PHOTOGRAMMETRIC APPROACHES FOR THE ARCHAEOLOGICAL MAPPING OF THE MAZOTOS SHIPWRECK

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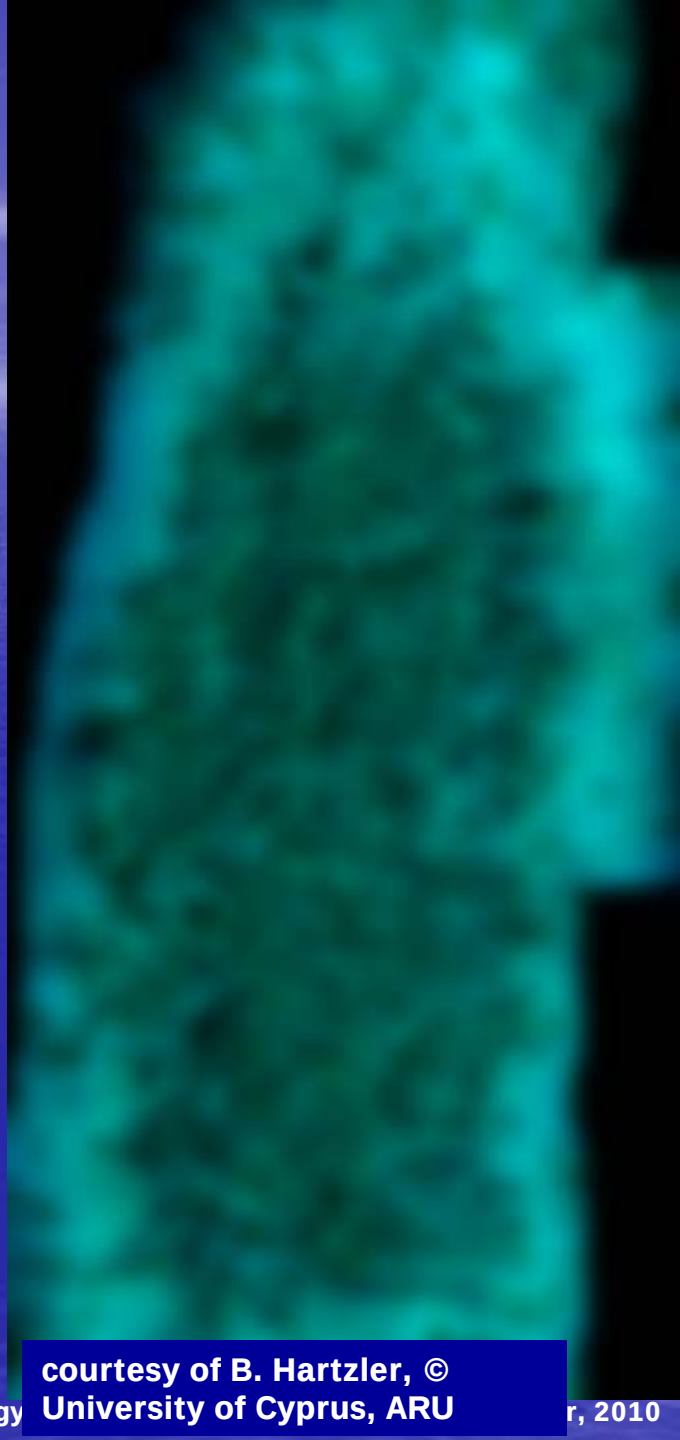
Study case: The Mazotos shipwreck

Some facts:

- ~300 bC
- Travelling from Chios
- 45 m depth
- Flat sand bottom
- ~500 amphoras
- 17x8 m revealed



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EOS 5D, 12.8 MP	EOS 5D, 12.8 MP	DMC-LMX2,10.4MP
8 photos	25 photos	8 photos
2184 x 1456	1747 x 1165	1624 x 1080
673 K points	1018 K points	355 K points

What does "support" means in an underwater excavation ?

- Mapping of the shipwrech as it was discovered
- Daily recording of the excavation site
- 3D progressive modelling of the whole ship wreck
- 3D modelling of main findings

Considering the challenging environment & temporal and time limitations, photogrammetry is the best (and only ?) available candidate for such task

Problems & limitations

- Limited accessibility
- Data acquisition by inexperienced personnel (divers)
- Two-interface (water and air)
- Absorption of red wavelength
- Significant diffusion
- Accuracy and establishment of control points
- Fast processing Vs demanding processing
- Expensive equipment Vs lack of funding

Underwater and overwater activities

Underwater

- Camera calibration
- Establish, measure and maintain network of control points
- Daily photography of the trench area

Overwater

- 3D modeling of findings (e.g. amphorae)
- Daily processing of new photography
- Daily maintenance and update the 3D model of the whole site

Network

- Establish control point network around the trench
- Connect it with the rest of the shipwreck area
- Estimate X,Y,Z of control, using aerial triangulation

σX= 0.034 m, σY= 0.064 m, σZ= 0.052 m over the whole shipwreck area

σX= 0.010 m, σY= 0.011 m, σZ= 0.031 m over the trench area

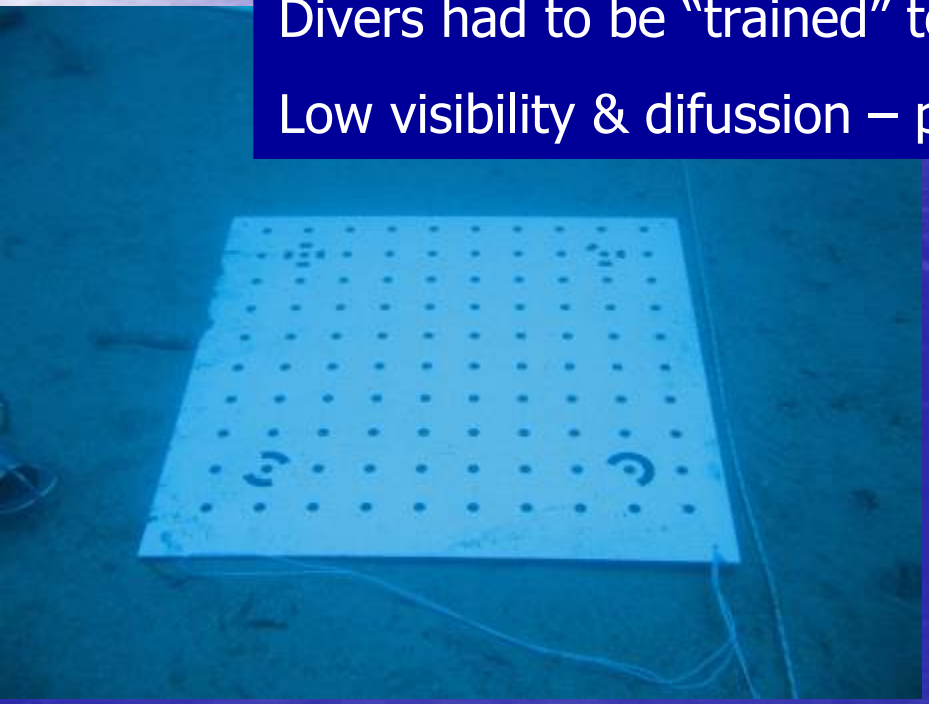
Camera calibration

Available camera: Low-cost Canon A620, 7.1 MP, with appropriate housing

Available s/w: Photomodeler

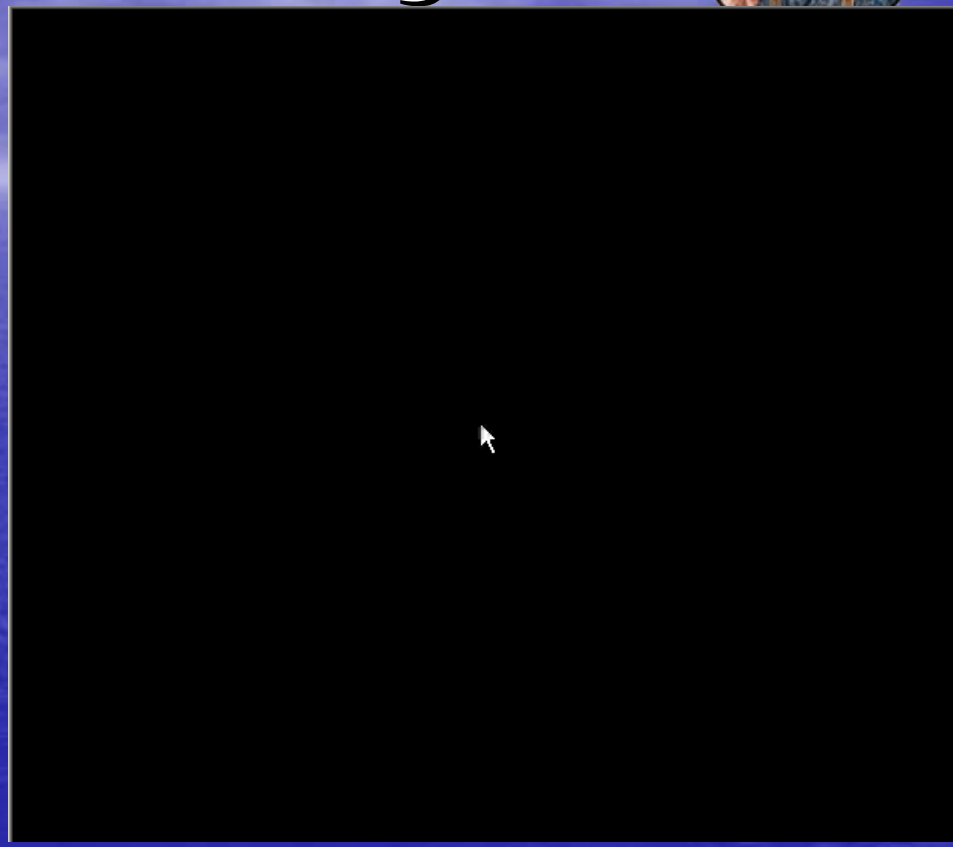
Divers had to be "trained" to perform such task

Low visibility & difussion – problems on auto detection



Daily trench modeling

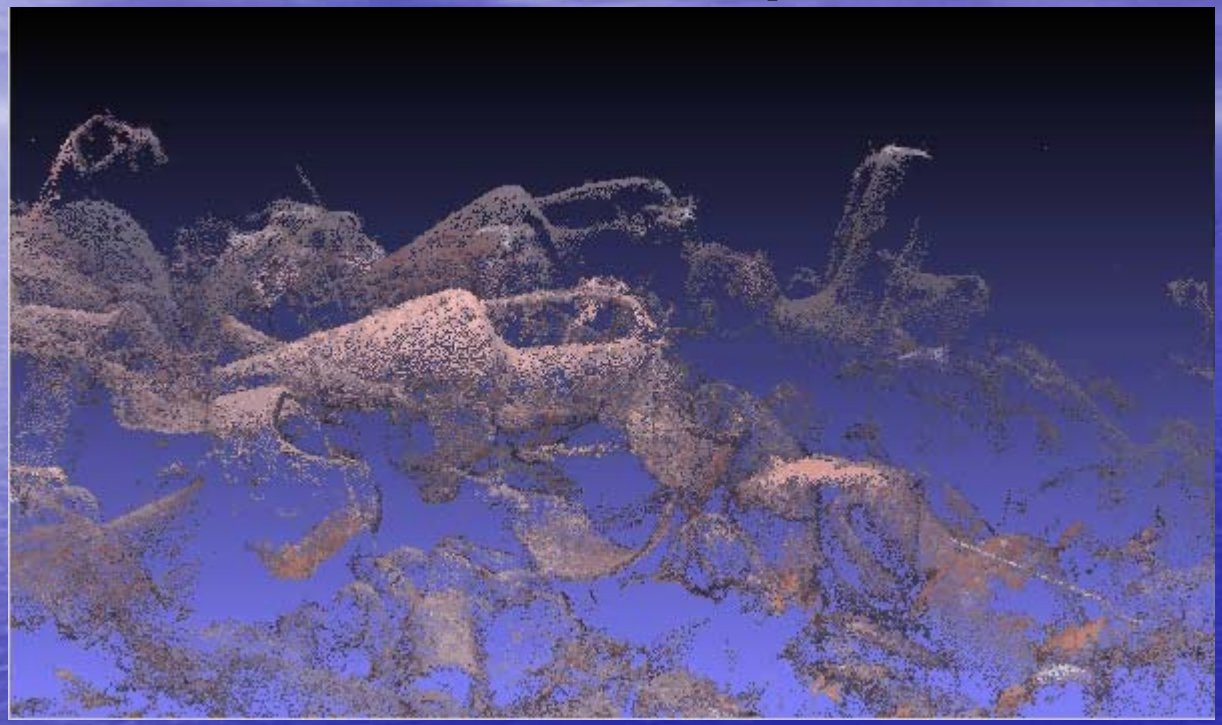
- Mosaic comprises an 'overview tool'
- Accuracy not necessary
- 35~50 images, taken in standard "aerial" layout with >60% overlap (to be used with standard photogrammetric processing al well)
- Open source automatic mosaicking
- Produced within 60 min from data capture



3D modeling for findings

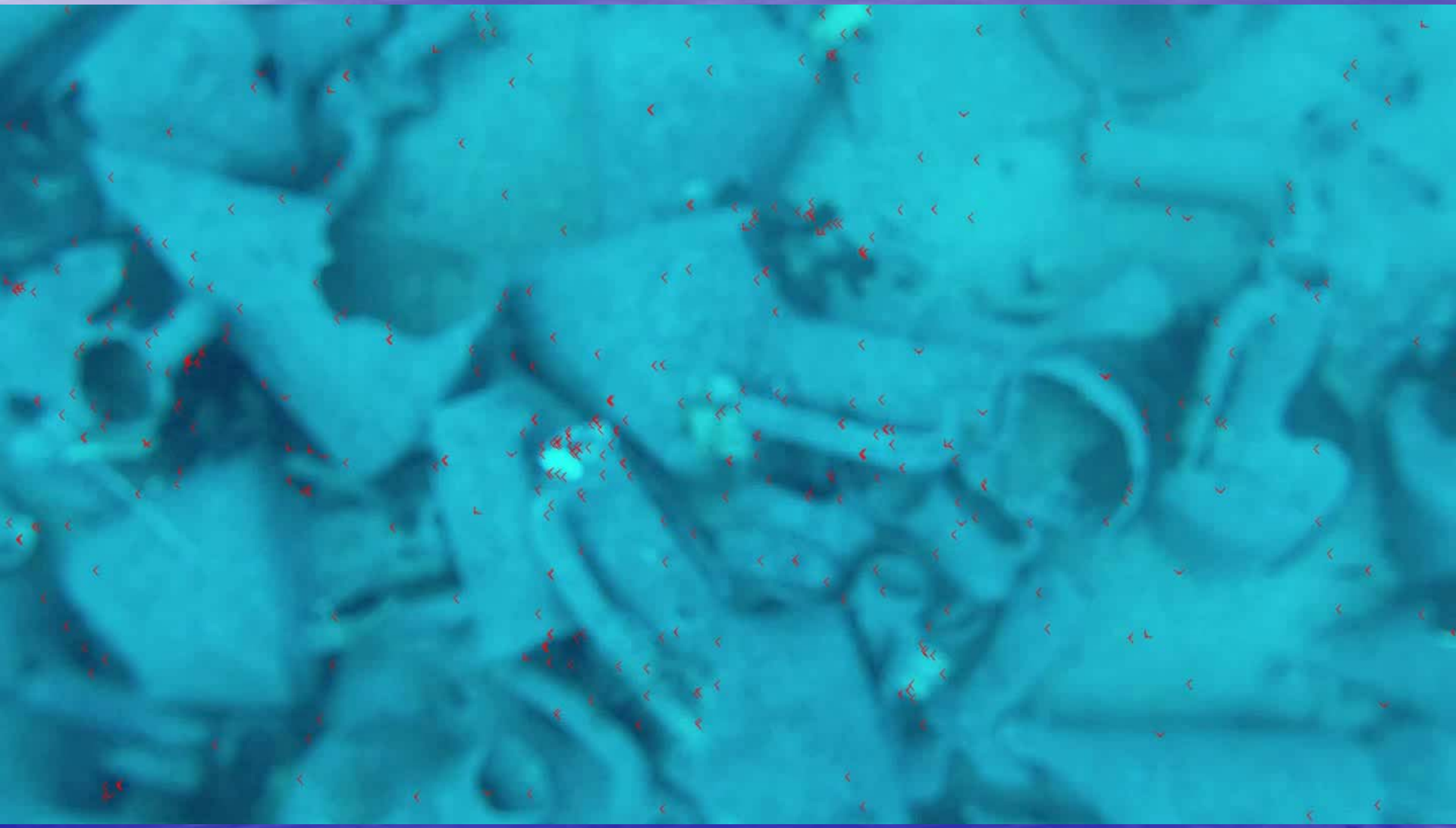
- 60~80 images using a 10.2MP DLSR Sony a320, in two setups
- Easy and fast acquisition (~10 min)
- Approximately 10 hours automatic processing for point cloud generations
- Some manual registration between point clouds
- Only scale is 'rectified' externally, in current configuration

3D modeling using machine vision techniques



- 164 photos from DSLR camera
- Full automatic processing
- Algorithmic approach can be extended to video processing

Initial efforts on 3D modeling using video



Thank you for your attention

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