

Photogrammetric Support on an Underwater Archaeological Site: The Mazotos Shipwreck Case

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What does “support” means in an underwater excavation ?



- 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

Underwater photogrammetry in an excavation site



There is the need to compromise among the following factors:

- Fast processing Vs demanding processing
- Stability Vs versatility
- Expert personnel Vs inexperienced divers
- 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



$\sigma_X = 0.034$ m, $\sigma_Y = 0.064$ m, $\sigma_Z = 0.052$ m
over the whole shipwreck area

$\sigma_X = 0.010$ m, $\sigma_Y = 0.011$ m, $\sigma_Z = 0.031$ m
over the trench area

Camera calibration

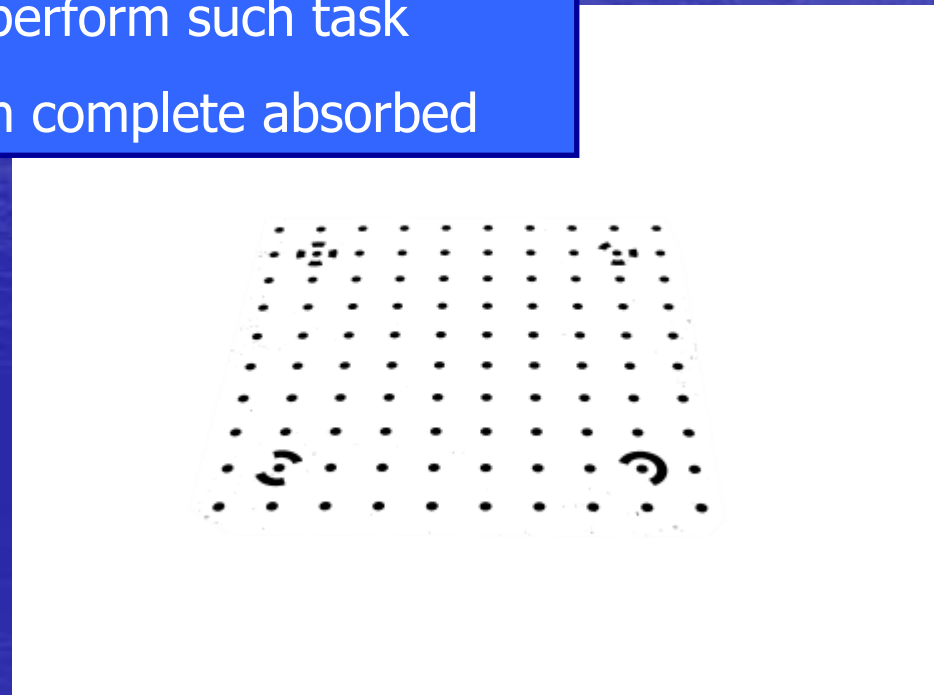


Available camera: Low-cost Canon A620, 7.1 MP, with appropriate housing

Available s/w: Photomodeler

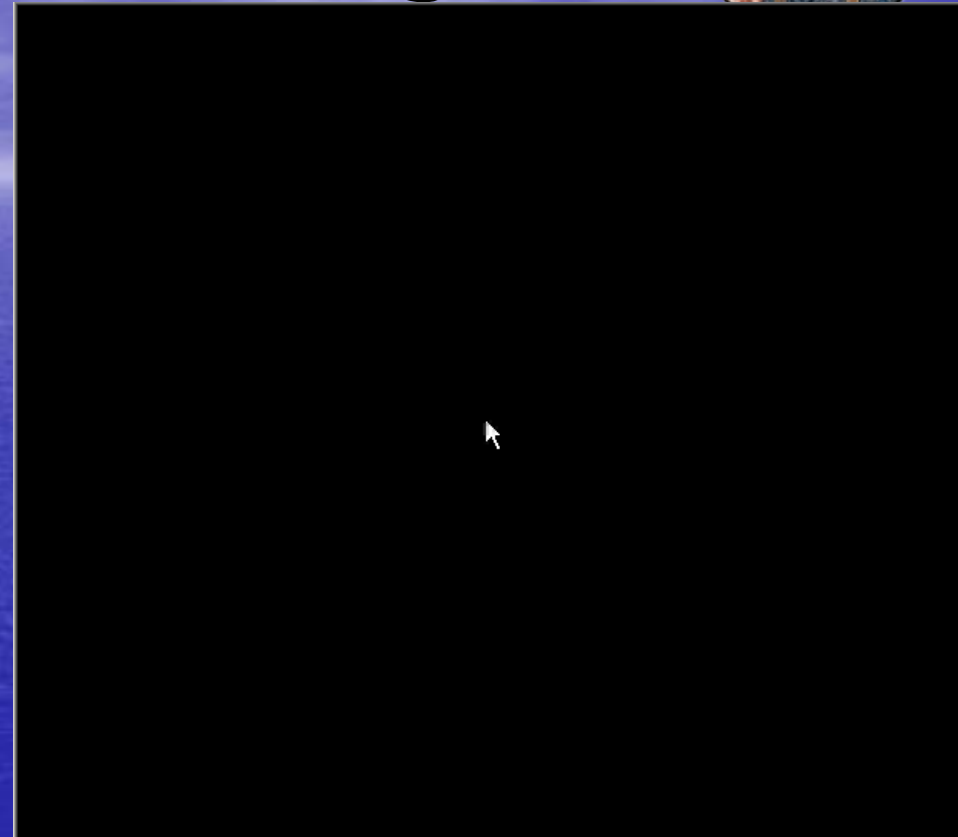
Divers had to be "trained" to perform such task

Low visibility – red wavelength complete absorbed



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 as well)
- Simple automatic mosaicking
- Produced within 60 min from data capture



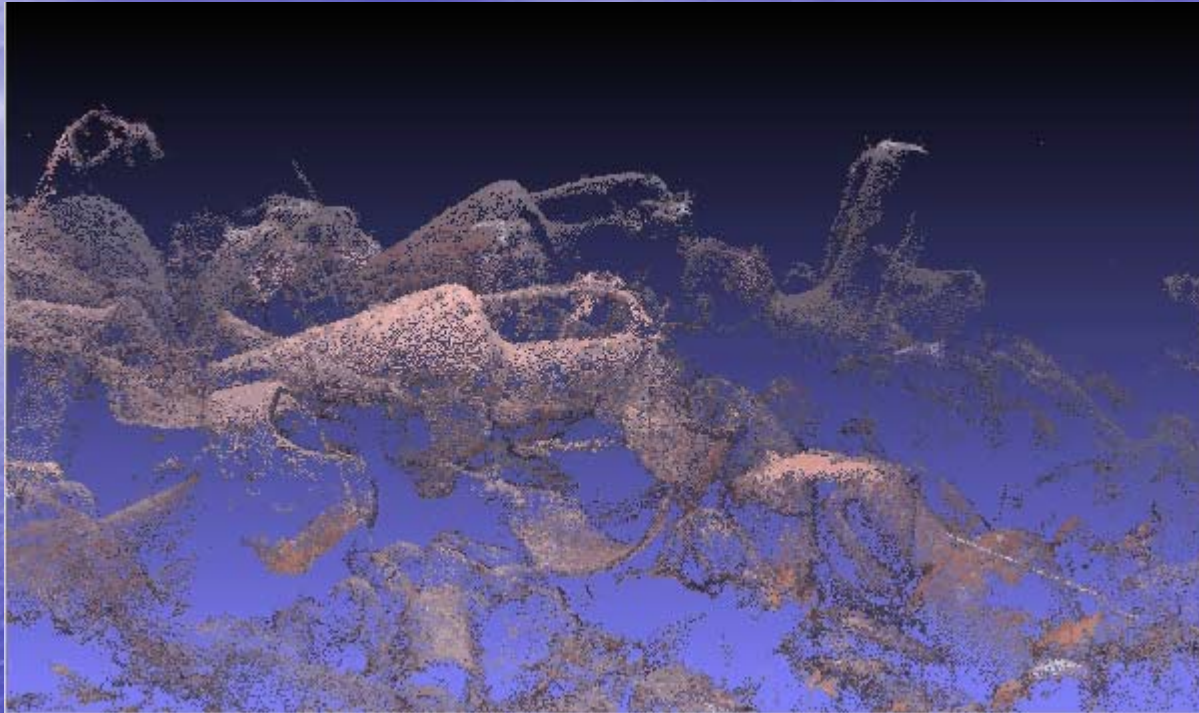
3D modeling for findings



- 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

