

Welcome to the 35th Meeting of the International Co-operative Programme on Effects on Materials, including Historic and Cultural Monuments





Domaine d'intérêt majeur (DIM) **Heritage and ancient materials:** Île-de-France research network dedicated to the study of ancient and patrimonial materials

- *What is a DIM?*

Research network financed by the Île-de-France region for 4 years.

Redistribution of the allocated fund to the members of the network based on calls for proposals (PhD grants, post-doctorate researches, workshops, equipments...)

- *What is aim of the DIM MAP? (2016-2020)*

- Consortium of more than 90 institutes

- 8 transversal research thematic

- *Objects: Provenance, Operative systems, use*
- *Fossils, Witnesses of old lifeforms*
- *Paleo-environments, Taphonomy*
- *Art Materials*
- *Alteration, preservation*
- *Uses and archives*
- *Signal, Calculation, Statistics*
- *Safe analyses*

- Strong interdisciplinarity

- *Physics, chemistry, computer sci., environment sci., biology and art history, archeology, paleontology and text studies*

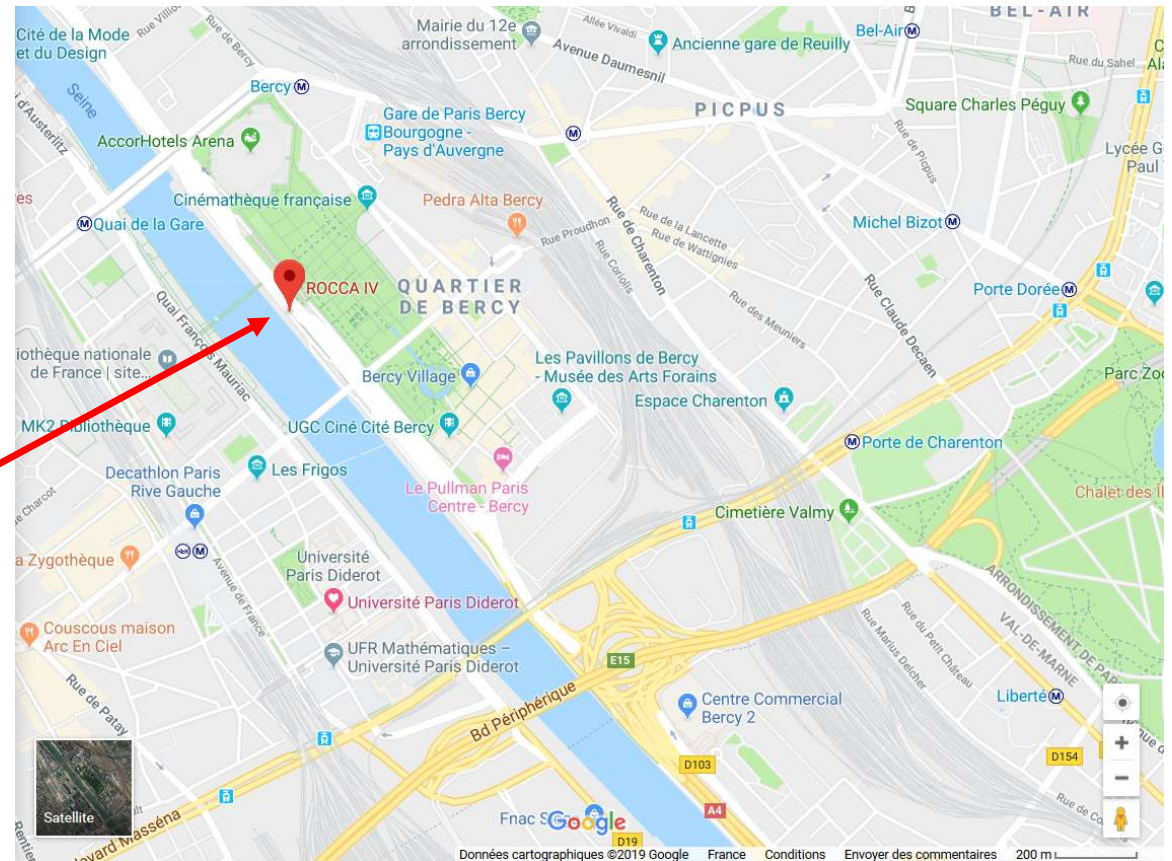
Information from the local organisers

Wednesday 24th of April

Lunch at 13:00 (**Dans la cuisine**)

Dinner: cruise

Meeting at **20:00** – 1 dock of Bercy 75012 PARIS



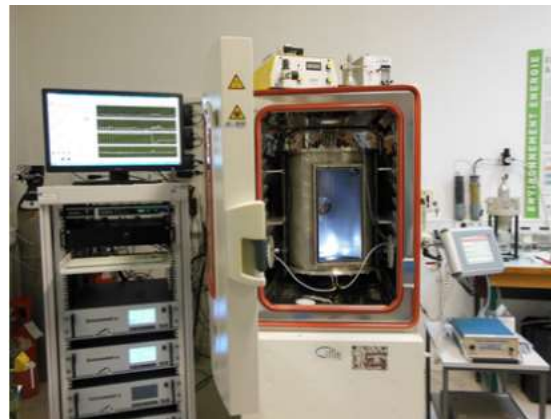
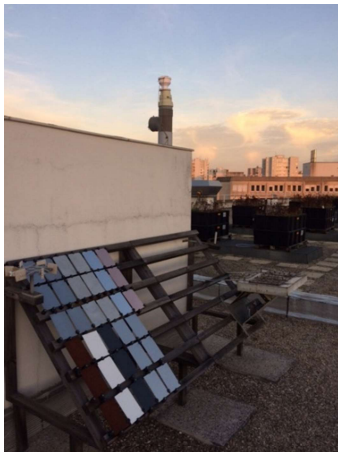
Break
Lunch at 13:00 (**Dans la cuisine**)
Break
End of the meeting at 18:00

Thursday 25th of April

Meeting at 9:00 am at the exit of 'Créteil Université' metro station
Visit of the rack and of the lab + short walk in Créteil to see the
main historical monuments (with A. Chabas) (until 12:00)

Friday 26th of April

Lunch in a restaurant in Créteil (Brasserie Le Village)



RESULTS FOR SOILING

Aurélie VERNEY-CARRON, Yesmine BEN AMOR, Clarisse BALLAND-BOLOU-BI

Meeting in Paris – 24-26 June 2019



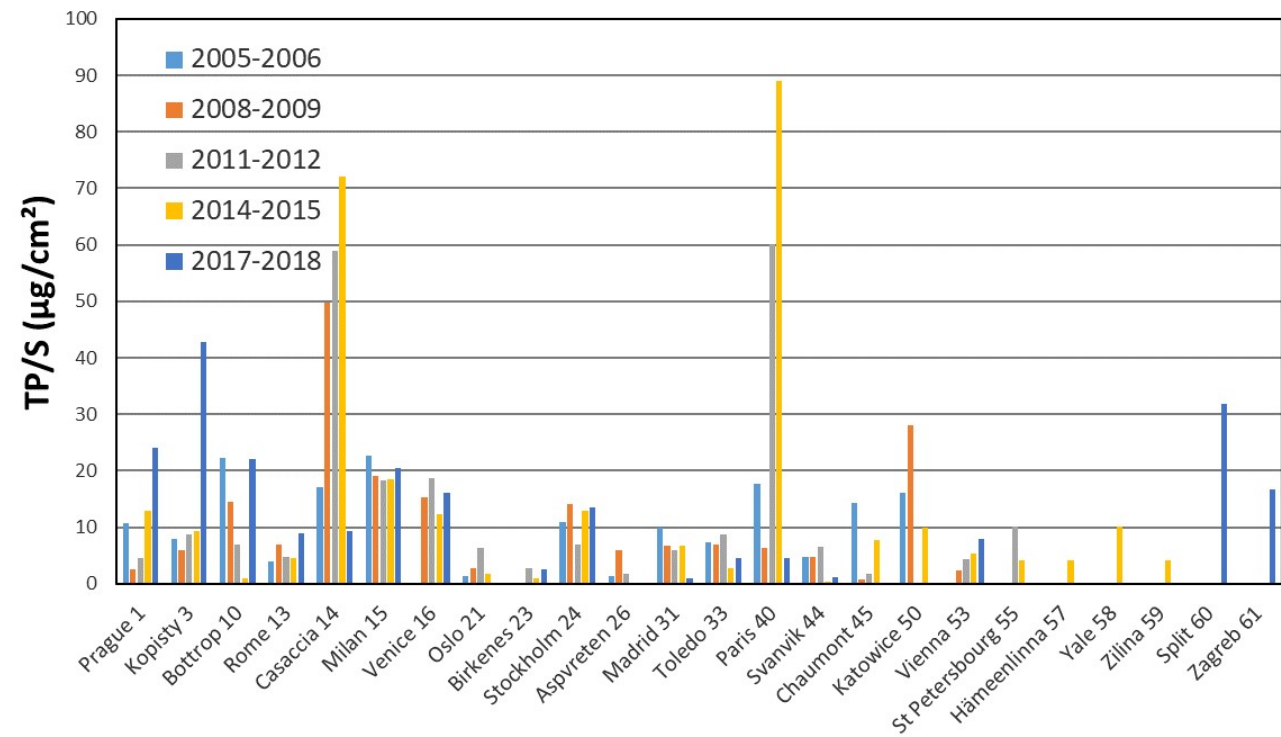
Summary of the campaign

	glass T	limestone O	marble P
1 Prague	1	1	1
3 Kopisty	1	1	1
10 Bottrop	1	1	1
13 Rome	1	1	1
14 Casaccia	1	1	1
15 Milan	1	1	1
16 Venice	1	1	1
21 Oslo	1	1	1
23 Birkenes	1	1	1
24 Stockholm	1	1	1
26 Aspvreten	1	1	1
31 Madrid	1	1	1
33 Toledo	1	1	1
40 Paris	fallen	1	1
41 Berlin	not received	1	1
44 Svanvik	1	1	1
45 Chaumont	1	1	1
50 Katowice	1	1	1
51 Athens	1	lost	lost
53 Vienna	1	1	1
57 Hämeenlinna	lost by the	French post	office
58 New Haven	1	1	1
59 Zilina	broken	broken	1
60 Split	1	1	1
61 Zagreb	1	1	1
TOTAL	21	22	23

GLASS

- Mass of the deposit (TP/S in $\mu\text{g}/\text{cm}^2$)

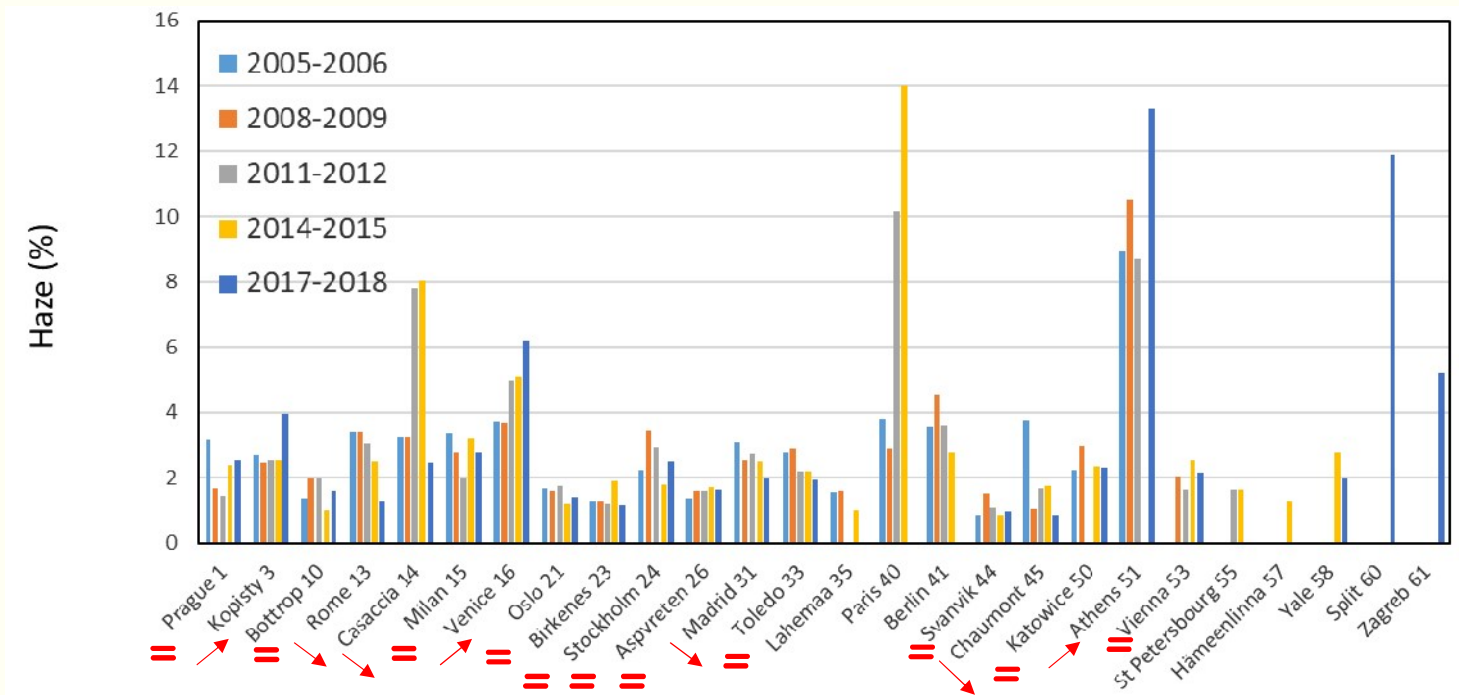
	glass T
1 Prague	24,8
3 Kopisty	42,9
10 Bottrop	22,0
13 Rome	8,9
14 Casaccia	9,2
15 Milan	20,5
16 Venice	16,2
21 Oslo	X
23 Birkenes	2,5
24 Stockholm	13,6
26 Aspvreten	X
31 Madrid	1,0
33 Toledo	4,5
40 Paris	lost
41 Berlin	not received
44 Svanvik	1,2
45 Chaumont	X
50 Katowice	X
51 Athens	X
53 Vienna	7,8
57 Hämeenlinna	Lost
58 New Haven	X
59 Zilina	broken
60 Split	31,9
61 Zagreb	16,7



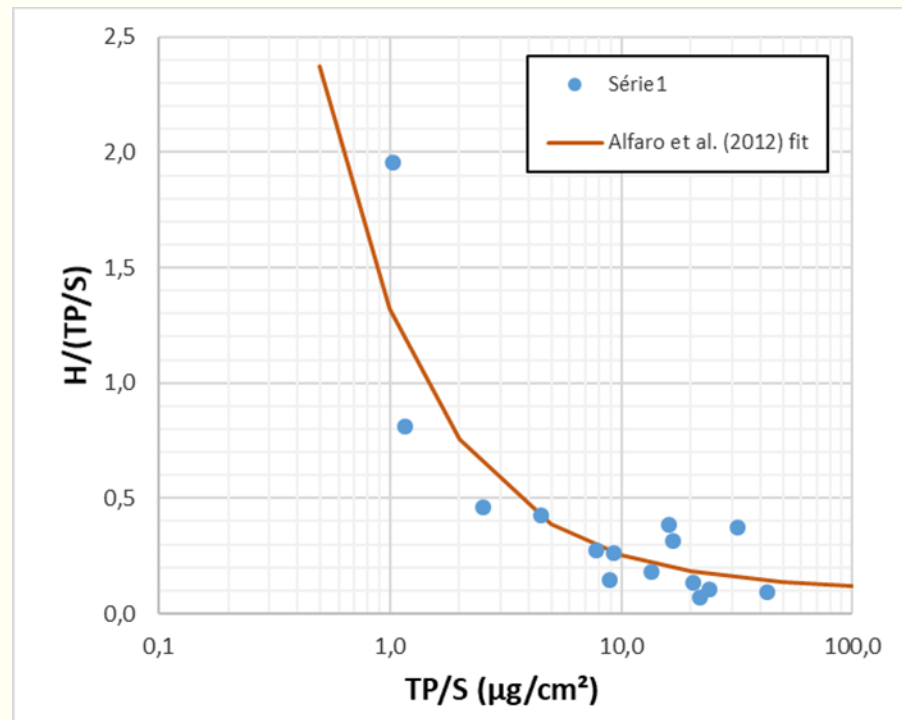
▪ Haze (%)

$$H = \frac{Td}{TL} \times 100$$

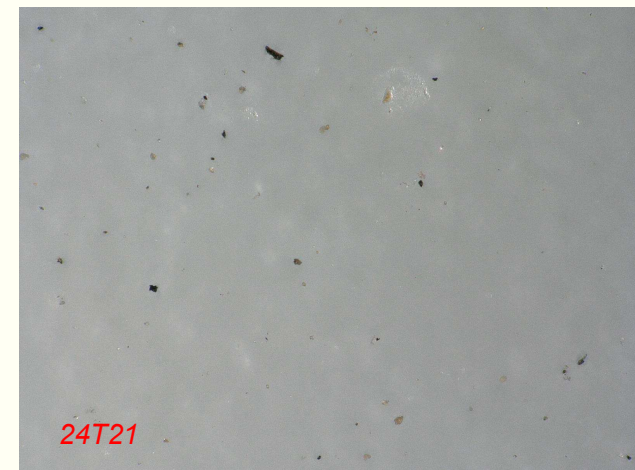
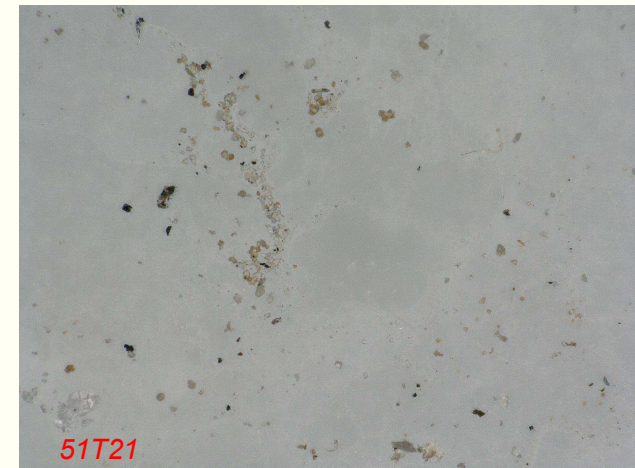
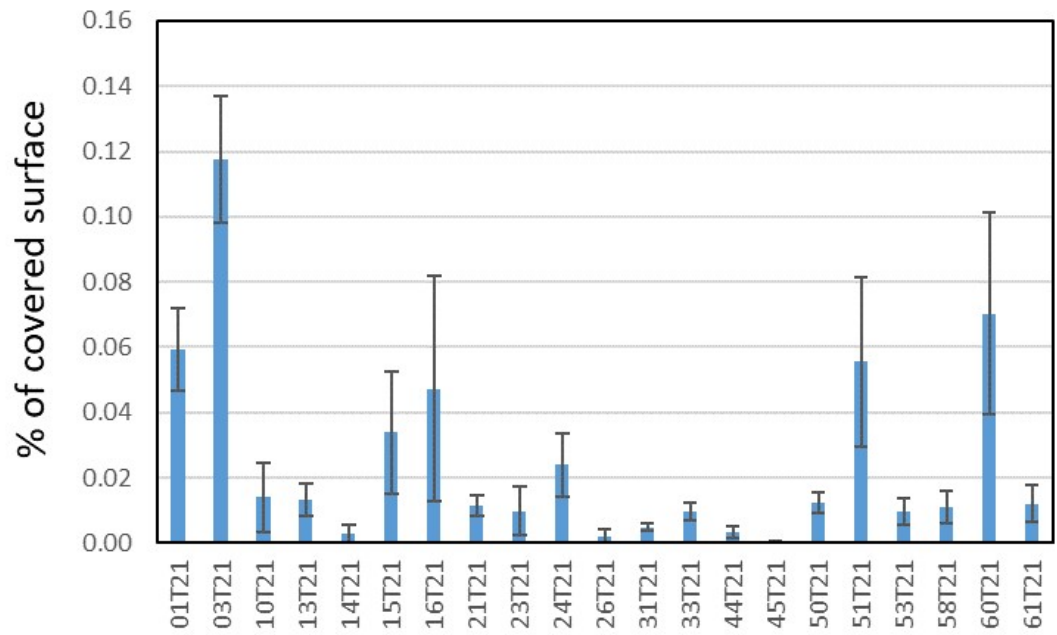
	glass T
1 Prague	2,5
3 Kopisty	4,0
10 Bottrop	1,6
13 Rome	1,3
14 Casaccia	2,4
15 Milan	2,8
16 Venice	6,2
21 Oslo	1,4
23 Birkenes	1,2
24 Stockholm	2,5
26 Aspvreten	1,6
31 Madrid	2,0
33 Toledo	1,9
40 Paris	lost
41 Berlin	not received
44 Svanvik	0,9
45 Chaumont	0,8
50 Katowice	2,3
51 Athens	13,3
53 Vienna	2,1
57 Hämeenlinna	Lost
58 New Haven	2,0
59 Zilina	Broken
60 Split	11,9
61 Zagreb	5,2



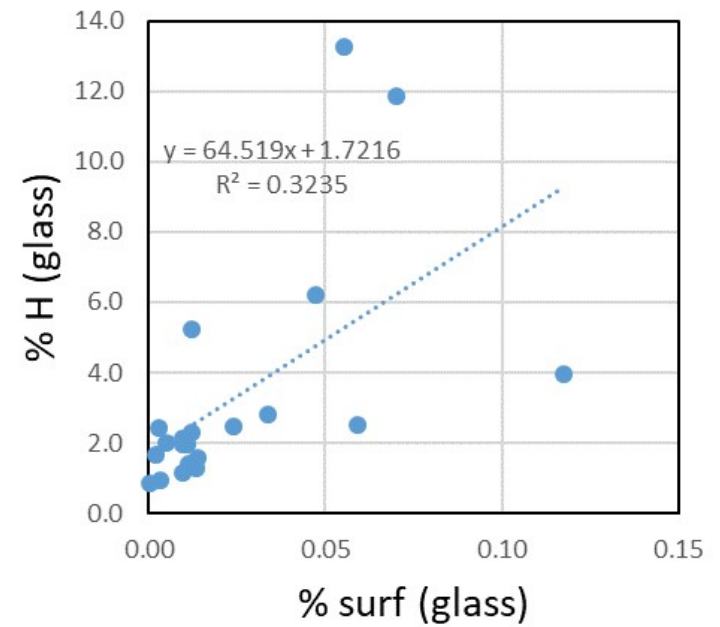
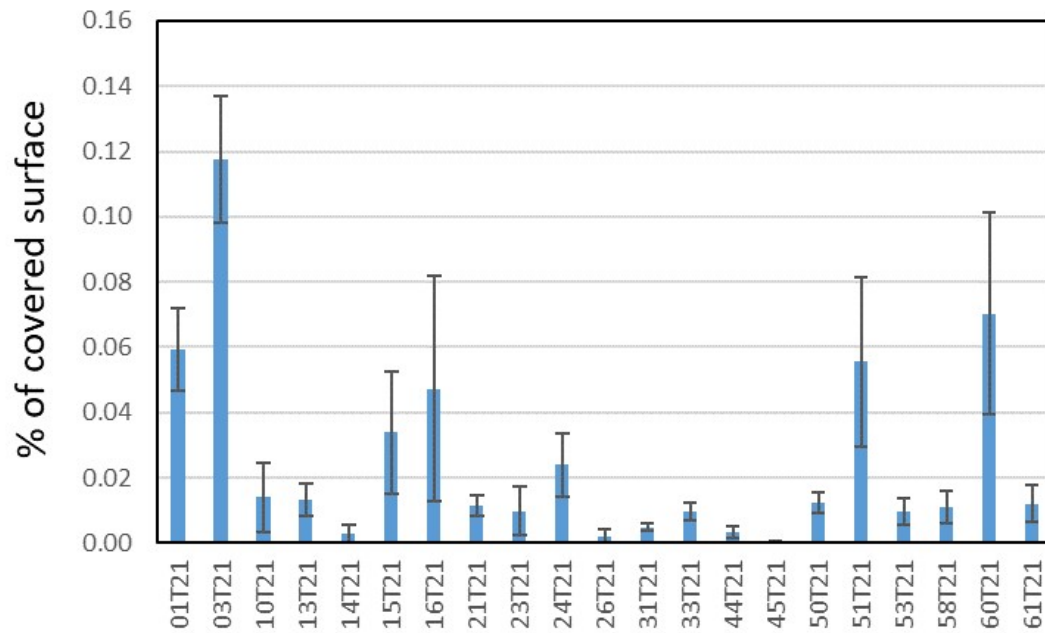
-
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- Correlation between mass and haze



- Percentage of covered surface



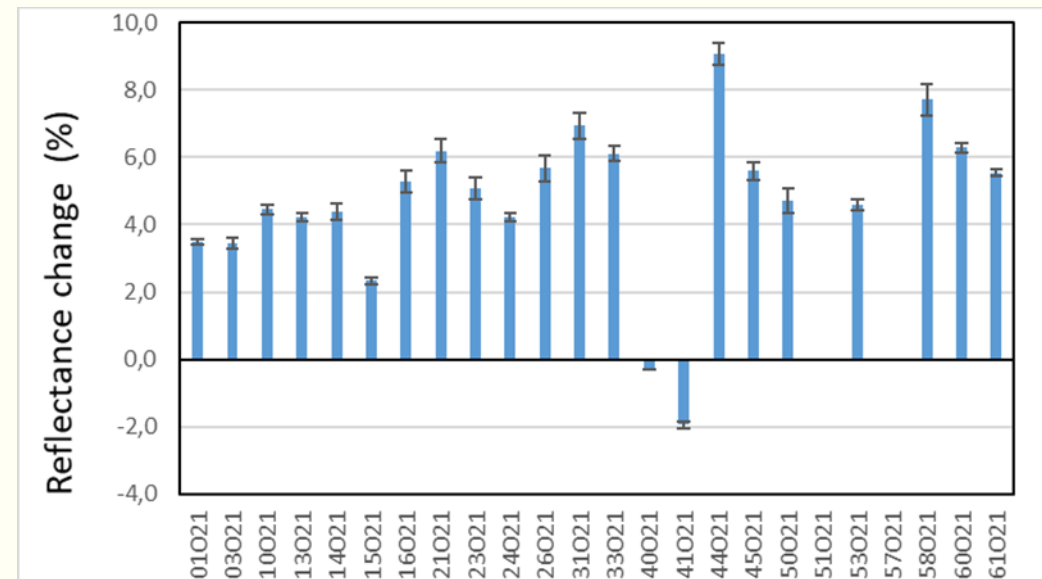
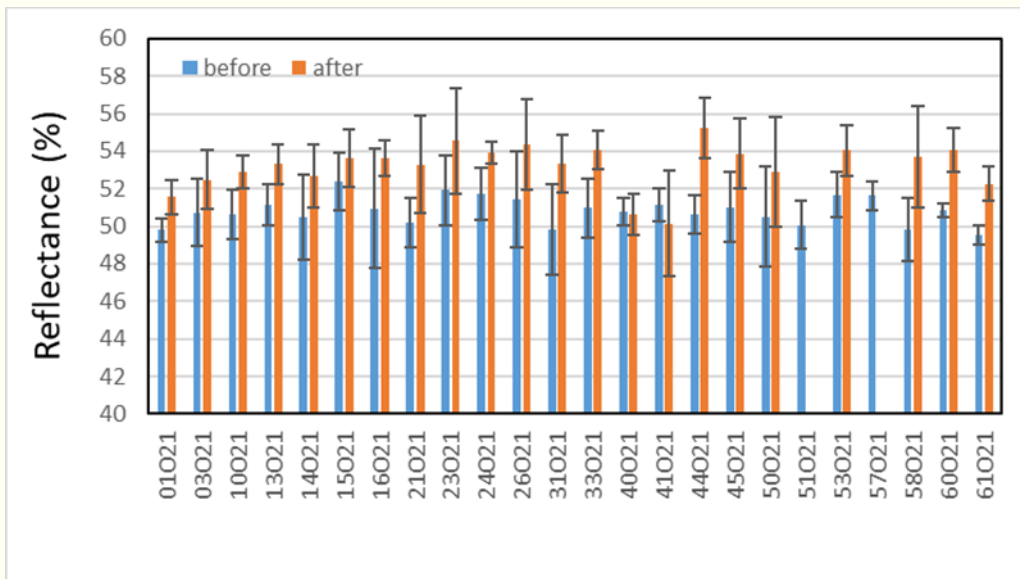
- Percentage of covered surface



LIMESTONE

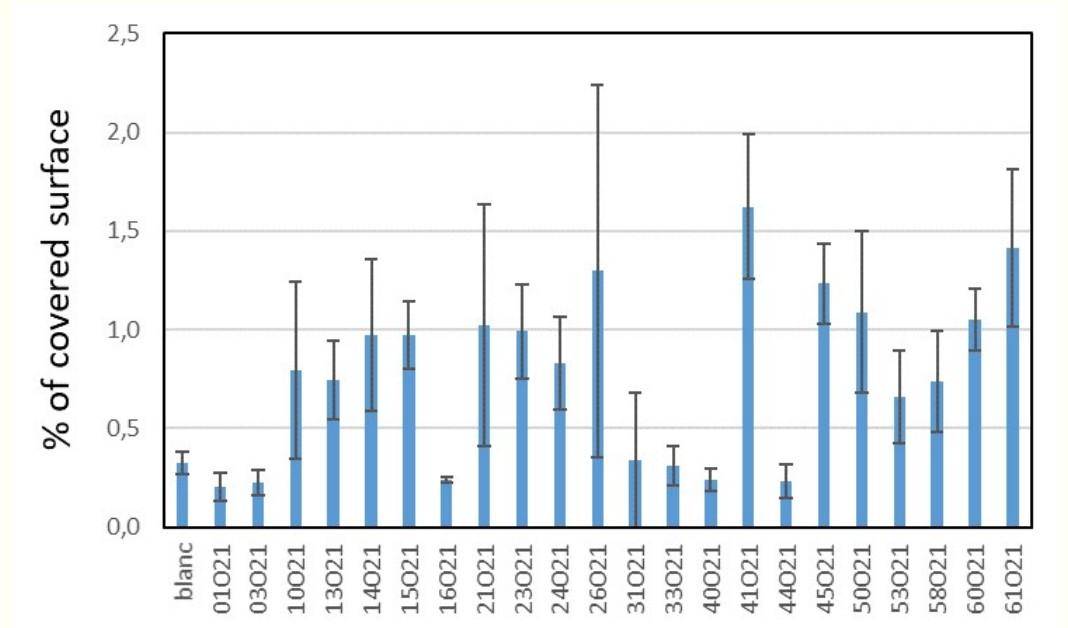
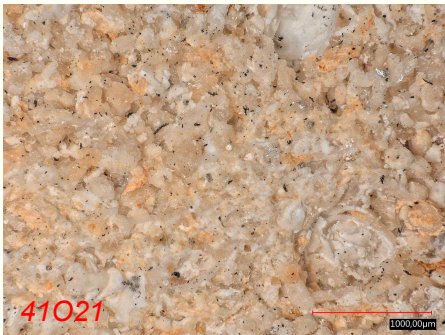
- No mass data (too much loss of material during the ship)
- Measurement of the reflectance

$$\% R \text{ change} = \frac{(R - R_0)}{R_0} \times 100$$

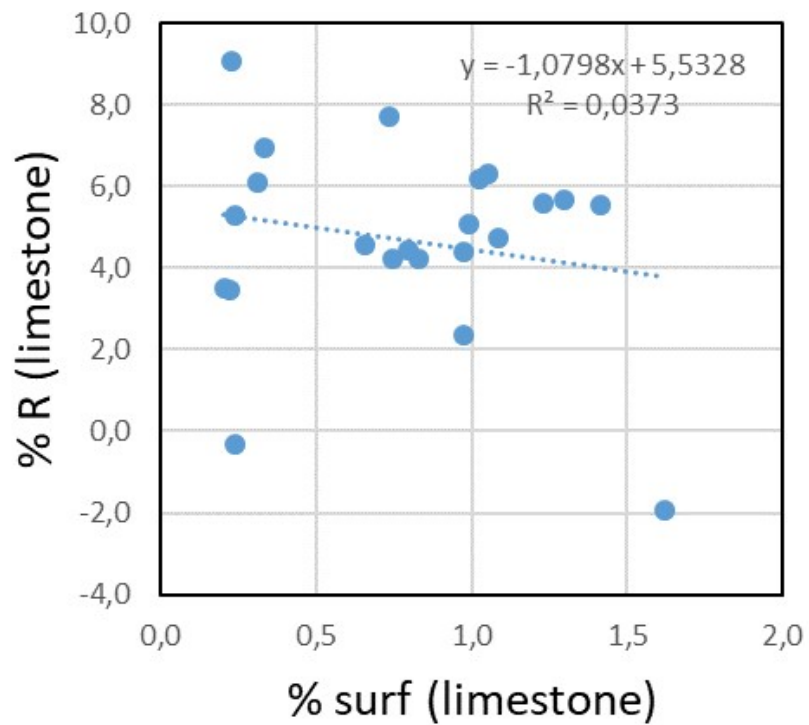


⇒ Increase of the reflectance (already observed in the first stages) except for Paris and Berlin

- Percentage of covered surface



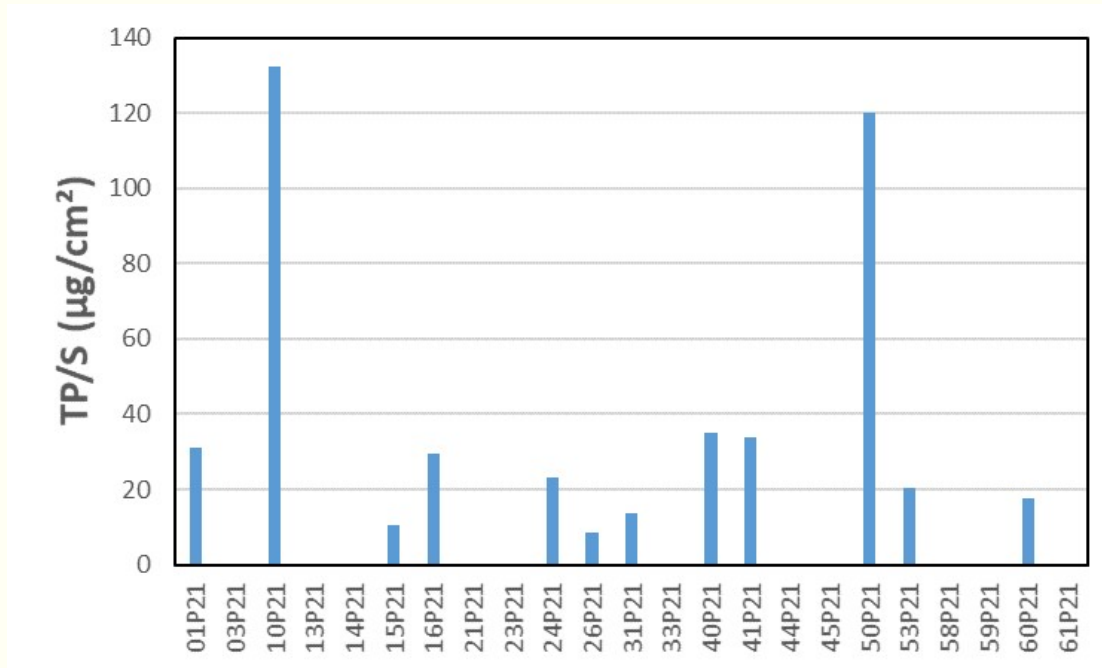
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- Correlation between % covered surface and % reflectance



⇒ No clear correlation

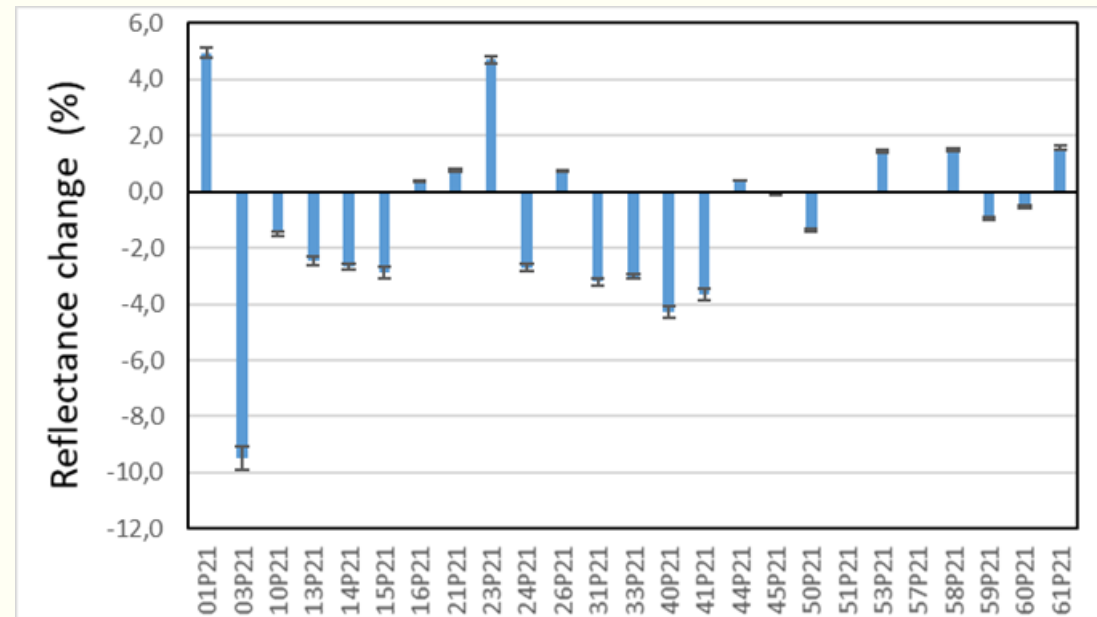
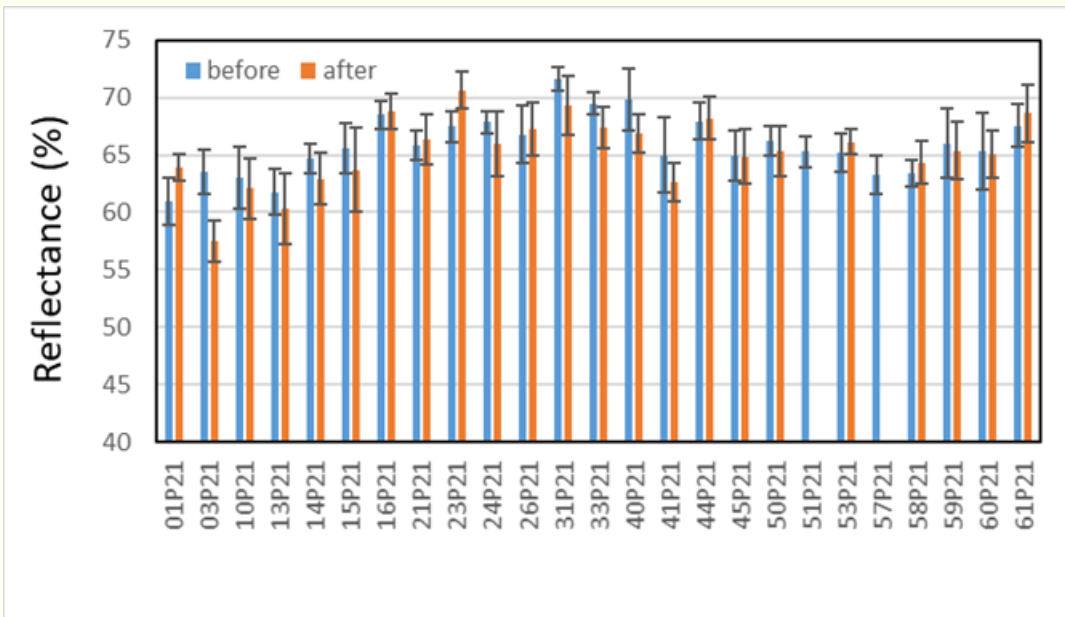
MARBLE

- Mass: a lot of uncertainties



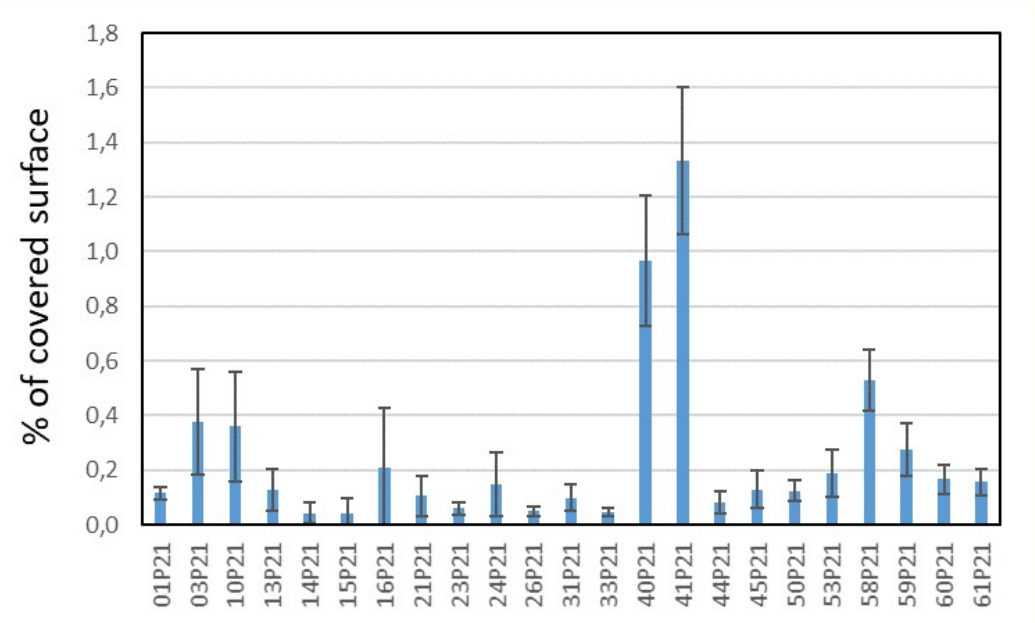
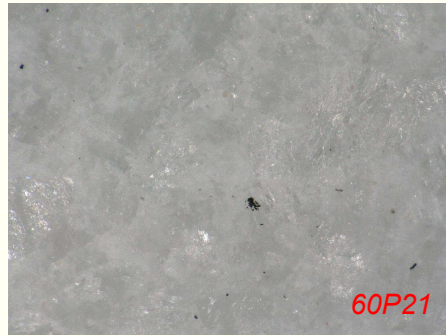
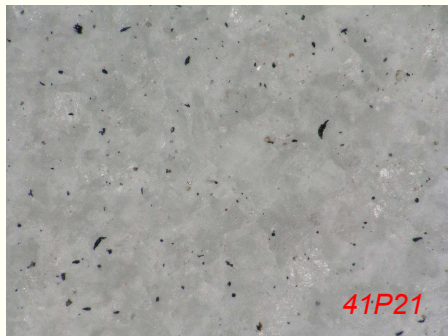
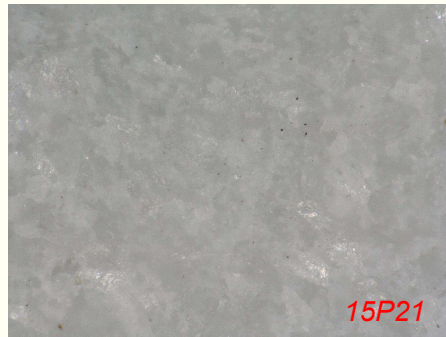
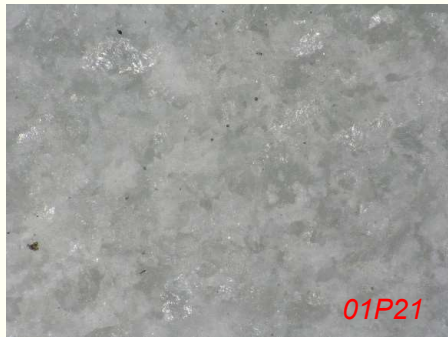
MARBLE

- Reflectance:



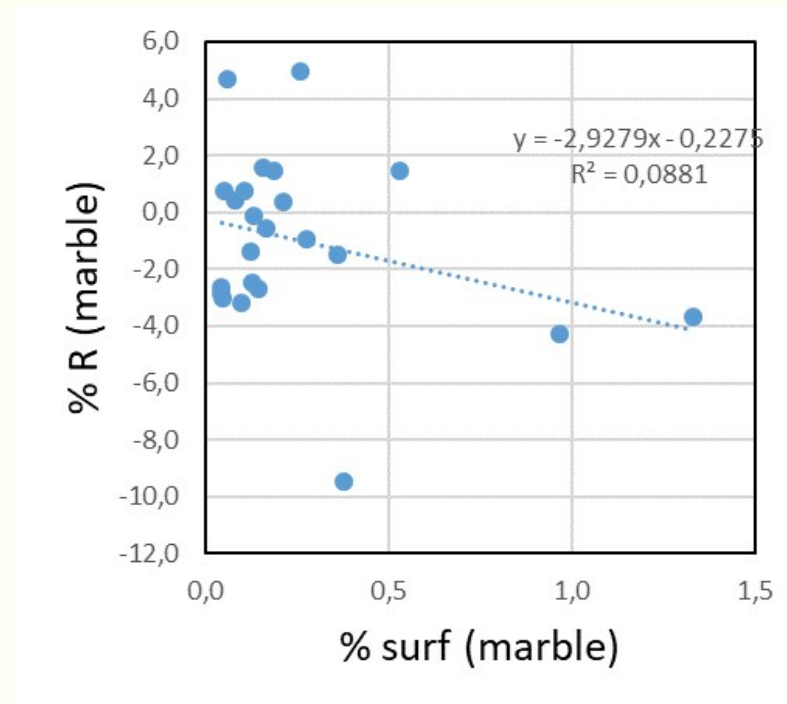
⇒ Increase or decrease of the reflectance

- Percentage of covered surface

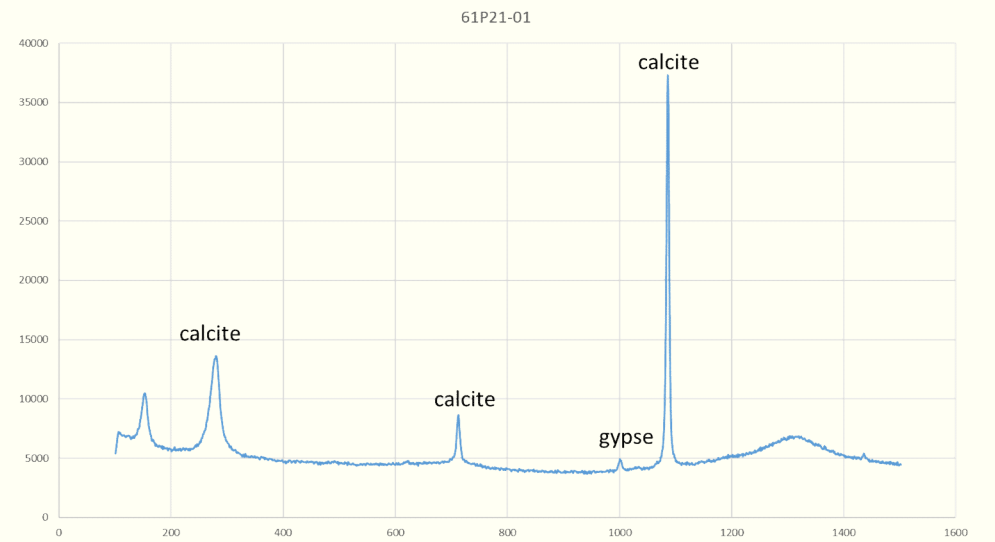
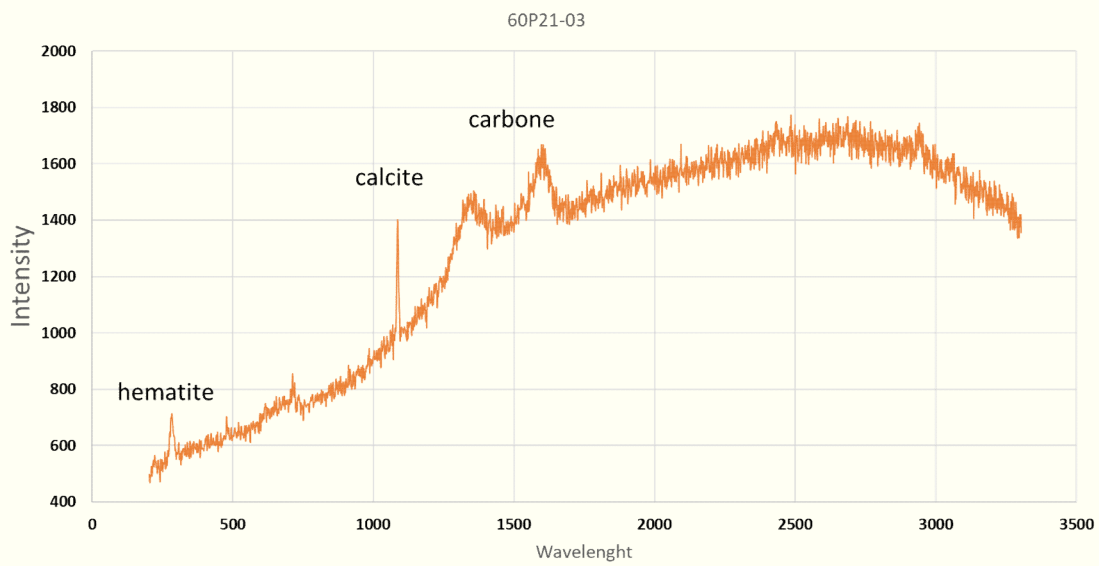


MARBLE

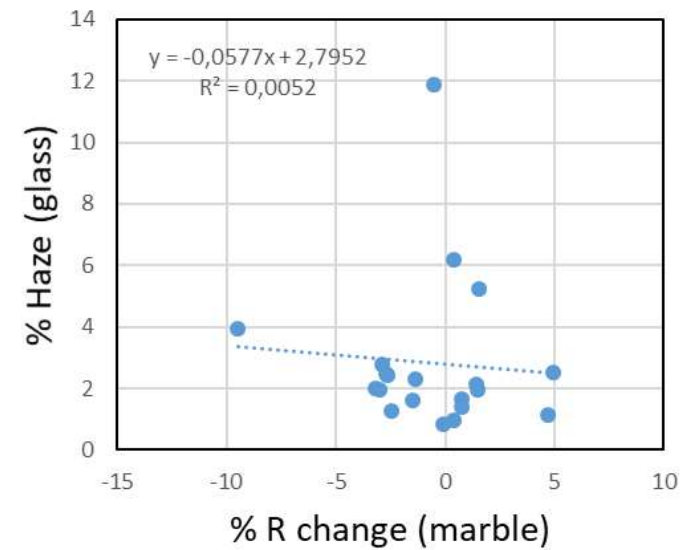
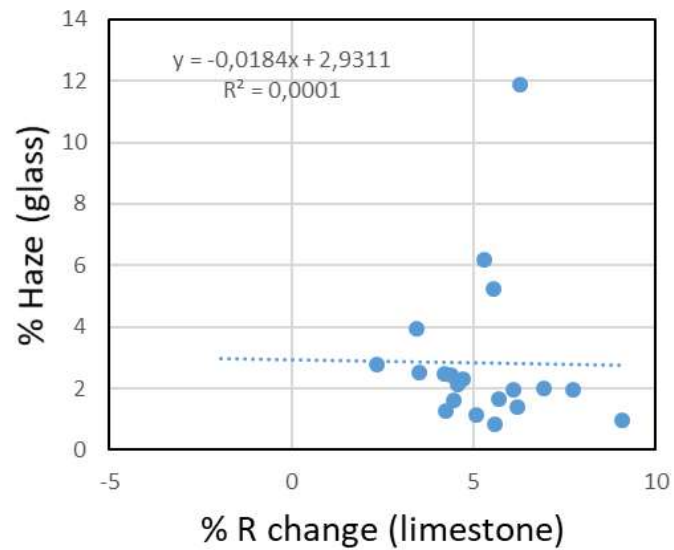
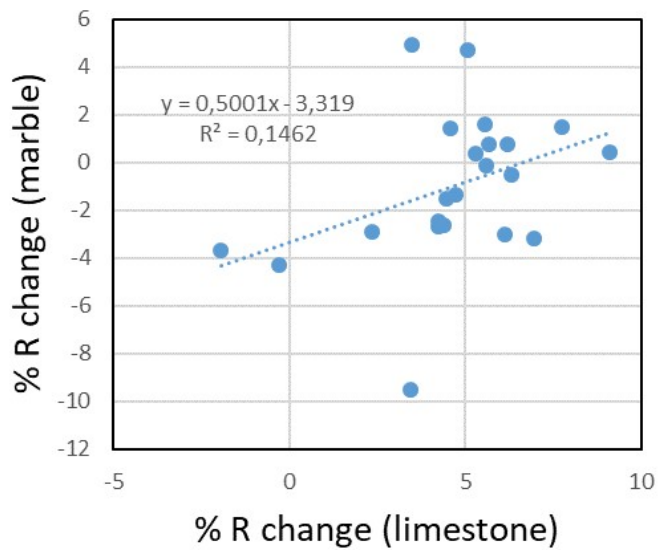
- Correlation between % reflectance change and % covered surface :



- Raman analyses of black spots



Correlation between materials



- ⇒ No clear correlation
- ⇒ Too short exposure time for stone samples?

Summary and future prospects

- Pursuit of the temporal trend of glass soiling
- New set of data to test the dose-response functions
- For the stone samples, the exposure time seems too small

→ longer campaigns (to be discussed) ? Local analyses ?

Next steps (ion chromatography for soluble species and ICP-MS for trace metals)