

## Remote Sensing of the Tomb of Nefertari

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Nefertari was the wife of Ramesses II who ruled Egypt circa 3200 BC. Her tomb is situated west of Luxor in the Valley of the Queens. Since its discovery in 1904, the tomb showed signs of deterioration of its magnificent wall paintings. The deterioration was mainly due to salt crystallization behind a plaster layer and on top of the paint layer. The salt must have been remobilized from joints in the limestone host rock by water. In 1986 a research project was initiated jointly by the Egyptian Antiquities Organization and the Getty Conservation Institute to study the wall paintings and recommend a process for their preservation.

The Boston University Center for Remote Sensing participated in the study by application of remote sensing techniques: (1) study of a Landsat Thematic Mapper image to establish the potential drainage in the Valley of the Queens; (2) Survey the region to produce detailed topographic profiles; (3) use GRASS to generate a hydrologic model; (4) measure the spectral reflectance of the paint layer inside the tomb, 10 meters below the surface; (5) compare photographs of the same paintings taken at different times; and (6) obtain multispectral and UV images of the tomb walls to discover deteriorated areas behind the plaster layer.

Results of the study suggested that the deterioration was most likely due to a one-time event of saturating the rock by water prior to its discovery in 1904. Emergency treatment of the wall paintings were conducted accordingly and permanent treatment is underway. The used nondestructive techniques prove the usefulness of remote sensing to archaeology.