

Supplementary material

Fig. S1. Stereographic projection of fractures.

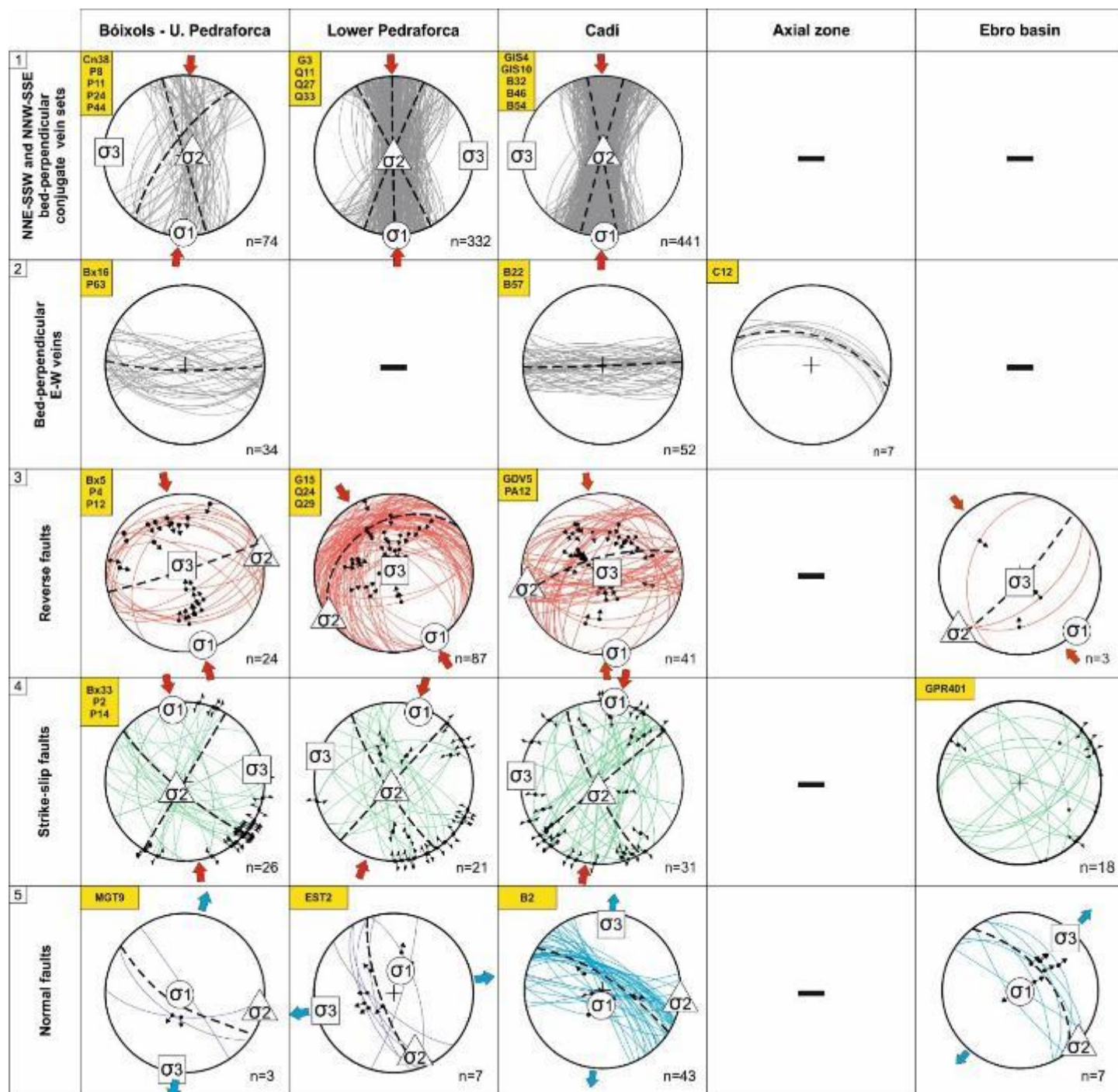


Table S1. Description and field images of samples

Bóixols – Upper Pedraforca thrust sheet

Sample	Location	Description	Host rock	Age
Bx1a	42° 9'55.90"N 1° 9'38.96"E	E-W sub-vertical calcite vein	Upper Cretaceous limestones	No



Sample	Location	Description	Host rock	Age
Bx5	42° 9'56.73"N 1° 9'39.25"E	Calcite within reverse fault	Upper Cretaceous limestones	Yes

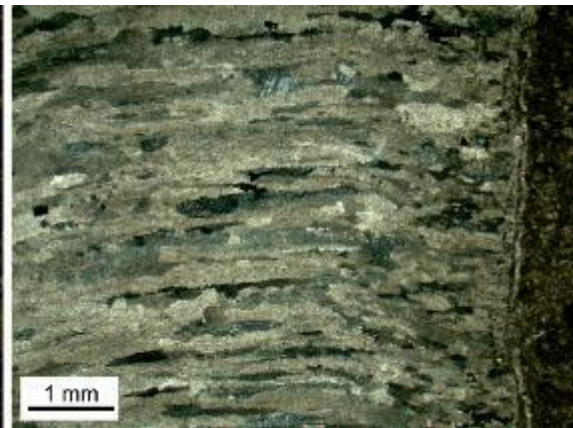
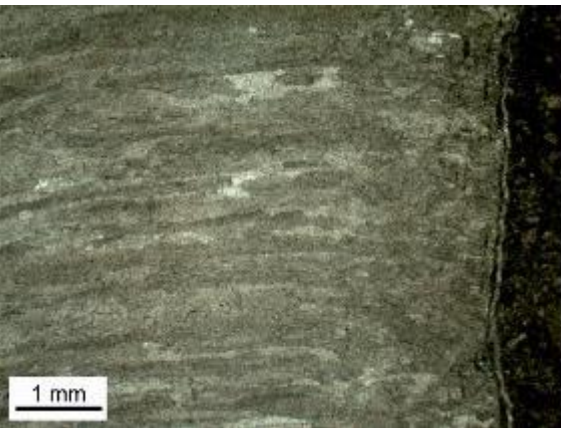
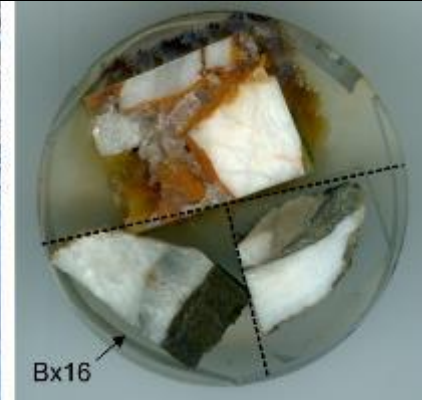


Sample	Location	Description	Host rock	Age
Bx10	42°10'9.17"N 1° 9'47.38"E	Calcite within normal fault	Jurassic limestones	No



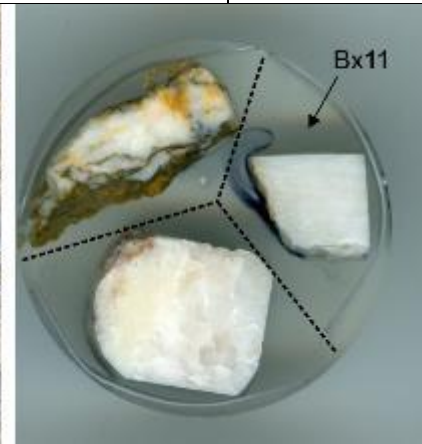
Sample	Location	Description	Host rock	Age
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Bx16	42°10'24.90"N 1° 9'55.47"E	E-W calcite veins	Lower Cretaceous limestones	Yes
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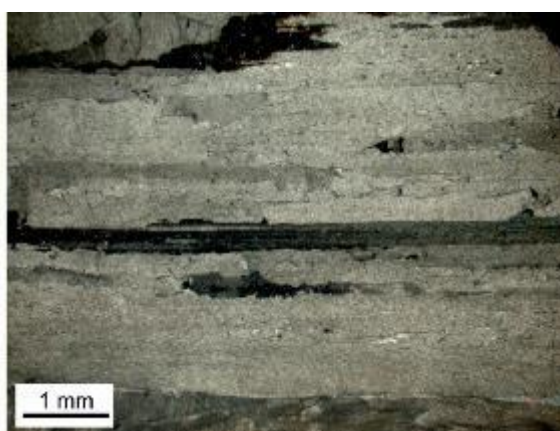
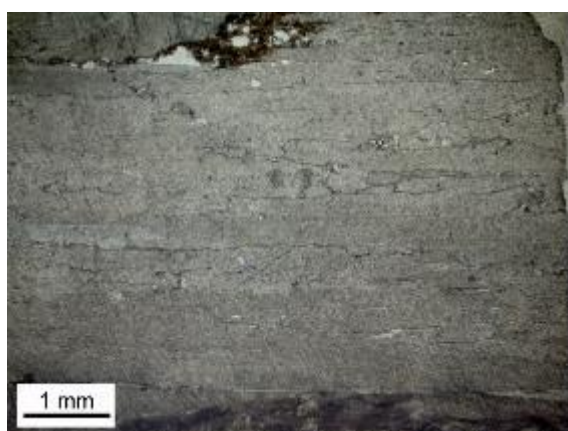
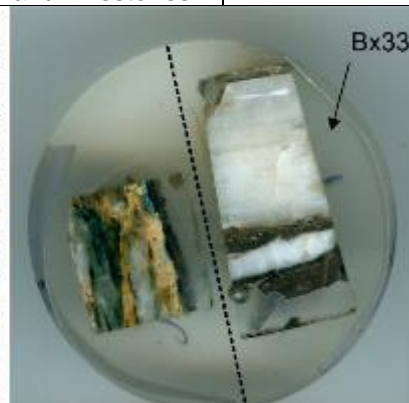


Sample Bx16: Optical microscope image showing elongated sparite texture perpendicular to fracture walls.

Sample	Location	Description	Host rock	Age
Bx11	42°10'25.48"N 1° 9'55.30"E	Calcite within strike-slip fault	Lower Cretaceous limestones	No

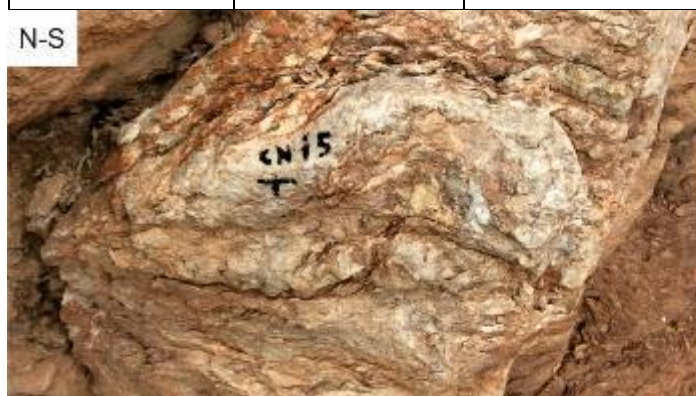


Sample	Location	Description	Host rock	Age
Bx33	42°11'29.08"N 0°57'27.28"E	Calcite within strike-slip fault	Upper Cretaceous marls and limestones	Yes

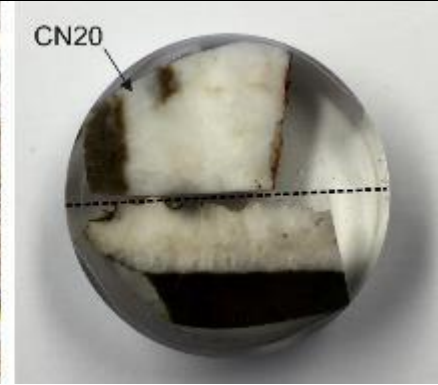


Sample Bx33: Optical microscope image showing elongated sparite texture parallel to fracture walls.

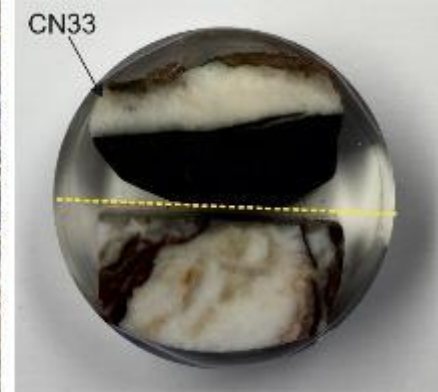
Sample	Location	Description	Host rock	Age
CN15	42°10'36.18"N 1°18'24.18"E	Calcite within strike-slip fault	Upper Cretaceous limestones	No



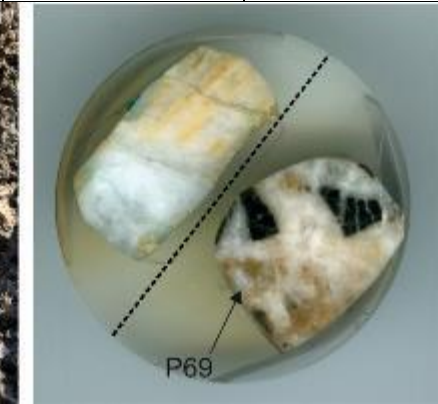
Sample	Location	Description	Host rock	Age
CN20	42°10'33.65"N 1°18'12.63"E	NW-SE calcite vein	Paleocene limestones	No



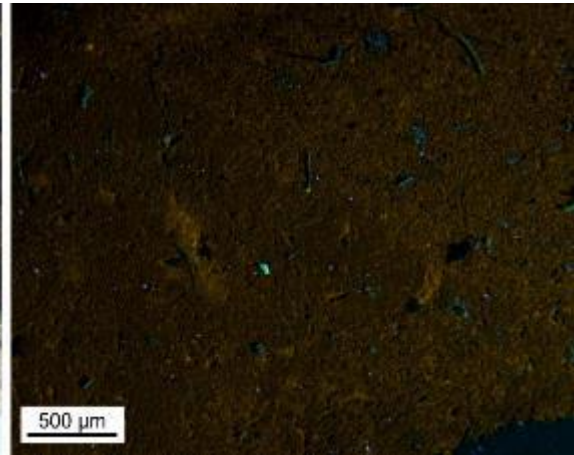
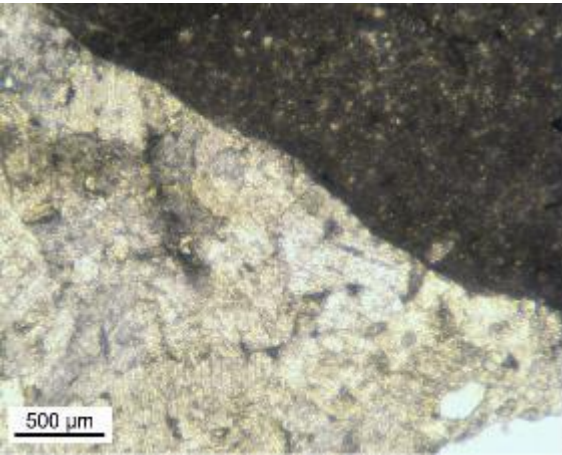
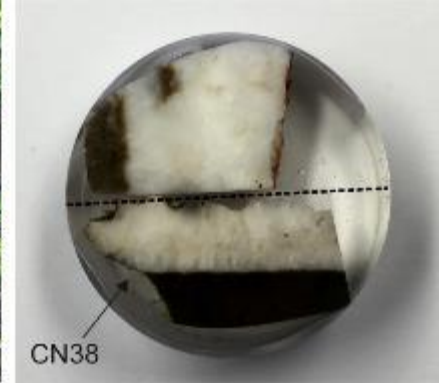
Sample	Location	Description	Host rock	Age
CN33	42°10'39.31"N 1°18'59.17"	NE-SW calcite vein	Lower Cretaceous limestones	No



Sample	Location	Description	Host rock	Age
P69	42°14'59.09"N 1°39'6.44"E	Calcite within WSW-ENE reverse fault	Lower Cretaceous breccias	No

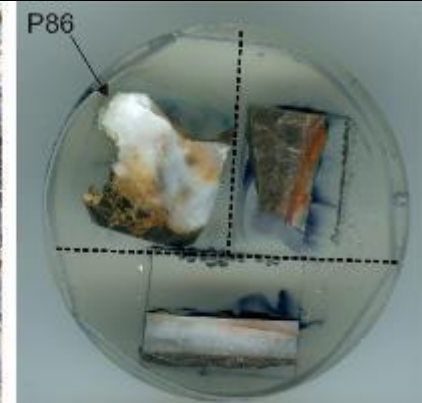


Sample	Location	Description	Host rock	Age
CN38	42°10'39.52"N 1°18'14.41"E	NW-SE calcite vein	Lower Cretaceous limestones	Yes

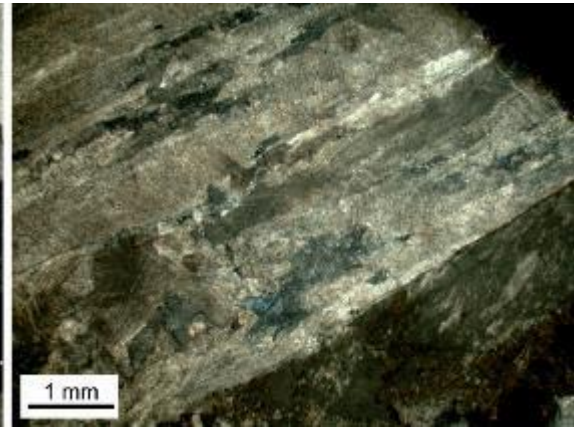
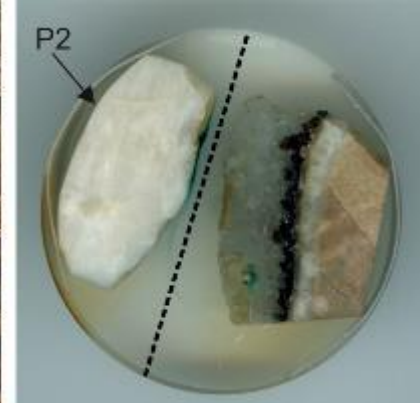


Sample CN38: Optical and cathodoluminescence microscope images showing blocky texture of the aged calcite.

Sample	Location	Description	Host rock	Age
P86	42°14'54.16"N 1°38'52.10"E	Calcite within E-W reverse fault	Lower Cretaceous breccias	No

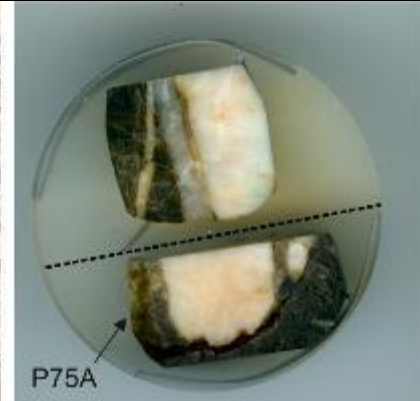


Sample	Location	Description	Host rock	Age
P2	42°14'50.15"N 1°42'18.21"E	Calcite within strike-slip fault	Upper Cretaceous limestones	Yes

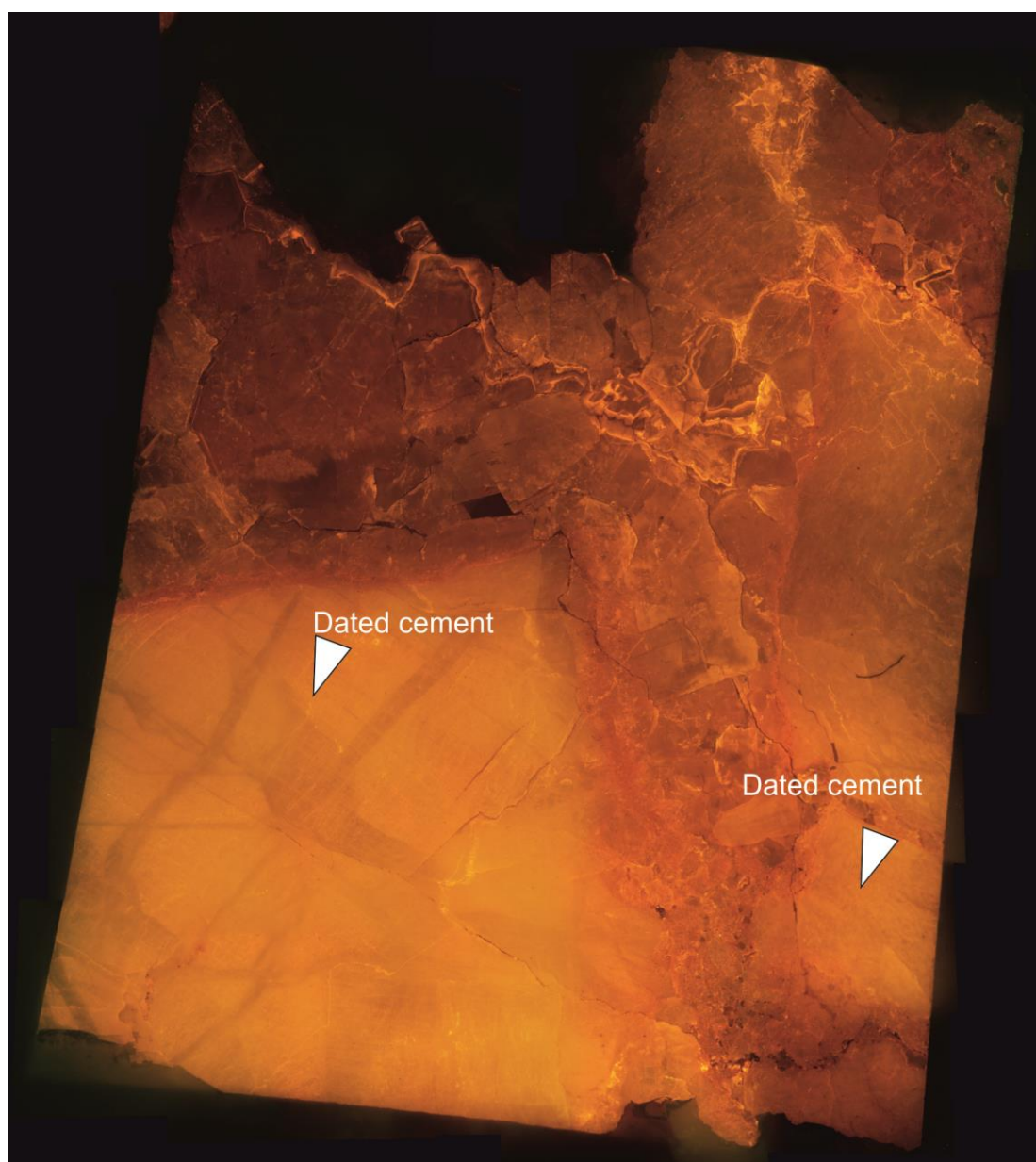
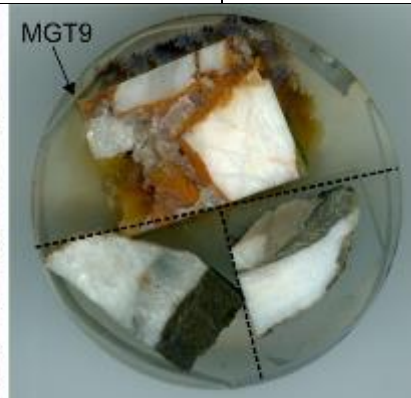


Sample P2: Optical microscope image showing elongated sparite texture parallel to fracture walls.

Sample	Location	Description	Host rock	Age
P75A	42°14'59.03"N 1°39'13.20"E	Bed-parallel dolomite vein	Upper Jurassic dolostones	No

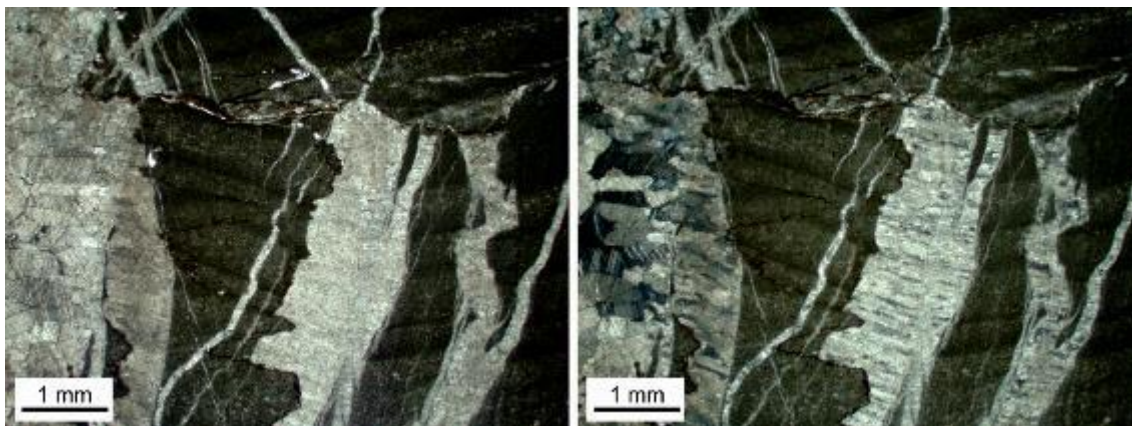


Sample	Location	Description	Host rock	Age
MGT9	42°11'53.57"N 1° 2'11.19"E	Calcite within normal fault	Lower Cretaceous limestones	Yes



Sample MGT9: Cathodoluminescence image of the analyzed mound showing the blocky texture of aged cements.

Sample	Location	Description	Host rock	Age
P8	42°14'39.87"N 1°41'52.75"E	N-S calcite vein	Lower Jurassic limestones	Yes

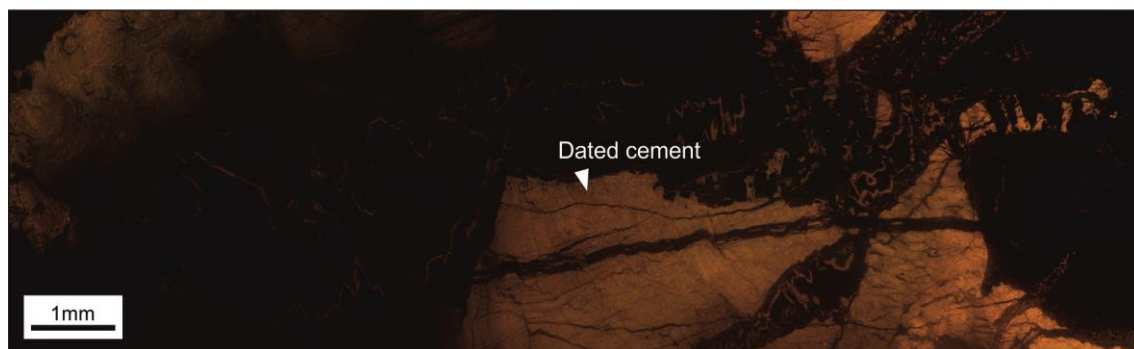
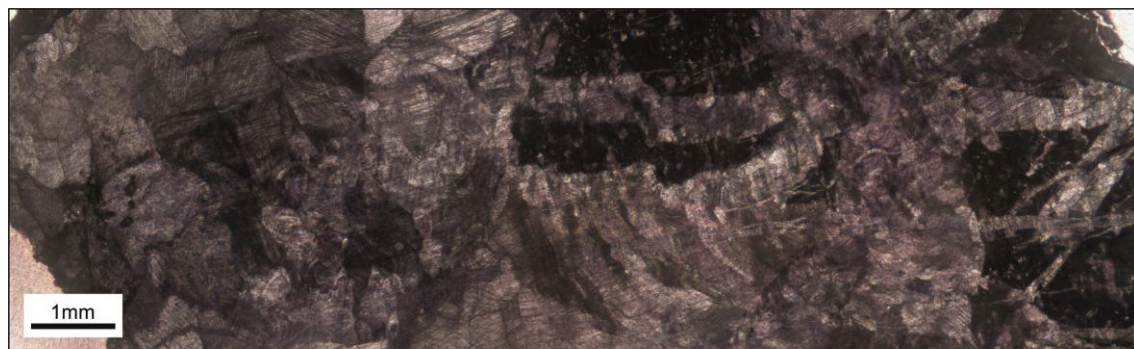


Sample P8: Optical microscope image showing elongated sparite perpendicular to fracture walls.

Sample	Location	Description	Host rock	Age
P82A and B	42°14'59.00"N 1°39'11.84"E	Calcite within E-W normal fault	Lower Cretaceous breccias	No

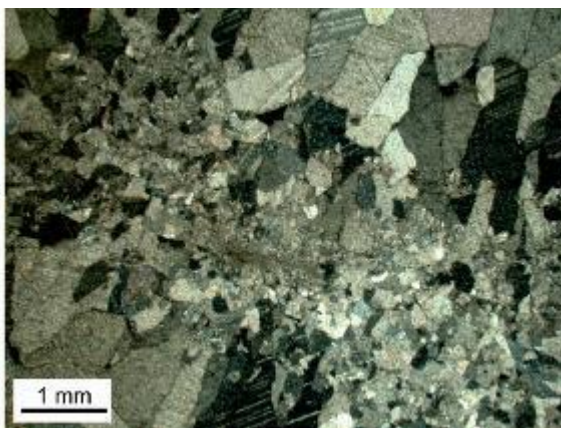


Sample	Location	Description	Host rock	Age
P4	42°14'50.15"N 1°42'18.21"E	Hydraulic breccia cemented by calcite	Upper Cretaceous limestones	Yes



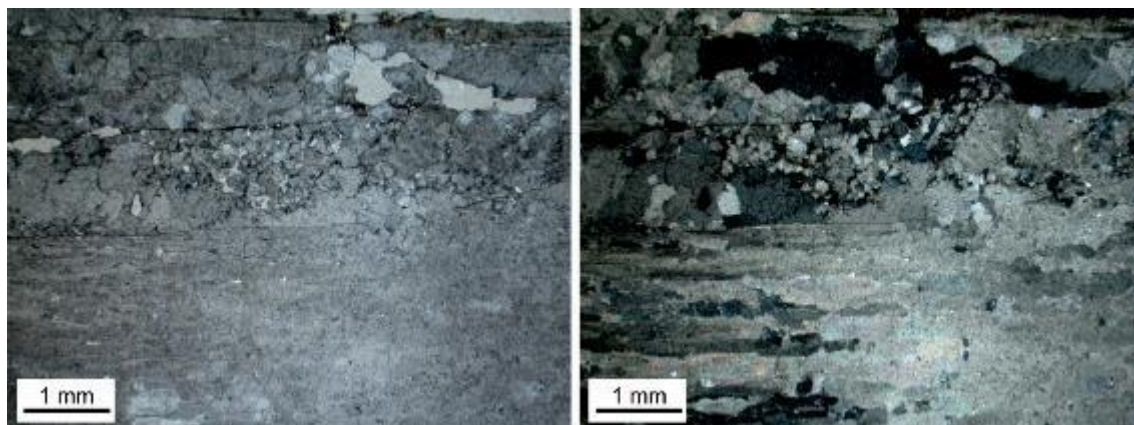
Sample P4: Optical and cathodoluminescence microscope images showing elongated sparite perpendicular to fracture walls and blocky calcite.

Sample	Location	Description	Host rock	Age
P9	42°14'39.62"N 1°41'52.82"E	Calcite within breccia	Lower Jurassic Breccias	Yes



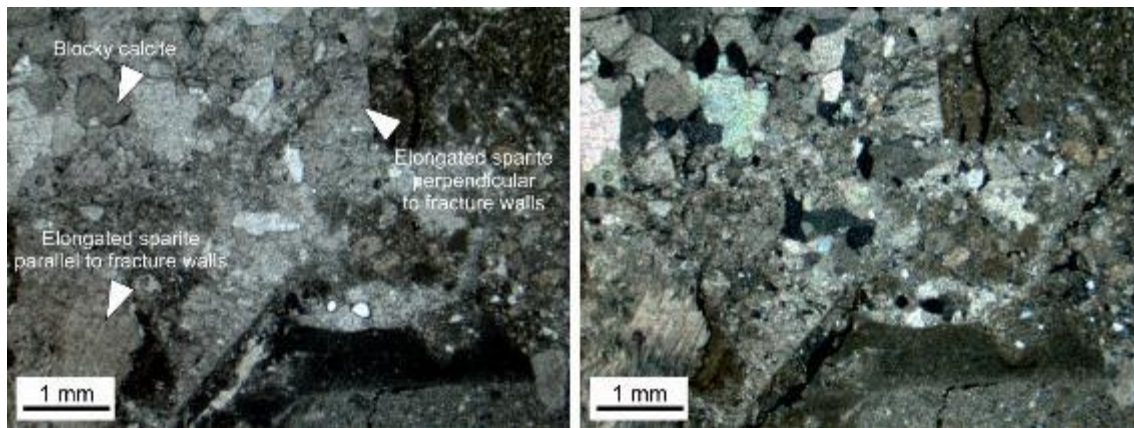
Sample P9: Optical and cathodoluminescence microscope images showing bladed and blocky textures of the analyzed calcite cements.

Sample	Location	Description	Host rock	Age
P12	42°13'35.72"N 1°42'41.08"E	Calcite within strike-slip fault	Upper Cretaceous Breccias	Yes



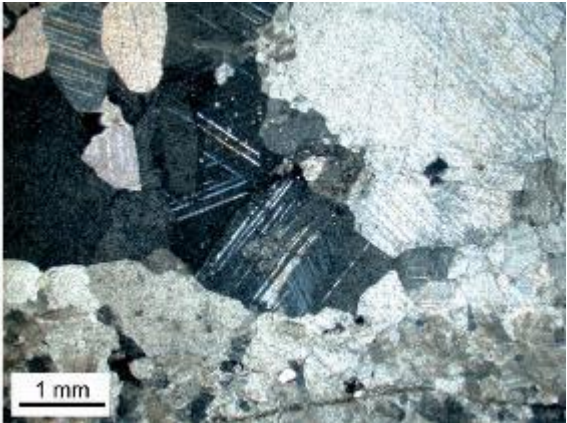
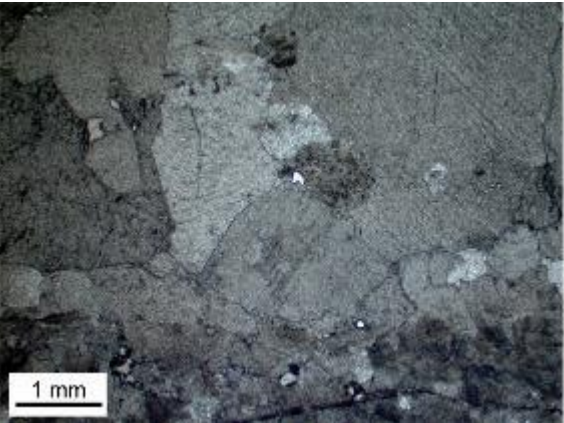
Sample P12: Optical microscope images showing elongated sparite parallel to fracture walls and blocky calcite.

Sample	Location	Description	Host rock	Age
P14	42°13'35.47"N 1°42'41.62"	Calcite within strike-slip fault	Upper Cretaceous marls	Yes



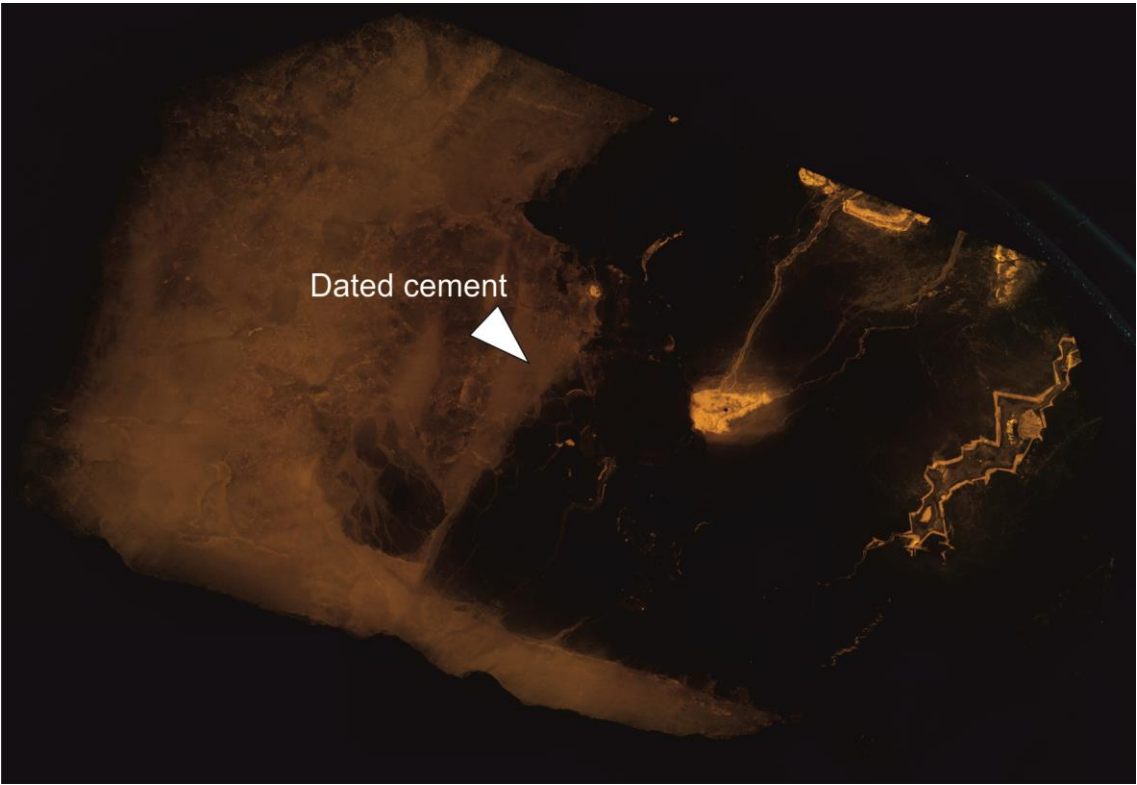
Sample P14: Optical microscope images showing blocky and elongated sparite perpendicular and parallel to fracture walls textures of aged cement.

Sample	Location	Description	Host rock	Age
P44	42°13'14.60"N 1°41'12.57"E	N-S calcite vein	Upper Cretaceous siltstones	Yes



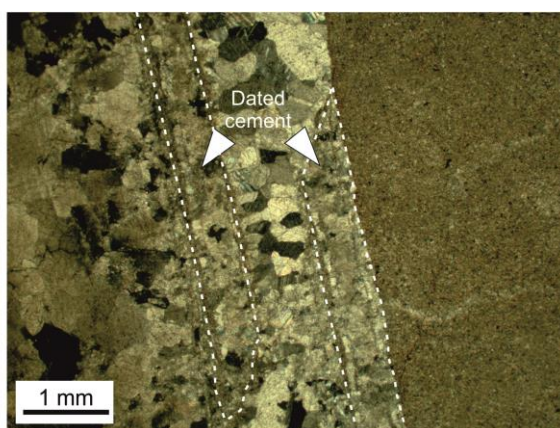
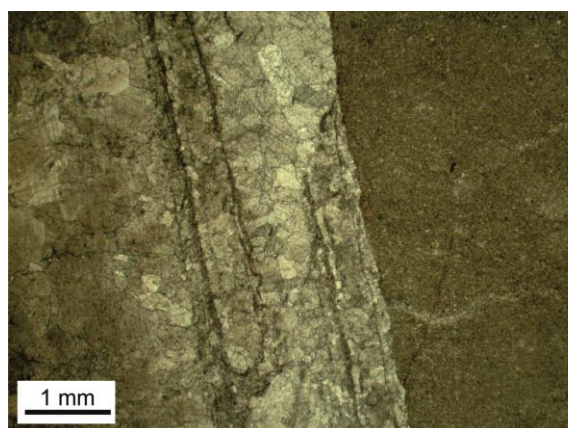
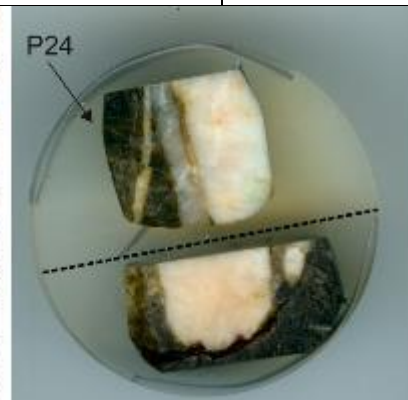
Sample P44: Optical microscope images and blocky texture of analyzed the calcite cement.

Sample	Location	Description	Host rock	Age
P21	42°14'59.03"N 1°39'5.60"E	Calcite within reverse fault	Lower Cretaceous breccias	Yes



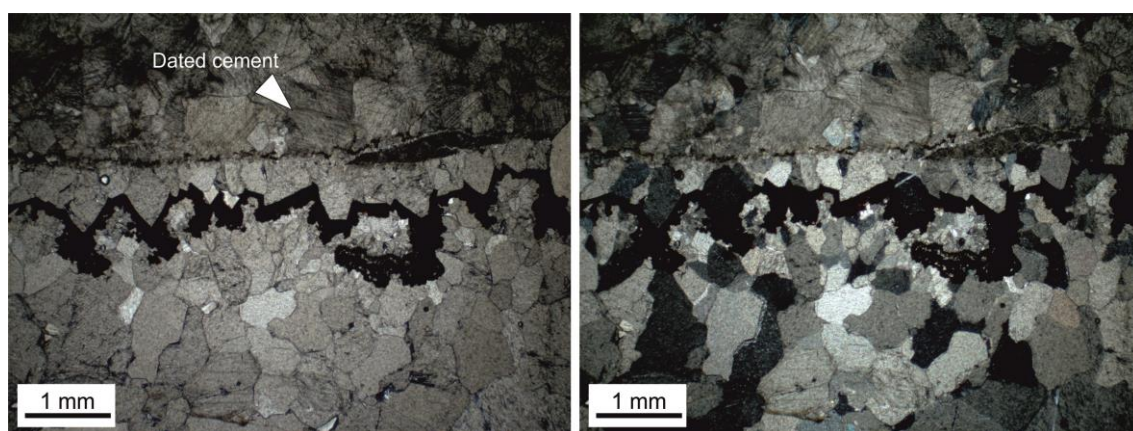
Sample P21: Cathodoluminescence image of the analyzed mound showing the blocky texture of aged cements.

Sample	Location	Description	Host rock	Age
P24	42°14'58.92"N 1°39'14.55"E	N-S dolomite vein predating N-S calcite vein	Upper Jurassic dolostones	Yes



Sample P24: Optical microscope images of blocky texture of the analyzed calcite cement.

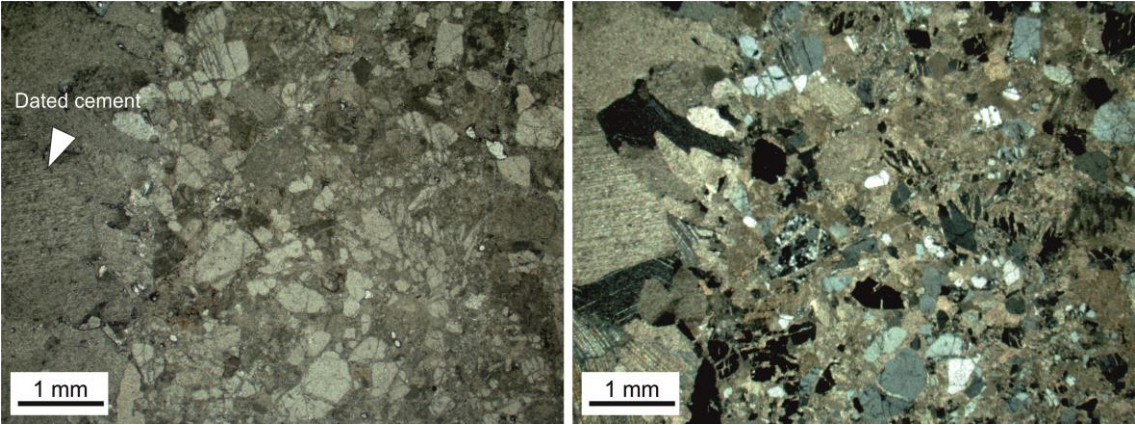
Sample	Location	Description	Host rock	Age
P63	42°14'31.10"N 1°41'55.27"E	Karst cavity	Lower Cretaceous breccias	Yes



Sample P63: Optical microscope images of blocky texture of the analyzed calcite cement.

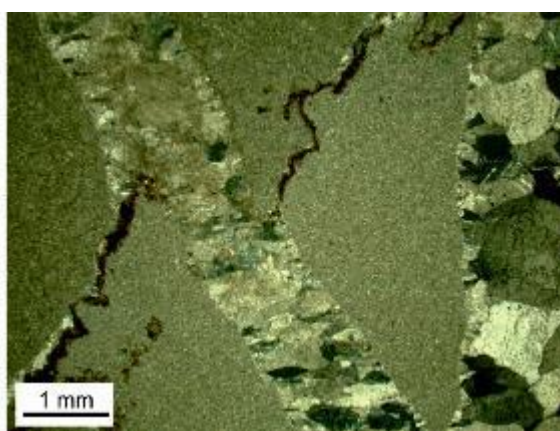
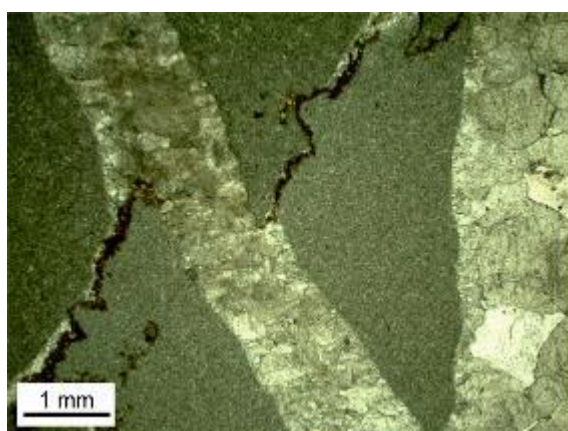
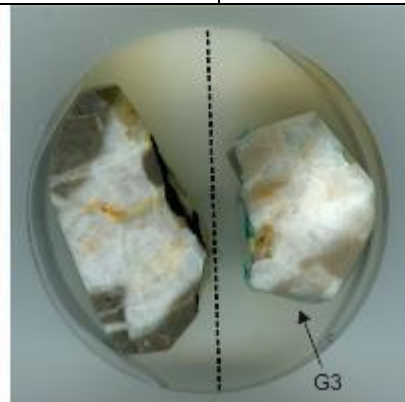
Lower Pedraforca thrust sheet

Sample	Location	Description	Host rock	Age
EST2	42°15'27.89"N 1°41'15.31"E	Calcite within NNW-SSE normal fault	Oligocene conglomerates	Yes



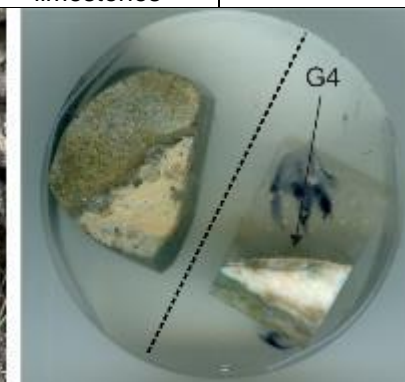
Sample EST2: Optical microscope images of blocky texture of the analyzed calcite cement.

Sample	Location	Description	Host rock	Age
G3	42° 7'55.99"N 1°51'45.57"E	N-S calcite vein	Lower Jurassic limestones	Yes

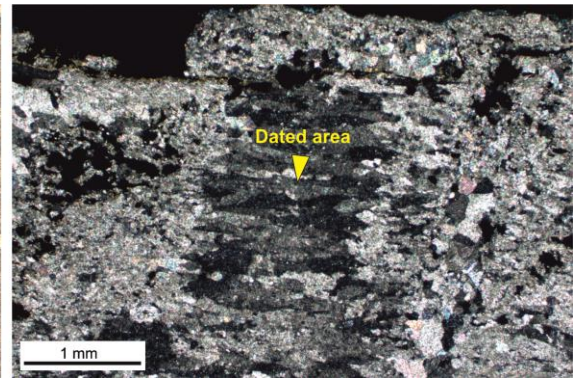
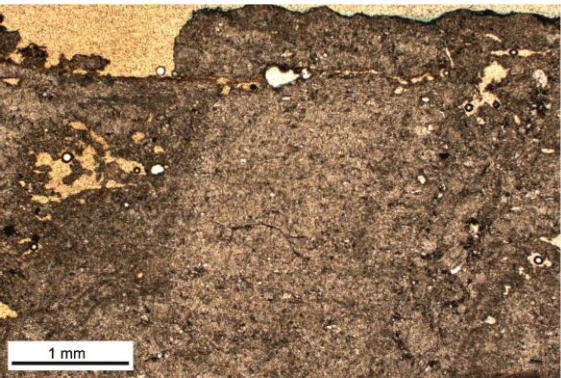
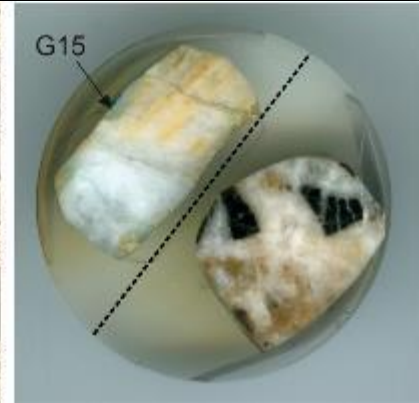


Sample G33: Optical microscope images of blocky and elongated sparite textures of the analyzed calcite cement.

Sample	Location	Description	Host rock	Age
G4	42° 7'56.49"N 1°51'47.59"E	Calcite within strike-slip fault	Upper Cretaceous limestones	No

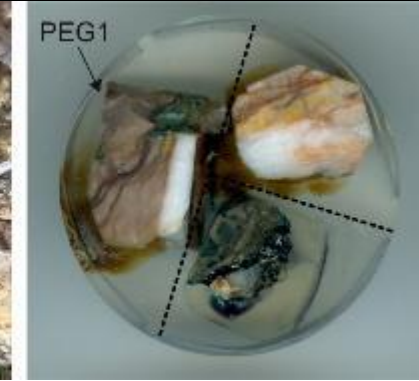


Sample	Location	Description	Host rock	Age
G15	42°14'16.70"N 1°51'55.89"E	Calcite within reverse fault	Lower Jurassic limestones	Yes



Sample G15: Optical microscope image showing elongated sparite parallel to fracture walls.

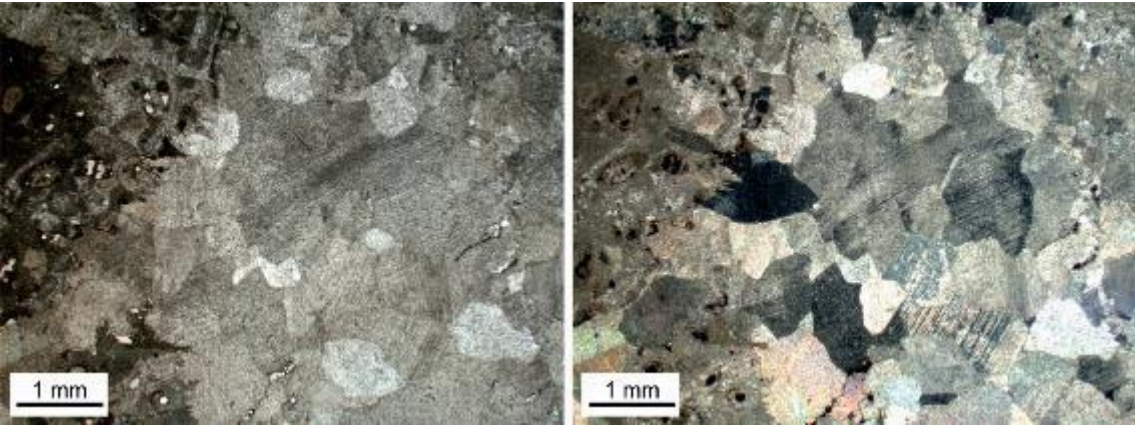
Sample	Location	Description	Host rock	Age
PEG1	42° 9'52.60"N 1°45'37.50"E	Calcite within reverse fault	Paleocene limestones	No



Sample	Location	Description	Host rock	Age
PEG4	42° 9'52.60"N 1°45'37.50"E	Calcite within reverse fault	Paleocene limestones	No

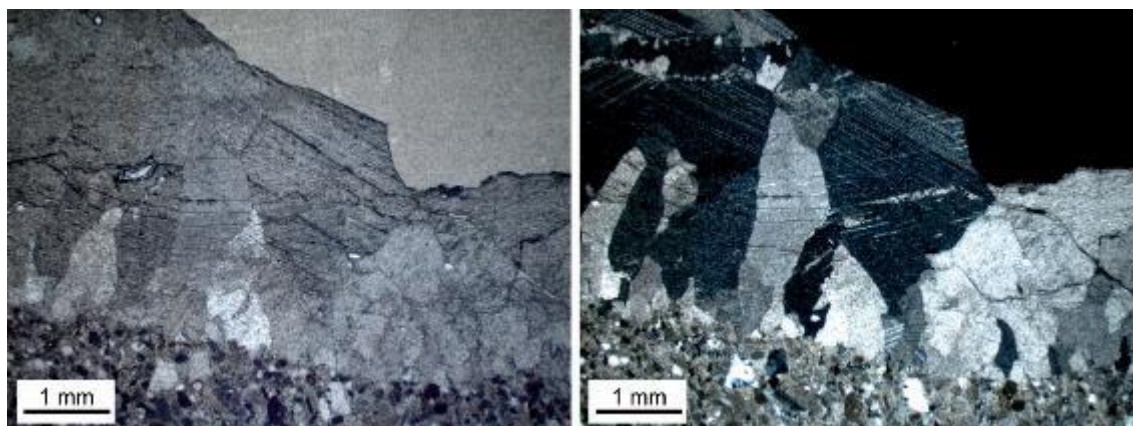


Sample	Location	Description	Host rock	Age
Q3-1 and Q3-2	42° 6'37.28"N 1°49'27.69"E	Calcite within reverse fault	Upper Cretaceous limestones	Q3-1 = Yes Q3-2 = No



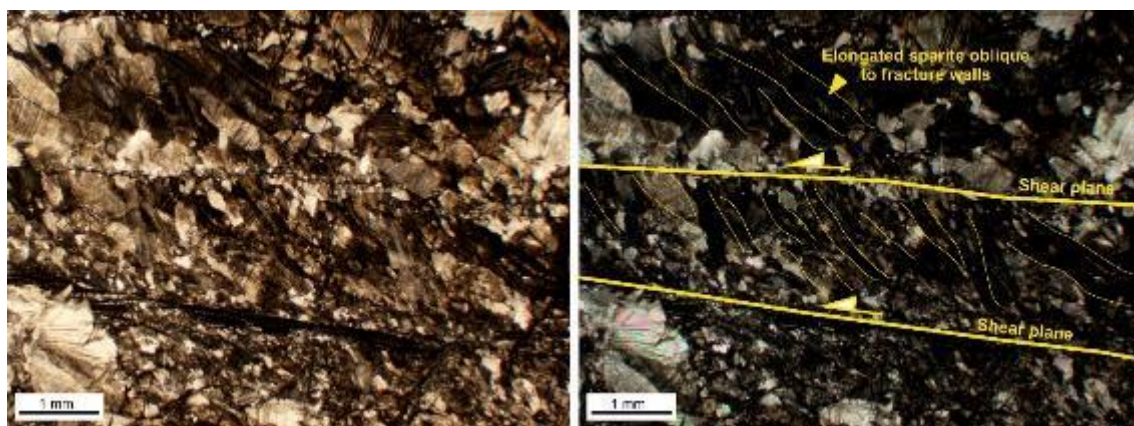
Sample Q3-1: Optical microscope images of blocky texture of the analyzed calcite cement.

Sample	Location	Description	Host rock	Age
Q11	42° 6'26.46"N 1°49'35.42"E	E-W calcite vein	Middle Eocene sandstones	Yes



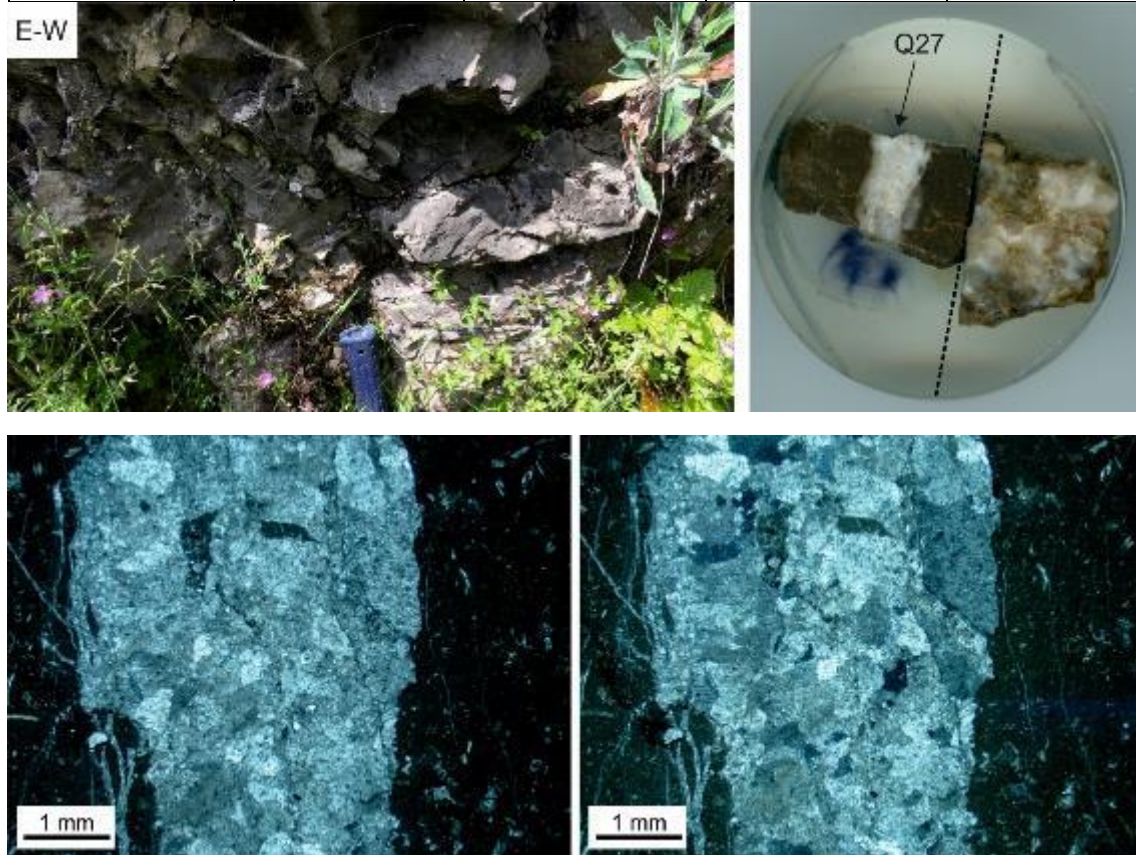
Sample Q11: Optical microscope images of blocky and bladed textures of the analyzed calcite cement.

Sample	Location	Description	Host rock	Age
Q24	42° 7'0.88"N 1°50'34.71"E	Calcite within reverse fault	Upper Cretaceous limestones	Yes



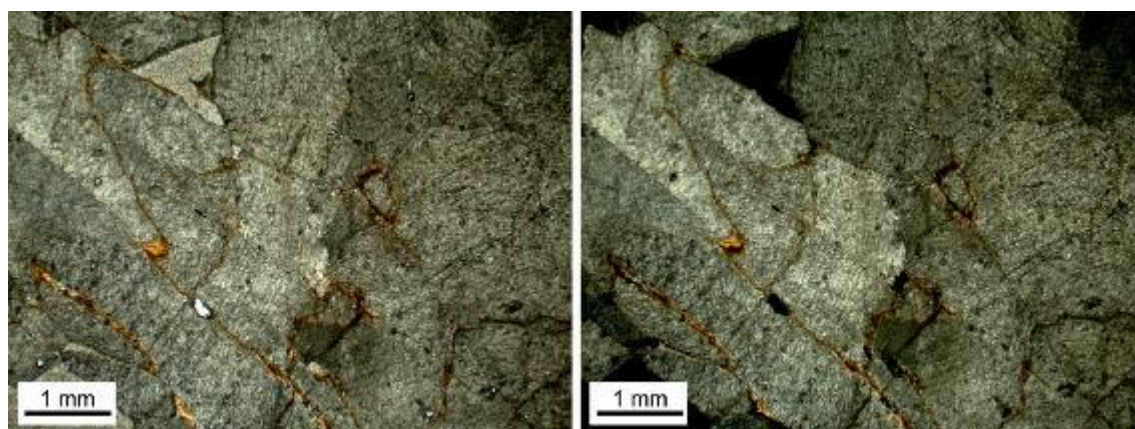
Sample Q24: Optical microscope image showing elongated sparite oblique to fracture walls.

Sample	Location	Description	Host rock	Age
Q27	42° 6'38.01"N 1°49'26.53"E	N-S calcite vein	Upper Cretaceous limestones	Yes



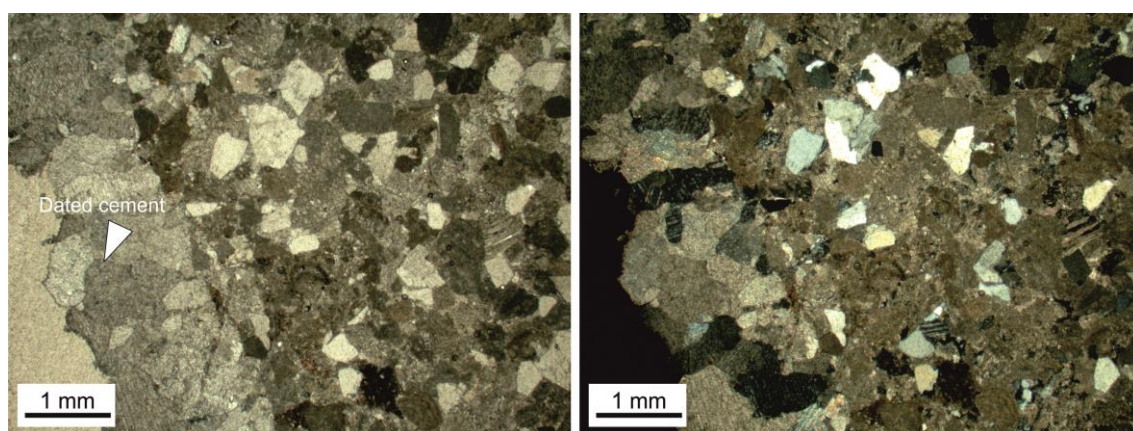
Sample Q27: Optical microscope images of blocky texture of the analyzed calcite cement.

Sample	Location	Description	Host rock	Age
Q29	42° 7'5.30"N 1°50'38.26"E	Calcite within reverse fault	Upper Cretaceous limestones	Yes



Sample Q29: Optical microscope images of blocky texture of the analyzed calcite cement.

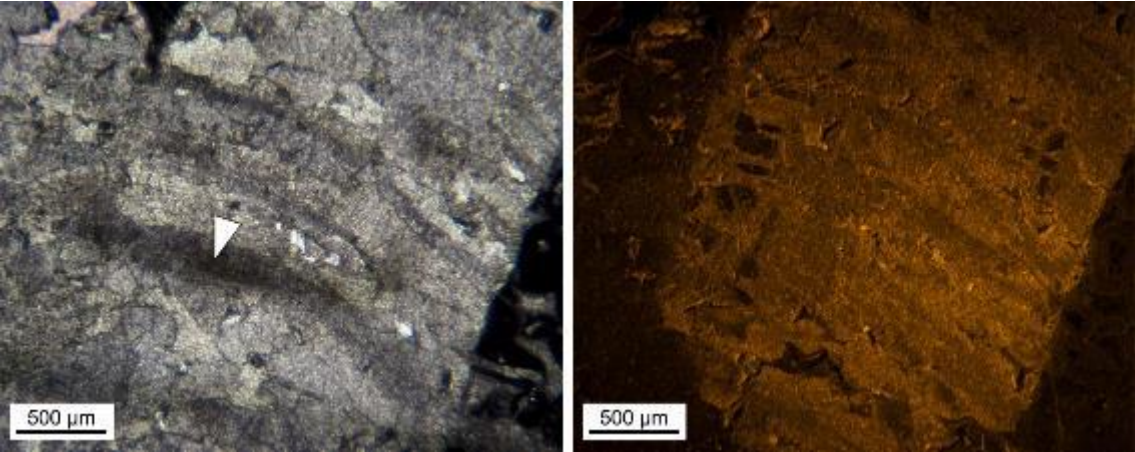
Sample	Location	Description	Host rock	Age
Q33	42° 6'26.26"N 1°49'35.74"E	N-S calcite vein	Middle Eocene sandstones	Yes



Sample Q33: Optical microscope images of blocky texture of the analyzed calcite cement.

Cadí thrust sheet

Sample	Location	Description	Host rock	Age
B2	42°16'4.45"N 1°51'5.53"E	E-W calcite veins and vug porosity	Middle Eocene limestones	Yes

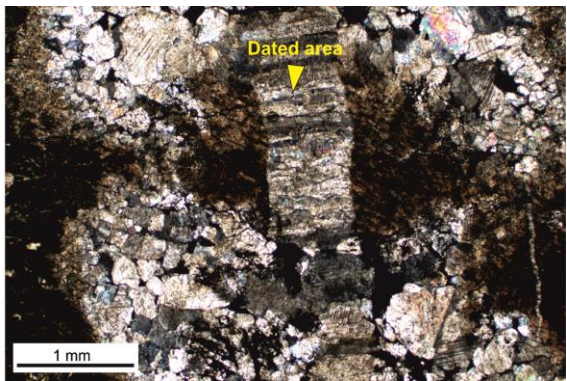
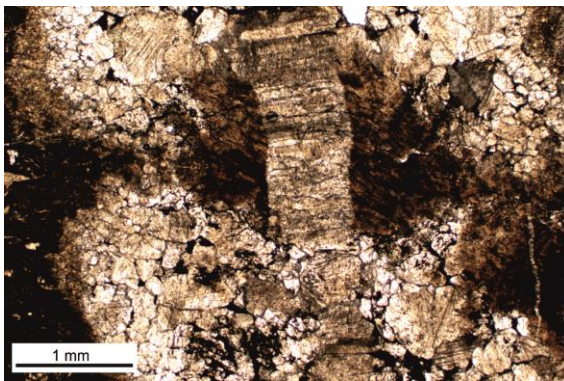


Sample B2: Optical and cathodoluminescence microscope images showing the elongated sparite texture perpendicular to fracture walls of the aged cement.

Sample	Location	Description	Host rock	Age
B1	42°16'4.45"N 1°51'5.53"E	N-S calcite vein	Lower Eocene limestones	No

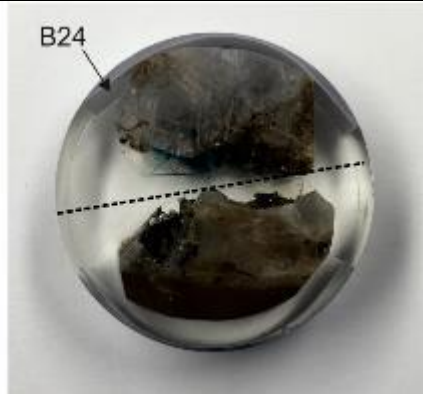


Sample	Location	Description	Host rock	Age
B22	42°15'43.66"N 1°52'24.92"E	E-W calcite vein	Lower Eocene limestones	Yes

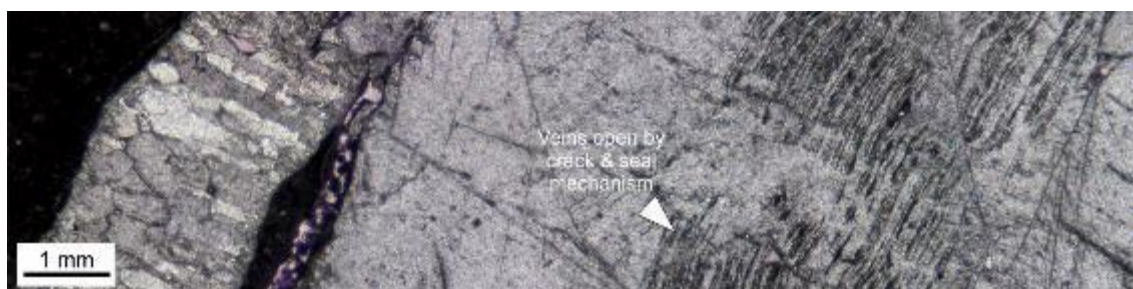
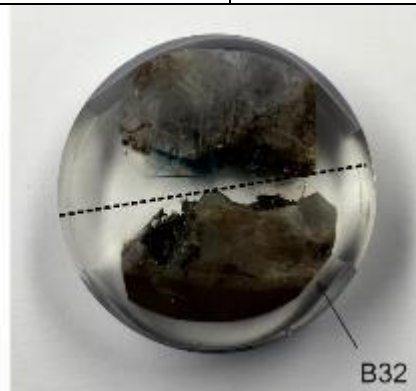


Sample B22: Optical microscope image showing elongated sparite perpendicular to fracture walls.

Sample	Location	Description	Host rock	Age
B24	42°15'43.67"N 1°52'24.47"E	E-W calcite vein	Lower Eocene limestones	No

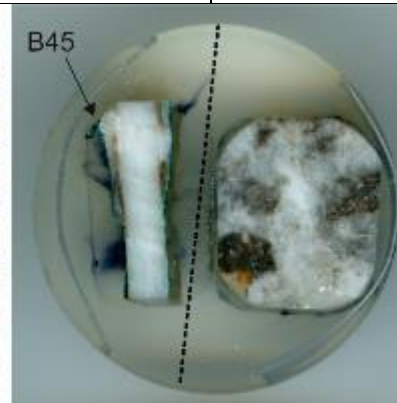


Sample	Location	Description	Host rock	Age
B32	42°15'34.75"N 1°51'59.95"E	N-S calcite vein	Lower Eocene limestones	Yes

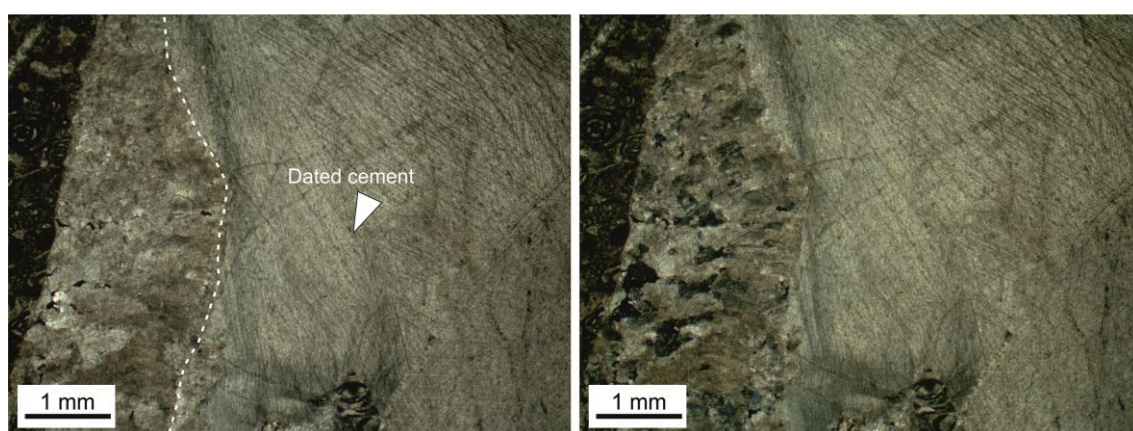


Sample B2: Optical microscope image showing elongated sparite perpendicular to fracture walls and veinlets formed by crack & seal mechanism.

Sample	Location	Description	Host rock	Age
B45	42°16'3.65"N 1°51'5.22"E	Calcite within strike-slip fault	Lower Eocene limestones	No



Sample	Location	Description	Host rock	Age
B46	42°15'55.18"N 1°51'1.34"E	N-S calcite vein	Lower Eocene limestones	Yes

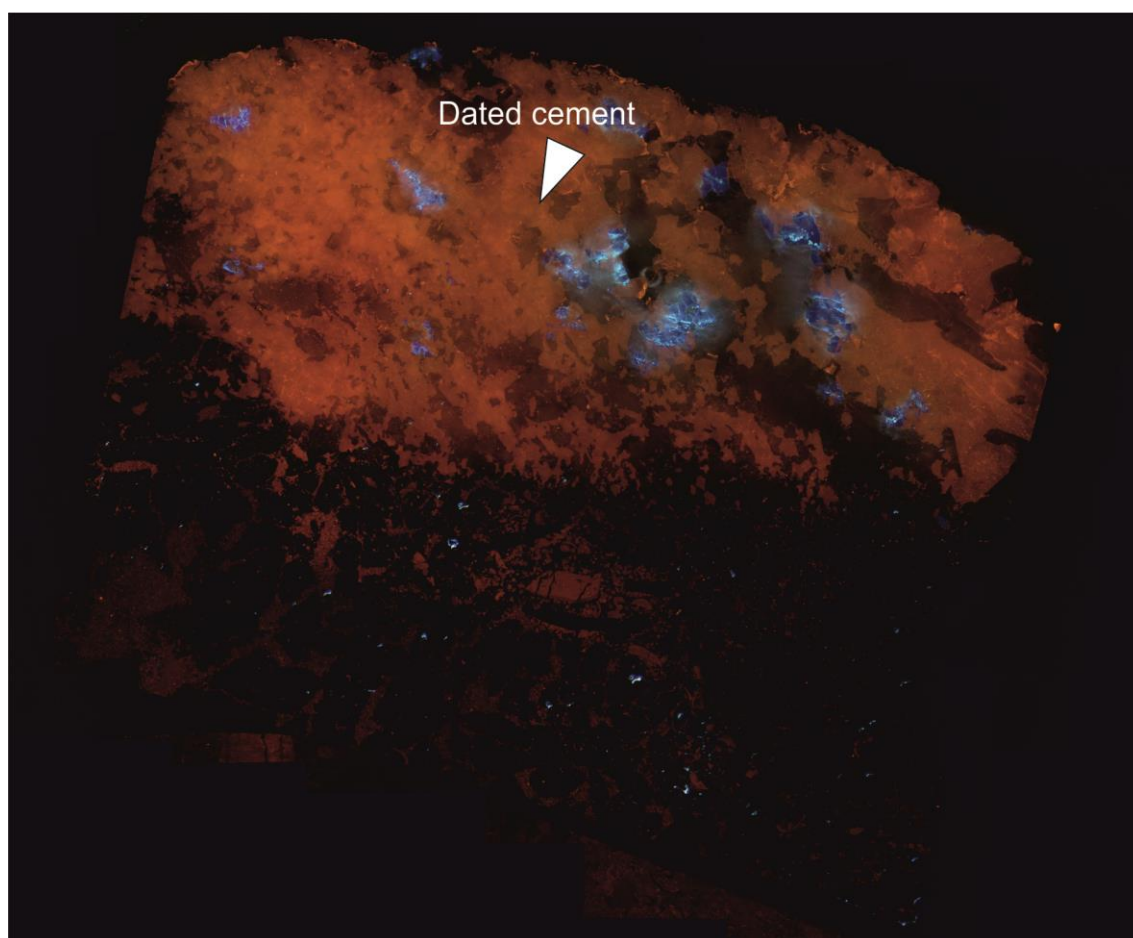
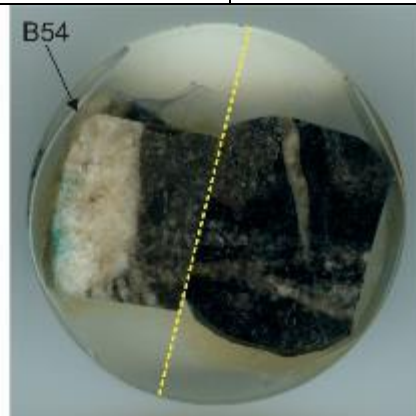


Sample B46: Optical microscope images of blocky texture of the analyzed calcite cement.

Sample	Location	Description	Host rock	Age
GDV13	42° 7'47.45"N 1°53'59.15"E	Calcite within reverse fault	Oligocene sandstones	No

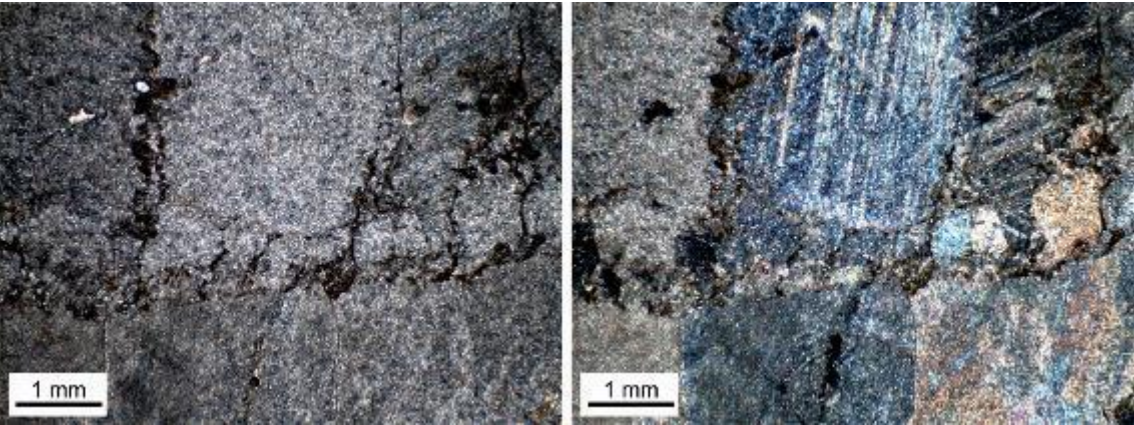


Sample	Location	Description	Host rock	Age
B54	42°15'52.14"N 1°51'4.54"E	N-S calcite vein	Lower Eocene limestones	Yes



Sample B54: Cathodoluminescence microscope image of the analyzed mound showing the blocky texture of the aged calcite cement.

Sample	Location	Description	Host rock	Age
GDV5	42°7'49.04"N 1°54'1.88"E	Calcite within reverse fault	Lower Eocene marls	Yes

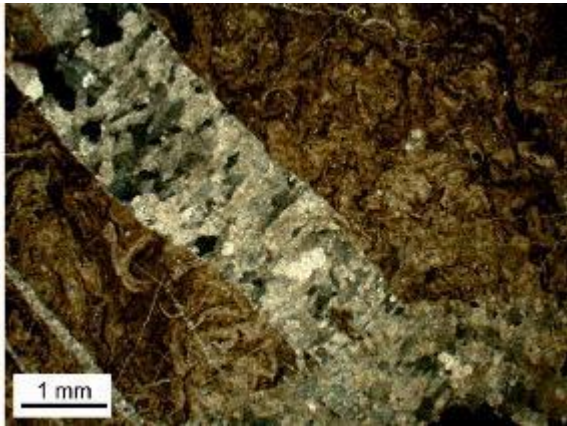
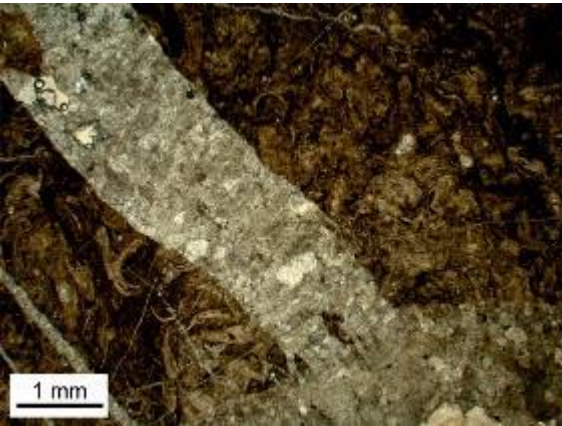
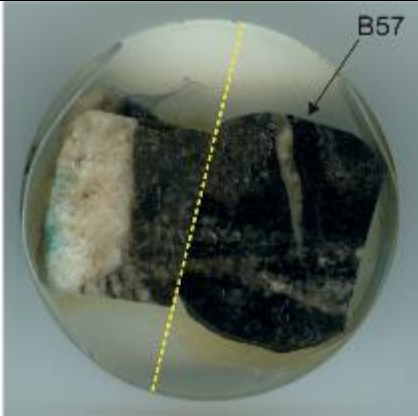


Sample GDV5: Optical microscope images of blocky texture of the analyzed calcite cement.

Sample	Location	Description	Host rock	Age
GDV26	42° 7'49.33"N 1°54'2.79"E	Calcite within strike-slip fault	Lower Eocene marls	No

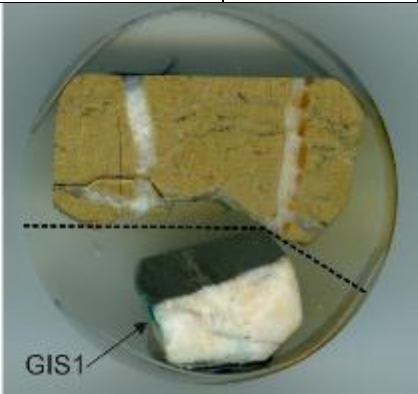


Sample	Location	Description	Host rock	Age
B57	42°15'43.95"N 1°52'24.76"E	N-S and E-W calcite veins	Lower Eocene limestones	Yes

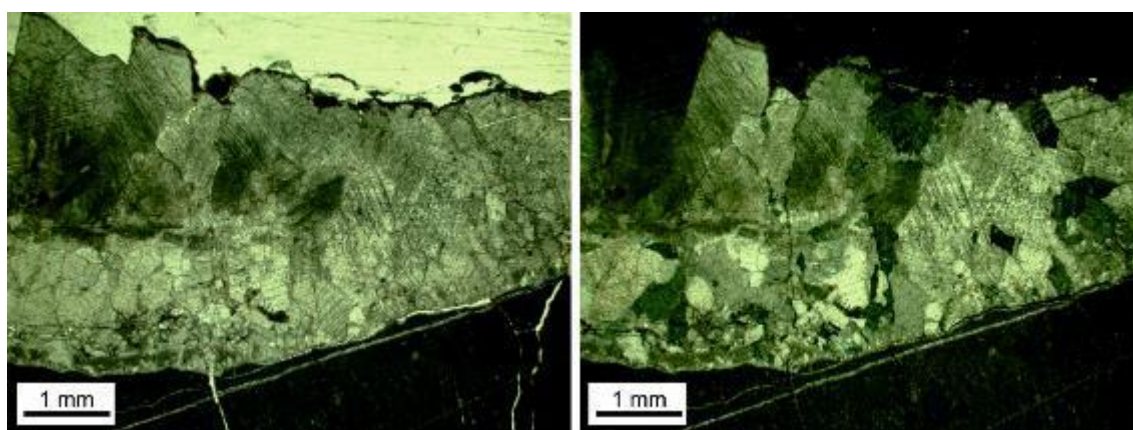


Sample B57: Optical microscope image showing elongated sparite perpendicular to fracture walls.

Sample	Location	Description	Host rock	Age
GIS1	42°15'58.35"N 1°44'33.28"E	E-W calcite vein	Lower Eocene marls	Not analyzed



Sample	Location	Description	Host rock	Age
GIS4	42°16'10.42"N 1°42'29.96"E	N-S calcite vein	Lower Eocene marls	Yes

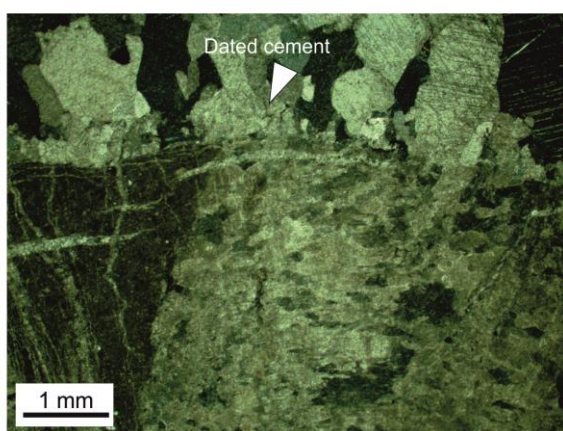
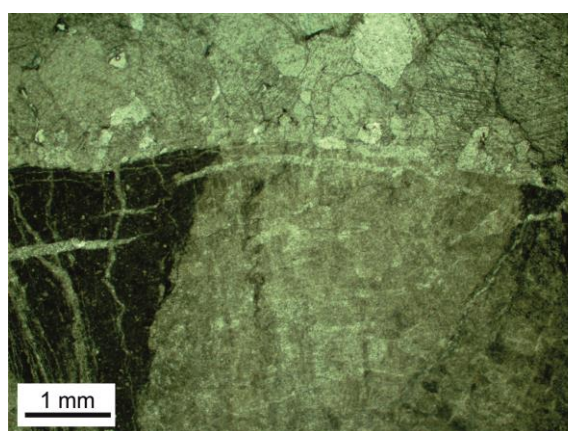
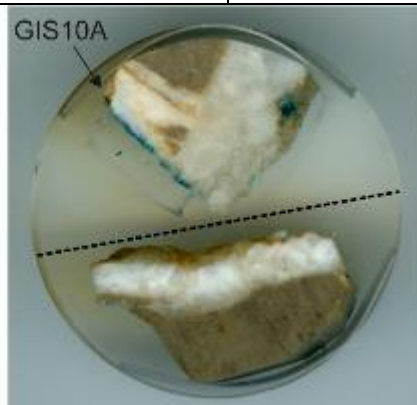


Sample GIS4: Optical microscope images of blocky texture of the analyzed calcite cement.

Sample	Location	Description	Host rock	Age
PA9	42°17'53.69"N 1°42'49.66"E	N-S and E-W calcite veins	Upper Cretaceous limestones	No

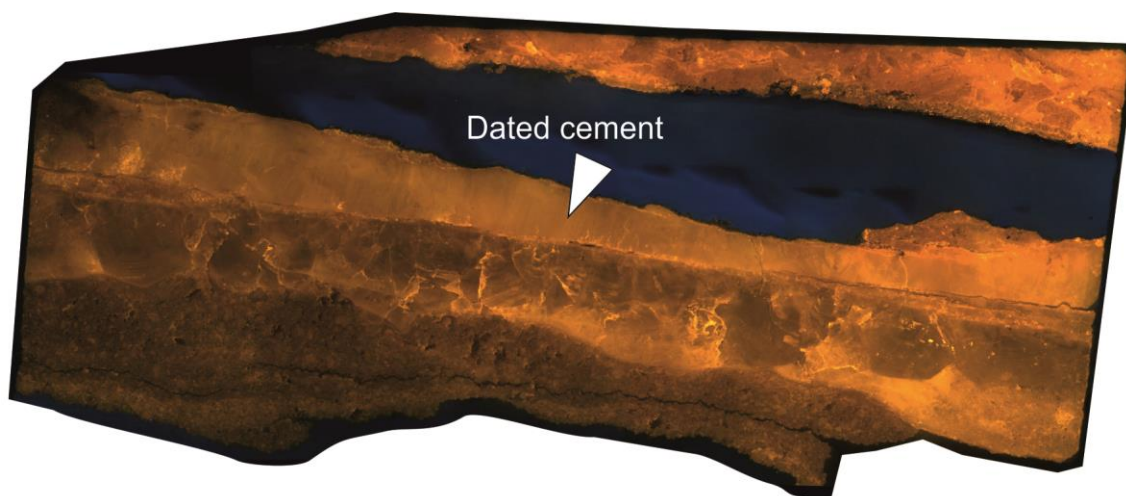


Sample	Location	Description	Host rock	Age
GIS10A	42°15'56.29"N 1°41'36.05"E	N-S and E-W calcite veins	Lower Eocene marls	Yes



Sample GIS10A: Optical microscope images of blocky texture of the analyzed calcite cement.

Sample	Location	Description	Host rock	Age
PA12	42°17'53.97"N 1°42'57.09"E	Calcite within reverse fault	Upper Cretaceous limestones	Yes



Sample PA12: Cathodoluminescence microscope image of the analyzed mound showing the blocky texture of the aged calcite cement.

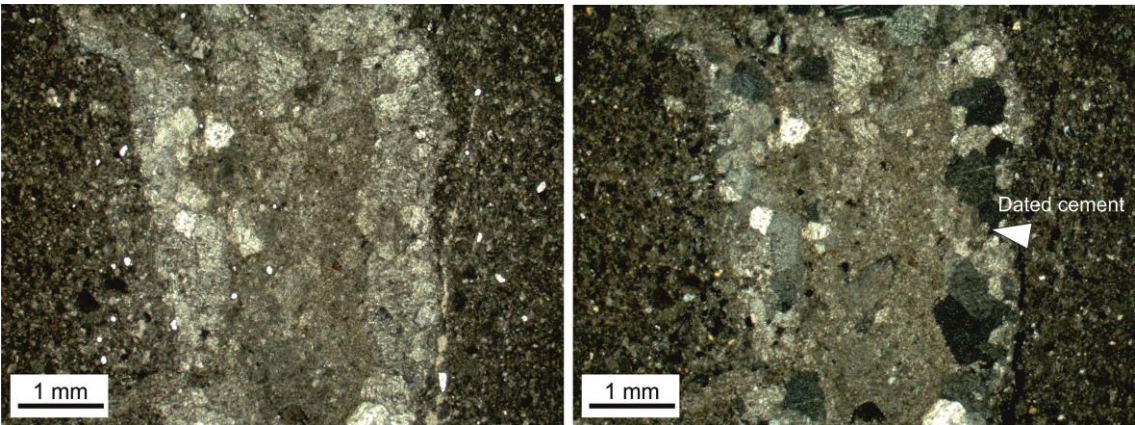
Ebro Basin

Sample	Location	Description	Host rock	Age
309B	42° 4'8.05"N 1°34'14.09"E	Calcite within strike-slip fault	Oligocene sandstones	No



Sample	Location	Description	Host rock	Age
311A	42° 3'54.91"N 1°34'9.26"E	Calcite within strike-slip fault	Oligocene sandstones	No

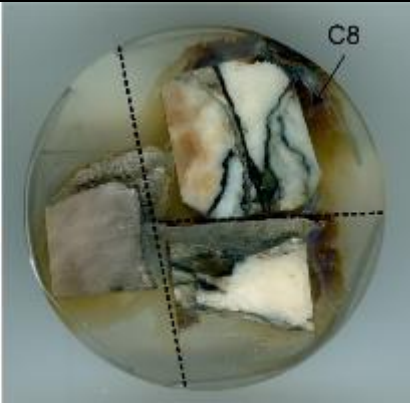
Sample	Location	Description	Host rock	Age
GPR401	42° 3'54.91"N 1°34'9.26"E	Calcite within fault breccia	Oligocene sandstones	Yes



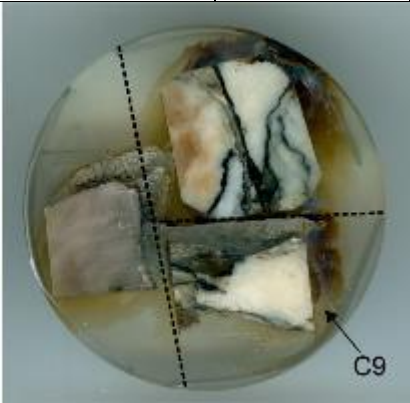
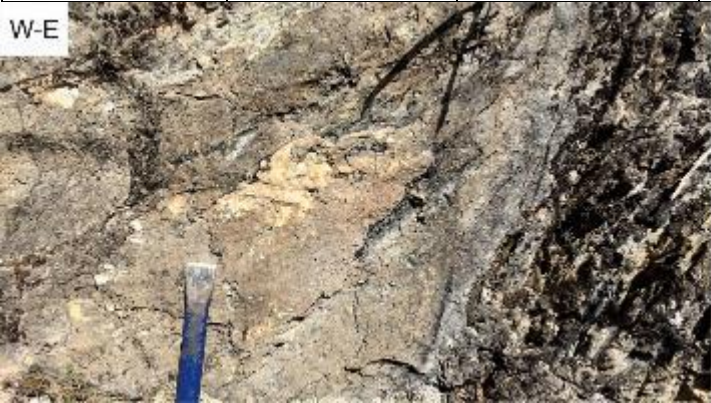
Sample GPR401: Optical microscope images of blocky texture of the analyzed calcite cement.

Axial Zone

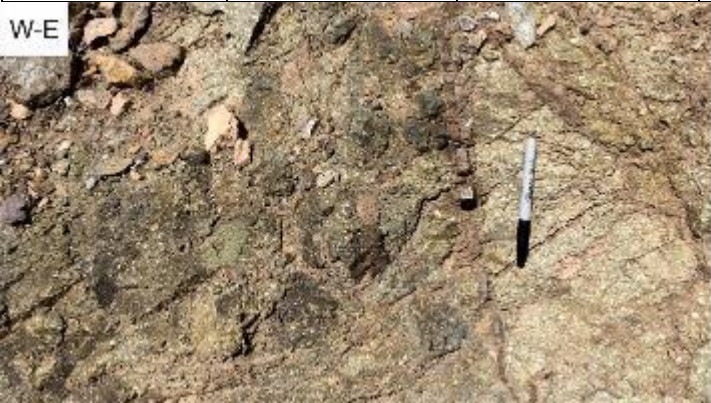
Sample	Location	Description	Host rock	Age
C8	42°20'12.45"N 1°29'57.58"E	Calcite within reverse fault	Devonian limestones	No



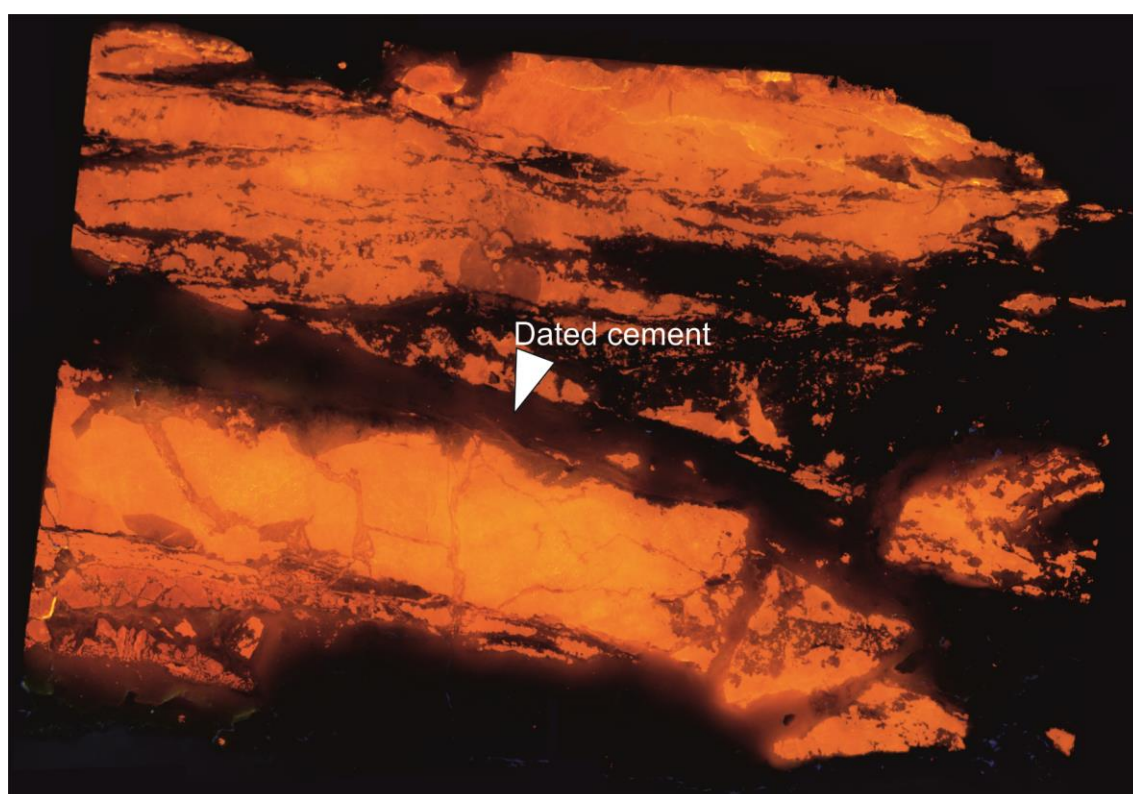
Sample	Location	Description	Host rock	Age
C9	42°20'12.45"N 1°29'57.58"E	Calcite within reverse fault	Devonian limestones	No



Sample	Location	Description	Host rock	Age
C10	42°20'12.45"N 1°29'57.58"E	N-S calcite vein	Permian volcanic rocks	No

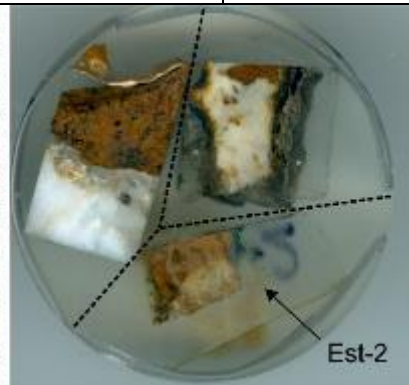


Sample	Location	Description	Host rock	Age
C12	42°20'12.45"N 1°29'57.58"E	E-W calcite vein	Permian volcanic rocks	Yes

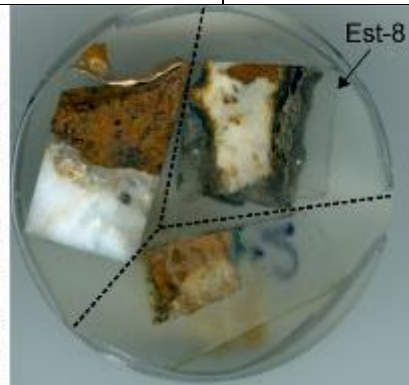


Sample C12: Cathodoluminescence microscope image of the analyzed mound showing the blocky texture of the aged calcite cement.

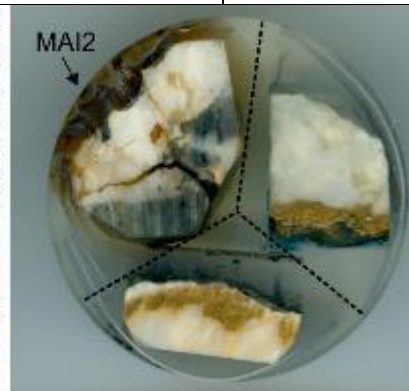
Sample	Location	Description	Host rock	Age
Est-2	42°21'37.16"N 1°31'5.31"E	Calcite within reverse fault	Permian? ? volcanic rocks	No



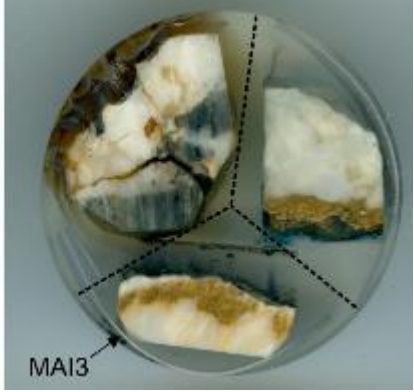
Sample	Location	Description	Host rock	Age
Est-8	42°21'34.91"N 1°31'8.19"E	Calcite within reverse fault	Devonian limestones	No



Sample	Location	Description	Host rock	Age
MAI2	42°32'43.83"N 1°43'11.37"E	Calcite within reverse fault	Devonian limestones	No



Sample	Location	Description	Host rock	Age
MAI3	42°32'43.91"N 1°43'11.58"E	Calcite within reverse fault	Devonian limestones	No



Sample	Location	Description	Host rock	Age
MAI4	42°32'43.69"N 1°43'11.01"E	Calcite within reverse fault	Devonian limestones	No

