A Cross-Comparative Study for the use of CORONA Satellite Imagery in Diverse Archaeological Landscapes

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ADVANCES IN REMOTE SENSING FOR CULTURAL HERITAGE: FROM SITE DETECTION, TO DOCUMENTATION AND RISK MONITORING, ESA – ESRIN

Frascati, Italy
12 - 13 November 2015
NRO Facts:
- Operations between 1959-1972
- 1st photo reconnaissance satellite in the world
- 1st mid-air recovery of a vehicle returning from space
- 1st mapping of earth from space
- 1st stereo-optical data from space
- 1st multiple reentry vehicles from space
Camera Orientation and Ground Projection in KH-4B

- ~609 mm focal length
- Distortion due to panoramic scan
- Ground scan length: 217.9 km
- Swath width: ~16 km
- Film width: 70 mm
CORONA Satellite Imagery: Distortion Problems

Zincirli, southern Turkey

Forward Image  Aft Image  Actual Site
CORONA Satellite Imagery: Camera Model
CORONA Satellite Imagery: An RPC Solution
CORONA Satellite Imagery: Mounded Ancient Settlements
CORONA Satellite Imagery: A Digital Survey
CORONA Satellite Imagery: Complete Road System
CORONA Satellite Imagery: Flat Sites
CORONA Satellite Imagery: A Sites Database
CORONA Satellite Imagery: And the Mediterranean

...in most cases bundle adjustment will not work in Greece
CORONA Satellite Imagery: Sites...not that prominent
CORONA Satellite Imagery: Flat Sites
...maybe it wasn’t that flat
CORONA Satellite Imagery: Slightly Elevated
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CORONA Satellite Imagery: yet still...a site discovery tool
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Flat Middle Eastern Landscapes vs. the Rugged Mediterranean

- Supreme site detection tool
- Detailed settlement morphologies
- Usually the only historic high resolution data available
- Pre-dates urbanization, industrial agriculture, state projects
- High temporal coverage due to the “sensitivity” of the area

- Satisfactory site detection tool
- Limited information on settlement morphologies
- It is a wide coverage alternative to historic imagery
- On-par with the changes in land-use strategies
- Limited temporal coverage