Cathodoluminescence and laser-induced fluorescence of calcium carbonate: a review of screening methods for radiocarbon dating of ancient lime mortars

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Supplementary Information

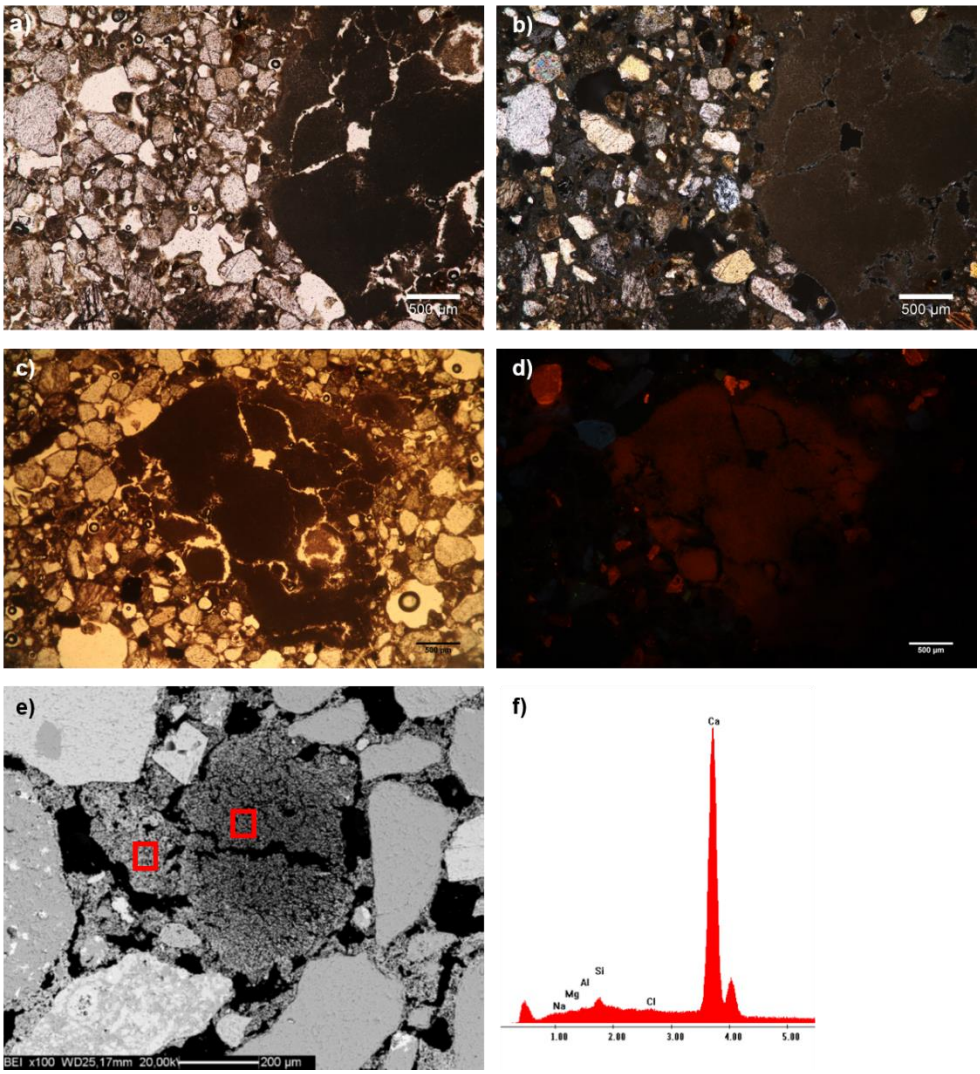

Figure 1. SS-V1 mortar sample. Transmitted light photomicrographs in parallel (a) and crossed (b) nicols; optical transmitted light (c) and cathodoluminescence optical spectroscopy (d); backscattered electron image (e) of a lime lump and EDS microanalysis (f) of the highlighted areas (lump and binder matrix).

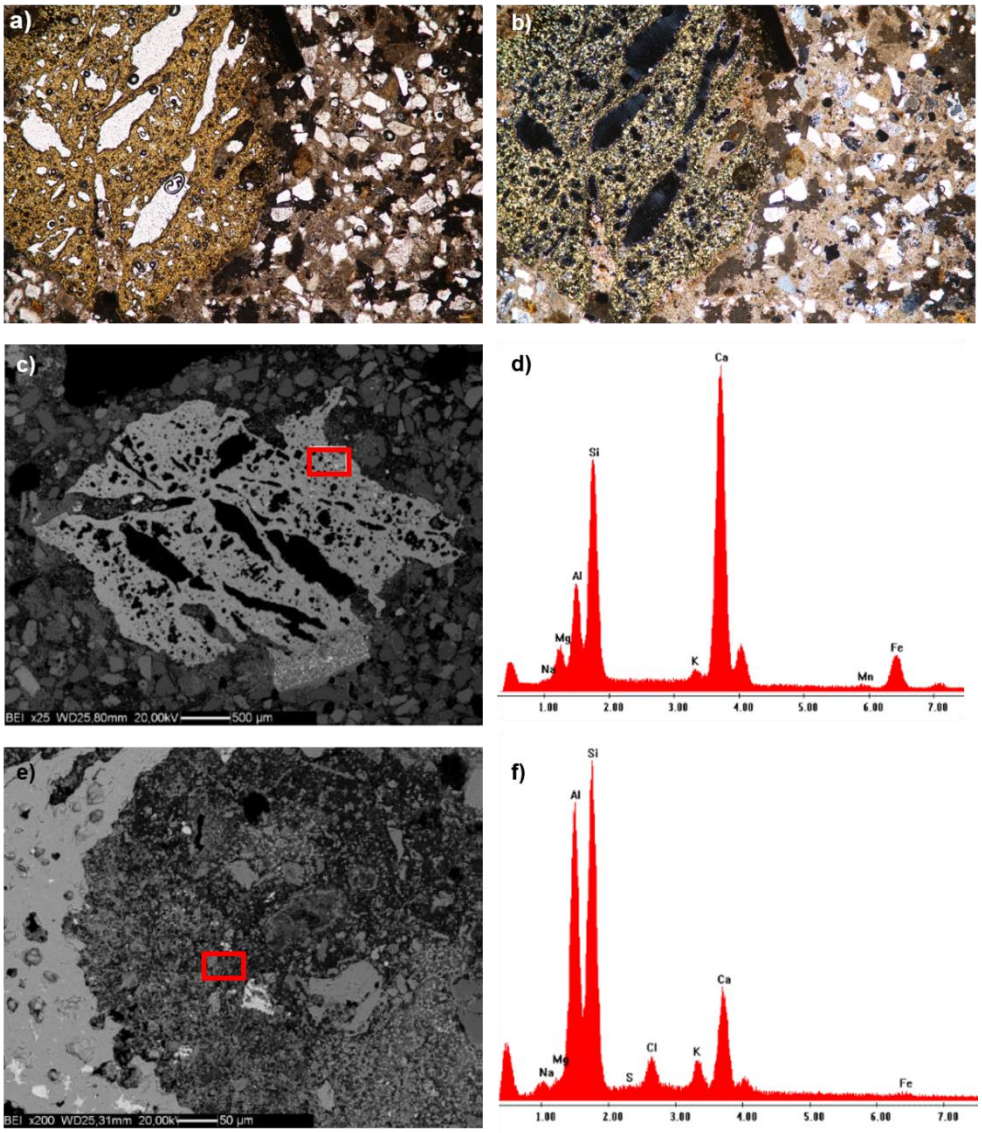

Figure 2. ML-1 mortar sample. Transmitted light photomicrographs in parallel (a) and crossed (b) nicols; backscattered electron image (c) of a secondary phase produced by the calcination process of a marlstone and EDS microanalysis of the highlighted area; backscattered electron image (e) of the binder matrix and EDS microanalysis (f) of the highlighted area.

Mineralogical and petrographic results showed that SS-V1 is an aerial mortar characterized by the presence of large lime lumps, silicate sand, phyllosilicates and very fine inclusions of calcite in a homogenous lime binder matrix (**Figure 1**) (Bergamo 2017). ML-1 exhibits quartz and feldspar as main aggregates, hydraulic phases (such as tobermorite and calcium aluminosilicates) derived from the use of marlstones in the calcination process, and a high amount of calcite (**Figure 2**) (Bandieri 2017).

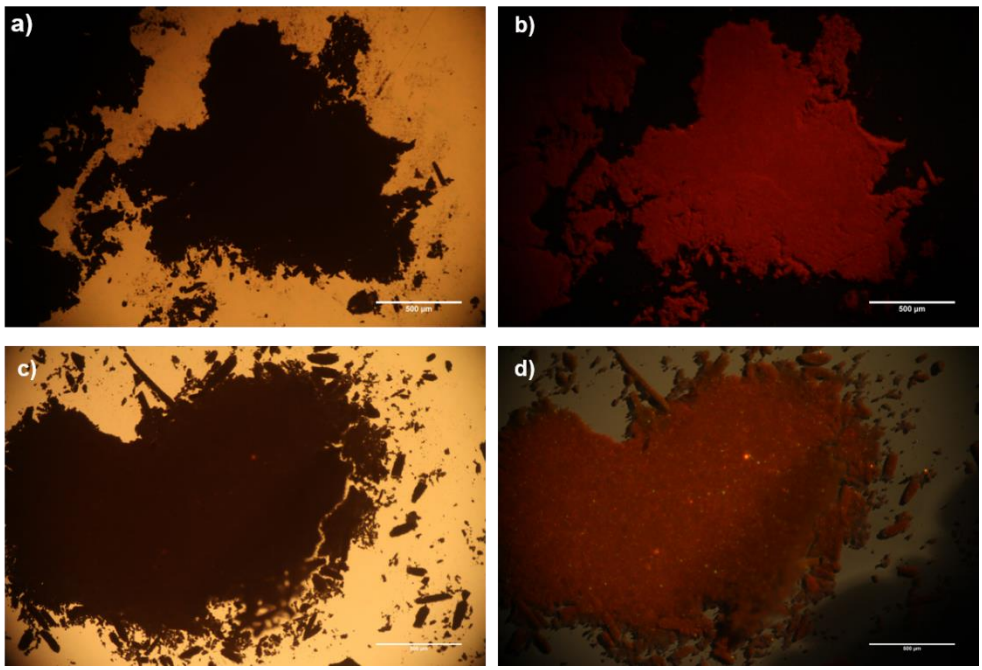

Figure 3. Binder fractions (SG) in powdered mortars SS-V1 and ML-1. Photomicrographs in optical transmitted light of SS-V1-SG and ML-1-SG (a and c, respectively) and cathodoluminescence optical spectroscopy of SS-V1-SG and ML-1-SG (b and d, respectively).

The shown OM-CL images were obtained using a NIKON Labophot2-POL microscope equipped with a cold cathode stage Cambridge Image Technology Ltd, CL8200 MK3 operated at 15kV and 200 µA.