

# Raman and XRF Insights into Past Conservation Interventions on the Marciana Coronelli Terrestrial Globe

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This study demonstrates the effectiveness of integrating XRF and Raman spectroscopy, conducted by the mobile laboratory team from CSMC, to investigate the conservation history of the Marciana Coronelli terrestrial globe. The multi-analytical approach provides crucial insights into the pigments and dyes applied during the globe's original creation and subsequent restoration interventions. The findings underscore the importance of combining complementary techniques for a comprehensive understanding of the artifact's material history. Additionally, the detection of modern dyes highlights the significance of careful interpretation when assessing the authenticity and provenance of historic objects, emphasizing the impact of later restorations on conservation and research efforts.



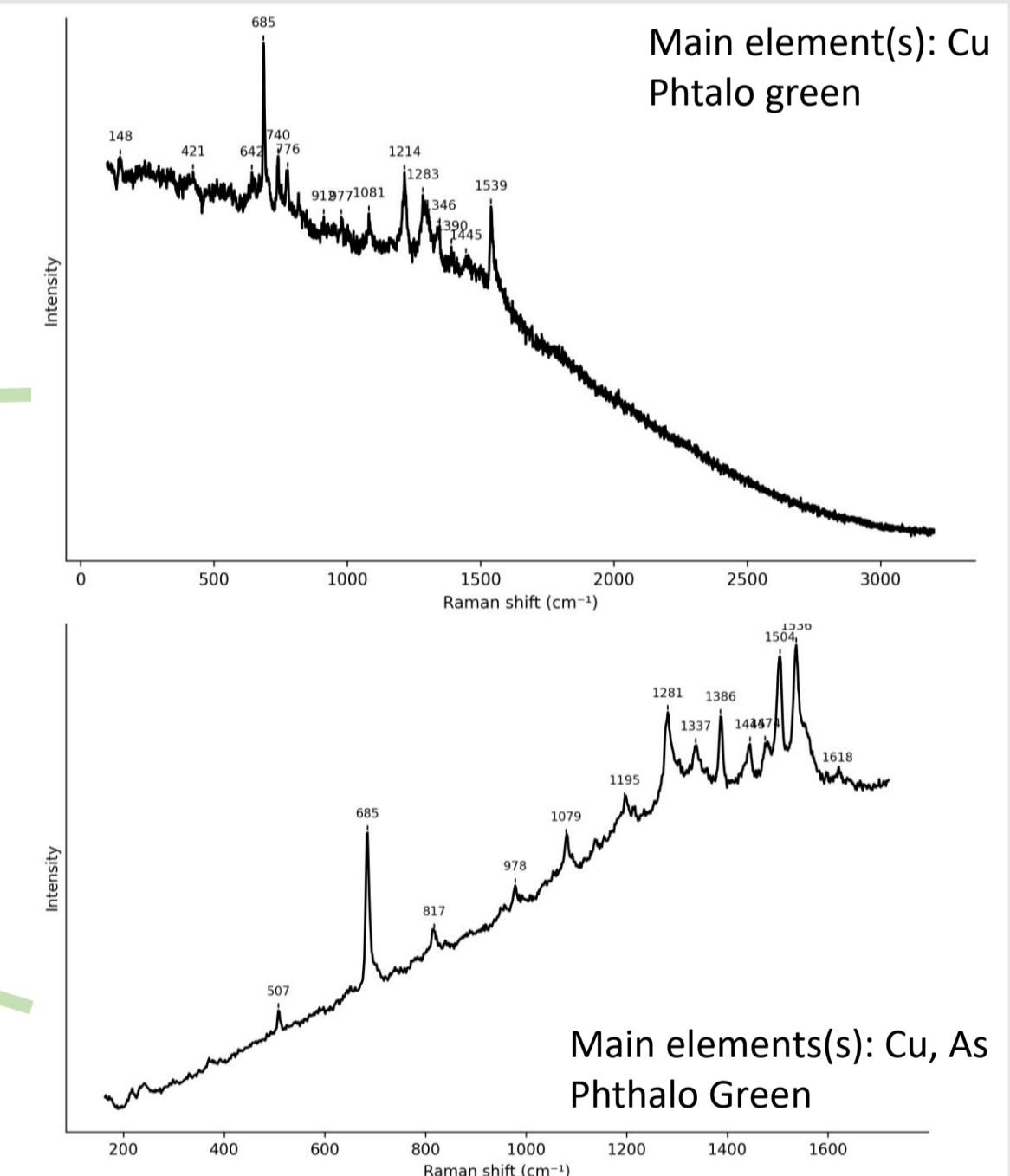
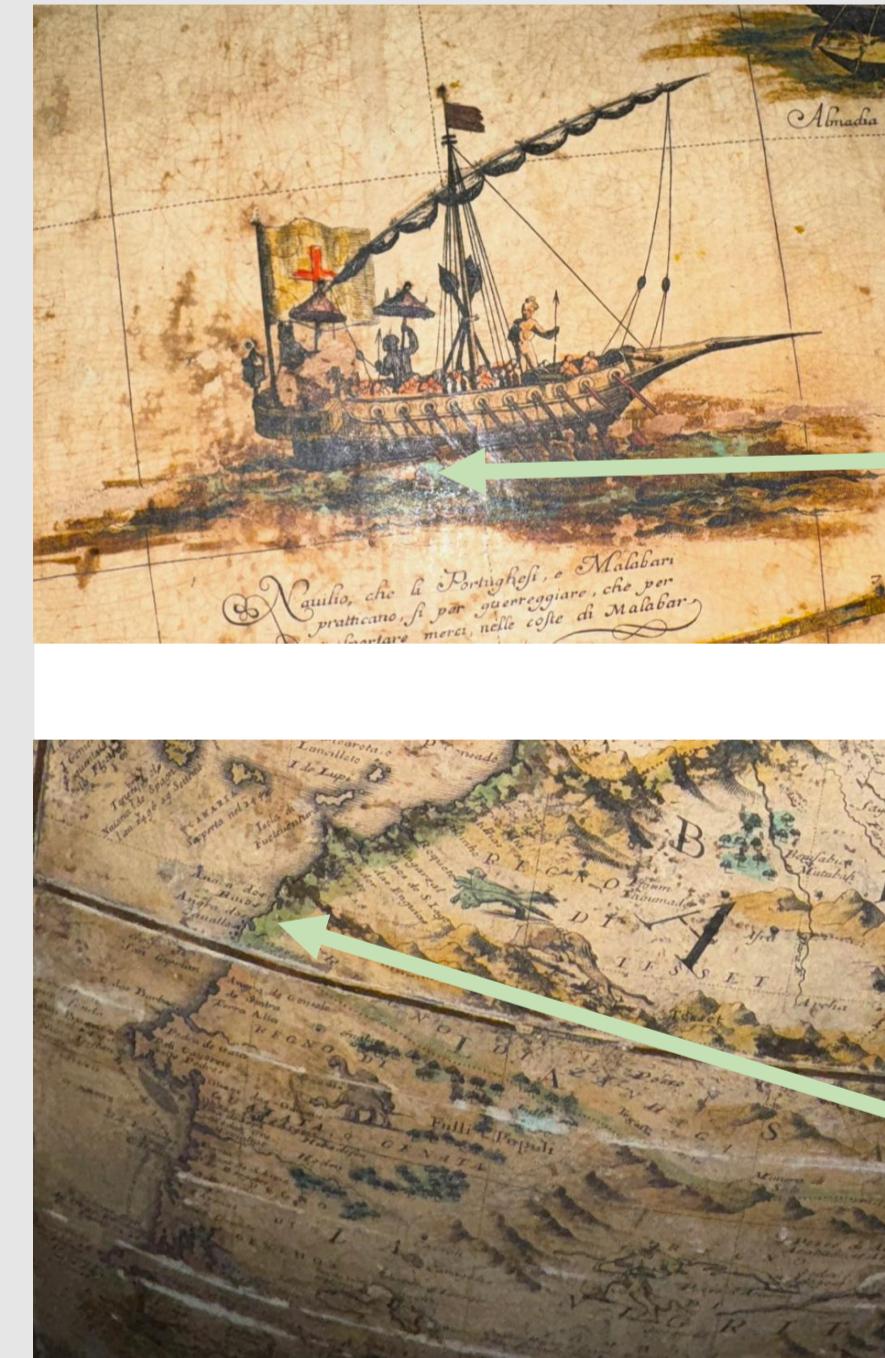
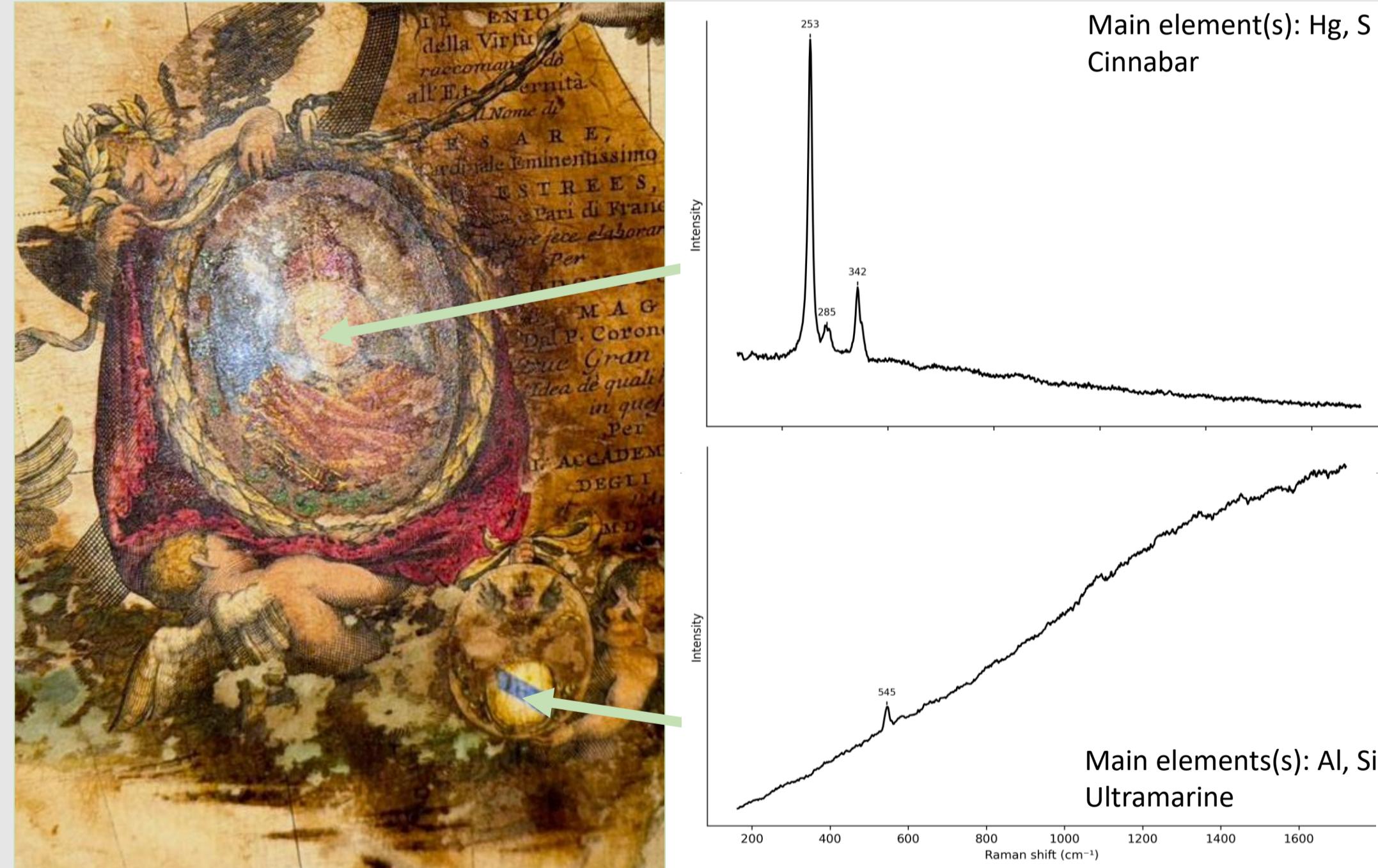
**XRF spectroscopy:** *Crono* (Bruker) XRF spectrometer  

- Rh X-ray tube operated at 50 kV and 200  $\mu$ A (80  $\mu$ A for the measurements of the metallic parts)
- X-ray spot size 2 mm
- Live time 60 seconds



**Raman spectroscopy:** *Virsa* (Renishaw) Raman spectrometer  

- 532 & 785 nm lasers
- 50x magnification lens with a long working distance
- output power from 2 to 12 mW.
- 1 to 30 scans of 2 to 10 seconds
- spectral range of 50 to 3200  $\text{cm}^{-1}$



The integration of XRF and Raman spectroscopy techniques facilitated the identification of several pigments and dyes applied to the globe. Among these, some are common materials consistent with the production period of the artifact, which dates from the second half of the 17th century to the early 18th century. These include yellow and red ochre, cinnabar/vermilion, ultramarine, carbon black, and verdigris.

Notably, the analysis revealed the presence of two modern dyes, phthalo blue and phthalo green, in most examined regions of the globe. These dyes have been in use only since the mid-20th century, which raises important considerations.

Their detection suggests that the globe has undergone a significant degree of repainting or restoration at a later date.

Consequently, the identification of these modern dyes precludes accurate reconstruction of the original palette, emphasizing the importance of considering subsequent interventions in provenance and conservation assessments.

**Data repository and report**



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