Furuli

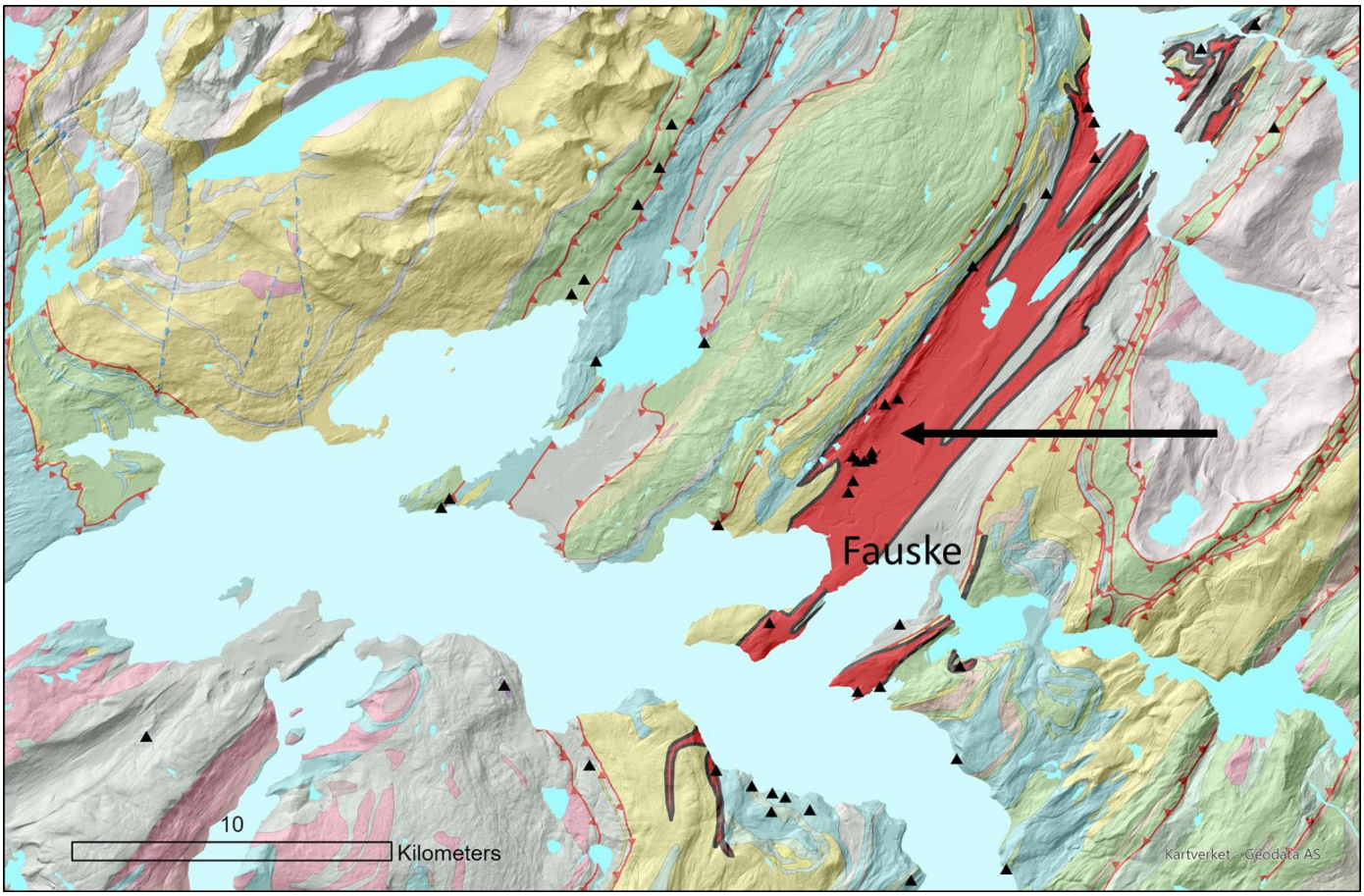
Tortenlia

5 centimeters

Short description: White dolomite marble, fine-grained. The image displays a polished surface.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Commercial Marble	Marble	White	Norway	Nordland	Fauske	Løvgavlen Tortenlia

Geological setting



Geology: The marble units within the Fauske Nappe are composed of a variety of coloured marbles. They were deposited as limestone on a carbonate platform near tidal environments. Tectonic emplacement and metamorphism took place during the Caledonian Orogeny. The Furuli subtype represents a thick layer (several tens of meters) of dolomitic marble in the western part of the unit (see arrow), almost 20 kilometers along the strike. However, subtle changes within the deposit cause strong variation in technical quality.

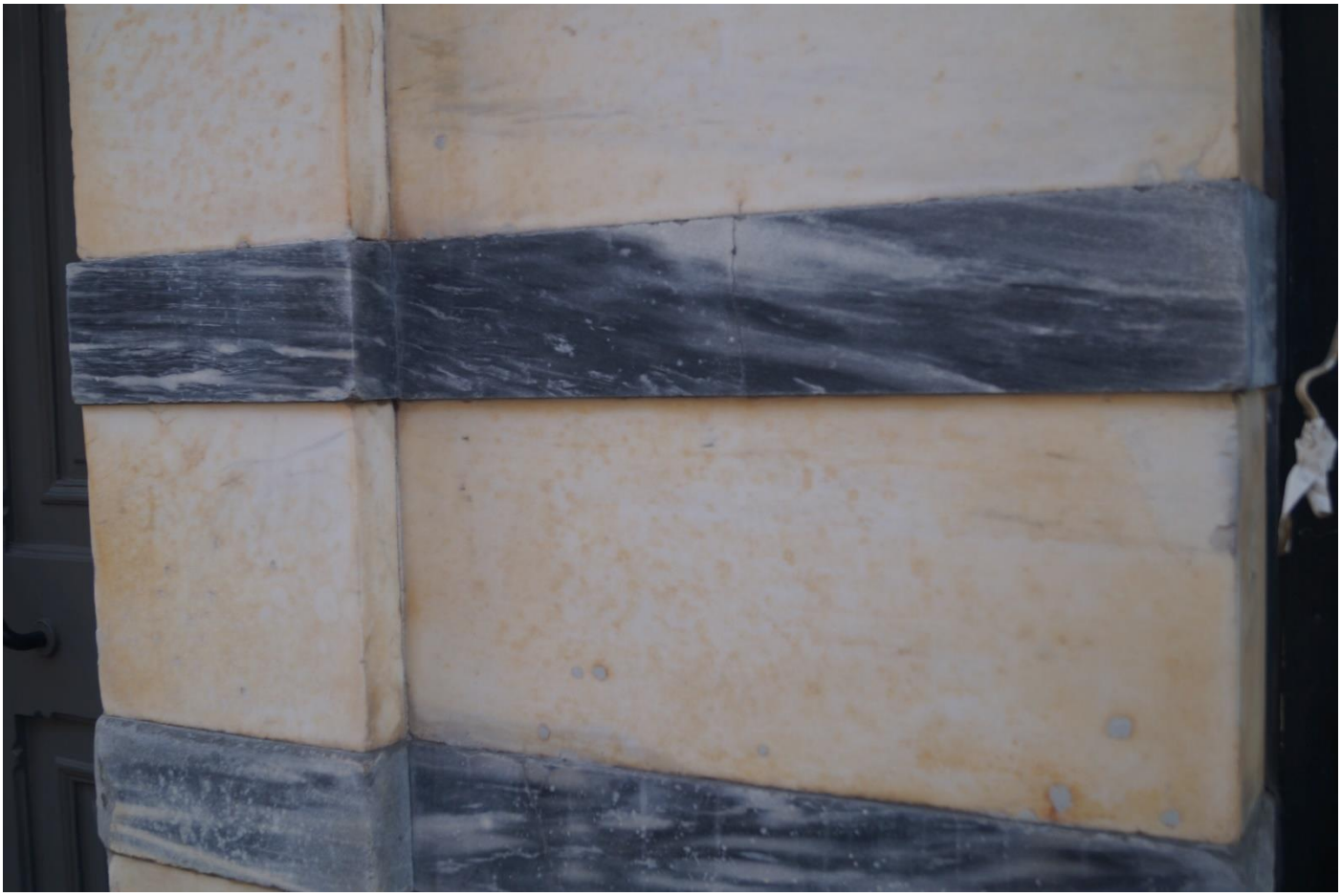
Production: The marble has been in regular production since 1884, predominantly at the Furli and Tortenlia sites (see arrows). At the time of writing, it may be difficult to obtain as dimension stone, since parts of the deposit area is employed for production of industrial dolomite.

Geological age: Cambrian 520 Ma
Geological unit: Fauske Nappe

Application, use and heritage

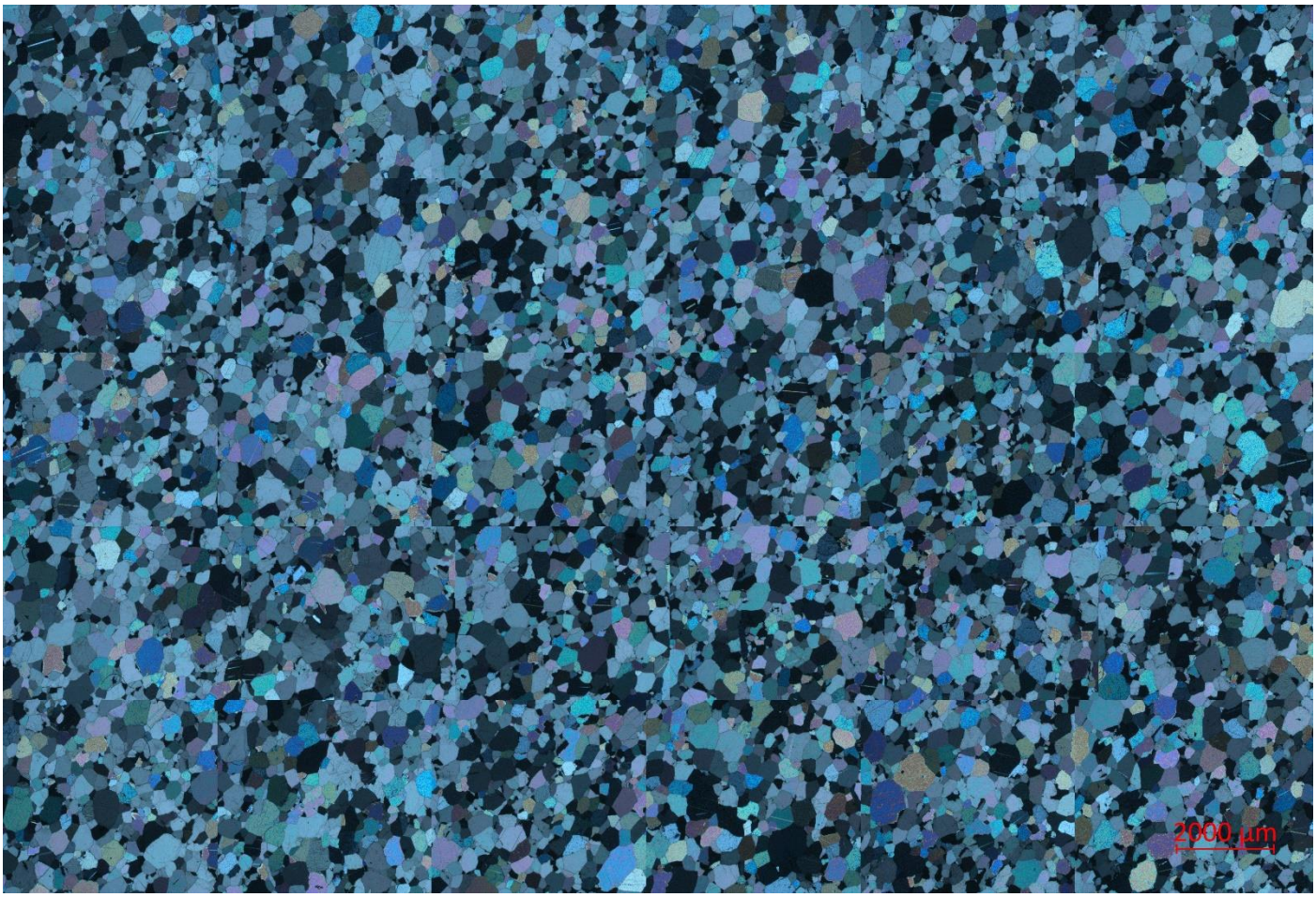
Description: Applied for façade blocks in some early buildings, but mostly it is used for interior floors and walls.

The “Marble Chateau”, Bodø, constructed in 1929. Dolomite marble from Tortenli as Scottish rubble façade. Photo credits: Ingebjørg Hage, published in https://arkitekturguide.uit.no.



Honed slabs of Furuli marble and Antique marble in building in Oslo, late 19th Century. Note rusty spots due to iron content in dolomite.

Petrography



Description: Photomicrograph (mosaic) of thin section, crossed polarized light showing predominantly fine-grained dolomite grains. Grain-boundaries are usually straight, which do cause the marble to be mechanically weak.

Source of information: Geological Survey of Norway

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Dolomite (%)	Accessory minerals (%)					
99	**1**					

Source of information: Unpublished NGU estimate for this directory

Physical properties

Apparent density (EN 1936), kg/m3	Open porosity (EN 1936), % vol	Water absorption at atmospheric pressure (EN 13755), % wt	Uniaxial Compressive strength (EN 1926), MPa	Flexural strength under concentrated load (EN 12372), MPa

Real density (EN 1936), kg/m3	Total porosity (EN 1936), % vol	Water absorption coefficient by capillary (EN 1925) (g/m2 x s0,5)	Flexural strength under constant moment (EN 13161), MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -), %	Change in open porosity (increase: +; decrease: -), %	Change in ultrasound pulse velocity (increase: +; decrease: -), %	Change in flexural strength under conc. load (increase: +; decrease: -) %

Abrasion resistance (EN 14157)			**Resistance to salt crystallisation (EN 12370)**	**Breaking load at dowel hole (EN 13364)**	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm^3 / $50cm^2$	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			**Rupture energy (EN 14158), Joule**	**Thermal Conductivity (EN 1745), W/m·K**
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
Polished				

Source of information:

Chemical properties

Main elements

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	LOI (%)

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information:

Sources of more information

Type of information	Name of provider	URL
Data sheet	Geological Survey of Norway	https://geo.ngu.no/api/faktaark/mineralressurser/visNaturstein.php?objid=9260&lang=eng https://geo.ngu.no/api/faktaark/mineralressurser/visNaturstein.php?objid=14864&lang=eng
Maplink	Geological Survey of Norway	https://geo.ngu.no/kart/common_mobil/?_/kart/mineralressurser_mobil/__lang=nor::extent=504813.5423853533,7461432.695400183,534347.6673853532,7474253.382900183::map=9
Non-commercial directory	Natural stone online	
Commercial directory		
Scientific publication		https://www.ngu.no/upload/Publikasjoner/Bulletin/Bulletin436_147-168.pdf
Other publication		

Compiled by:	Geological Survey of Norway (NGU) https://www.ngu.no/	