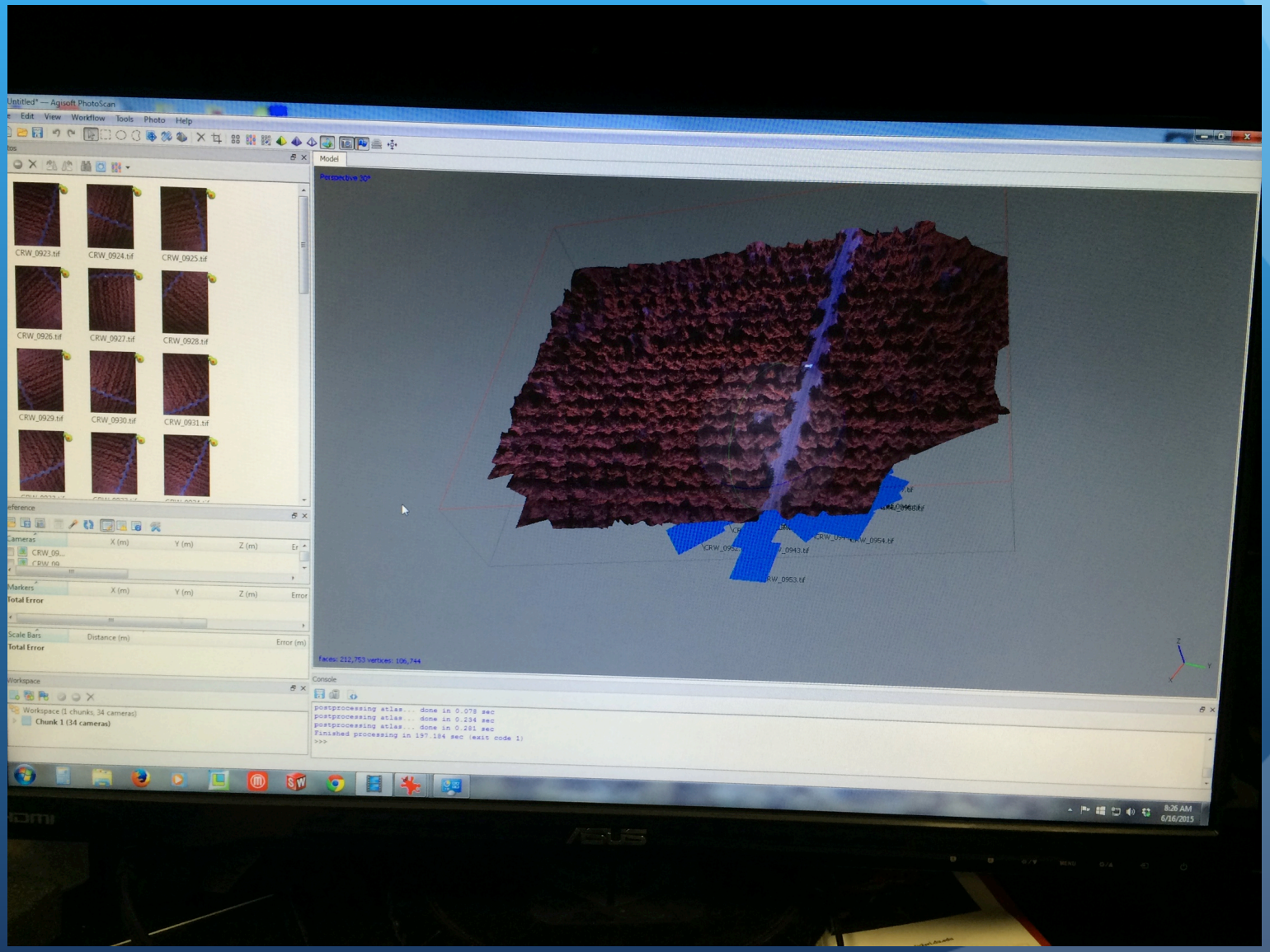
Build Dense Cloud



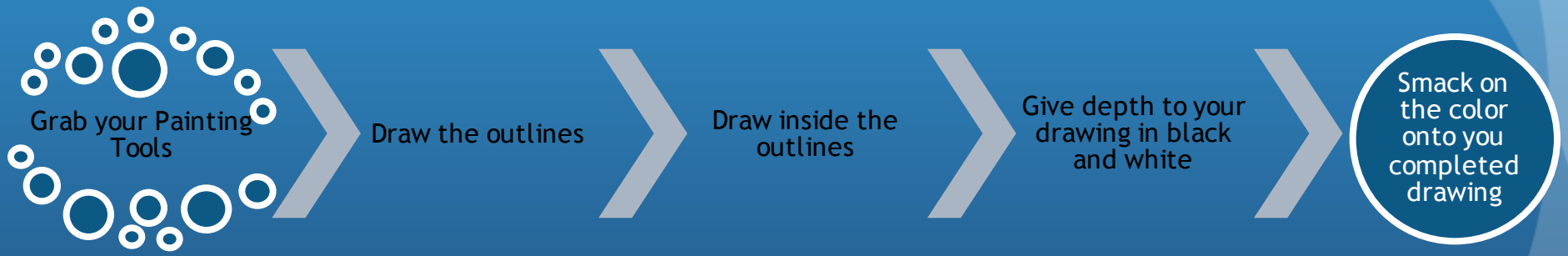
Build Mesh


Untitled* — Agisoft PhotoScan
File Edit View Workflow Tools Photo Help
Photos
Model
Perspective 30°
Reference
Cameras
Markers
Total Error
Scale Bars
Distance (m)
Error (m)
Workspace
Workspace (1 chunks, 34 cameras)
Chunk 1 (34 cameras)
Console
Finished processing in 1.623 sec (exit code 1)
Parameterizing texture atlas...
Error: aborted by user
Finished processing in 17.628 sec (exit code 0)
>>>
faces: 212,753 vertices: 106,744
8:20 AM
6/16/2015

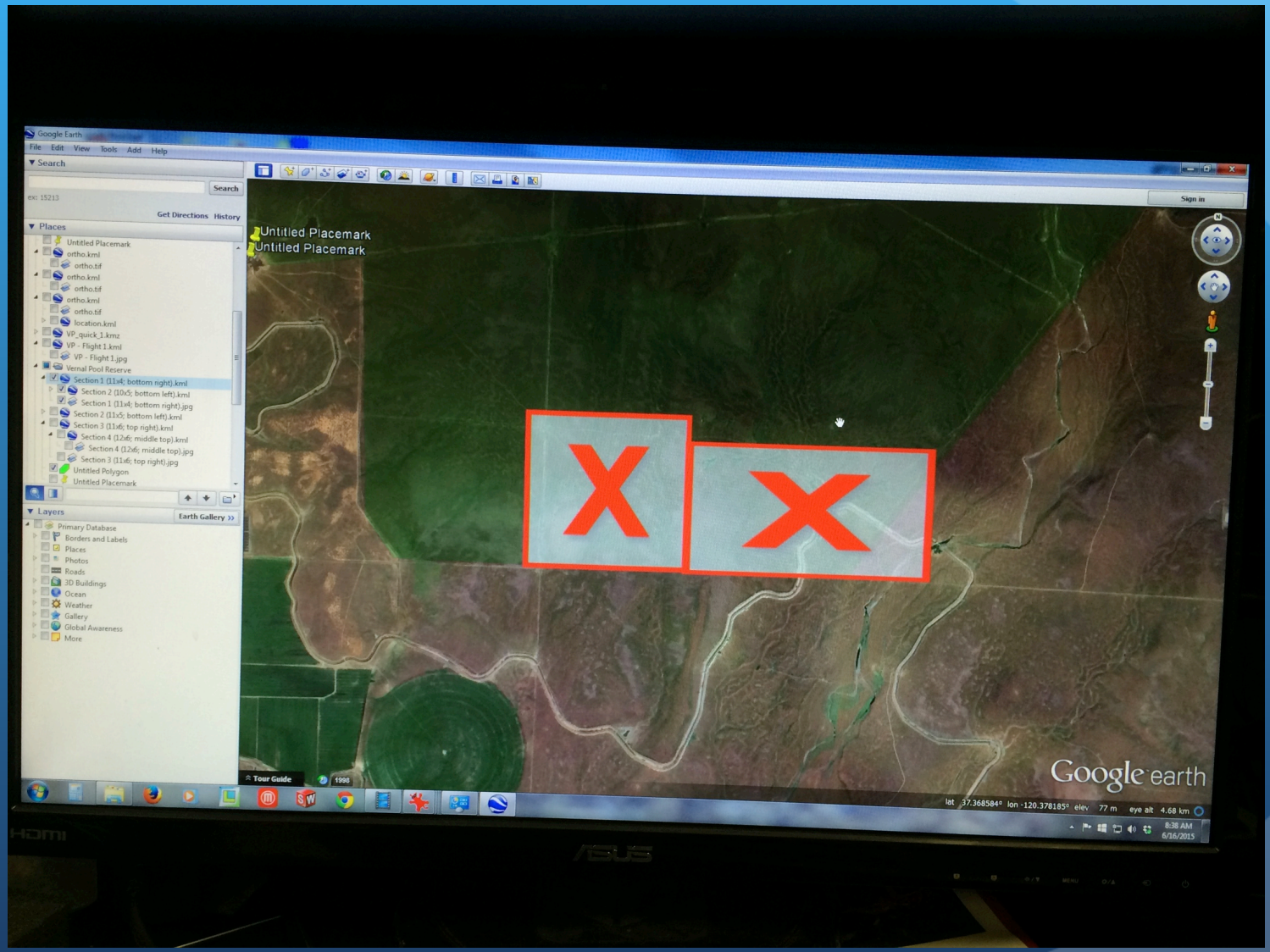
Build Texture



Agisoft PhotoScan Analogy



Georeferencing w/ Google Maps



Exporting Ortho

Survey Data

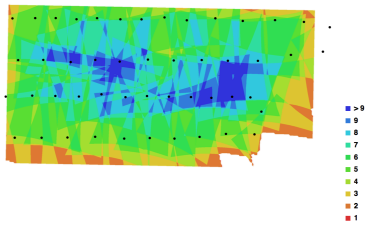


Fig. 1. Camera locations and image overlap.

Number of images:	50	Camera stations:	49
Flying altitude:	283.655 m	Tie-points:	27602
Ground resolution:	0.0920926 m/pix	Projections:	80557
Coverage area:	0.686169 sq km	Error:	1.51495 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
Canon PowerShot S95	3736 x 2776	unknown	unknown	No

Table. 1. Cameras.

Camera Calibration

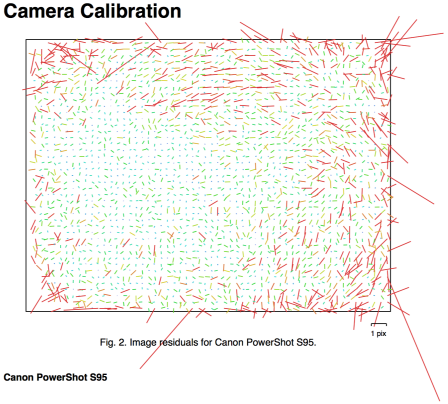


Fig. 2. Image residuals for Canon PowerShot S95.

Canon PowerShot S95

Type:	Frame	K1:	-0.28972
Fx:	3026.68	K2:	0.119971
Fy:	3028.52	K3:	-0.0526472
Cx:	1853.92	K4:	0.0264868

Camera Locations



Fig. 3. Camera locations and error estimates.
Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.
Estimated camera locations are marked with a black dot.

X error (m)	Y error (m)	Z error (m)	Total error (m)
4.515195	2.094422	1.643023	5.241481

Table. 2. Average camera location error.

Digital Elevation Model

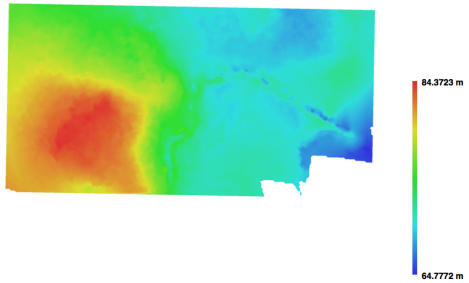
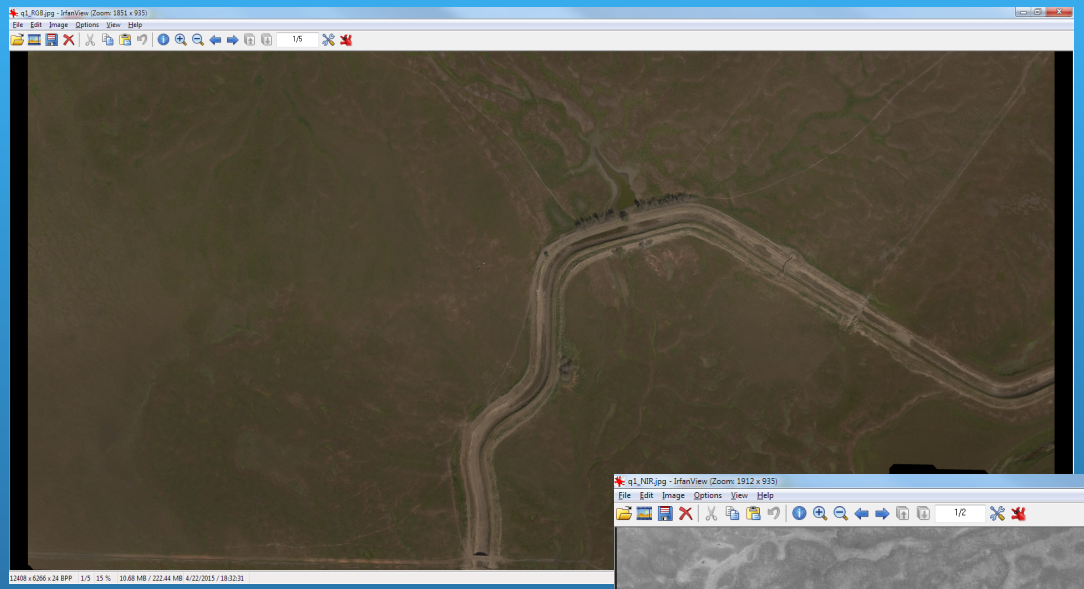
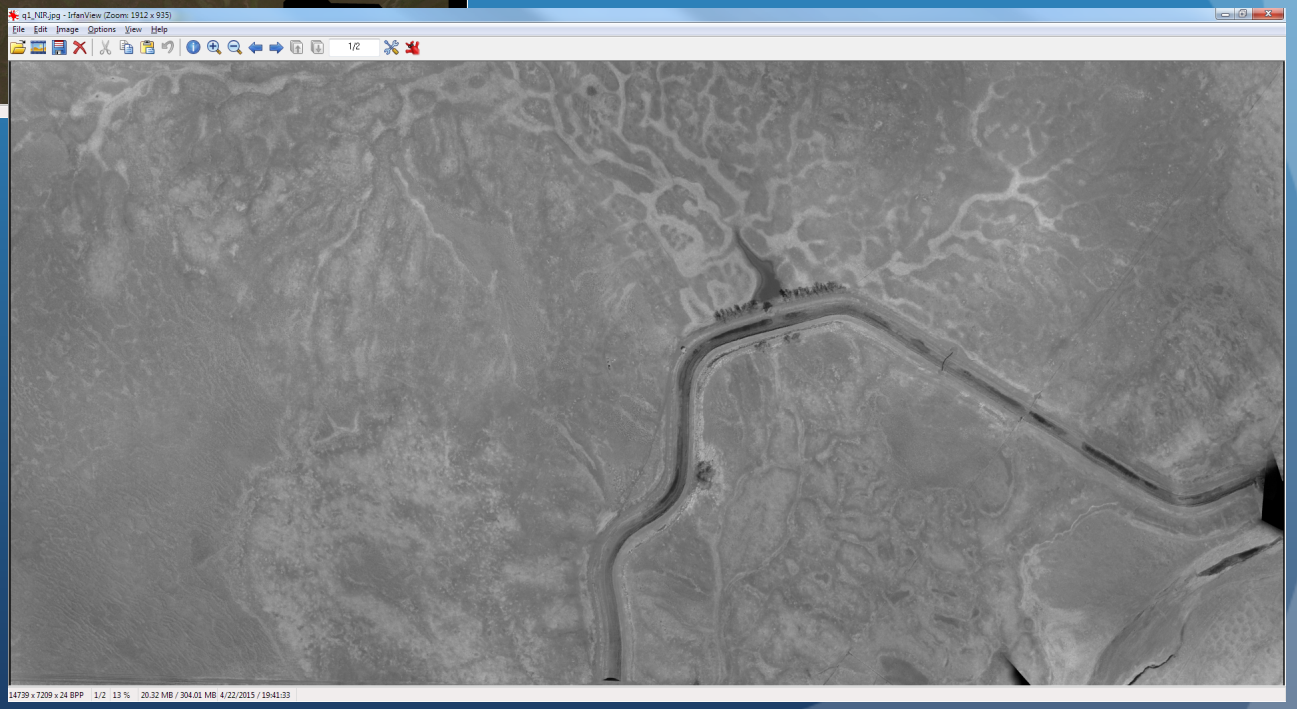


Fig. 4. Reconstructed digital elevation model.

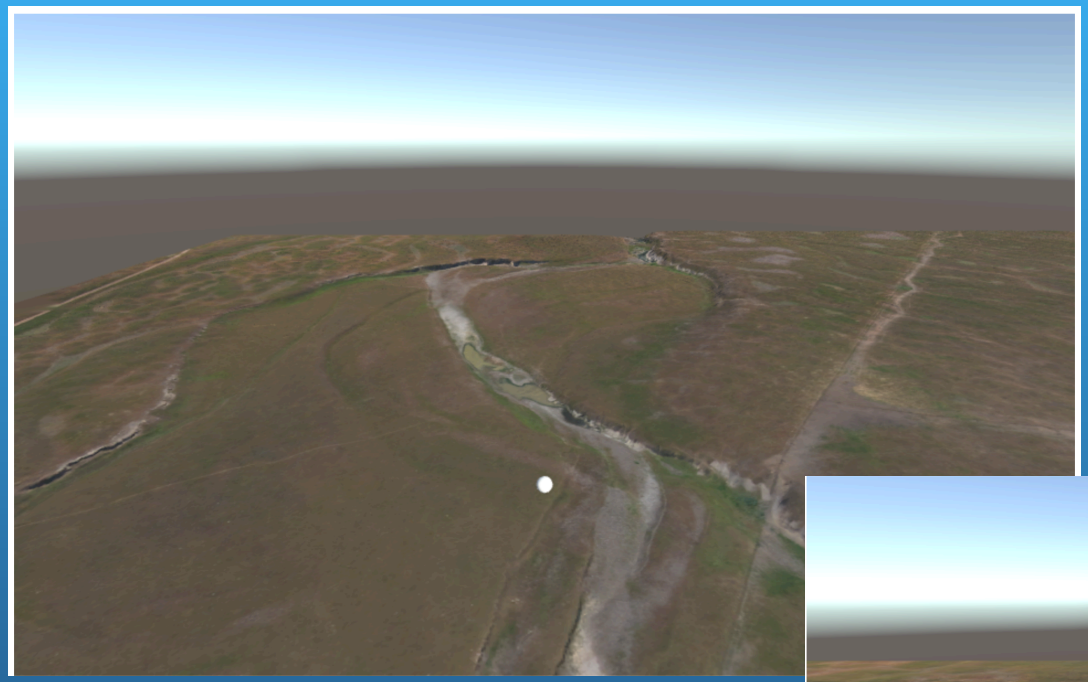
Resolution:	4.82254 m/pix
Point density:	0.042998 points per sq m

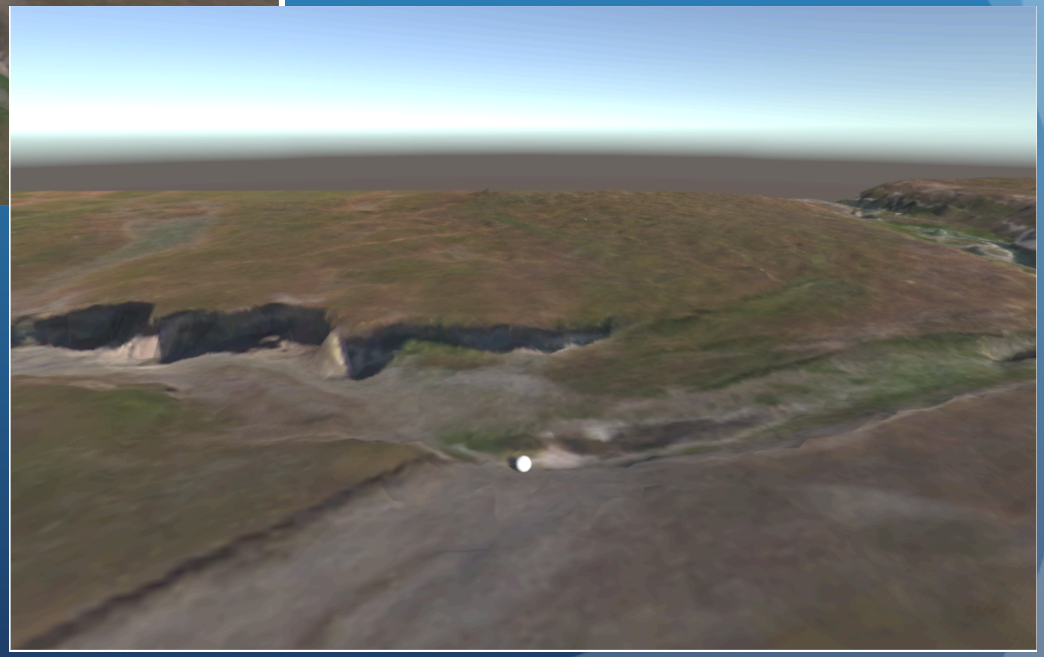
Using NIR Imagery vs RGB





Unity Gameplay





RawTherapee

Used for Image Correction