

From Soil to Structure

Geological Diversity of Clays in Tuscany and Their Potential A Journey of Discovery

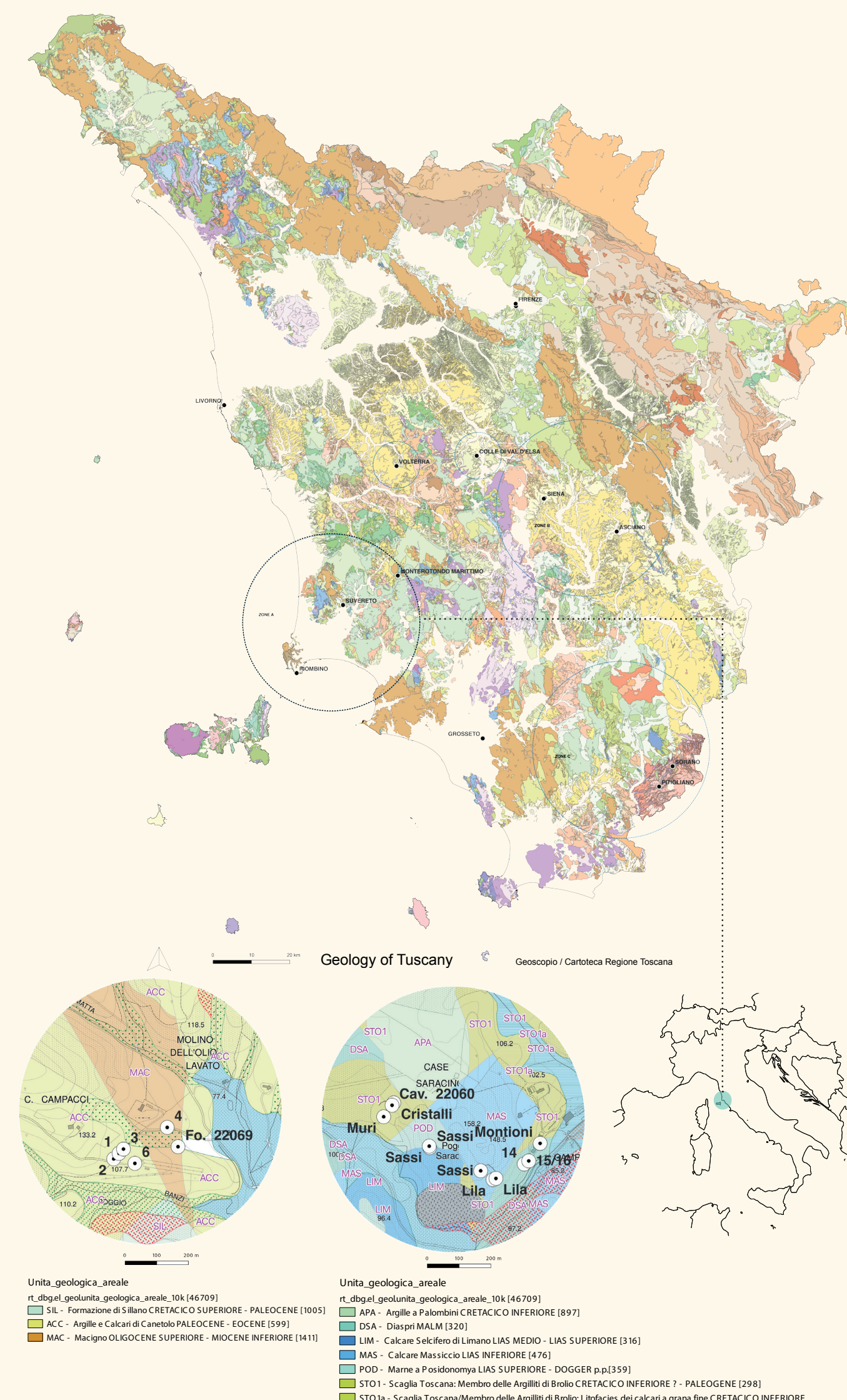


Fig.a

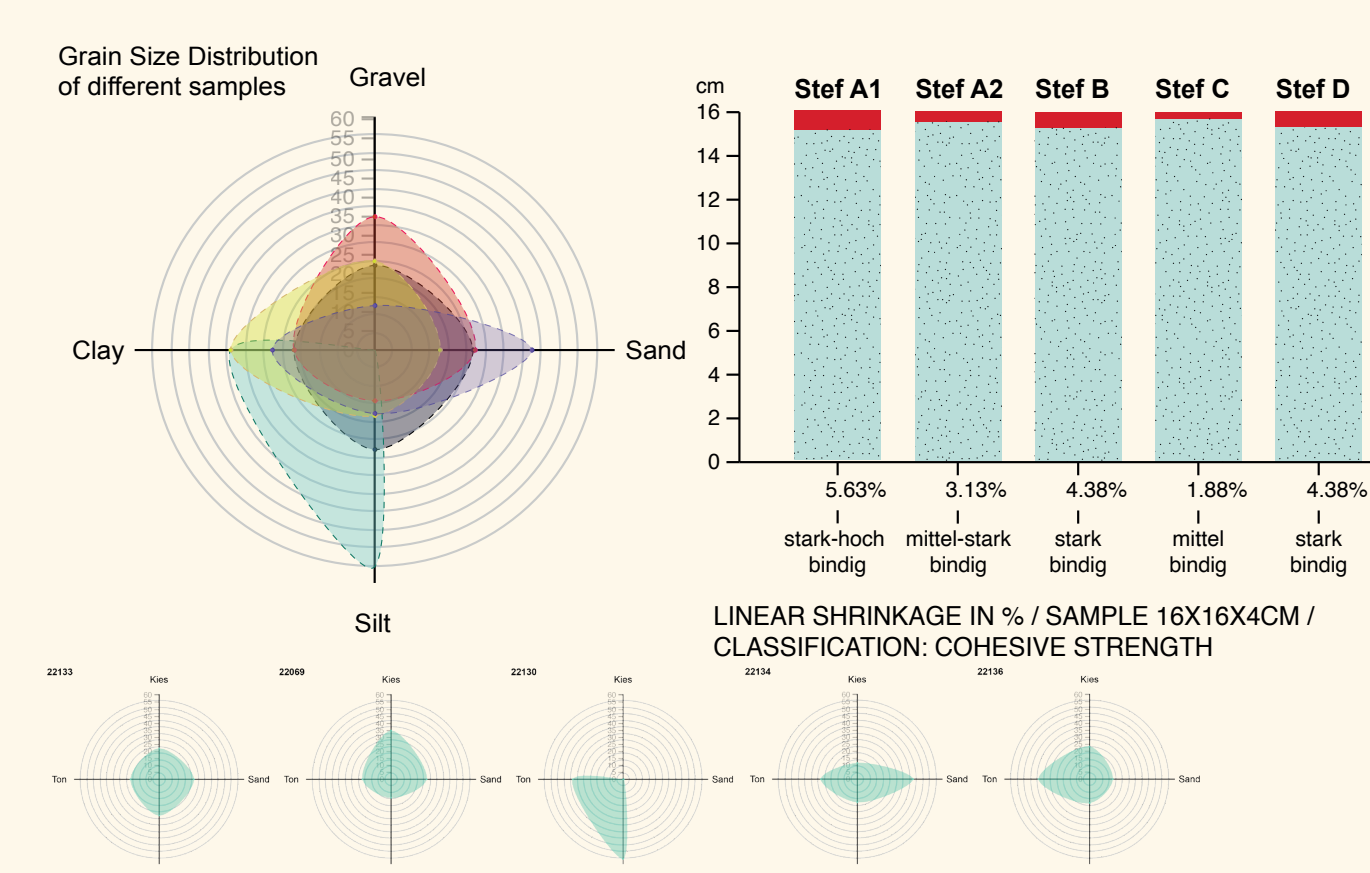


Fig.b

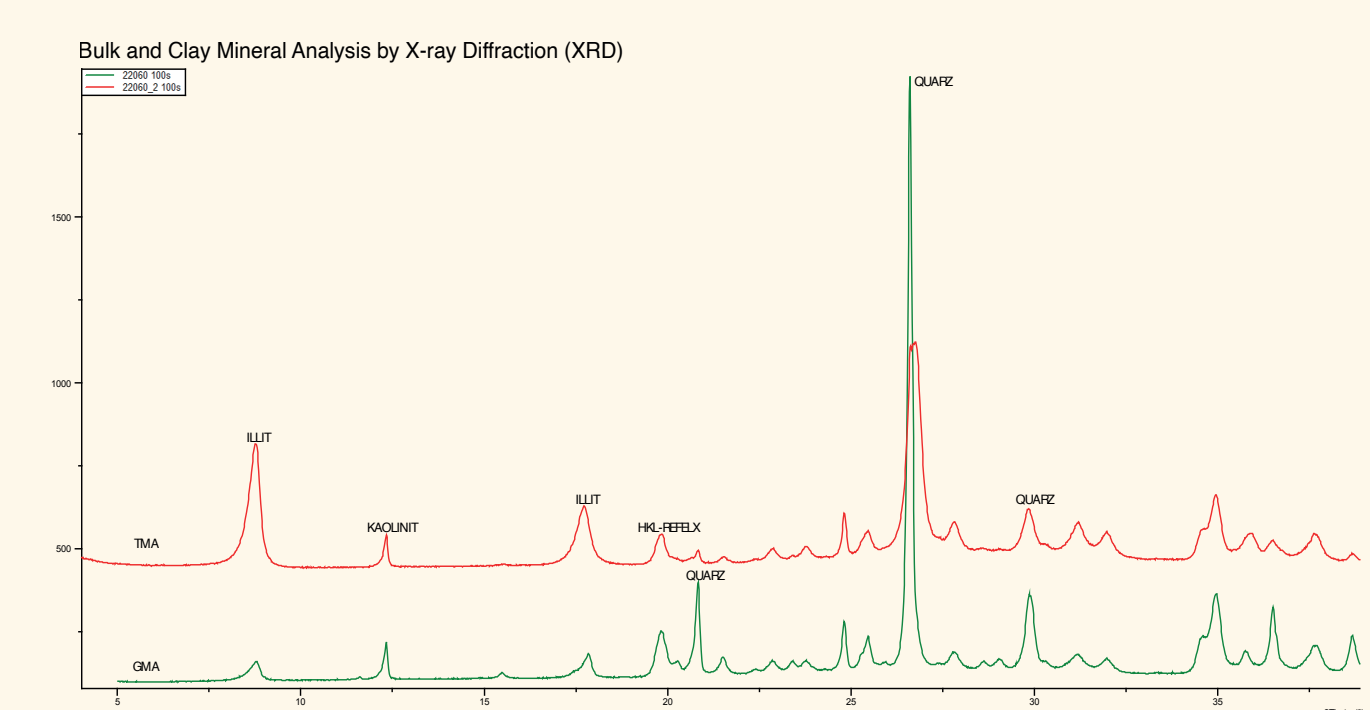


Fig.c

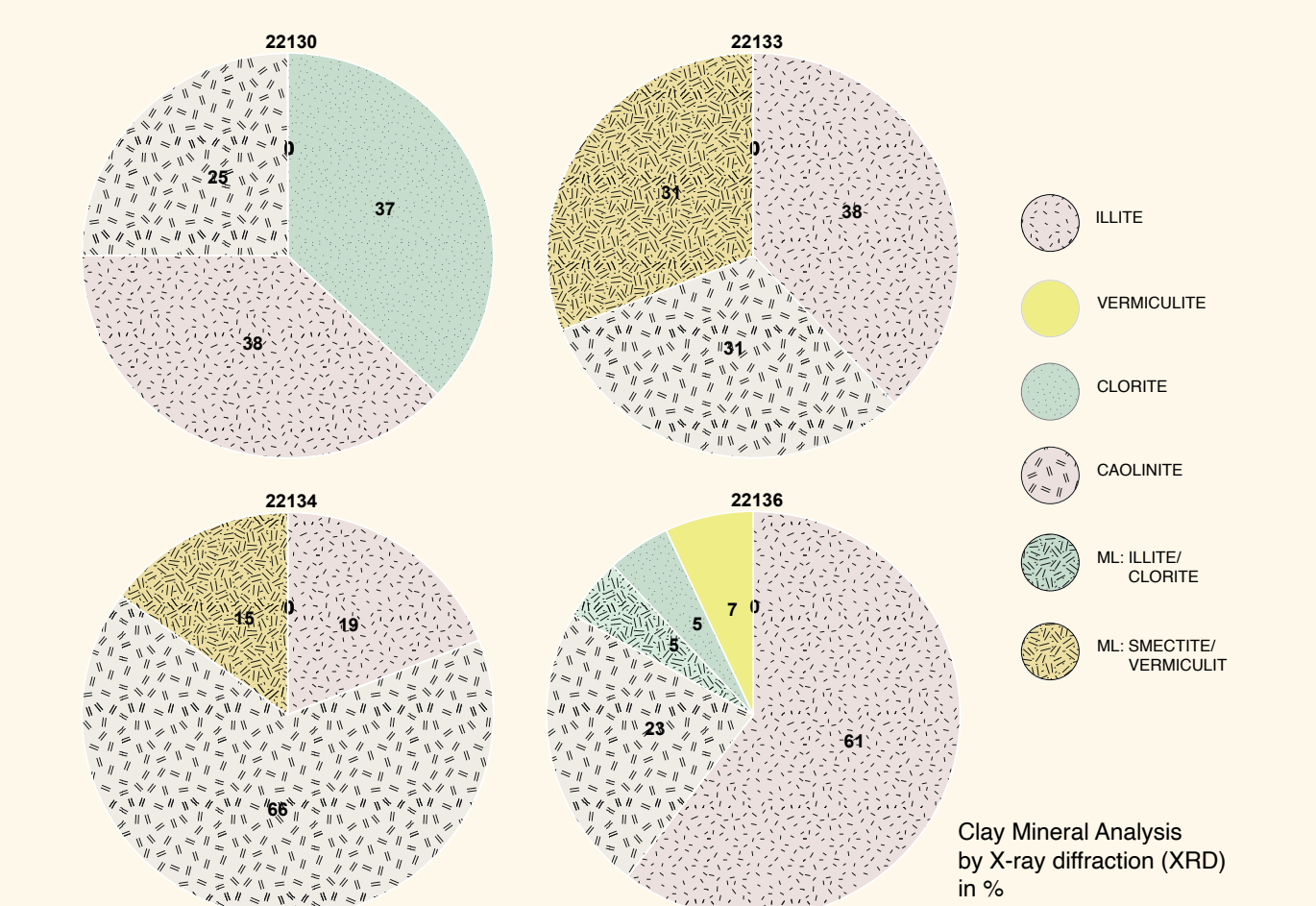


Fig.d

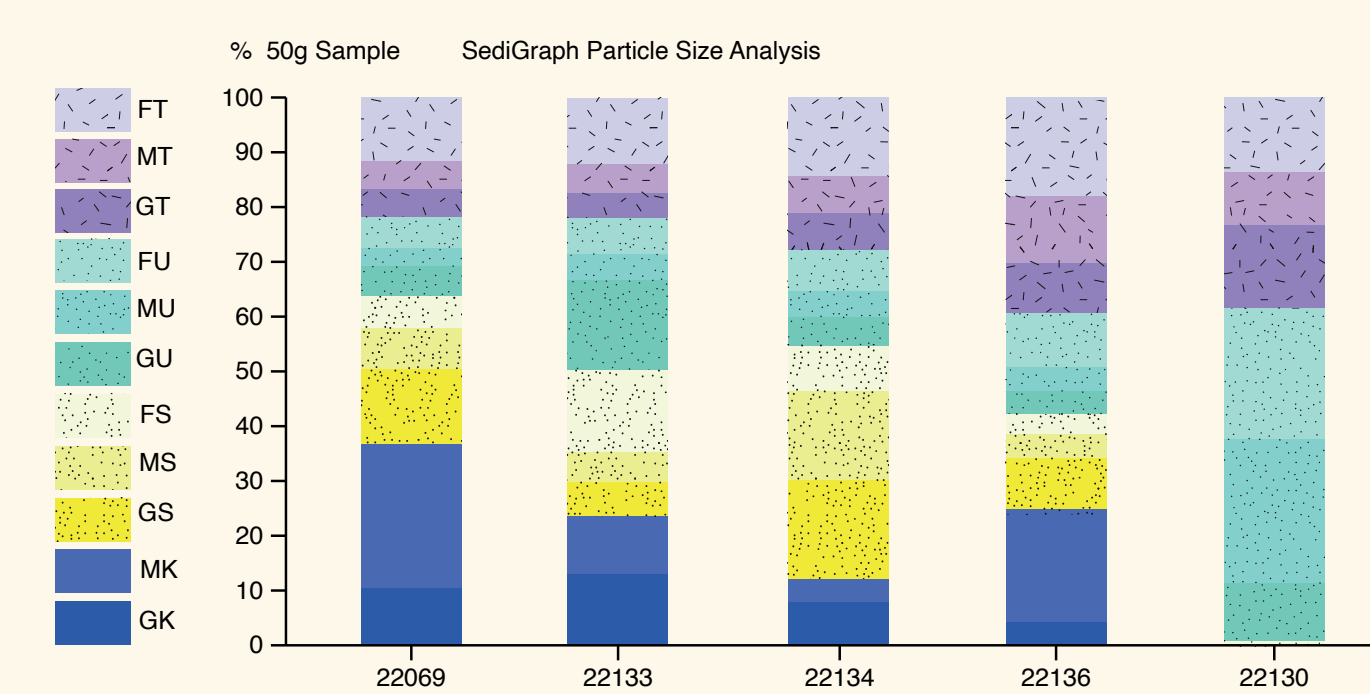


Fig.e

The research explores the potential for a renaissance of clay-based materials in Tuscany, focusing on a specific region (Fig.a) distinguished by its remarkable geological diversity. Archaeological studies of Etruscan, Roman, and historical sites reveal a continuous tradition of material culture that serves both as an inspiration and as a point of reference for innovation in the processing and use of local earthen resources.

Through extensive field research, the project maps and analyses locally available earthen and mineral resources (Fig.a) within the vernacular and rural environment of Tuscany, aiming to develop climate-resilient, claybased building materials. The exploration follows a decentralised, small-scale methodology that identifies and utilises materials found directly on site and in the surrounding nature, with the goal of reducing the ecological footprint while reconnecting architectural practice and aesthetics to the local context.

Particular attention is given to the development of claybased plasters and mineral pigments (Fig.1, Fig.2) for ecological use in the Mediterranean climatic and cultural context, where their physical properties offer significant advantages for both restoration and construction. The focus lies in providing an in-depth insight into the processes of field research — one of the fundamental methodologies within the study — and in exploring the following questions:

- How can specific field research approaches help to identify local mineral and earthen resources?
- What factors contribute to discoveries and innovation during empirical–experimental processes?
- What side effects emerge from interdisciplinary exchange during fieldwork?

Experimental laboratory practices and excursions, developed and conducted within a teaching and research framework, form an essential part of this approach (Fig.2,3,4). In these settings, collected raw materials are processed into clay-based samples, which are systematically tested and evaluated. The study elaborates on key aspects of field research, including the mapping of local earthen and mineral resources (Fig.a), as well as the investigation of historic clay pits (Fig.1), excavation sites, and other mineral sources.

Geological surveys using QGIS, together with laboratory analyses such as X-ray diffraction at BOKU University (Fig.c), provide detailed insights into the materials' properties, allowing for conclusions about their potential applications (Fig.b,d,e).

The field research follows a creative and experimental approach to develop environmentally responsible solutions within the vernacular architectural context. The methodology systematically identifies, collects, and experimentally tests materials found on site, while fostering interdisciplinary collaboration and integrating local knowledge. Collaboration with geologists deepens the understanding of the origins, properties, and transformation processes of local resources within their geological and cultural setting.

A fundamental goal is to activate local networks and cooperation by combining indigenous and scientific knowledge, making this approach and knowledge accessible in a low-threshold manner to craftsmen, experts, and local communities.

Rooted in Tuscany's geological diversity, the research raises awareness of the potential of local earthen resources and fosters material culture.

1. Field research in a hydrothermally influenced zone
2. Polychromatic earth pigments from metal-rich soils
3. Fine clay plaster made from illite-rich earth
4. Field tests to characterize the clays' properties

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