

# Thera Frescoes

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# Geography

Thera is a Greek island. The modern name is Santorini.



<http://www.boutrostours.com/images/map-greece.gif>

# History

- ▶ Aegean civilization: before “ancient Greece”
- ▶ Minoan age: c. 2000 BC – c. 1400 BC
  - ▶ Named for King Minos of Crete
  - ▶ Centered on Crete
  - ▶ Bronze-age civilization
  - ▶ Overseas trade with Cyprus, Egypt, Aegean Islands
  - ▶ Pre-Indo-European: not Greek, alphabet undeciphered
  - ▶ Cycladic islands had distinct culture, influenced by Crete and Eastern civilizations
  - ▶ Eventually conquered by Mycaeneans
- ▶ Sources:
  - ▶ *Encyclopedia Britannica*: “Aegean Civilizations”
  - ▶ <http://www.ancientgreece.com/history/history.htm>
  - ▶ [http://en.wikipedia.org/wiki/History\\_of\\_Greece](http://en.wikipedia.org/wiki/History_of_Greece)

# Eruption

Thera exploded about 1650 B.C.



<http://www.mmtaylor.net/Holiday2000/Legends/Atlantis.html>

# Eruption

Most of island and civilization destroyed



<http://www.mmtaylor.net/Holiday2000/Legends/Atlantis.html>

# Eruption

Explosion was bigger than Mt. St. Helens or Krakatoa



<http://www.mmtaylor.net/Holiday2000/Legends/Atlantis.html>

# Eruption

Source of Atlantis legend?



<http://www.mmtaylor.net/Holiday2000/Legends/Atlantis.html>

# Akrotiri

- ▶ Major excavation at Akrotiri
- ▶ Well preserved by ash, like Pompeii
- ▶ No bodies  $\implies$  time to evacuate island



Thera Foundation



Thera Foundation

# Wall Paintings

- ▶ The most important finds are wall paintings



Saffron Gatherers - Thera Foundation

# Wall Paintings

- ▶ The most important finds are wall paintings



Spirals - David Dobkin

# Wall Paintings

- ▶ The most important finds are wall paintings



Thera Foundation

# Wall Paintings

- ▶ Shattered by eruption and earthquakes



Spirals - David Dobkin

# Fresco

## Painting on plaster:

- ▶ Basically invented by Minoans, used by Romans, rediscovered during Italian Renaissance (<http://en.wikipedia.org/wiki/Fresco>)
- ▶ *Buon fresco*
  - ▶ Pigment is applied to wet plaster
  - ▶ Highly durable
  - ▶ Pigment must be applied very quickly
- ▶ *A secco*
  - ▶ Paint (pigment with binder) is applied to dry plaster
  - ▶ Much less durable
  - ▶ Useful for touching up after plaster has dried
- ▶ Thera wall paintings are mostly *buon fresco*, with some *a secco* elements

# Fragment Matching

- ▶ Archaeologists match based on edge fits (3-D)
  - ▶ Painstaking
  - ▶ Requires lots of handling of pieces
  - ▶ What about erosion?
- ▶ Many things we could match
  - ▶ 2-D and 3-D edge profile
  - ▶ thickness
  - ▶ painting
  - ▶ plaster color/discoloration
  - ▶ proximity of finds
  - ▶ user annotations
  - ▶ some of these have been explored some

# Painting Techniques

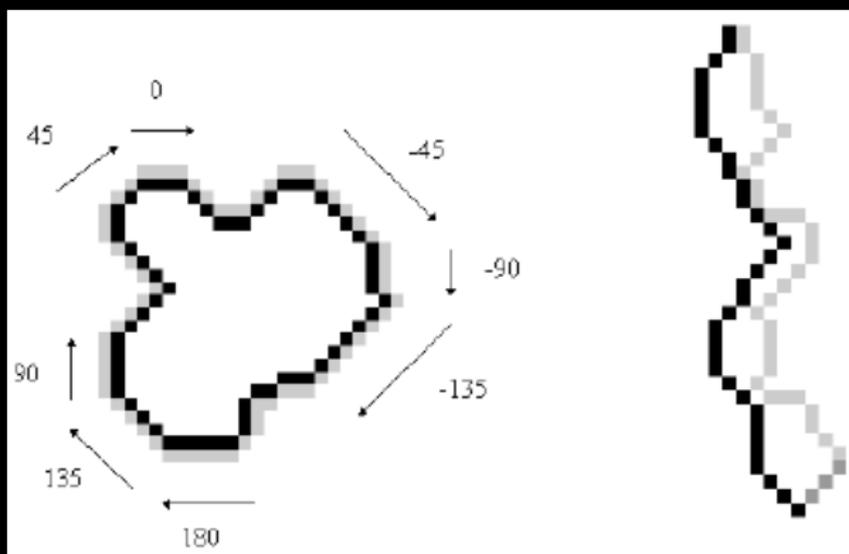
- ▶ Curves painted using stencils to allow fast painting on wet plaster
- ▶ Use curve fitting to identify stencils (Papaodysseus et al.)
- ▶ Stencils are Ellipses, hyperbolae and linear spirals



Papaodysseus et al.

# Existing Matching Work

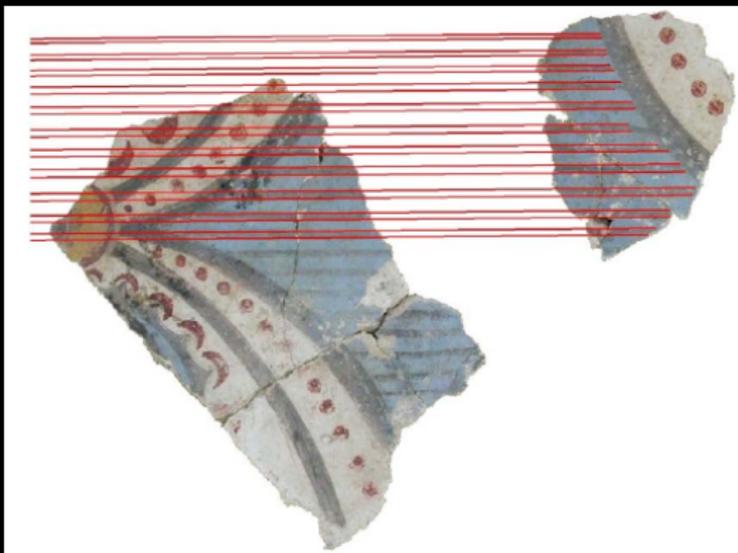
- ▶ 2-D Edge profile
- ▶ Line widths
- ▶ Curve extension



Papaodysseus et al.

# Existing Matching Work

- ▶ 2-D Edge profile
- ▶ Line widths
- ▶ Curve extension



Fragoulis et al.

# Existing Matching Work

- ▶ 2-D Edge profile
- ▶ Line widths
- ▶ **Curve extension**



Papaodysseus et al.

# Other Tasks for Computer

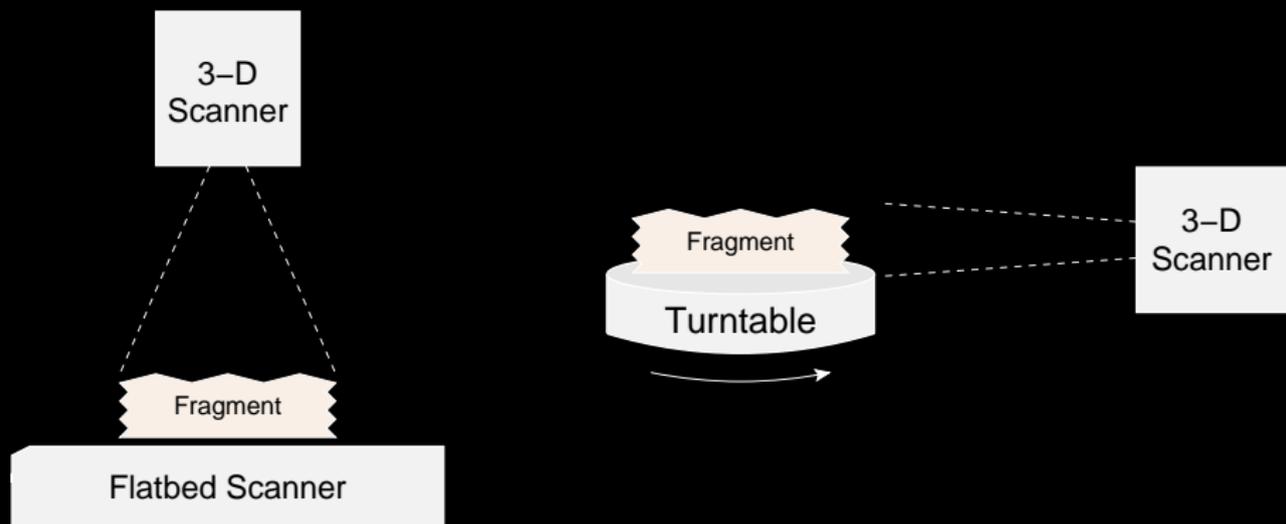
- ▶ Archiving (annotated database)
- ▶ Technical analysis (e.g. curve fitting)
- ▶ Color restoration
- ▶ Inpainting missing areas
- ▶ Efficient distribution of work



David Dobkin

# Scanning Setup

- ▶ Assume frescoed face is flat, scan with flatbed scanner
- ▶ Scan back with 3-D scanner for thickness and registration
- ▶ Scan sides with 3-D scanner for matching



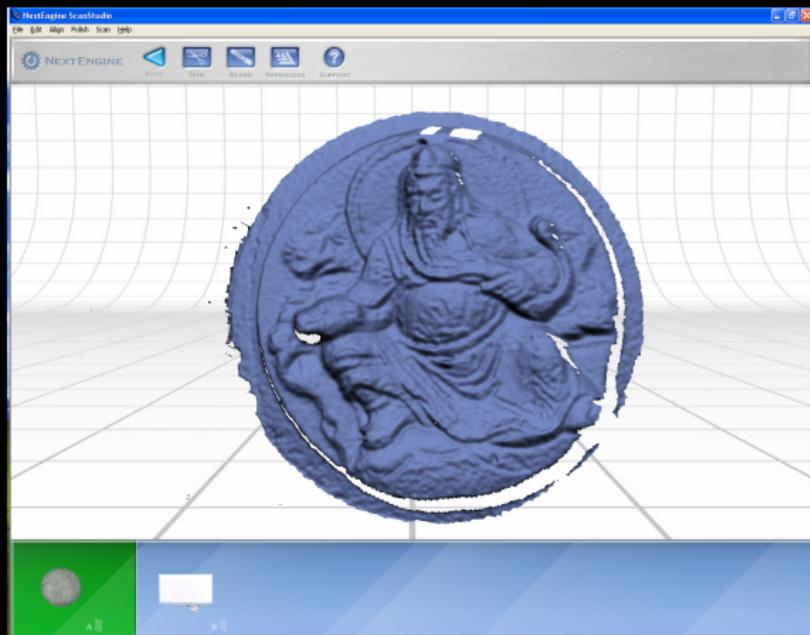
## 3-D Scanner

- ▶ Off-the-shelf, NextEngine scanner



# 3-D Scanner

- ▶ Off-the-shelf, NextEngine scanner



# User Experience

- ▶ Archaeologist scans piece, and simultaneously enters information into db
- ▶ Virtual worktable for matching pieces
- ▶ Ability to annotate pieces graphically
- ▶ Distributed, multi-user, matching environment