



efficient traversal of large sets of images in cultural heritage

Greg Downing

xRez Studio

Yosemite Valley Extreme Panoramic Imaging Project

Managing large image datasets



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Santa Monica CA



Project Goals

- Base-line image for rockfall and rescue
- Merge photos to create detailed “Unwrapped” view

Other uses

- Understanding cultural heritage sites in context
- Site interpretation

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Yosemite Extreme Pano Project



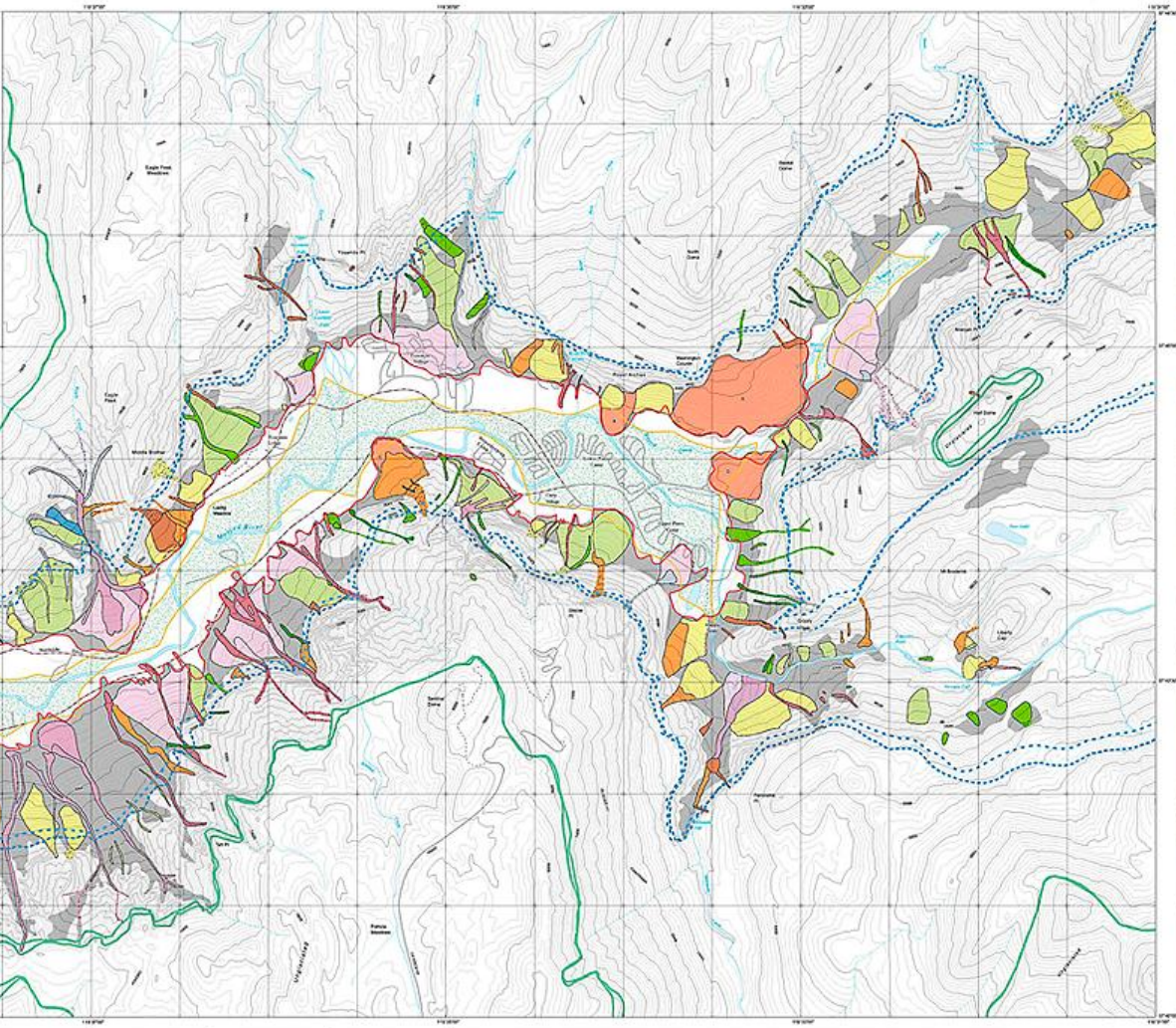


Rockfall can be hazardous



Map Explanation

Map No.	Location	Estimated Volume (C.U.)	Depth of Cut (ft.)	Length of Reach (ft.)	$\frac{V}{L}$
1	Bridge	1,471 (0.01)	1.0	400	3.67 (1.1)
2	Bridge	1,631	425	340	4.80 (1.3)
3	Bridge	1,631	425	340	4.80 (1.3)
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11	Bridge	1,631	425	340	4.80 (1.3)
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18	Bridge	1,631	425	340	4.80 (1.3)
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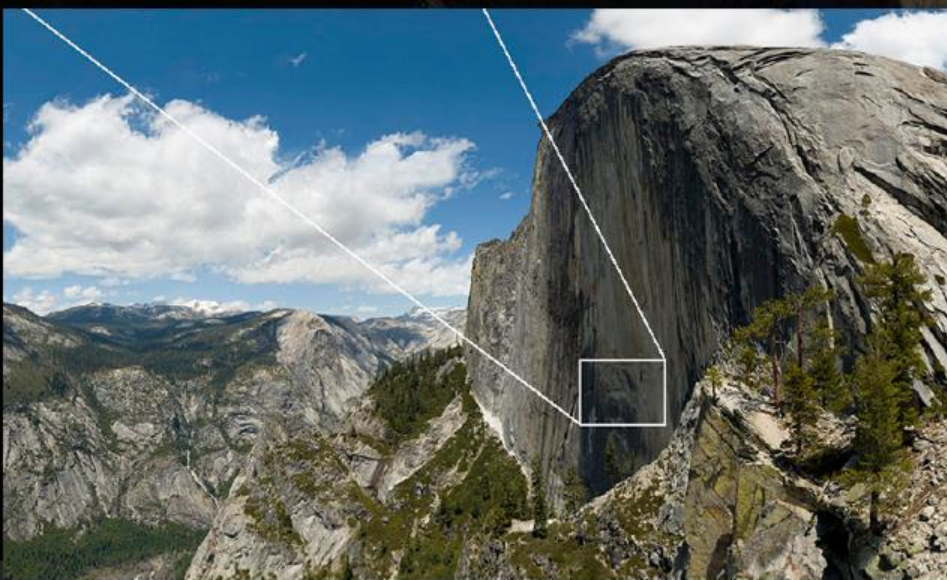


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Yosemite Extreme Pano Project

Re-photography

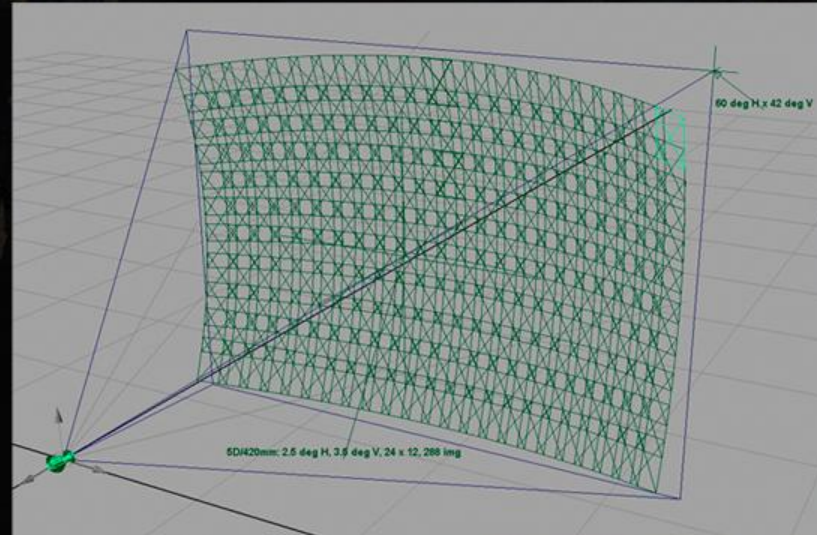


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Gigapixel Pan & Tile



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Yosemite Extreme Pano Project



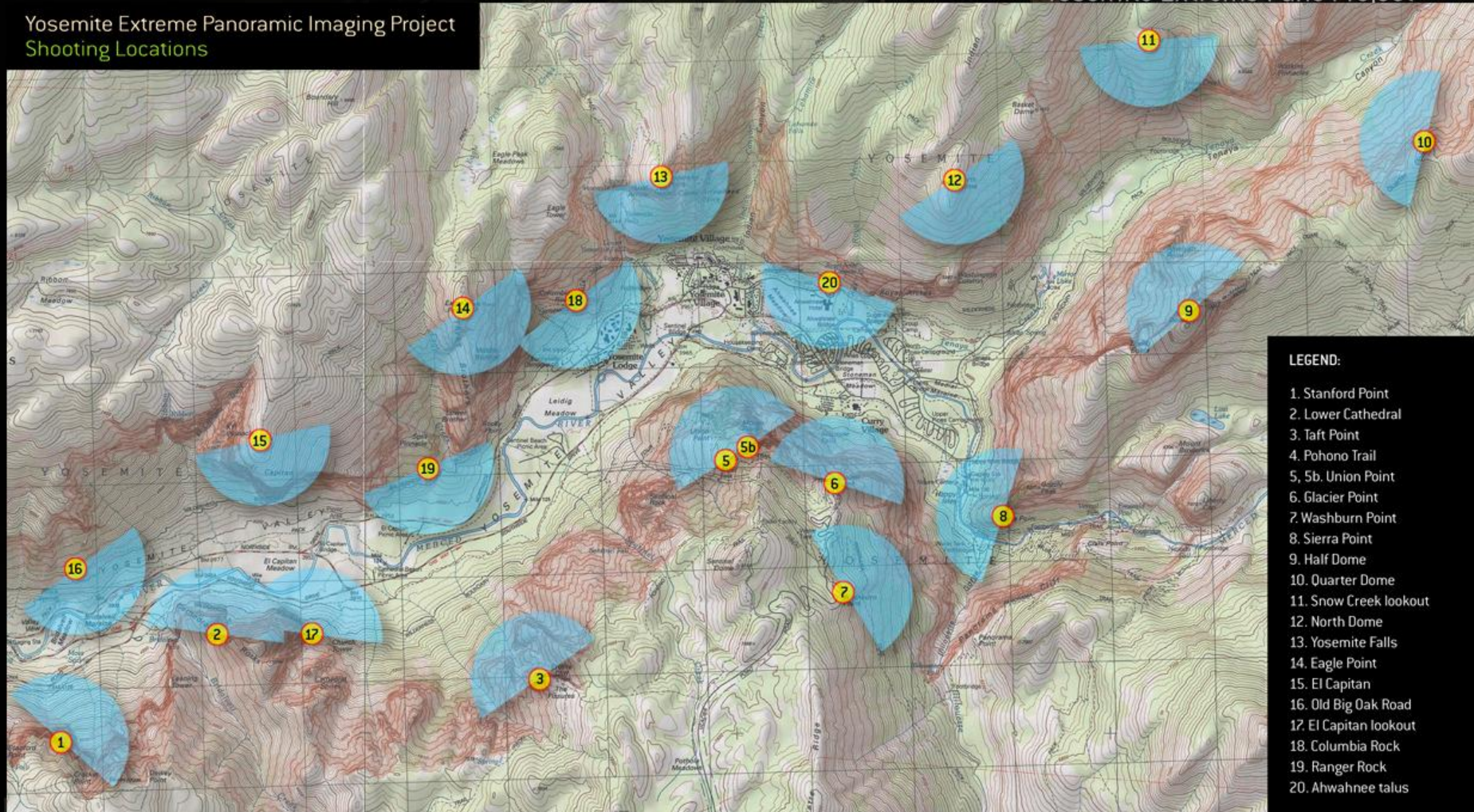
75,000 pixel width, 612 shots w/ 300mm, 3.2 gigapixels total

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Yosemite Extreme Pano Project

Yosemite Extreme Panoramic Imaging Project Shooting Locations



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Yosemite Extreme Pano Project





Equipment

- Canon G9
- Gigapan
- GPS
- Radio
- Color Chart





Total Travel

-120 miles of
hiking

-36,000 feet
of vertical
climb



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ZUI via Silverlight

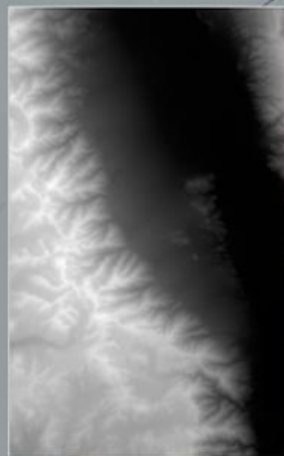
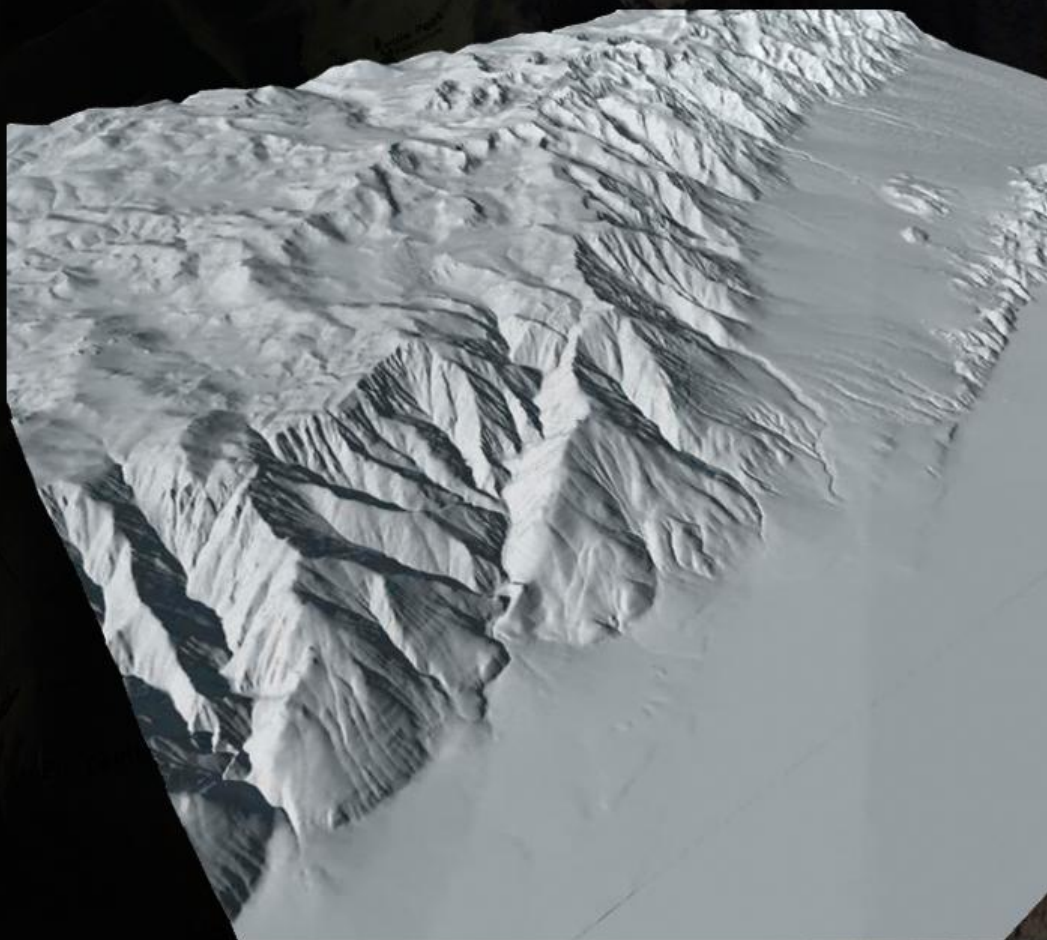


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Yosemite Extreme Pano Project

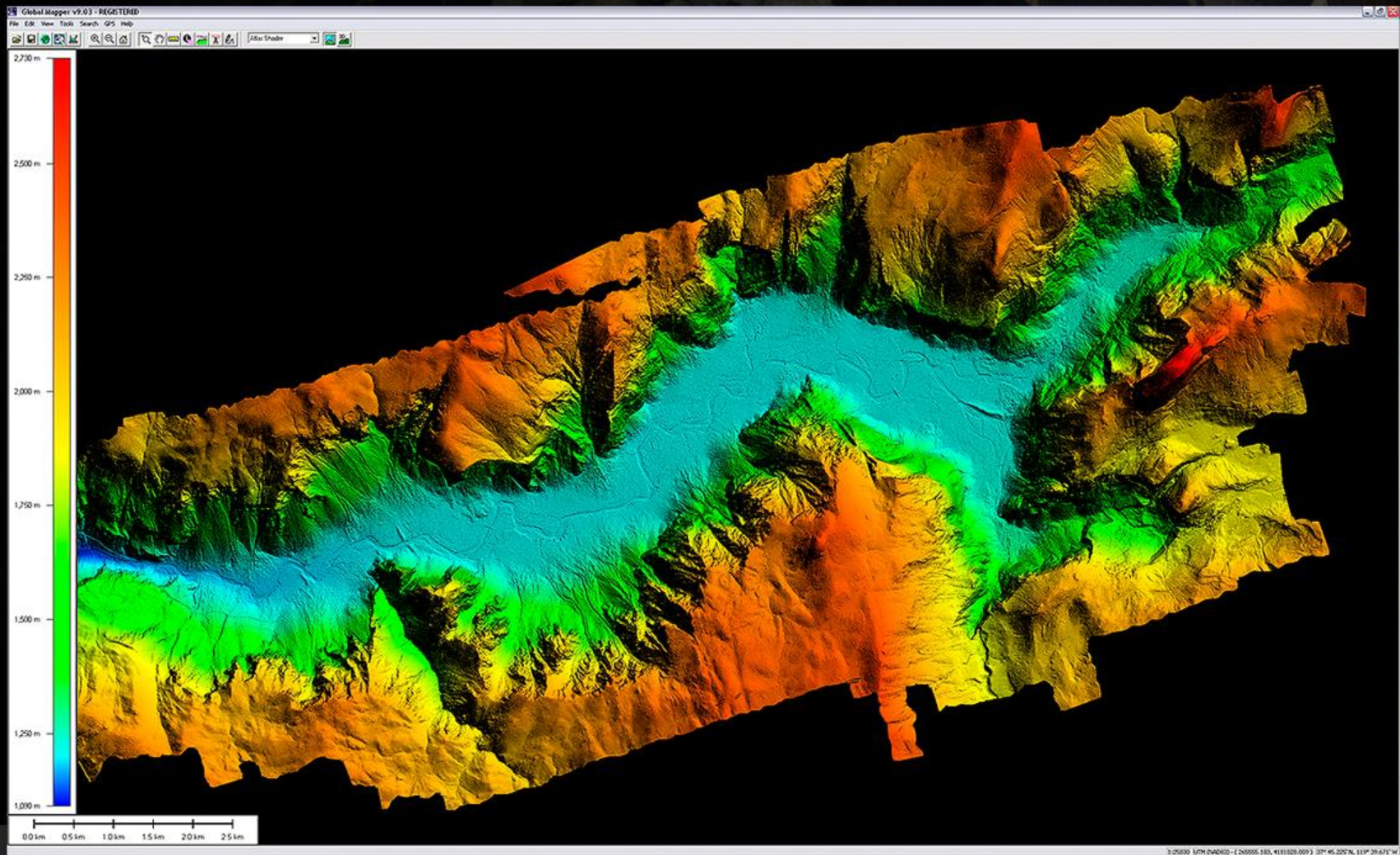
Digital Elevation Models



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Yosemite Extreme Pano Project

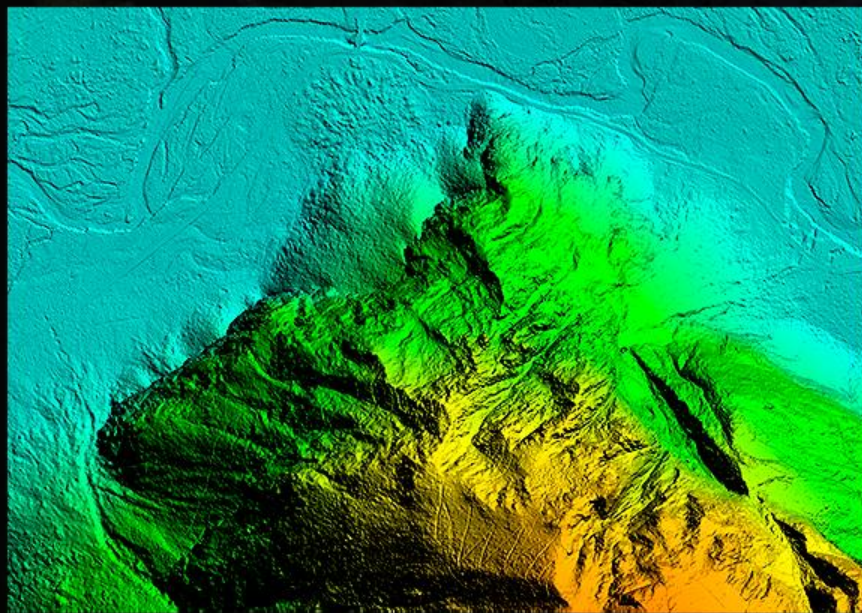


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1 Meter per Pixel

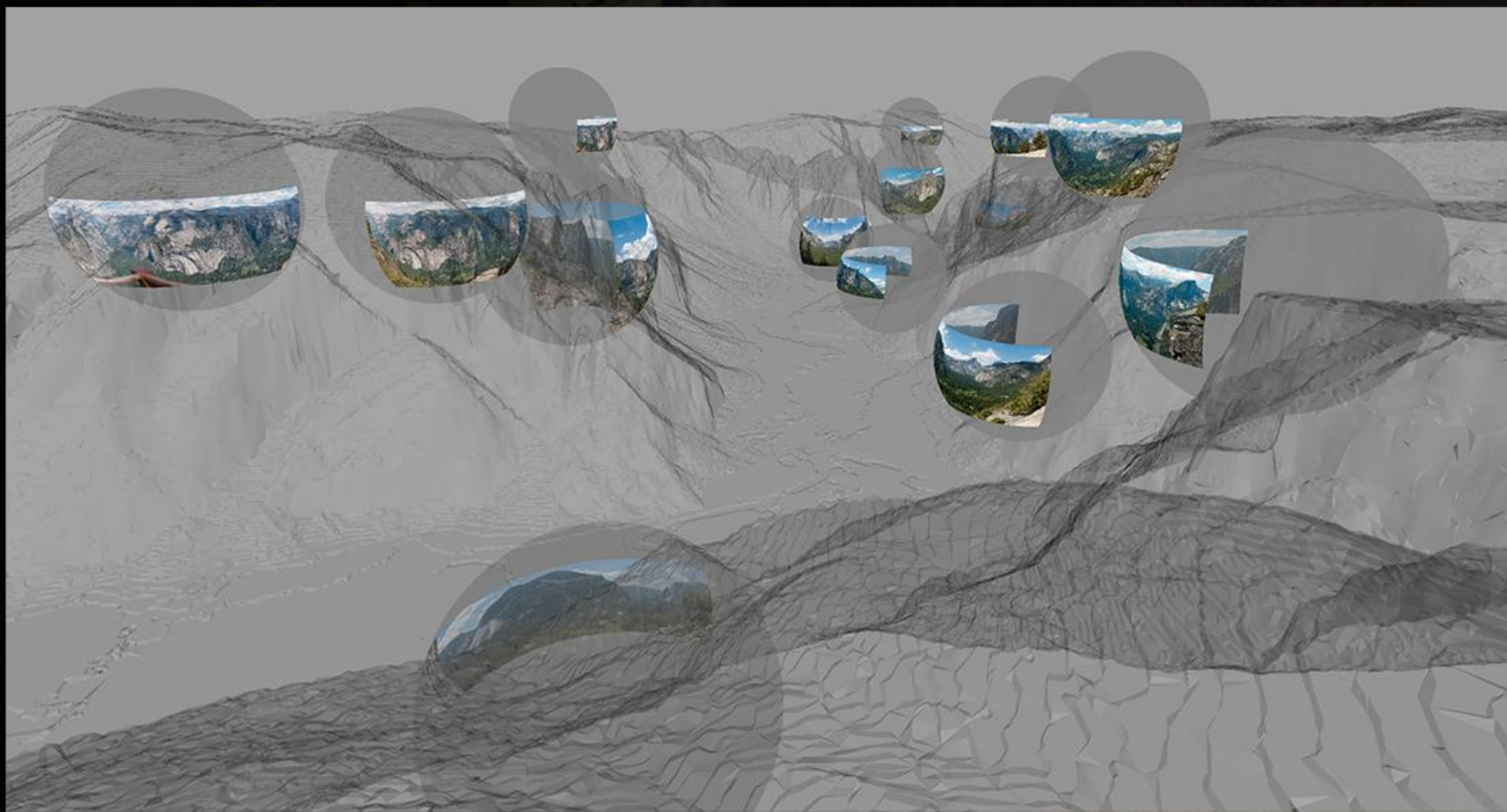


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Tracking



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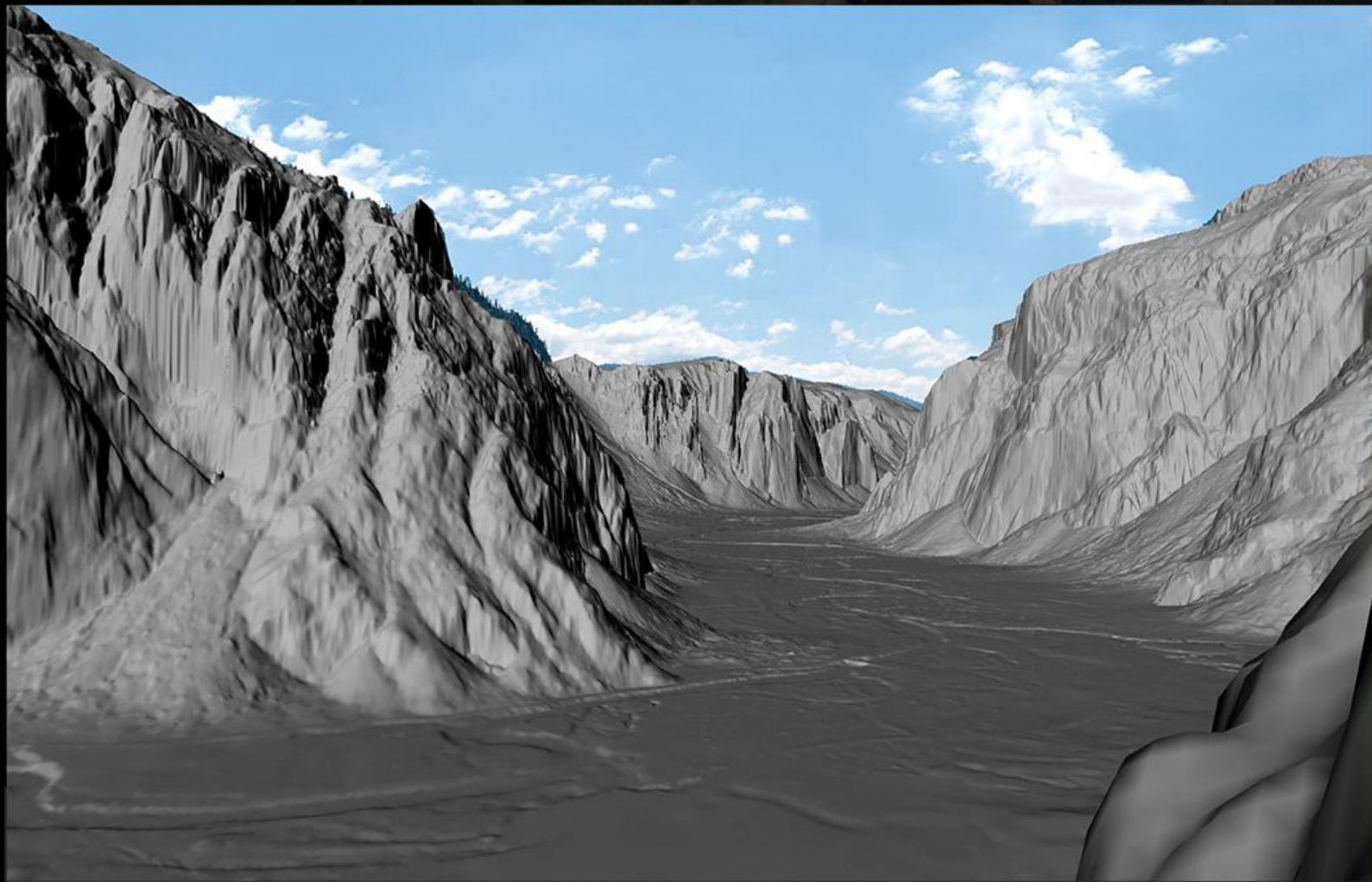
Yosemite Extreme Pano Project



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Yosemite Extreme Pano Project

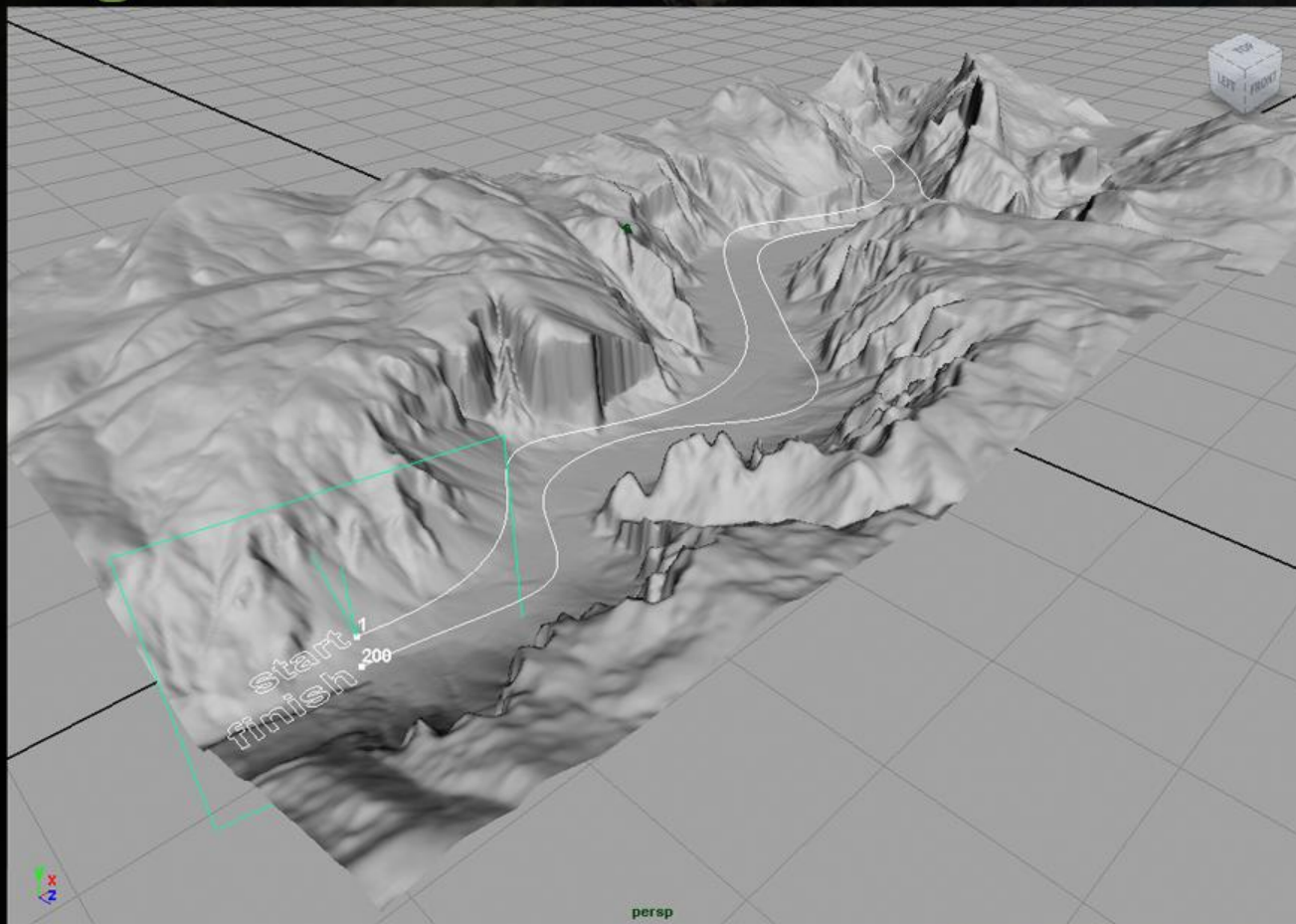


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Rendering 16 miles of view



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Slit-scan renders

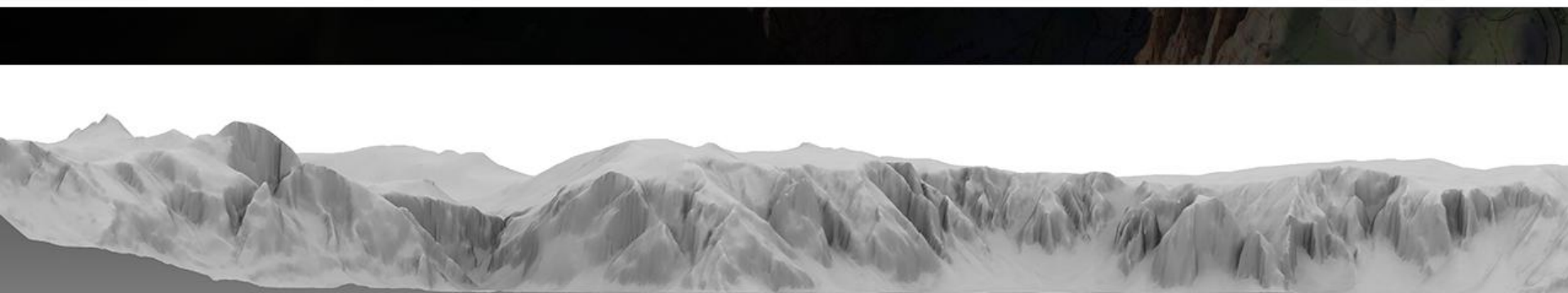
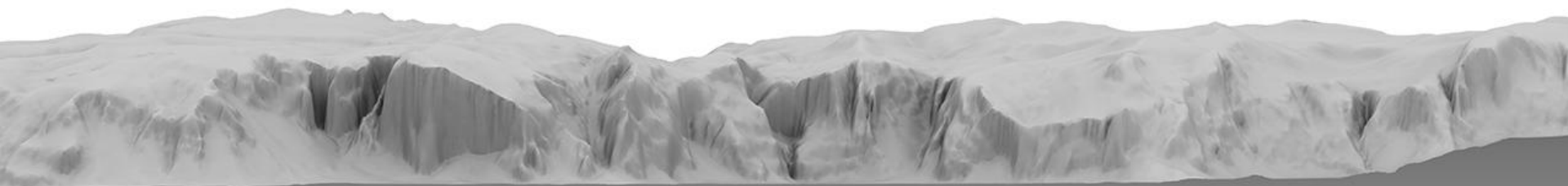


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Orthographic Renders



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Siggraph 08





Improvements

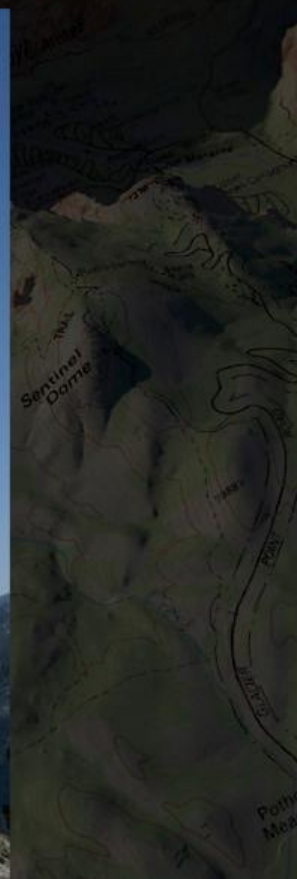
- Manually tracking gigapixel imagery is hard
- DEMs do not work so well with extremely vertical or overhanging rock

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Automatic Dense Photogrammetry



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The image is a screenshot of a web browser window displaying the Photosynth website. The browser's address bar shows a URL from photosynth.net. The website's header includes the Photosynth logo and navigation links like 'Sign In' and 'Search Synths'. The main content area features a large, interactive 3D scene of a hang glider flying over a valley, with a large, semi-transparent image of the hang glider in the foreground. The interface includes a left sidebar with 'Home', 'Create', and 'Explore' links, and a right sidebar with a title 'Hang Gliding over Yosemite Valley', a date 'xRez_Studio 8/22/2008', and a description of the project. The bottom of the page shows a list of related synths, including one by Seth_Bridge titled 'OMG! This is so cool'.

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Yosemite Extreme Pano Project

Resulting Point Cloud



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Yosemite Extreme Pano Project





Large Image Dataset

- Unwrap made from 15,000 photos
- Photogrammetry required 500, whole valley would require x20 as many



Tools for managing large sets

- Image Pipeline (automatically added via Downloader Pro)
 - Unique names
 - Addition of GPS, camera and other metadata
- Manual Logs and Maps
- Potentially photogrammetry could be used

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Yosemite Extreme Pano Project

result

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Yosemite Extreme Pano Project

http://www.xrez.com/yose_proj/Yose_index.html

<http://www.seadragon.com>