

Enhancing Applications of the Digital Archive for Silk Road Studies

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Goals & Methods

New applications of Digital Archive of Toyo Bunko Rare Books

1) Mapping Stein's Maps onto Google Earth

- We found the discrepancies of old maps
- We identified some ruins on satellite photos

2) 3D Reconstruction of Buddhist Cave Murals

- We visualized the relationship between the arrangement of murals and the style of worship

Stein's Maps

- Made by Sir Marc Aurel Stein (1862-1943)
 - Famous Archaeologist
 - Published as parts of his expedition reports
- Comprehensive and exhaustive
 - Full of archaeological and topographical information
 - Still remain the greatest credibility in relevant studies

Stein's Two Maps

Maps of *Serindia*

- report of the second exploration, 1906-08
- map in 94 sheets
- scale 1 inch = 4 miles or 1 : 253,440
- digitized in 2004

Maps of *Innermost Asia*

- report of the third exploration, 1913-15
- map in 47 sheets
- scale 1 : 500,000 or 1.014 inches = 8 miles
- digitized in 2005

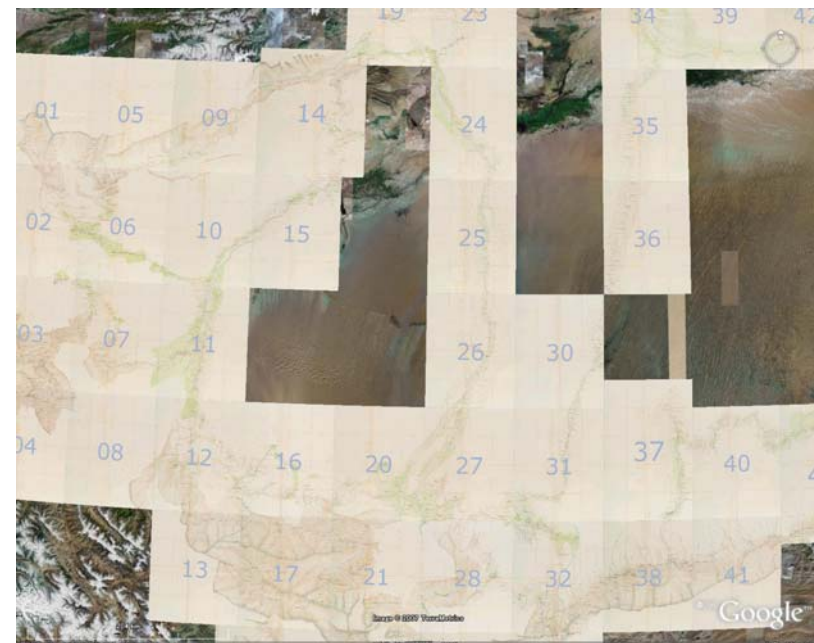
But...

- Hard to refer
 - Divided into numerous sheets of big maps
 - Troublesome to find the adjacent maps



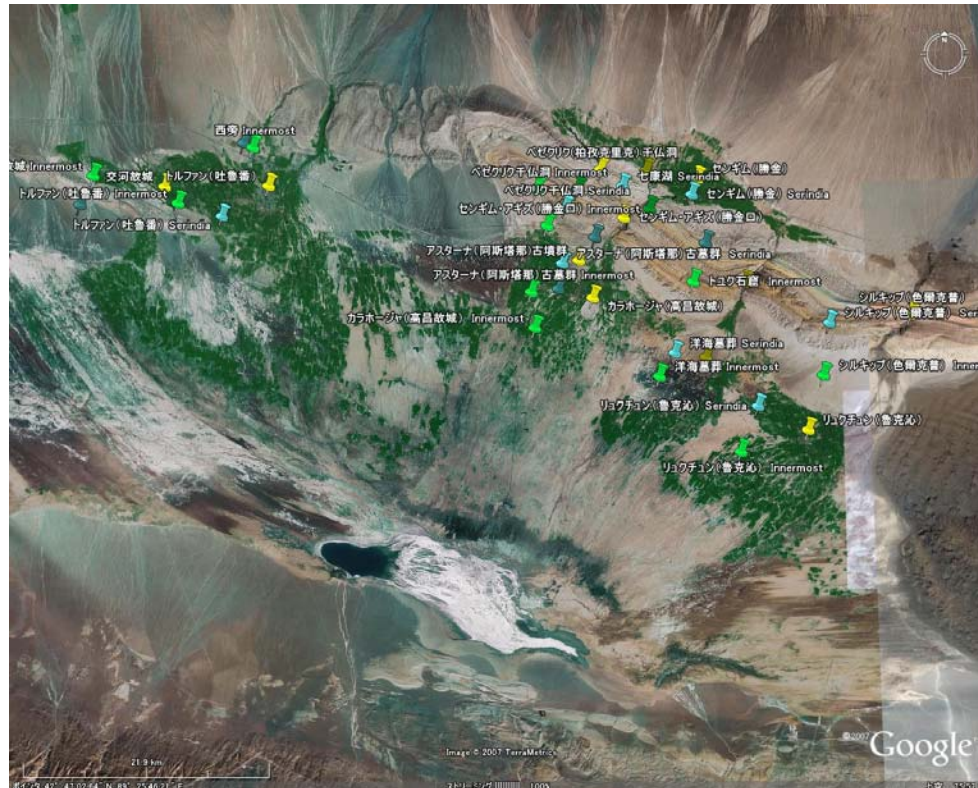
Mapping onto Google Earth

- Lat/Long grid lines were drawn on Stein's maps
- Georeference according to grid line intersection points
- Reference becomes extremely easier



Serindia maps on Google Earth

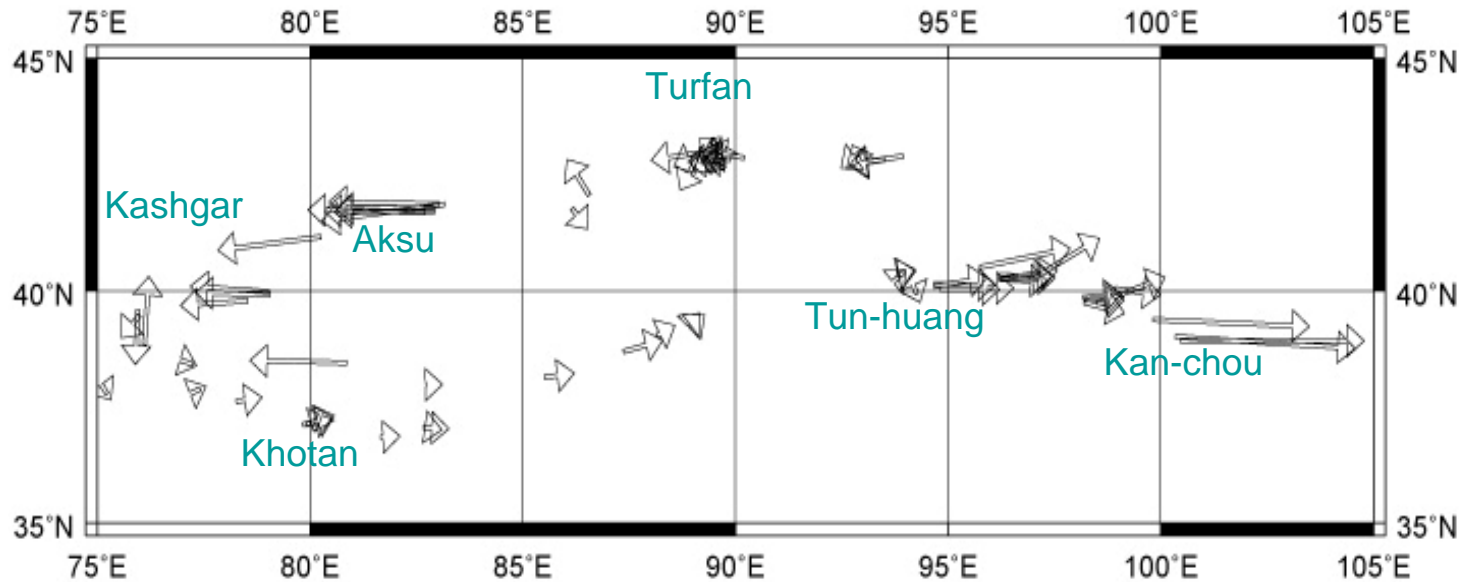
Use 1: Comparison



- : actual point
- : Serindia point
- : Innermost Asia point

- Positions differ between maps from Stein's earlier and later surveys and actual data

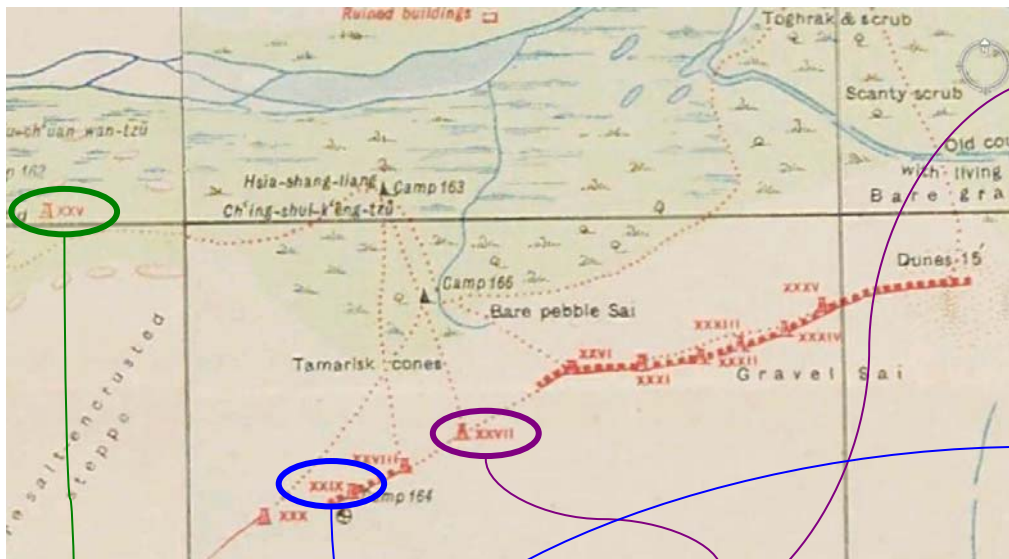
Use 1: Comparison



- Discrepancies are irregular but show some tendency

Use 2: Identification of Ruins

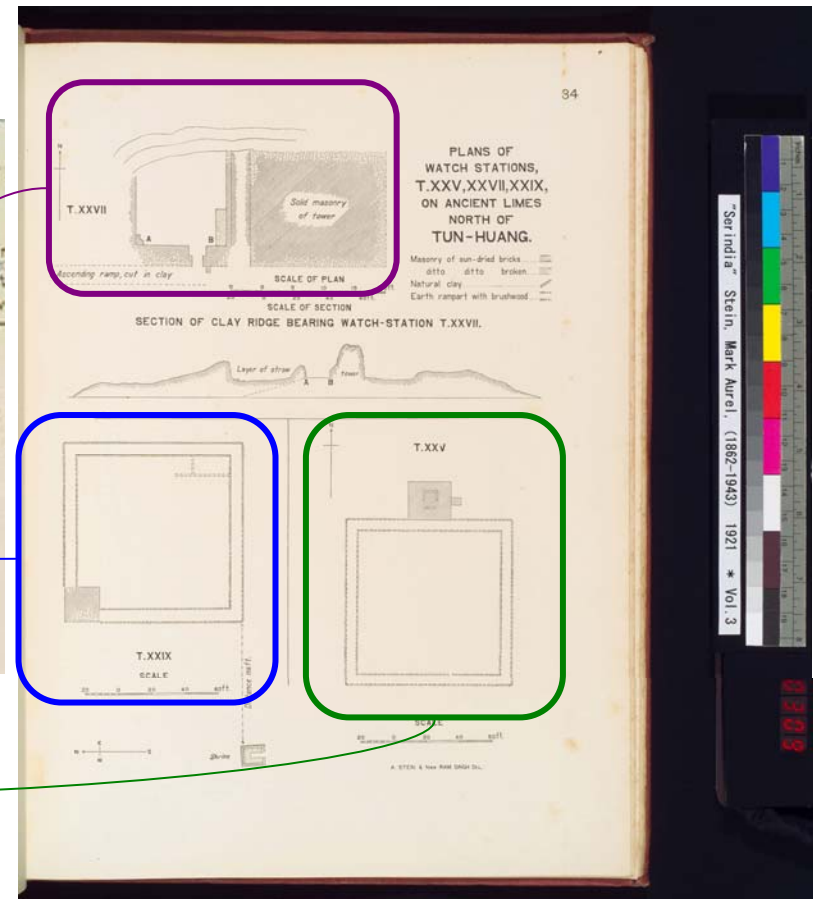
Identified ruins and sites on satellite photos by using Stein's reports



XXV

XXIX

XXVII

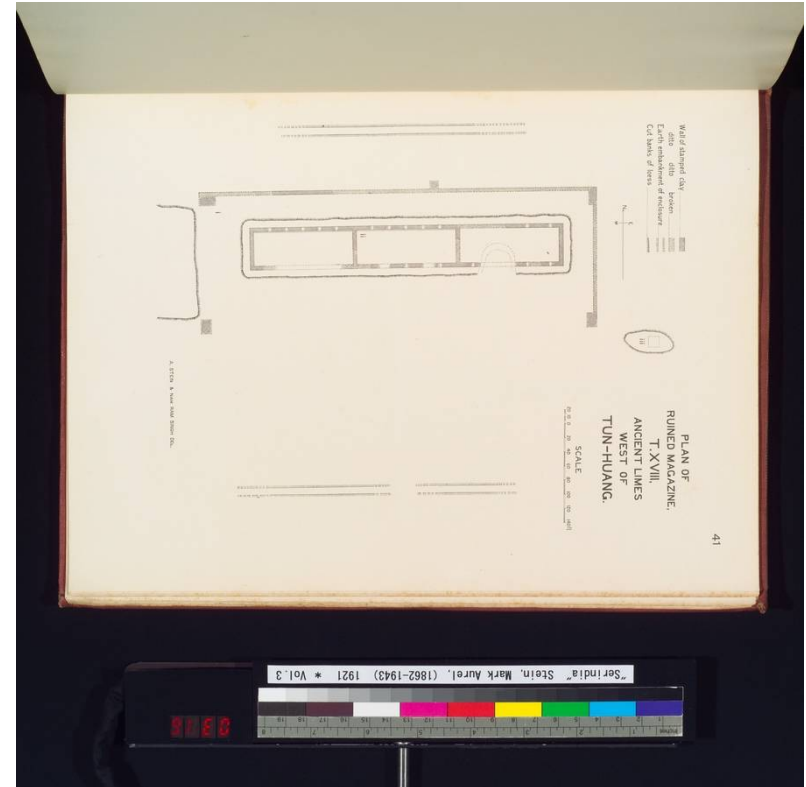


Serindia, Vol.3 plan 34

Use 2: Identification of Ruins



Ruined Magazine, T.XVIII.
Ancient Limes west of Tun-huang

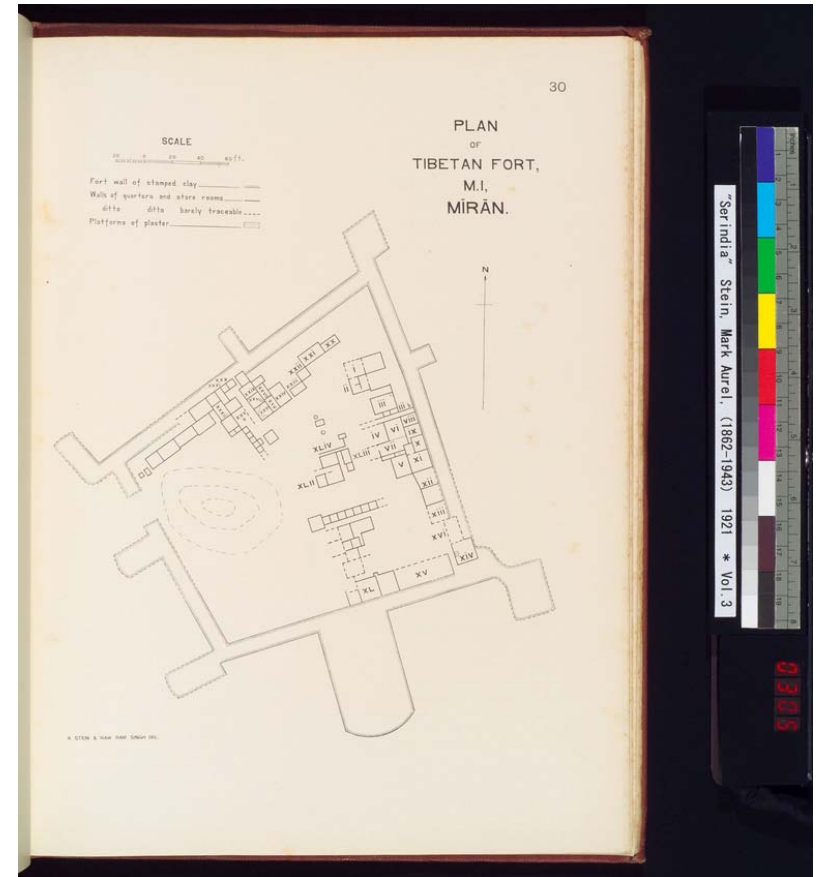


Serindia, Vol.3 plan 41

Use 2: Identification of Ruins



Tibetan Fort, M.I. Mīrān



Serindia, Vol.3 plan 30

Other Possible Uses

- Use for Archaeological excavations
- Link to other related issues



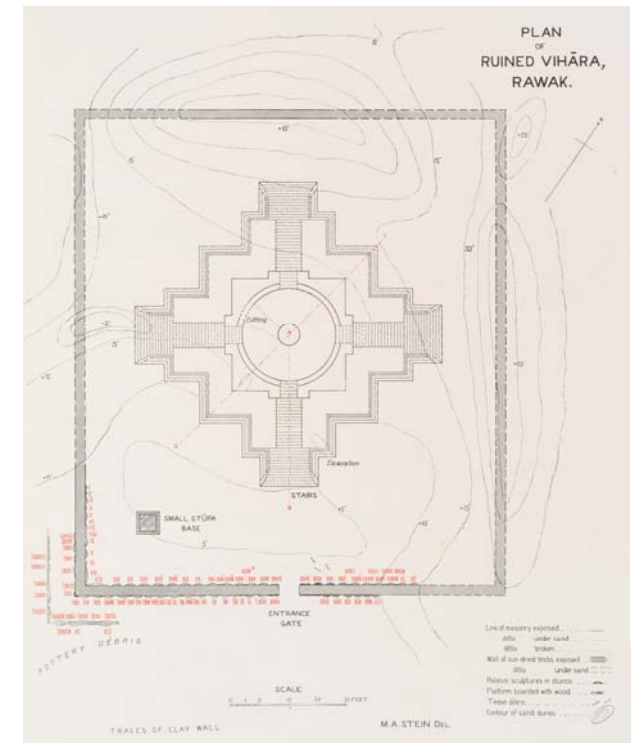
Photo of Rawak Stūpa



Excavated Buddhas of Rawak Stūpa



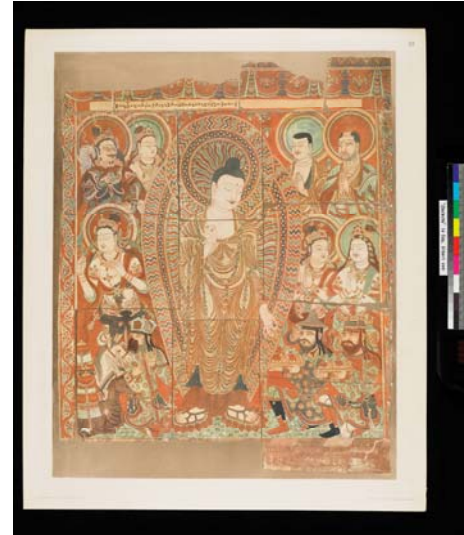
Manuscript excavated in Rawak



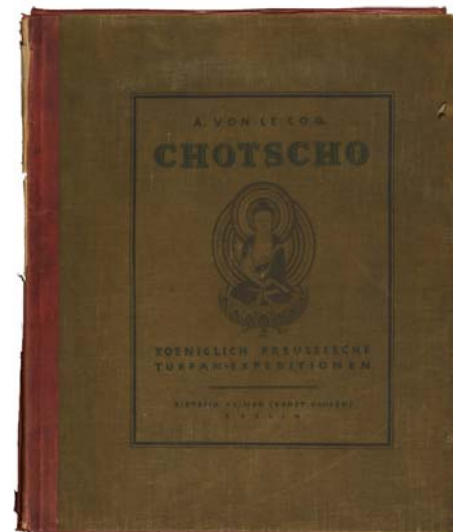
Plan of Rawak Stūpa

Cave no.9 in Bezeklik

- The best preserved cave in Bezeklik
- Famous for colorful big Praniidhi paintings
- Original murals were lost
- Recorded in the book, *Chotscho* (digitized in 2005)



Praniidhi painting



Chotscho, Berlin, 1913. 61 × 51cm

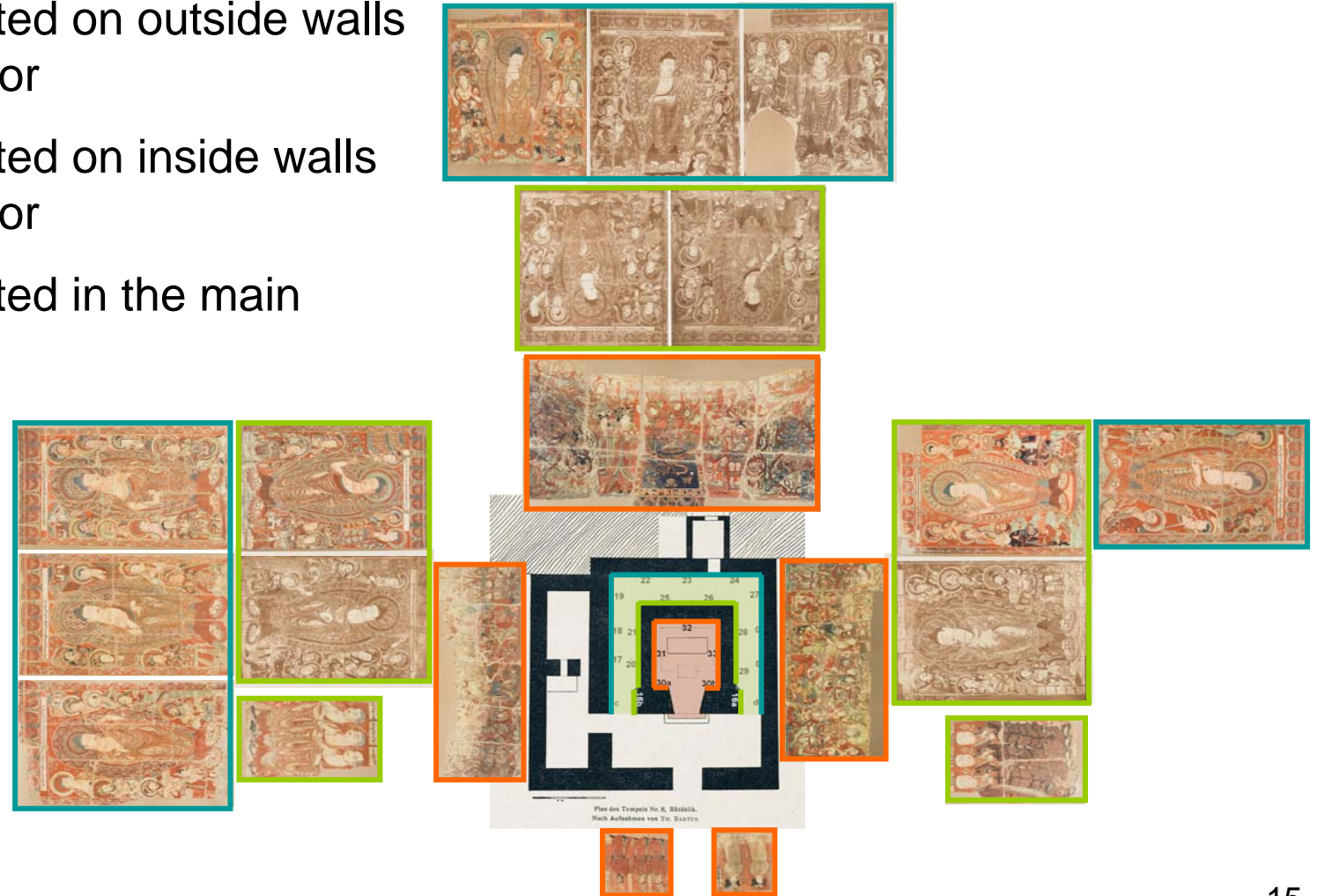
But...

- Recorded separately in *Chotscho*
- Difficult to comprehend
 - Arrangement of murals
 - Religious function of the cave

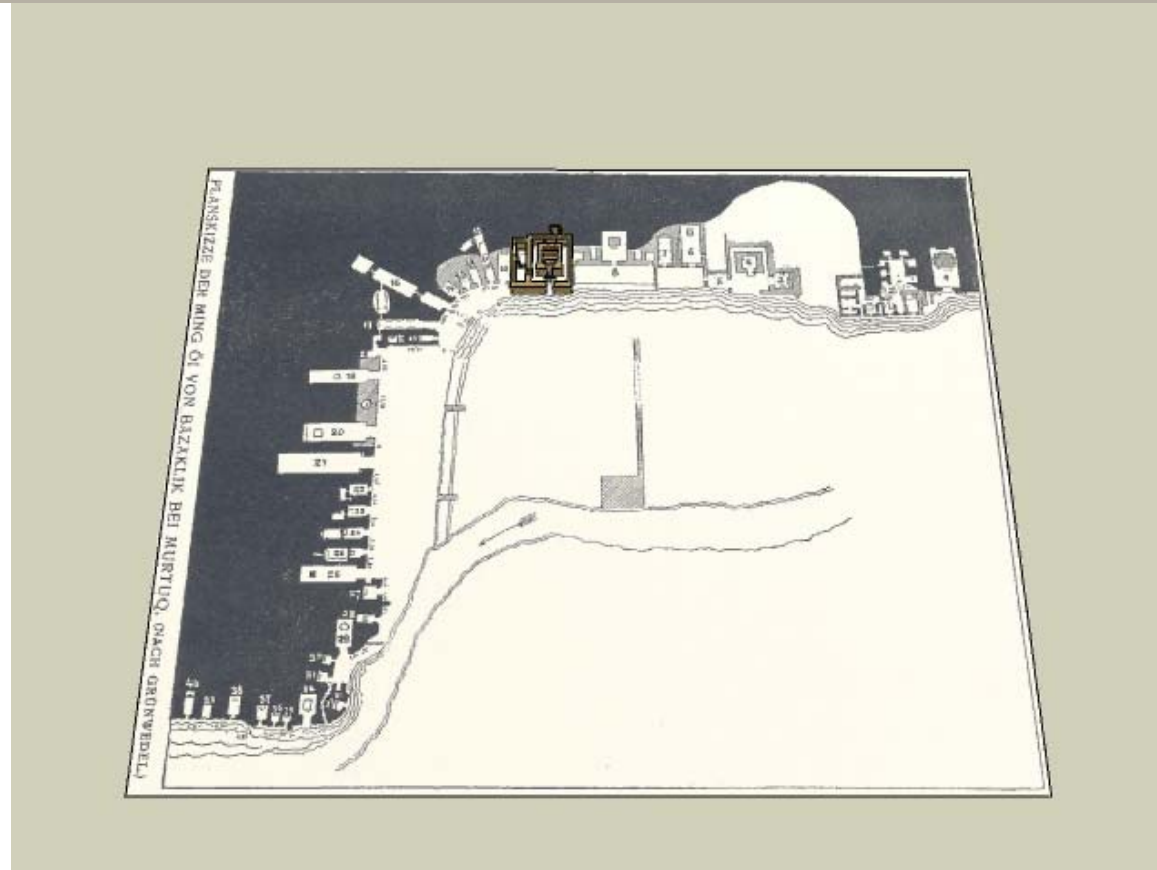


Preparation for Reconstruction

- Murals painted on outside walls of the corridor
- Murals painted on inside walls of the corridor
- Murals painted in the main shrine



3D Reconstruction



On-site research to improve

- Vertical position of each mural
- Height of the floor in the main shrine

Conclusion & Future Works

Conclusion

Mapping Stein's Maps onto Google Earth

- Comparison
- Identification of ruins

3D reconstruction of Buddhist Cave Murals

- Visualization of the relationship between the arrangement of murals and the style of worship

Future Works

- Investigate reasons of discrepancies of Stein's maps
- Adjust Stein's maps with correct position