LUMINESCENCE DATING OF MORTARS FROM ANCIENT ARCHITECTURAL ELEMENTS. J. Sanjurjo-Sánchez[1] and Rebeca Blanco Rotea[2], [1]University Institute of Geology "Isidro Parga Pondal", University of A Coruña, Campus de Elviña, 15071 A Coruña, Spain, jsanjurjo@udc.es, [2]Laboratorio de Patrimonio (LaPa) - CSIC c/ San Roque,2. 15704, Santiago de Compostela, Spain, rebeca.blanco-rotea@iegps.csic.es).

Introduction: Lime mortars are one of the most used building materials from prehistoric times. They are composed of a lime binder and an aggregate, usually sand. Historic buildings have commonly been constructed and modified in several periods of their history, or their construction date is unknown. Some of the building materials used in the construction and reconstructions (bricks or ashlars) could been reused and thus could not provide information on the constructive stages. However, mortars cannot be reused. Therefore, they are interesting targets to date buildings. Attempts to date lime mortars by ^{14}C and geochemical dating have been unsuccessful or have shown limited succes [1], [2]. Optically Stimulated Luminescence (OSL) has also been scarcely tested to date lime mortars by OSL with promising results. Boetter-Jensen et *al*. [3] reported that manufacturing procedures for mortars erase the geological paleodose of quartz grains of the aggregate sand enough to be used as a dosimeter. Reports of luminescence dating of mortars have been carried out [4], opening a new way to date buildings constructed using not typically datable materials such as rock ashlars. Goedicke [5] established a bleaching model assuming the bleaching of some grains due to the manual transport and manufacturing of mortars and the bleaching of quartz grains in deeper layers due to the transparency of sand layers in gravel pits.

Mortar dating by OSL involves technical and architectural considerations regarding both the paleodose and the annual dose. Considering the beta annual dose, microdosimetry can be important if heterogeneous mortars are dated. It must be considered that, in some cases, buildings were reconstructed or modified in past times, causing variation of the gamma dose.

Aim of the study: The Luminescence Laboratory of the University Institute of Geology (University A Coruña, Spain) has reconstructed the history of ancient buildings and historic walls of the NW of Spain by dating lime mortars by OSL. Mortars and bricks from the cupola and a wall of a Romanesque Basilica of San Martiño de Foz and restoration lime mortars from ancient city walls of Santiago de Compostela (Galicia, NW Spain) have been taken and dated by OSL. The mortars of the former building are lime mortars made of lime and aggregate sand. The mortars of the latter are made of lime, and sand-gravel aggregate.

Results: The paleodose calculation showed problems related to the quartz content in the mortars made with sand-gravel aggregate. Also, a sample aggregate of the Basilica of San Martiño de Foz had quartz-poor sand and a feldspar contaminated quartz aliquots have been measured by a Post-IR OSL procedure [6]. Results showed ages in agreement with the archaeological and architectural hypoteses. In the case of the Romanesque Basilica of San Martiño de Foz the mortars allowed to date the cupola in the 10-11th Centuries, while the bricks dated are older, and they have been probably reused. The mortars of the ancient city walls of Santiago de Compostela correspond to the 17-18th centuries, and they match the archaeological hypothesis, as they are restoration mortars. Thus, carefully sampling, handling and measurement of OSL provide reliable ages for lime mortars, even when the aggregate is not quartz-rich sand.

References:

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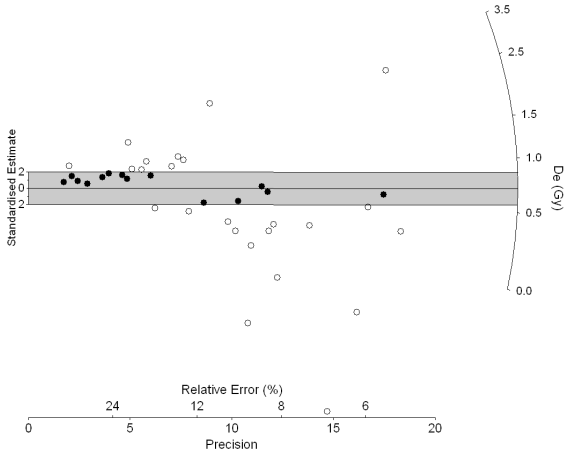

Figure 1. Radial plot of a lime mortar sample from San Martinho de Foz.