



## **Sources of chalk limestone used for medieval building in the Upper Normandy (North France)**

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The sources of historic building stones are interesting, among others, for conservation and heritage studies of historic monuments. Chalk limestone was widely used for building in the Upper Normandy (North France) long the history, being preserved more than 50 castles, churches, abbeys and cathedrals constructed in the X-XIV centuries. The project ATP (archaeomaterials, territory, heritage) founded by the Normandy Region aims the characterization and sourcing of chalky building stone. The methodology includes the characterization of chalk blocks in medieval buildings (castles, abbeys, cathedrals and churches), including its mineralogy, texture, chemical composition (whole rock and Sr isotopes) and petrophysics, and the comparison between this information with the characteristics of the quarry rocks and natural rocky outcrops. According to the use of the chalk, medieval buildings are divided in two types: i) buildings made of both chalk and other rocks and ii) buildings only in chalk, with chalk also used for sculptures or openings. In this last case, a distinction can be made between cohesive chalk used for foundations and soft chalk used for openings and sculptures. At regional scale, the main medieval stone corresponds to the white dolomitic bioclastic-packstone chalk of the top of the St-Pierre-en-Port Fm. (Lewes Fm. in UK), lower Coniacian in age. The rate of  $^{87}\text{Sr}/^{86}\text{Sr}$  of this rock shows the lowest values of Sr isotopes along the chalk series. The dolomitic chalk was mainly exported at the low Seine Valley, from the Caumont or Vernon quarries to the majority of the Upper Normandy. These quarries involve more than 14 km of underground galleries and the main exploitation bancs are locally named “gros lien” and “franc banc”, with 1 and 0.5 m in thickness respectively. At local scale, others chalks were used as construction stone, as the Cenomanian sandy-bioclastic-packstone chalk of the St-Join Fm. (West Melbury Fm. in UK). This is the case of the ducal palace and abbey church of Fécamp, being located the main quarries in the surroundings of this village.