
COMPUTATIONAL METHODS FOR ARCHAEOLOGICAL FIELDWORK

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OVERVIEW

1. Why computers in the field?
2. Weeks 11 and 12: Geographical Information Systems (GIS)
3. Week 15: Reflectance Transformation Imaging (RTI)
4. Week 16: Photogrammetry

HARDWARE AND SOFTWARE

Hardware:

Have access to a laptop or desktop

You cannot use a chromebook, smartphone or tablet

Software installation:

Weeks 11 and 12: QGIS

Week 15: RTIBuilder and RTIViewer. **You need a machine running Windows OS!**

Week 16: Free version of Photoscan

OVERVIEW

1. Reflectance Transformation Imaging (RTI)
2. Things to try at home
3. Resources
4. Exercise: work with RTI

REFLECTANCE TRANSFORMATION IMAGING

- RTI for short
- Sometimes referred to as Polynomial Texture Mapping (PTM) after the algorithm used.
- Photos of artefacts or features in the lab or field, under controlled and known light conditions and directions.
- Aggregate and interpolate photos

RTI



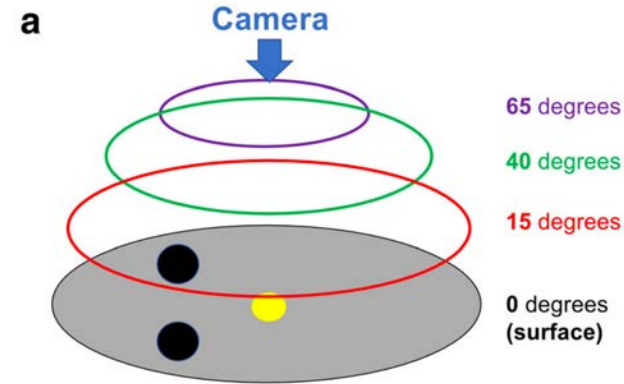
Kotouli 2013 Fig. 7



REFLECTANCE TRANSFORMATION IMAGING

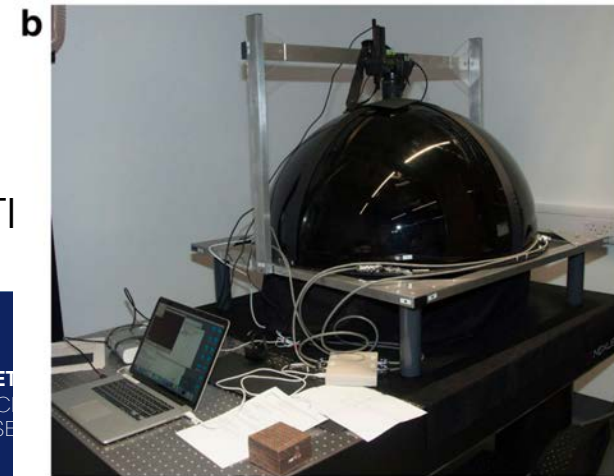
- Traditional RTI: fixed camera location, fixed series of LED lights at known angles, dark environment (e.g. dome)
- H-RTI: spheres used for determining location light source, can be used in day light, perfect for in the field.

Mytum and Peterson 2018, Fig. 1, Kirk Martinez 2014.



H-RTI

Traditional RTI



Mytum and Peterson 2018, Fig. 2

REFLECTANCE TRANSFORMATION IMAGING

- Can be used for coins, stelae, painting, manuscripts, ceramics, small finds ...
- Have a look at these examples of coins and sculpture:
<http://vcg.isti.cnr.it/rti/webviewer.php>
- Relatively easy, fast and cheap to do
 - Software and tutorial:
http://culturalheritageimaging.org/What_We_Offer/Downloads/Capture/index.html
 - Good introduction for historical archaeology application:

Mytum, H., & Peterson, J. R. (2018). The Application of Reflectance Transformation Imaging (RTI) in Historical Archaeology. *Historical Archaeology*, 52(2), 489–503. <https://doi.org/10.1007/s41636-018-0107-x>

- Invaluable for work in countries where artefacts cannot be removed to the lab

RTI EXERCISE TO TRY AT HOME

- Urubici Rock Art Project, Riris and Corteletti 2015. Open online data on Archaeology Data Service (ADS)
- Resource related to article:
Riris, P. and Corteletti, R. (2015). 'A New Record of Pre-Columbian Engravings in Urubici (SC), Brazil using Polynomial Texture Mapping', *Internet Archaeology* 38. <https://doi.org/10.11141/ia.38.7>
- Example of real field recording at night. Sculptural features very hard to distinguish and imperfections in recording, i.e. a very realistic example.
- Exercise:
 - Go to: https://archaeologydataservice.ac.uk/archives/view/urubici_na_2015/index.cfm
 - Click on 'Downloads' and then on some of the panels.
 - Click on the lightbulb and inspect the sculpture by moving your cursor.
 - Draw part of one panel

RTI RESOURCES

- Examples RTI datasets you can use:

[Engraving example](#)

[Projectile point example](#)

- Instructions on how to build your own low-cost RTI rig

<https://conservancy.umn.edu/handle/11299/181539>

RTI EXERCISE IN CLASS

- You should have RTI builder and RTI viewer installed
- Download the exercise dataset from Blackboard > RTI class > 'Dataset RTI tutorial: CAP stamp'
- You can find the step-by-step tutorial instructions on Blackboard > RTI class > 'RTI tutorial'.
- We will walk you through this tutorial in class, please follow along
- Please do the entire tutorial at home
 - take a screenshot of the completed RTI result at the end of it
 - **send this screenshot to Niels Bargfeldt by email by Friday**
nielsbargfeldt@hotmail.com