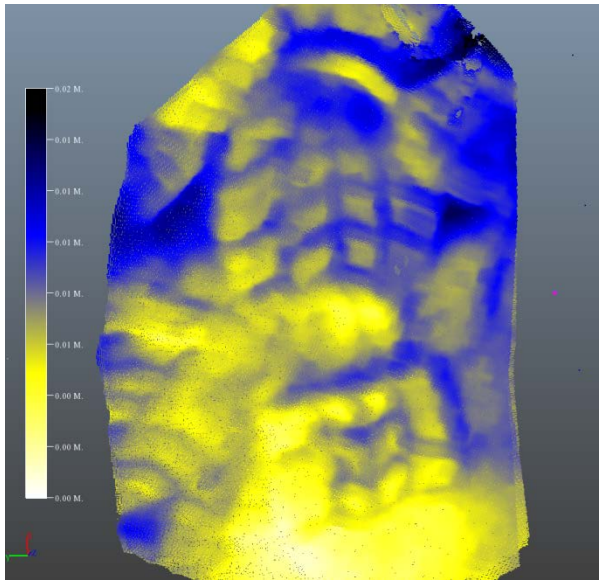
Applications of Photogrammetry in Forensic Investigations



International Association of Forensics and Security Metrology

PMS AG
PHOTO MESS SYSTEME

URC VENTURES

Eos Systems

Agenda

Speaker: Eugene Liscio, IAFSM
Introduction and Applications of Photogrammetry in Forensics
Duration: 20 min

Speaker: Harald Krause, Photo Mess Systeme
Bloodstain Pattern Analysis in Elcovision 10
Duration: 10 min

Speaker: David Boardman, URC Ventures
Dense Point Cloluds & Aerial Photogrammetry
Duration: 10 min

Matt Klymson, Eos Systems
Photogrammetric & Other Point Cloud Sources in PhotoModeler Scanner
Duration: 10 min

Questions: 5 min

International Association of Forensics and Security Metrology

IAFSM (www.iafsm.org, info@iafsm.org)

Non-profit, professional association of users, service providers, and manufacturers of metrological techniques and technology working for the advancement of justice.

Promote the development and use of precision measurement systems, techniques and software in the generation of two- or three-dimensional coordinate spatial data for documentation, planning, analysis and/or presentation purposes in the service of justice.

Education through webinars, workshops, presentations, papers and conferences.

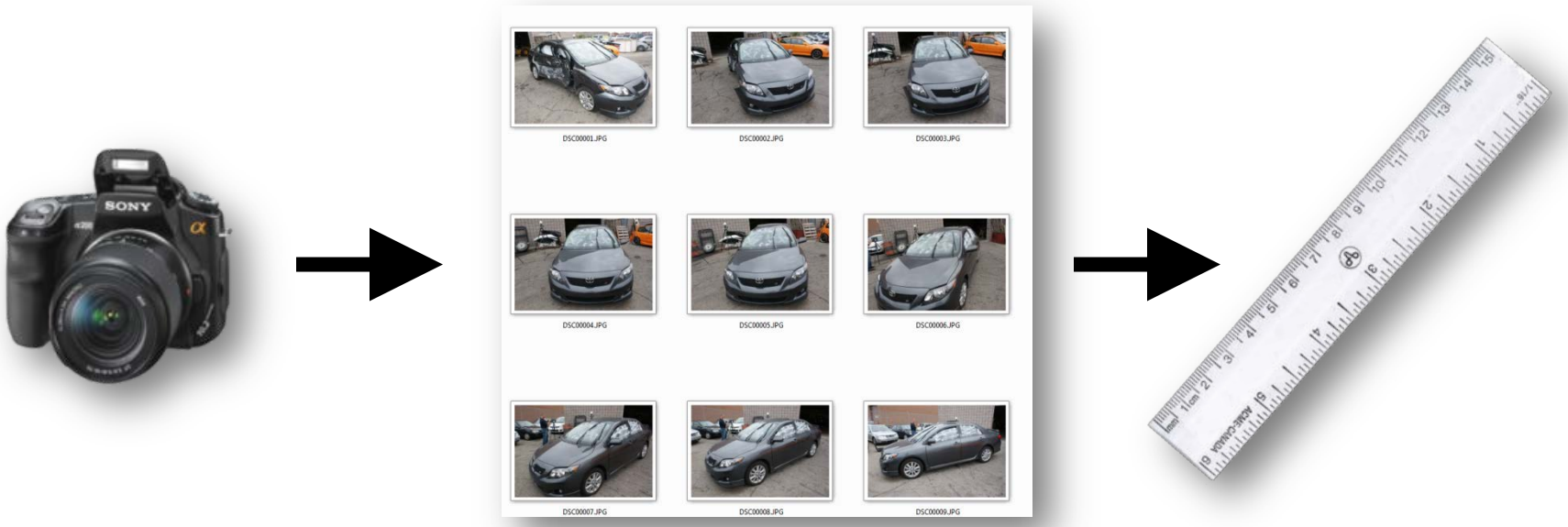
Photogrammetry

The term photogrammetry is derived from three Greek words:

“PHOTOS” = light or light rays

“GRAMMA” = drawn or written

“METRON” = to measure



Why Photogrammetry?

- Proliferation of cameras (and video) means they are abundant.
- Digital SLR cameras are still one of the most utilized tools at crime and accident scenes.
- Photogrammetry is a low cost solution when compared to total stations or laser scanners.
- Another tool for the toolbox.

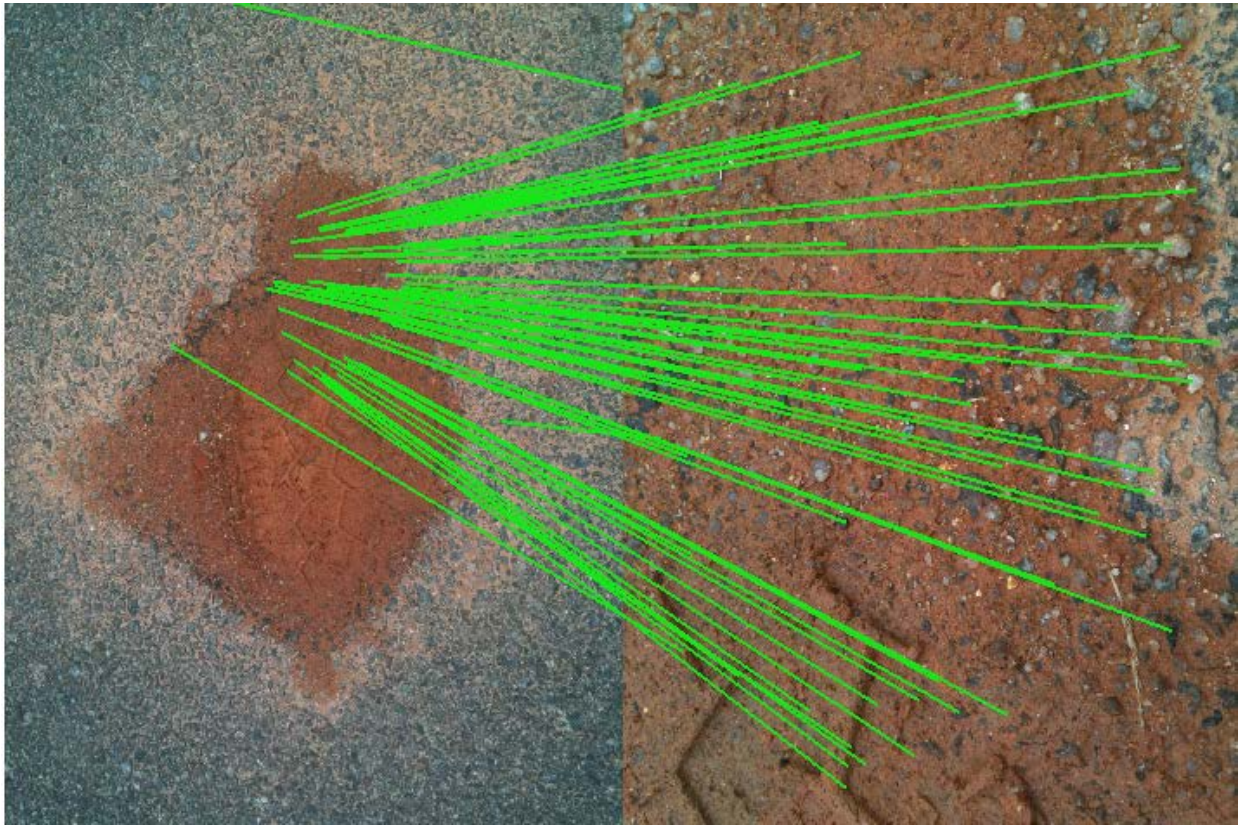
Why the Recent Interest of Photogrammetry?

- 1980s–1990s: Digitizing tablets available, but the process of working with photogrammetry packages meant manual marking and referencing.
- Circa 2000: Some automation started to appear including semi-automated target detection.

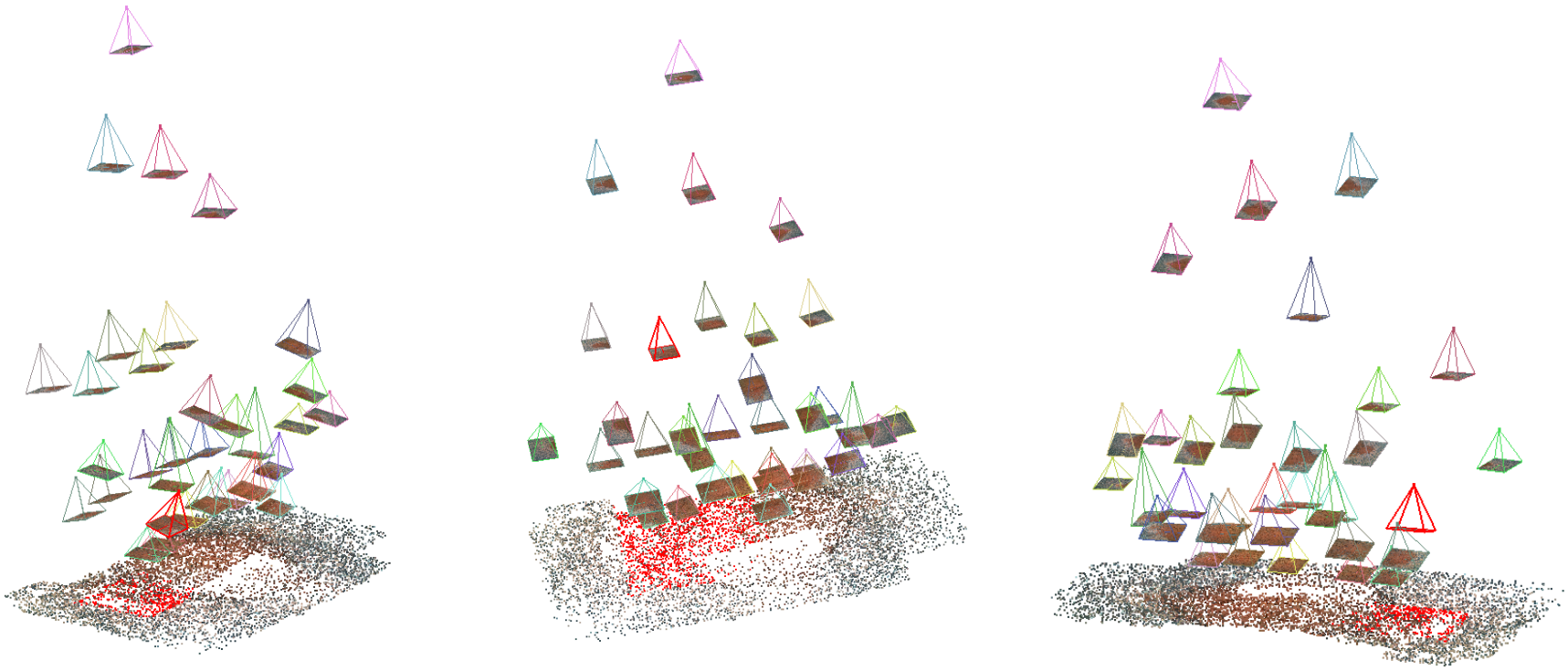
- Circa 2005: Dense reconstructions available
- 2006: Early form of automatic Image orientation
- 2008 and on: Bundler, Photosynth, 123D Catch, VisualSFM, CMPMVS and others doing fully automated construction from photos to finished mesh.

Scale Invariant Feature Transform (SIFT)

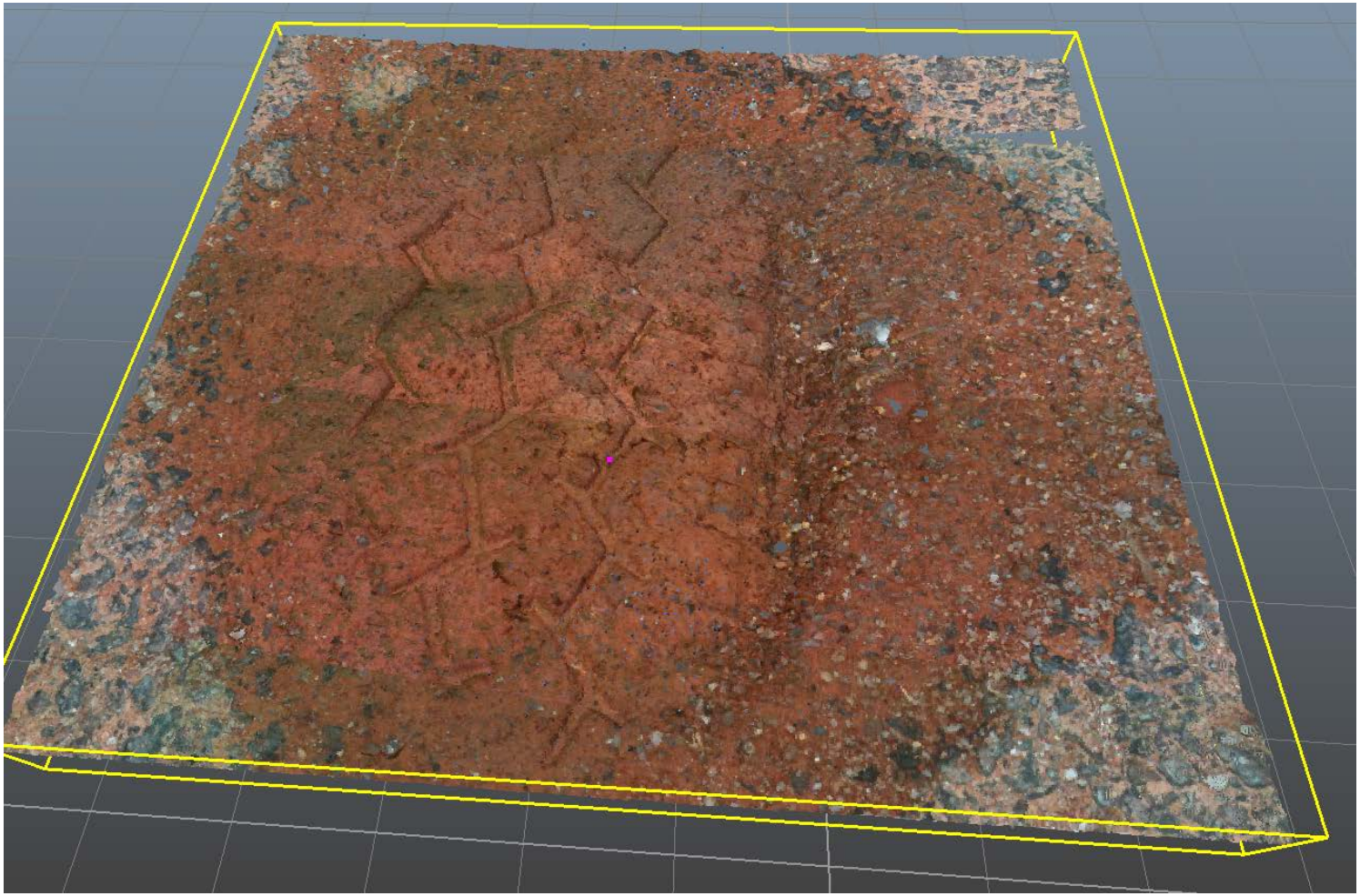
“Object Recognition from Local Scale-Invariant Features”, 1999
-David G. Lowe, University of British Columbia



Camera Orientations & 3D Features



Dense Reconstructions



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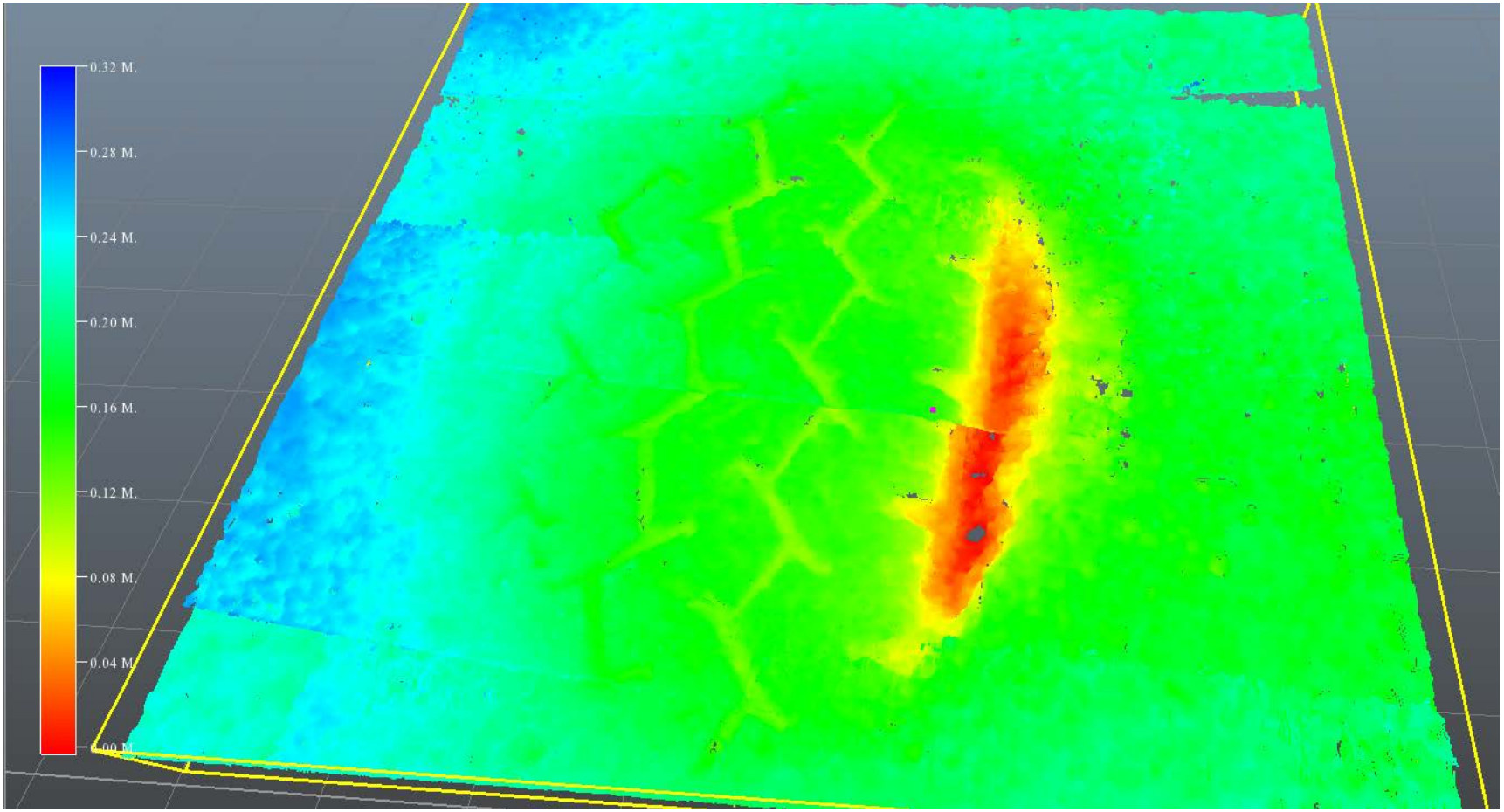


What Are Most Common Photogrammetry Techniques

- Solve for 3D Points
- Use Targets for High Accuracy Projects
- Dense Point Clouds
- 3D Meshed and Textured Models
- Solve for Single Photographs
- Orthorectification of Images

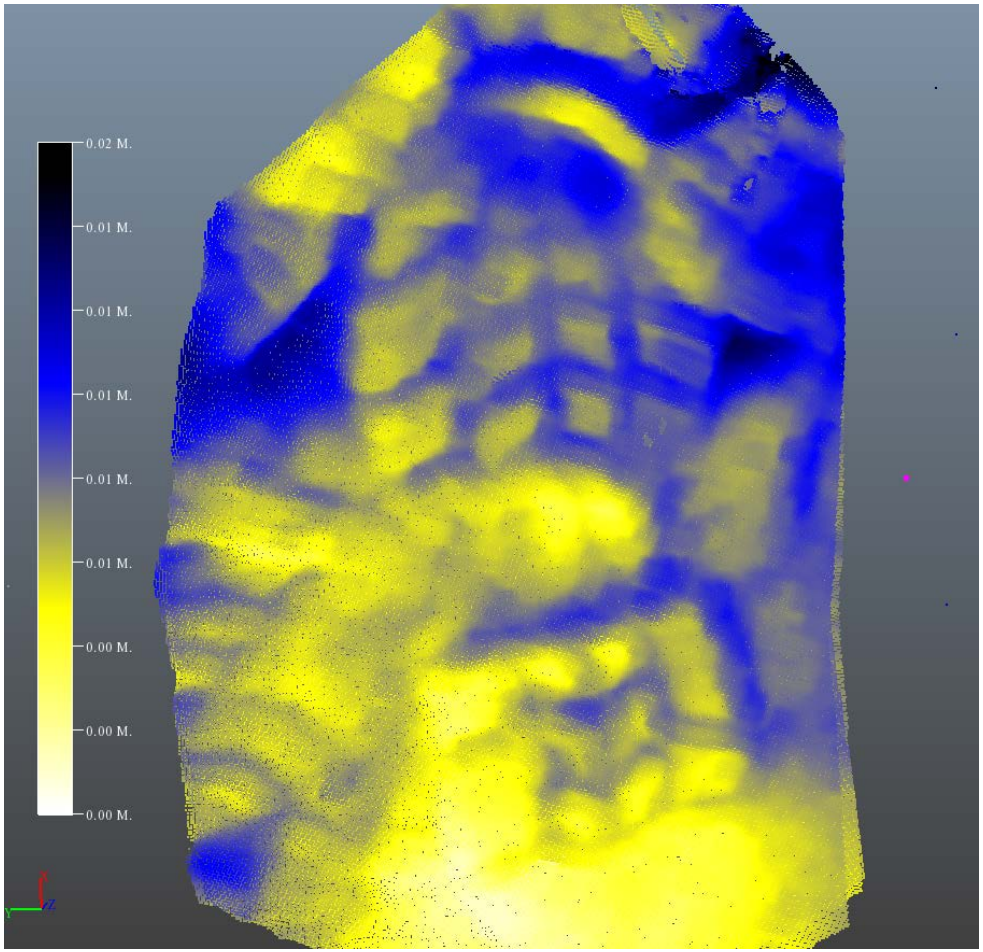
Applications: Cartridge Case

Photographs

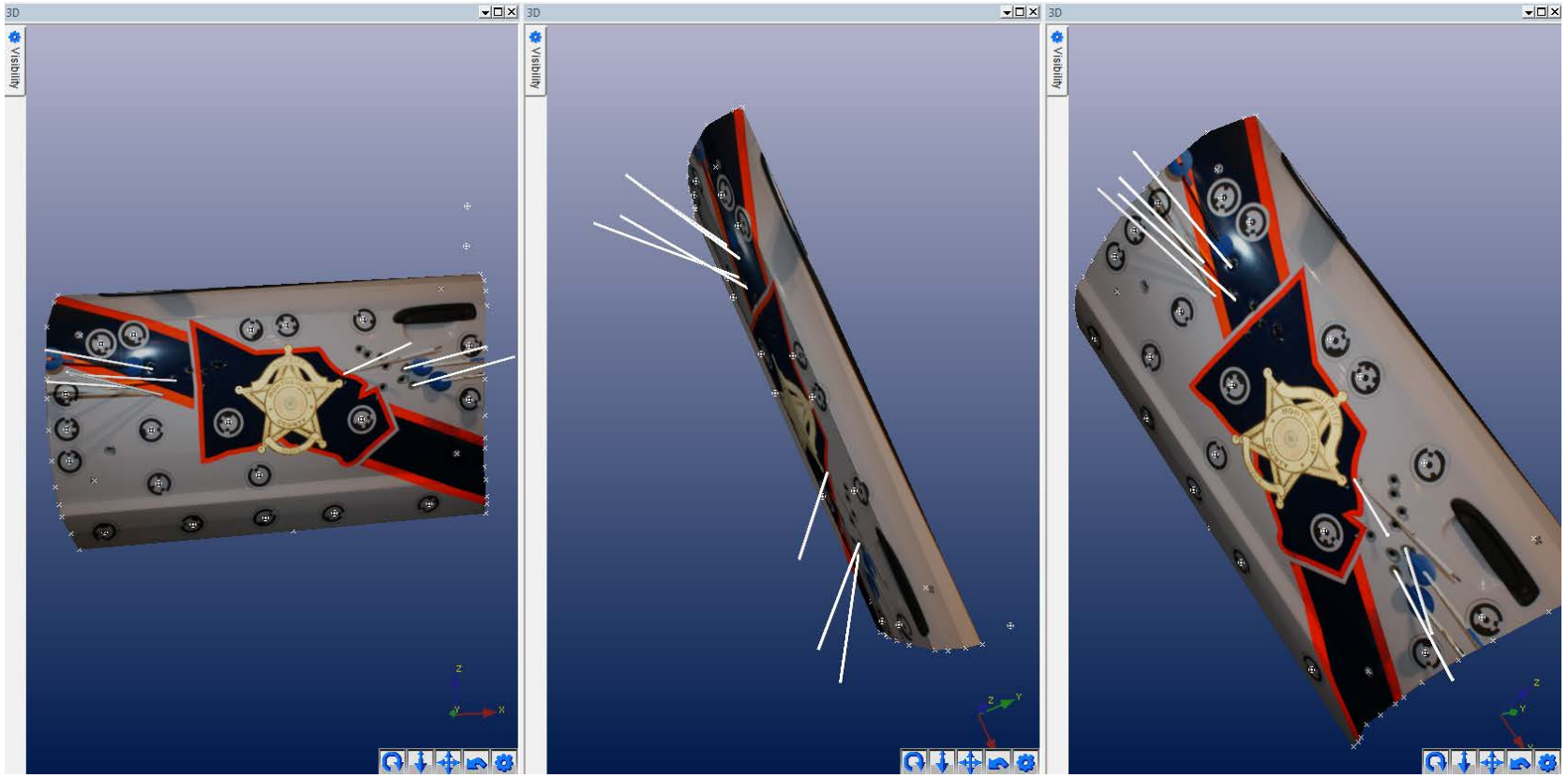
3D Textured Mesh

“Unrolled” Mesh

Applications: Footprint Documentation



Applications: Bullet Trajectories



Applications: Fire Investigation

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Applications: General Crime Scene Modeling

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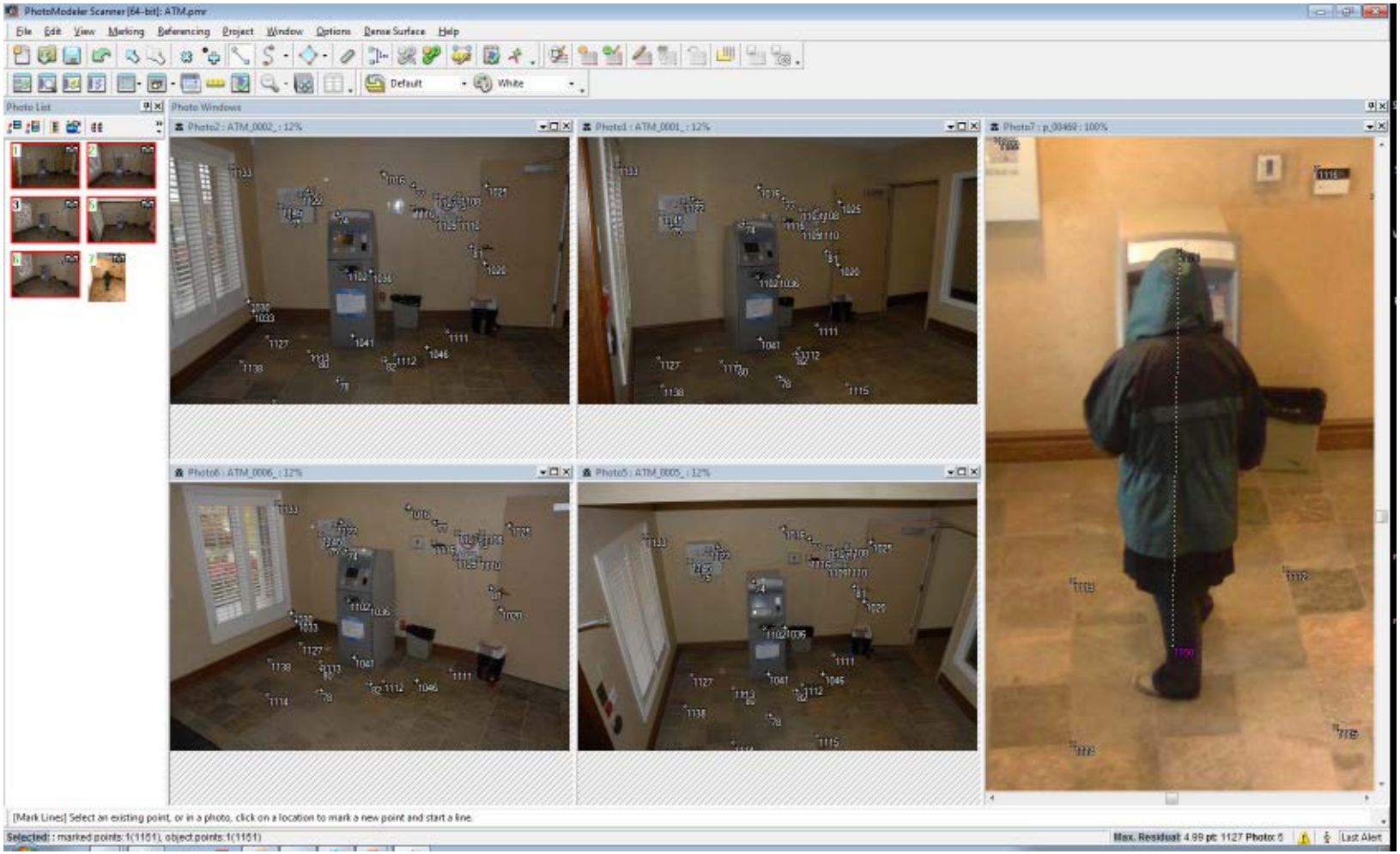
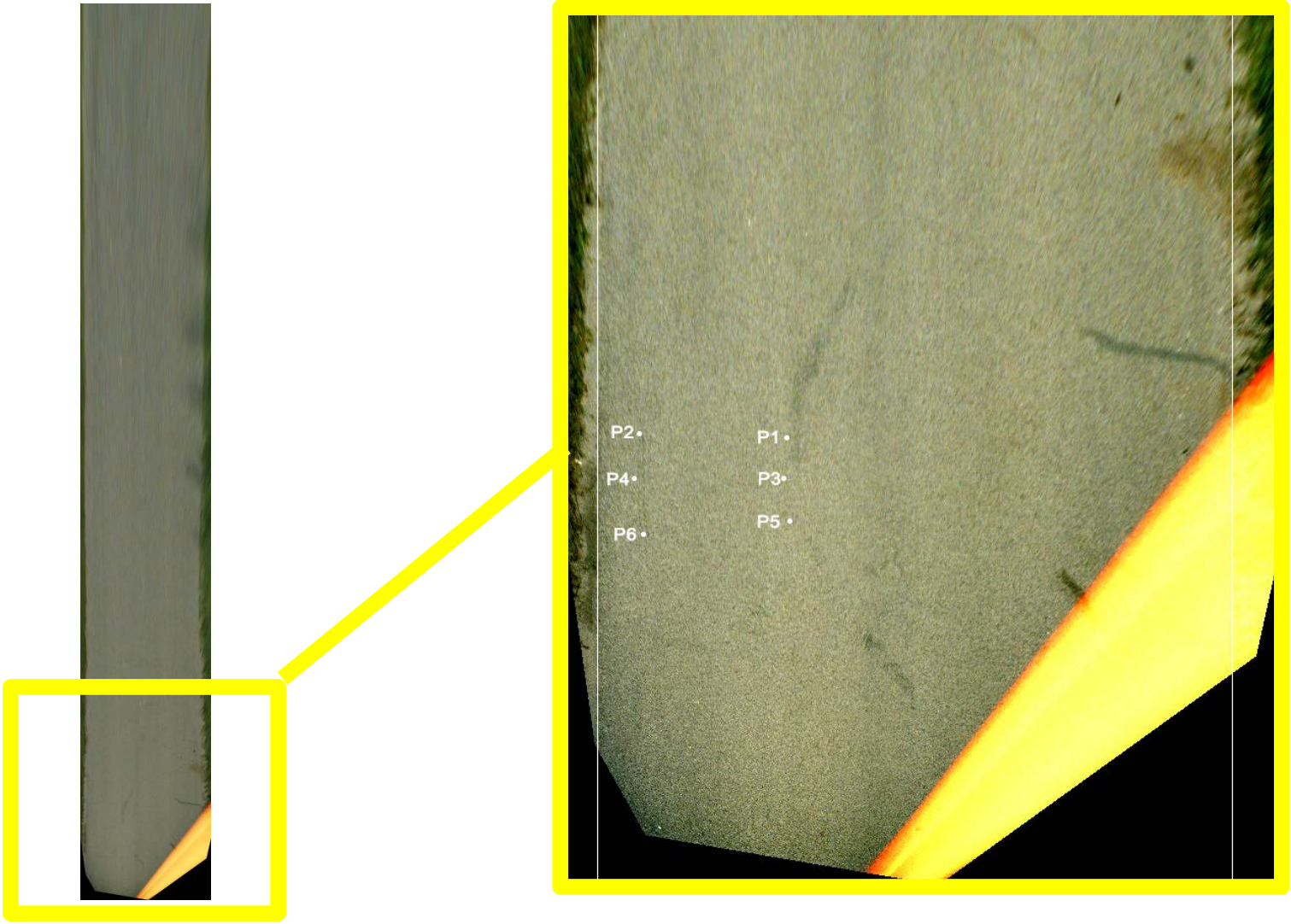
Applications: Suspect Height Analysis



Applications: Orthorectification of Photos

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