CONCORSO PUBBLICO, PER ESAMI, A N. 1 POSTO DI CATEGORIA D POSIZIONE ECONOMICA D1, AREA TECNICA, TECNICO-SCIENTIFICA ED ELABORAZIONE DATI, PER LE ESIGENZE DEL DIPARTIMENTO DI SCIENZE DELLA TERRA, DELL'AMBIENTE E DELLE RISORSE (DISTAR) DELL'UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II (COD. RIF. 2001) INDETTO CON DECRETO DEL DIRETTORE GENERALE N. 437 DEL 30.06.2020 E PUBBLICATO SULLA G.U. IV SERIE SPECIALE – CONCORSI ED ESAMI – N. 53 DEL 10.07.2020

GRUPPO DOMANDE NON ESTRATTE PROVA ORALE DEL 24/09/2020

- ✓ Quali sono le potenzialità in campo archeometrico delle analisi in XRF?
- ✓ Come ottenere la rappresentatività di un campione massivo per le analisi DRX.
- ✓ La norma UNI EN 12370:2001 per la determinazione della resistenza alla cristallizzazione dei sali.
- ✓ Rappresentazione di diagrammi per la classificazione di una roccia vulcanica effusiva.
- ✓ Le analisi porosimetriche ad intrusione di Hg per la caratterizzazione dei geomateriali.
- ✓ Le analisi di laboratorio per la caratterizzazione di un materiale argilloso.
- ✓ Procedure di laboratorio per la preparazione di una prova per la determinazione della resistenza all'invecchiamento mediante nebbia salina (UNI EN 14147:2005).
- ✓ Utilità dei database cristallografici per l'identificazione della composizione di una miscela cristallina.

PER ORDINE DEL PRESIDENTE
IL SEGRETARIO DELLA COMMISSIONE
F.to dott. Pasquale PIROLLI

(ALL.5)

2.1.4 Imaging the past: visual reconstruction and analysis

The techniques for collecting digital image data, both two-dimensional and three-dimensional, that are suitable for analysis by powerful computer programs are nowadays widespread tools for everybody working in cultural heritage. One can laser scan objects up to the size of buildings and sites, or get the internal pictures of metre-sized objects by tomography in order to have the data for any subsequent **virtual rendering** of the scanned objects. Most data at present end up in enjoyable animations of the object, the building, or the site rotating and shifting under different light conditions on the screen while viewers are comfortably seated in front of the TV set or a laptop computer screen. The overall field of the application of **information technology** to cultural heritage is rapidly developing, so that we are talking about virtual archaeology (Barceló *et al.* 2000) and the fourth dimension in cultural heritage (Stadtarchäologie Wien 2004). However, we should cautiously distinguish between virtual 3D rendering of real data, modelling of the data using **virtual reconstruction** and **virtual reality**, and the use of advanced information technology for research and management of the cultural heritage.

Taking for granted that virtual aids are important tools for the research and management in the cultural heritage, I see at least three points that need to be properly addressed and clarified: (1) authenticity versus virtual reality. Are we looking at real objects or models? (2) access and standardization of large databases, which involves the integration of different kind of data, and (3) the use of virtual reconstruction in active research.

Authenticity. From the point of view of the end-user, one of the major issues in the digital world is in distinguishing the real data from the interpretation. Photographic images, laser scans of surfaces and 3D tomographic images are measured data that can be nicely visualized using advanced computer graphics and rendering tools. There is a whole field of research dealing with the production and treatment of these experimental data, which are designed to be stored in digital form for future reference and long-lasting preservation, rather than to promote **virtual access** to museum, collections, buildings and sites (Lahanier 2004, MacDonald 2006). There are practical problems related to light sources, colour accuracy, spatial resolution and image definition, relief detection and measurement, data storage, and so on. Assuming that satisfactory experimental data are available, then the problems to be faced during visualization are mostly those of realism (rendering, illumination, texture) and the realistic models used for graphical representation. Visualization in this context can be defined as the process of creating a *geometric representation* of the regularity present in the experimental data set: joining points with lines, fitting surfaces to lines, or "solidifying" connected surfaces (Gershon 1994). In this sense, we realize that taking a 2D digital photograph and producing a visual representation of the same surface from a laser scan or spectroscopic data are entirely different processes. In the second case, we are already dealing with mathematical models of the data and while, on one hand, the visualized reconstructed picture usually contains information that is invisible in the simple photographic image, on the other hand this is a **model** of reality, showing a conceptual interpretation, or one of the possible theoretical projections of the model (Barceló 2001).

(ALL.6)

This section focuses on widely occurring geological materials that were and are used in their pristine state, or shaped and fired to produce large elements used for constructions and tools. The large variety of geological materials (Rapp 2002) and their properties are treated in detail in geosciences courses. They are so important in the history of mankind that possibly every archaeologist or conservation scientist ought to have at least a course on geomaterials in his/her curriculum (Herz and Garrison 1998, Garrison 2003). Here we will use an extremely simplified scheme, treating materials from the point of view of the way they are used; that is **solid rocks** of different kind that are shaped into usable fragments, tools or blocks, and unconsolidated **clay-based materials** that can be plastically shaped with water and then hardened by fire (Table 3.2).

In the case of solid, consolidated, or naturally cemented materials (stones, rocks), the action of humans is simply that of selecting the right substance and shaping it to their needs. Size and shape depend on the application, and may vary from microartefacts (Dunnell and Stein 1989) such as small chips of obsidian and flint used for prehistoric blades and arrow points (Fig. 3.7), to very large stoneblocks used for buildings and statues, such as the impressive Preseli dolerite bluestones of Stonehenge (Williams-Thorpe *et al.* 2006), the Kachiqhat red granite and Rumiqolqa andesites used in the Inca walls of Ollantaytambo and Cuzco (Protzen 1985, Protzen and Nair 1997), the massive basalt blocks of Sardinian nuragi (Fig. 3.8), or the striking moai made out of the Rano Raraku tuffs by the Rapanui people on Easter Island (Baker 1993).

In the case of unconsolidated geologic materials, the role of clay minerals is fundamental, because their specific mineral properties make them the ideal material to be plastically shaped when mixed with water. The final shape is maintained through high temperature reactions and mineral transformations. The other clay-free unconsolidated natural materials such as sand and gravel are historically important mostly for binders and concrete, which are treated separately (Section 3.2), or as minor component (temper) of ceramics.

3.1.1 Lithics, rocks, stones

The systematic listing of rocks and minerals used in the past is not of interest here. The excellent volume by Rapp (2002) should be used for the overall understanding of the variety of geomaterials used in ancient times, and their detailed physico-chemical and structural properties can be found in all textbook on mineralogy and petrology (for example, Deer *et al.* 1996, Blatt *et al.* 2005). To keep up with the philosophy of the volume, only a few materials will be mentioned (Table 3.3) whereas the concepts that will be outlined are (1) how do we investigate geological materials, (2) what kind of information may we derive from the scientific analyses, and (3) is there a relationship between the properties of the employed materials and their use?

Rocks are assemblages of one or more mineral phases, and they are commonly investigated by the tools developed within mineralogy, petrology, and