

Transport and Trade of Volcanic Building Materials in the Mediterranean: State of the Question

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The impetus for examining Roman trade networks for volcanic building stones began in 1992 when J. P. Oleson and G. Branton first reported results of chemical analyses of volcanic ash and tuff in the concrete of the harbor at Caesarea Maritima in Israel.¹ They showed that the chemical signature most resembled that of products from Campi Flegrei volcanic system on the Bay of Naples. Since this time, advances in chemical analysis have allowed for further isolation of provenance by focusing on particular trace elements, often called “immobile”, because they do not go undergo the same degree of alteration that affects other elements during deposition and subsequent weathering; thus, the present paper examines the latest research to establish what we can now say about these maritime trade networks.

This paper deals mainly with the work of two research groups that have analyzed volcanic products used in ancient concrete: ROMACONS, which focuses on maritime structures throughout the Mediterranean, and an Italian group led by F. Marra, which focuses on structures in Italy, both maritime and terrestrial. Both groups sampled pozzolanic mortar from maritime structures dating from the 1st cent. B.C. along the Tyrrhenian coast of Italy and found that Campi Flegrei volcanic ash was present, but Marra’s group also found that a few cases also contained ash from the Colli Albani volcanic complex south of Rome.² The discovery of the mixing of ash from different sources revealed a greater level of complexity than previously realized. Another example of the importance of the new analytical method comes from the study of the volcanic ash contained in an amphora found on Shipwreck B at Pisa, which was originally hypothesized to have contained ash from Campania. Trace element analysis revealed that ash is actually from Bolsena in Tuscany.³ The question of how far the Campi Flegrei ash was exported proved difficult to establish. In addition to re-examining the samples from Caesarea Maritima, ROMACONS took analyzed cores from harbor structures at Chersonisus, Pompeiopolis, and Egnatia. The results excluded Santorini, Milos, Cos, or the Aeolian Islands and generally fell within the range of products from the Bay of Naples, but they did not match the known deposits, which led to the conclusion that 1) there could have been mixing of ash from different sources, which skewed the results or 2) there is another potential source for which data is not published. One suggestion is that microprobe analysis could be used in the future to control against ash mixing.⁴ Further analysis is necessary before the question of long distance trade in volcanic ash can be answered definitively.

Lightweight volcanic aggregate (scoria and pumice) used to lighten the vaults of terrestrial structures was also analyzed. The earliest use of scoria in Rome occurs in vaults at the Forum of Caesar in the mid-1st cent. B.C. Both mineralogical and chemical

analysis has shown that it came from Mount Vesuvius.⁵ Thus, shipborne trade in both volcanic ash and scoria from Campania is confirmed from the 1st cent. B.C. Outside of Italy, regional trade networks can be detected. Trace element analysis of scoria samples from the Antonine Baths at Carthage reveal a provenance of Sardinia whereas mineralogical analysis of pumice from the East Baths at Leptiminus reveal the presence of aenigmatite thus giving a definitive provenance of the volcanic island Pantelleria.⁶ Both places were sources of millstones of volcanic rock, and the building stones were probably part of this regional trade network. Finally, trace element analysis confirmed that the scoria cones in Smooth Cilicia provided scoria for vaulting at nearby Anazarbus as well as the for some of the *cubilia* in the Reticulate Baths at Elaeussa Sebaste.⁷ However, the scoria at the latter was not used in any strategic way and cannot be considered to have been intentionally shipped to the site.

The result of these recent studies confirm early seaborne trade in both volcanic ash and lightweight scoria from the Bay of Naples by the 1st cent. B.C., and it suggests that long distance trade could have existed by the time of Augustus. However, the definitive confirmation of long distance seaborne awaits further advances in the analytical techniques used for sampling and analysis.

Notes

¹ Oleson – Branton 1992.

² Marra et al. 2016b, 68.

³ Marra – D’Ambrosio 2013. Note, however, that the date of Ship B (Augustan) was misreported as 4th–2nd cent. B.C., which resulted in a problematic historical assessment. Likewise, in another of the studies, the misdating of the context for the sampling resulted in the faulty assertion that volcanic ash was being traded as early as the 3rd–2nd cent. B.C. (D’Ambrosio et al. 2015, 201).

⁴ Brandon et al. 2014, 154–159.

⁵ Lancaster et al. 2011.

⁶ Lancaster et al. 2010.

⁷ Lancaster et al. 2010.

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