

The current state of impact research in the Czech Republic

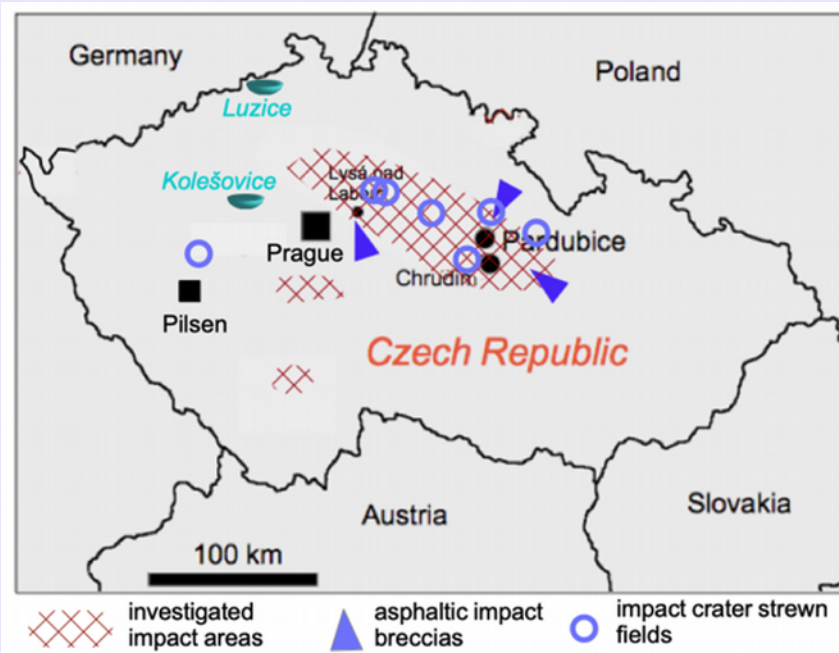
Martin Molnár¹, Karel Ventura², Jens Poßekel³, Kord Ernstson⁴

¹Resselovo nám. 76, Chrudim 537 01, Czech Republic; molnar@ego93.com, ²University of Pardubice, Czech Republic; Karel.Ventura@upce.cz, ³Geophysik Poßekel Mülheim, Germany (possekeltjens@gmail.com). ⁴University of Würzburg, D-97074 Würzburg, Germany (kernstson@ernstson.de).

87th Annual Meeting of the Meteoritical Society 2025 (LPI Contrib. No. 3088 #5133.pdf)

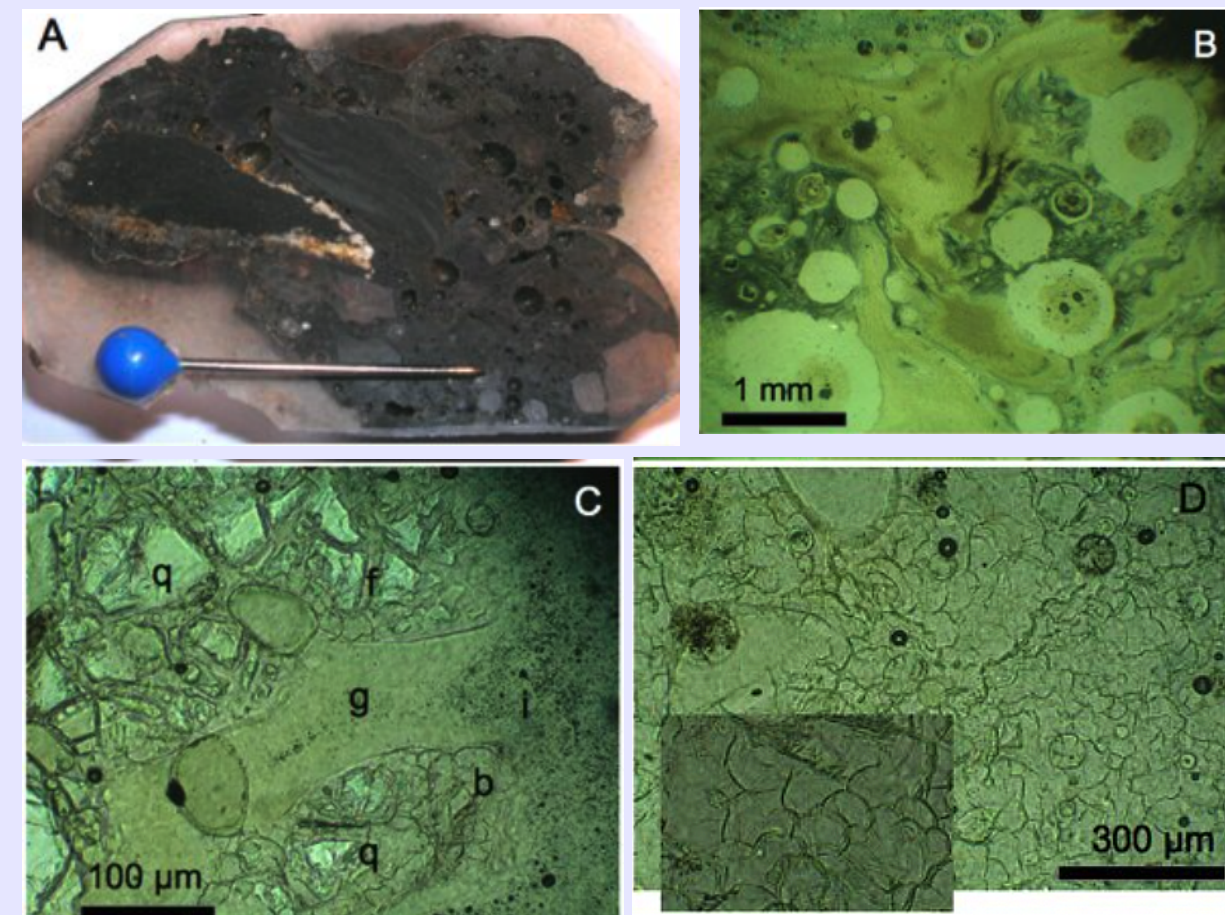
The poster can be enlarged considerably on the monitor.

Introduction: Impact-specific investigations began at the start of the new millennium when geologist Z.Štaffen published findings on widespread black glass chunks in connection with shallow depressions and, in the absence of geological and anthropogenic explanations, postulated a meteorite impact. This was rejected by his geological colleagues, so he eventually gave up further investigations yet inspiring the current M.M. to take up what has since become extensive impact research which now extends across nearly the whole of the Czech Republic (map in Fig. below). Here we provide a rough overview with focus in particular on the recently intensified discussion and publications of low-altitude touchdown airburst impacts. These recent and latest investigations include findings and analyses (the sunstones/alemonites and Moldavite tektites) that show a connection to the Ries impact crater in neighboring Germany.

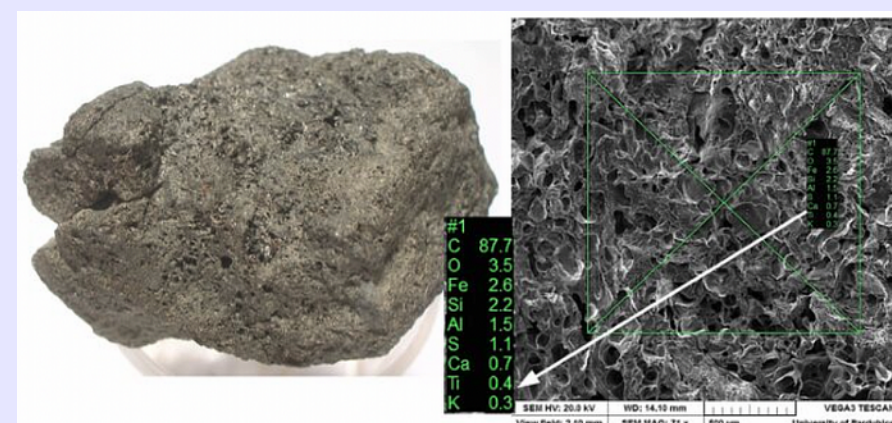


This rough overview deliberately shows only eye-catching label-like references for the many subject areas, which can be clicked on (the numbers in the headings) to access links to the existing comprehensive poster contributions to the LPSC, AGU, and MetSoc conferences..

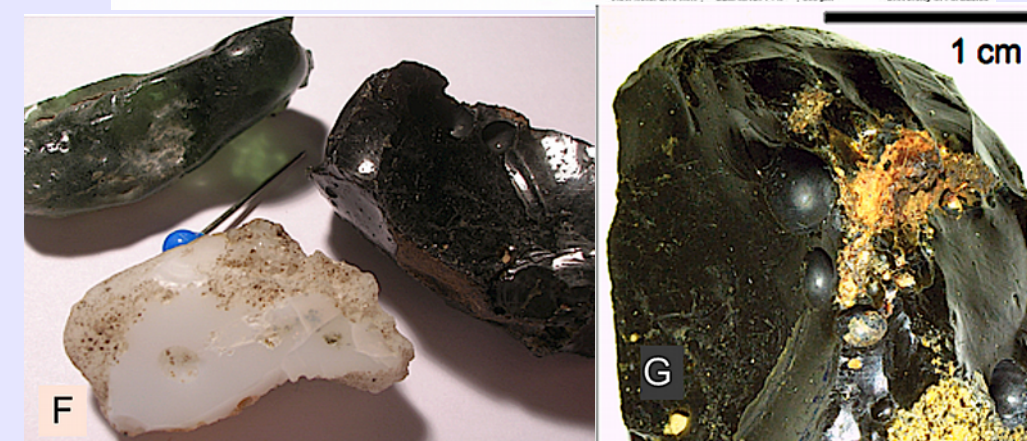
Early impact finds (2010-2017)



Typical samples (superficial and upper soil) from the strewn fields; A: cut surface of a black vesicular glass with tiny rock fragments. B: Melt glass with vesicles, schlieren and mineral fragments; C: q-quartz grain with open, glass-filled fissures (f), g-glass, b-ballen structures, i-tiny gas or fluid inclusions in glass, D: ballen silica in the adjacent quartz grain, detail inserted. B-D photomicrographs, plane light.

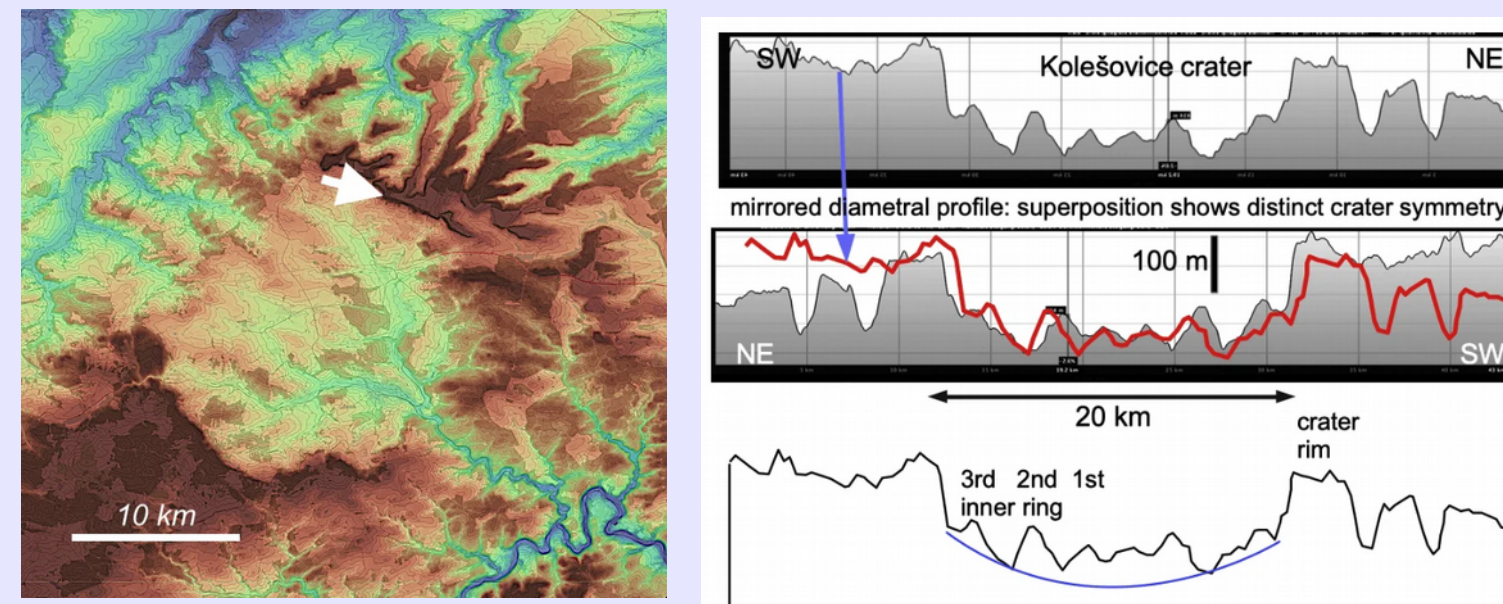


E: Pumice-like carbon matter (chiemite), size: 3.5 cm, and SEM image with EDX analysis.



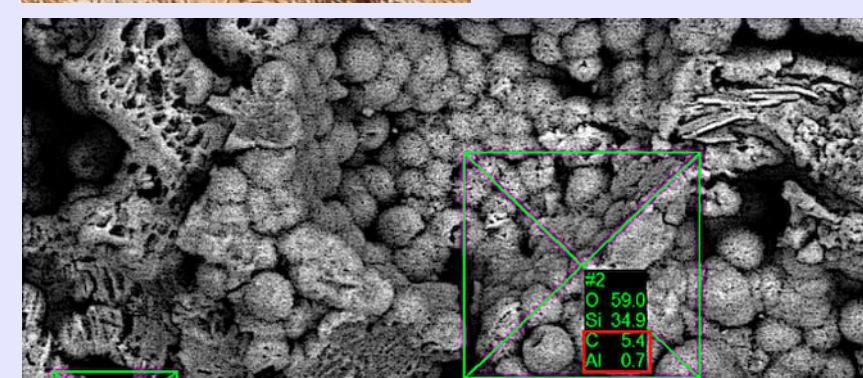
F: Green, black and white glass from the impact strewn fields. G: Black glass with embedded metallic spherules.

The Kolečovice impact structure [1]



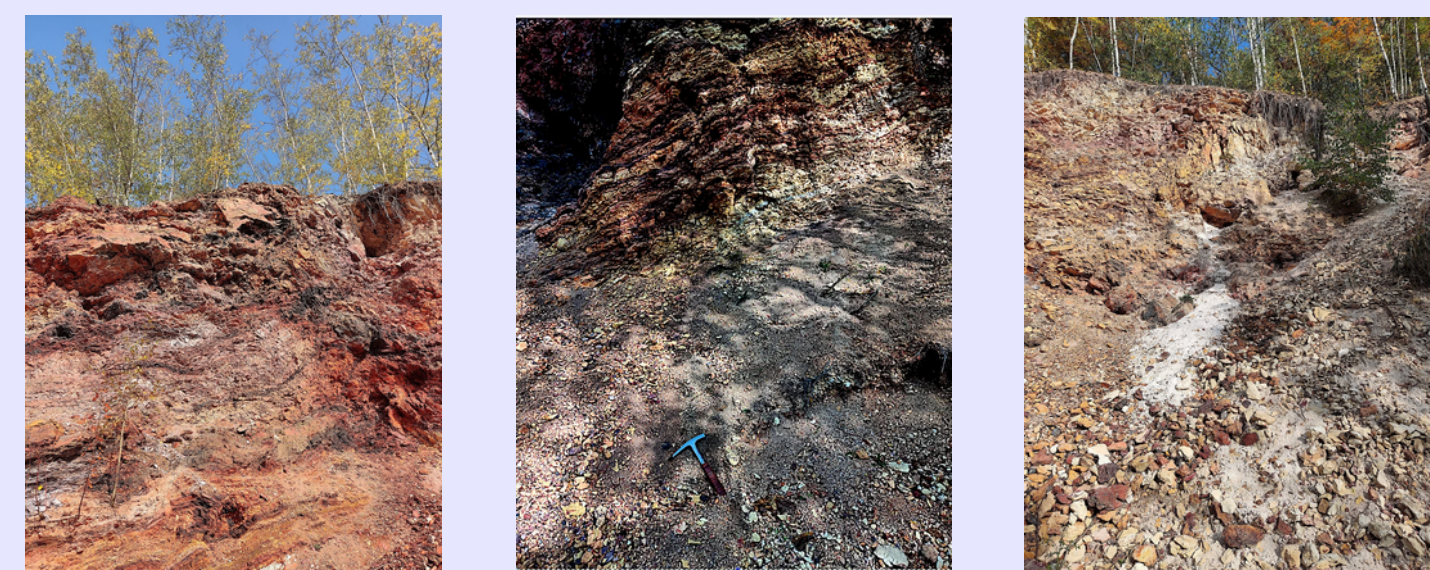
The multi-ring structure in a Digital Terrain Model map and two diametral DTM profiles. The superposition underlines the circular symmetry of the crater. White arrow: investigated quarry.

Shatter cones in the investigated quarry as in proof of meteorite impact shock.

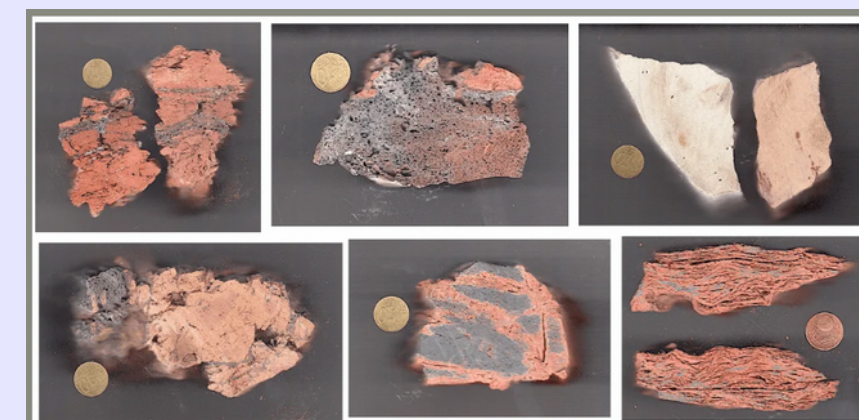


SEM-EDS image of clusters of silica spherules, which have completely replaced all calcite (and Ca) in the sample from the quarry.

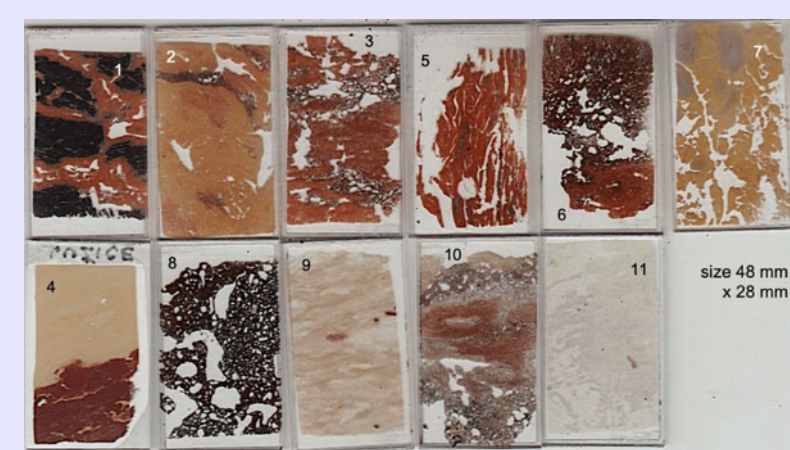
The enigmatic Luzice impact melt rock megabreccia (“porcelanite”) [2]



The abandoned porcelanite quarry exposing the megabreccia.



Selection of polymictic breccia cuts.

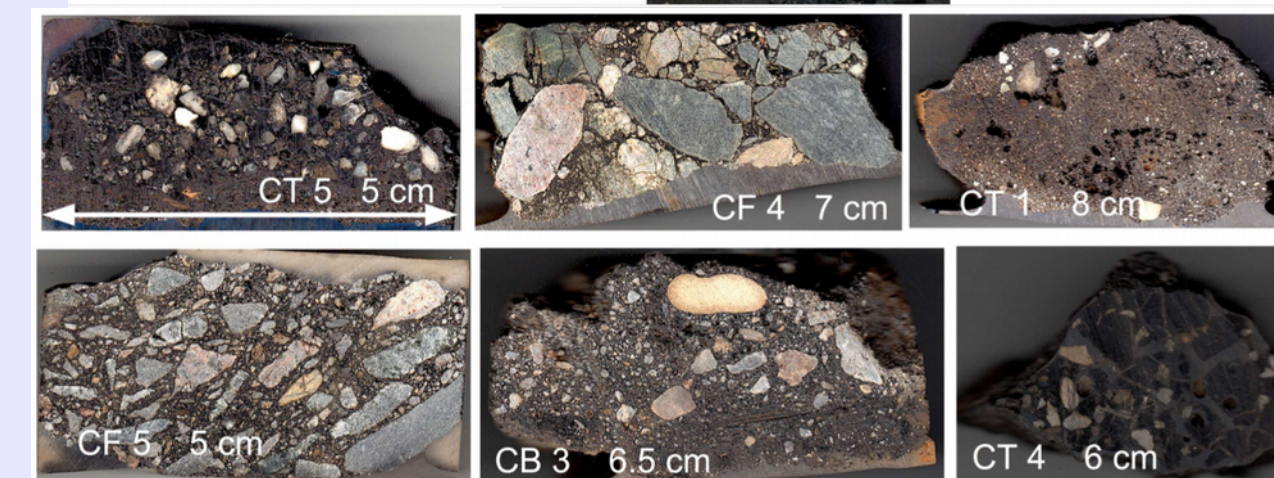


Selection of scanned thin sections for polarizing microscopy.



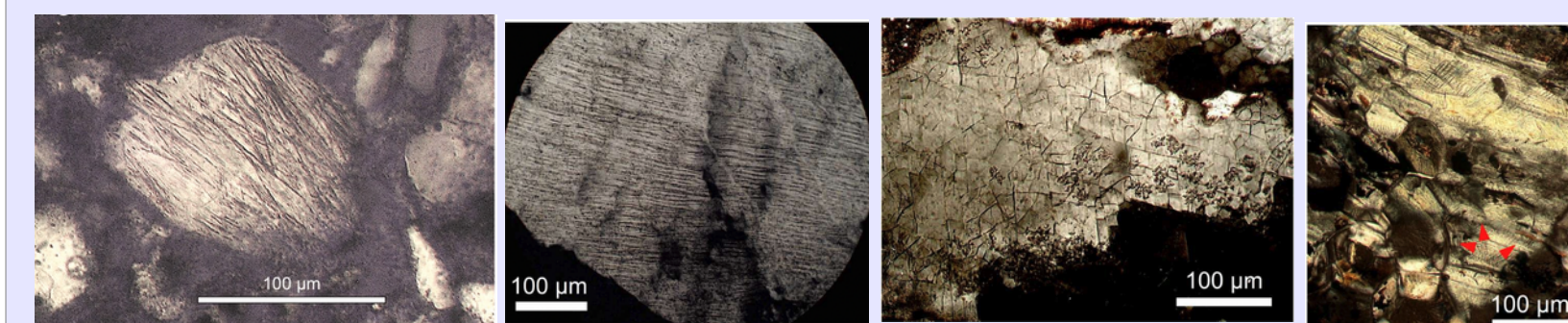
Melt breccia with black glass scoria.

The asphaltic (bituminous) polymictic impact breccia [3]

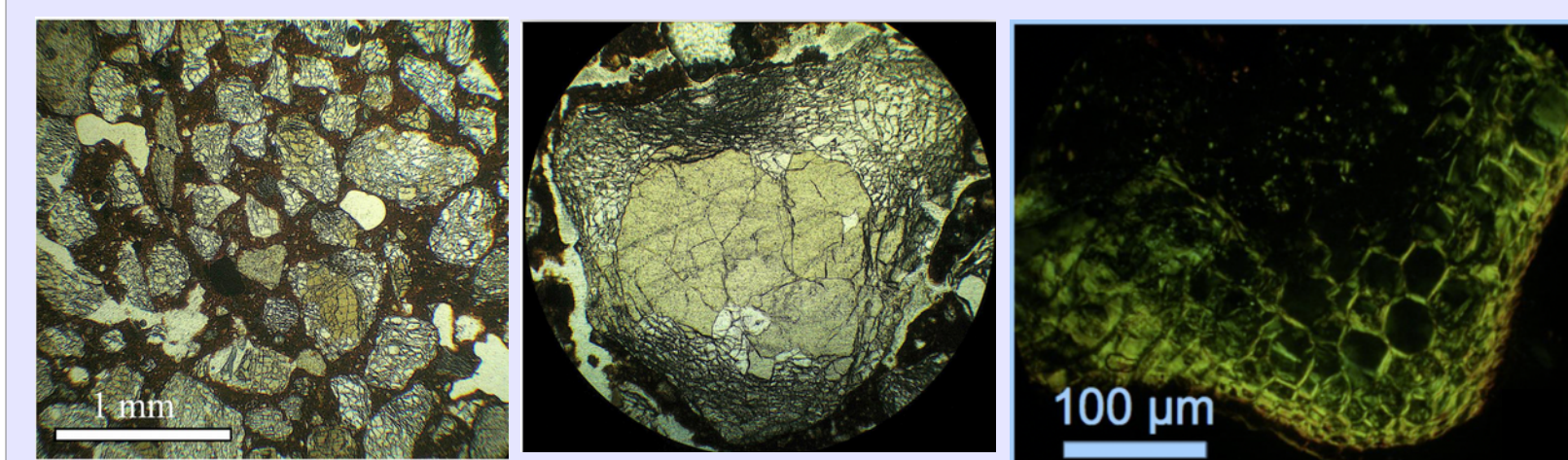


Rock and glass fragments in asphalt/glass breccia matrix.

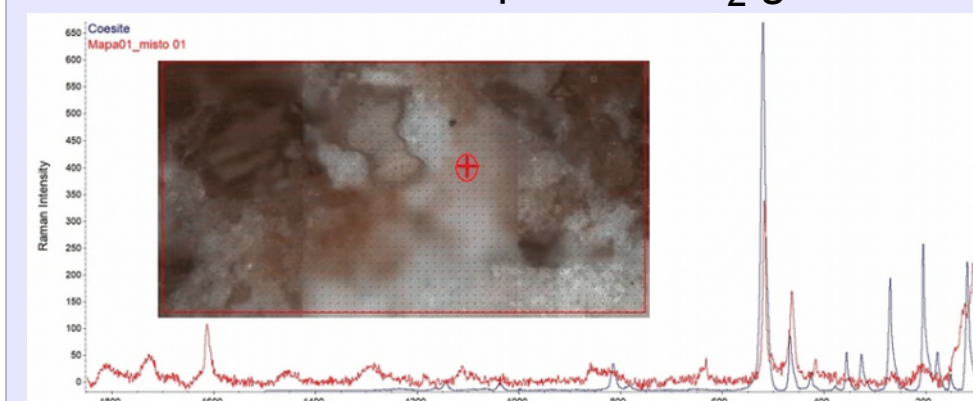
Shock metamorphism - various finds in polymictic breccias [3] [7] [8]



Multiple sets (five at least) of planar deformation features PDF in quartz. - Decorated PDF and kink bands in quartz, - Multiple sets of planar fractures PF in quartz. - Multiple sets of PDF and spots of diaplectic glass in feldspar.



Thermal shock in monomictic quartz breccia; single grain. - Ballen structures in diaplectic SiO₂ glass.

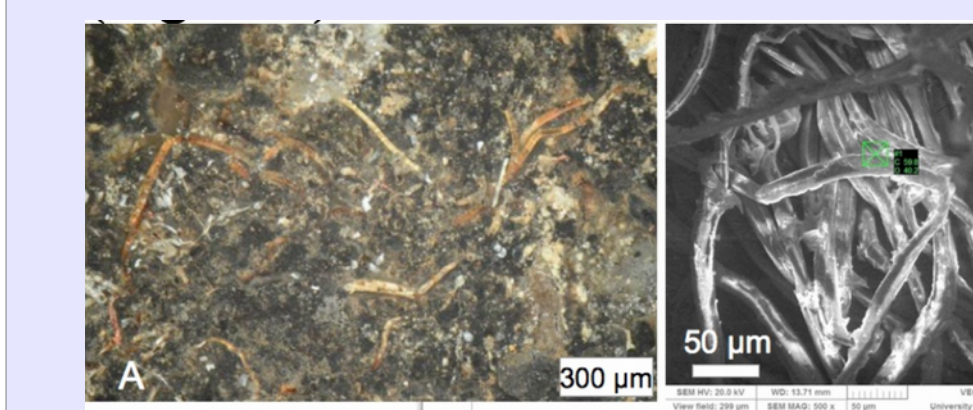


Coesite [4]

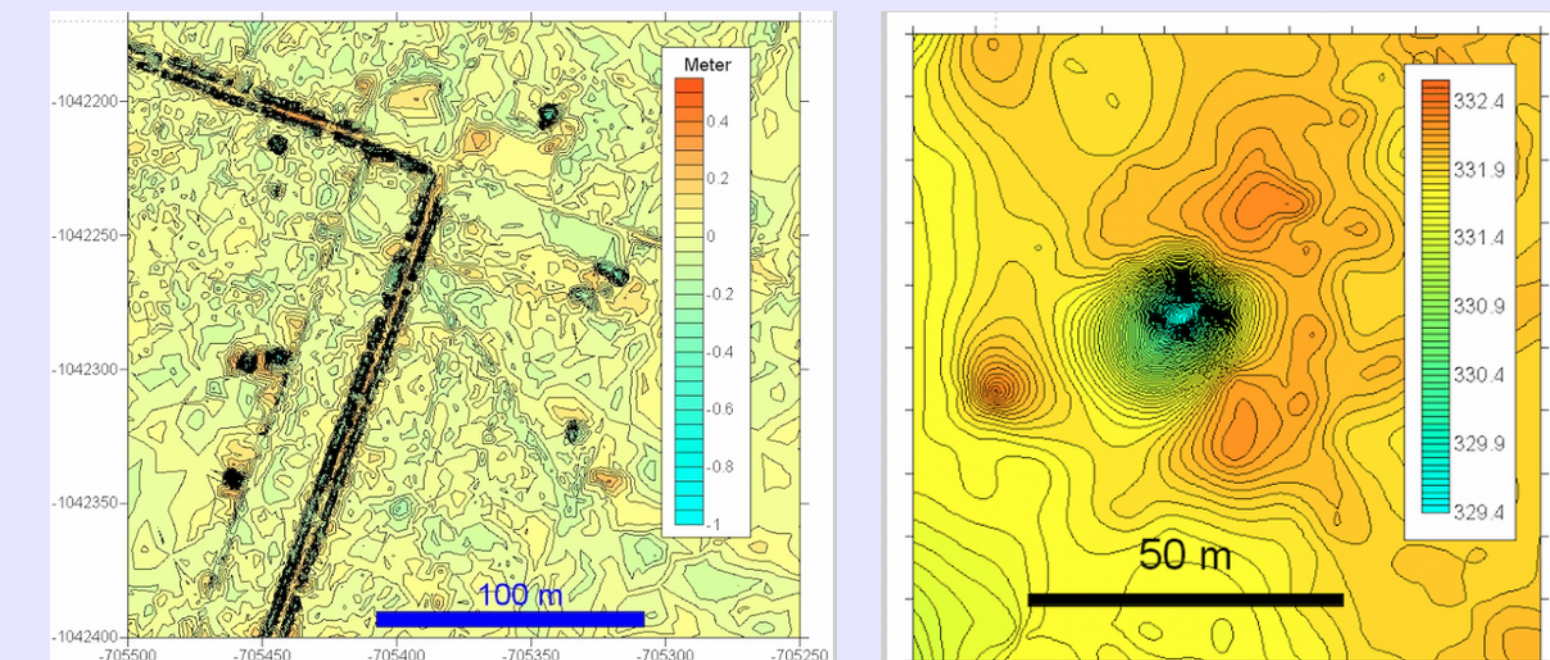
High-pressure SiO₂ polymorph
Raman spectroscopy

Carbolite [5]

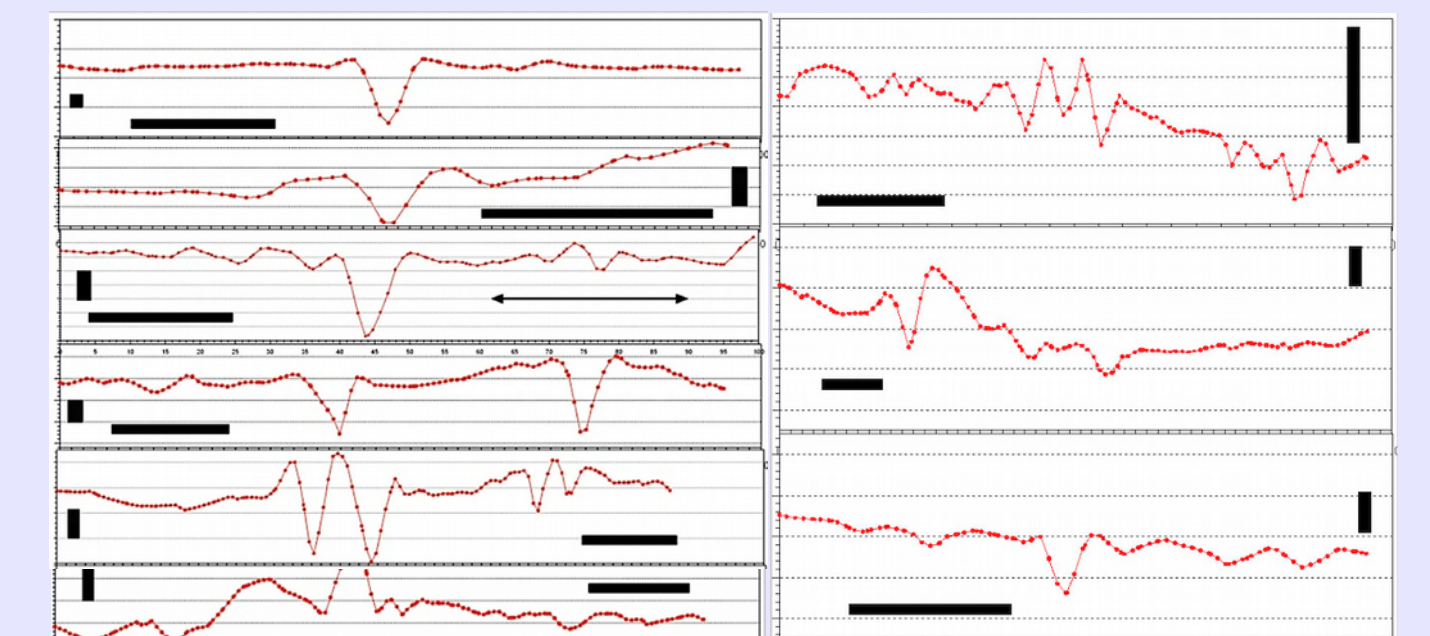
high-pressure/high temperature carbon allotrope. Optical photo and SEM-EDS.



Impact crater strewn fields Digital Terrain Models (DTM) [6]

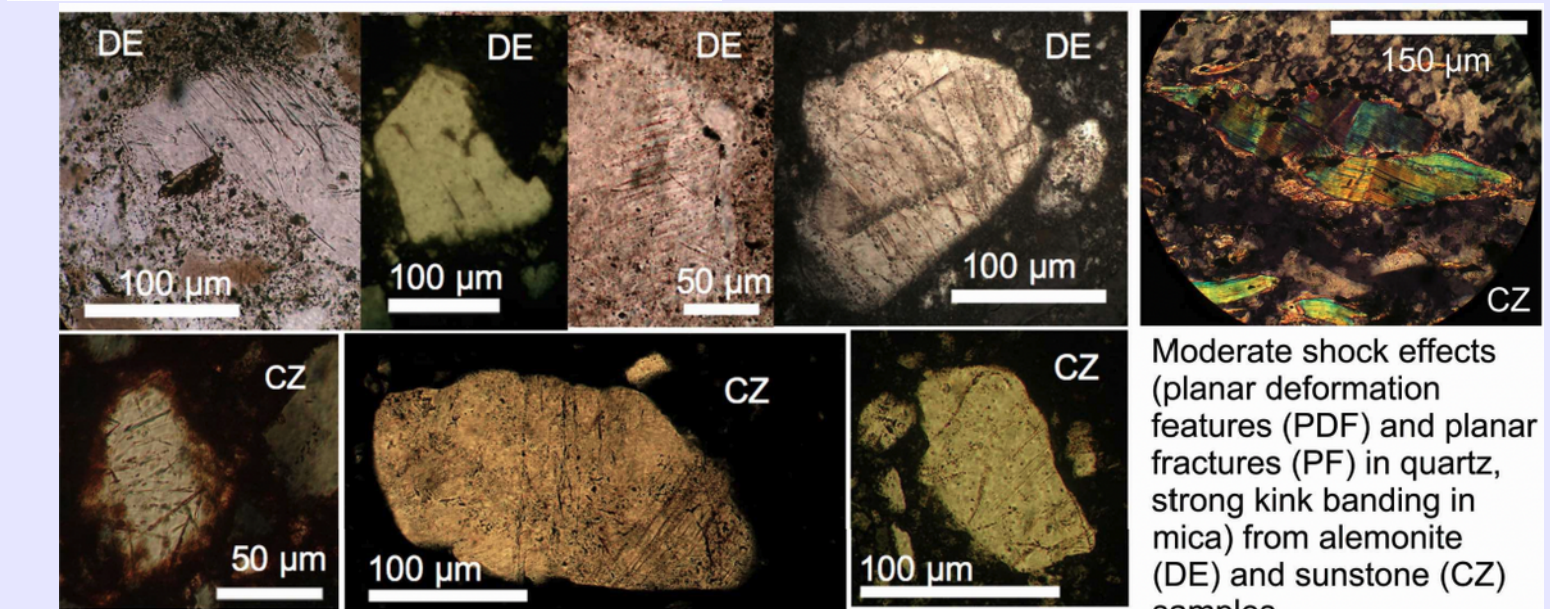
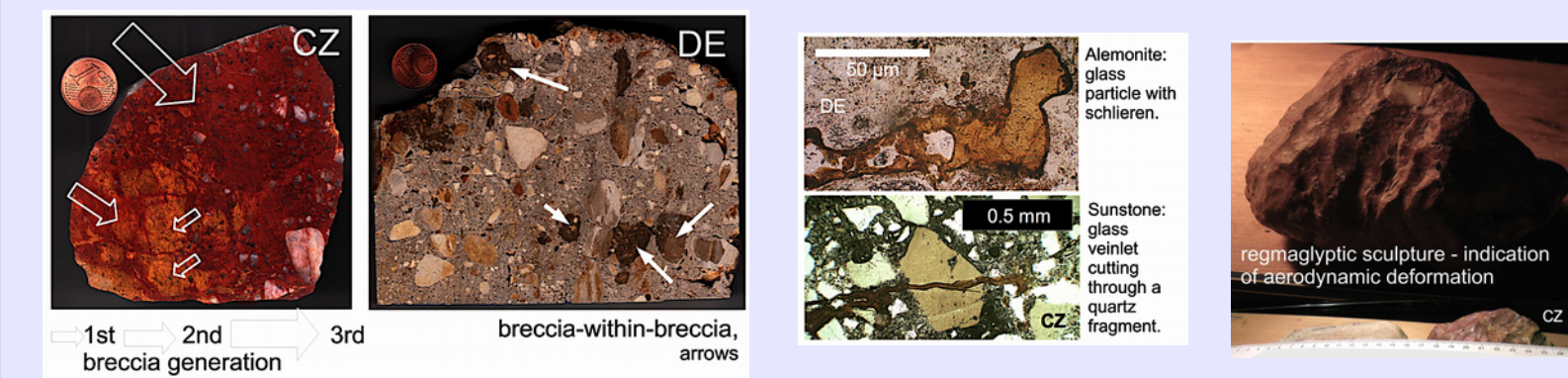


Cluster of crateriform structures. Example of a doublet NE-SW crater.



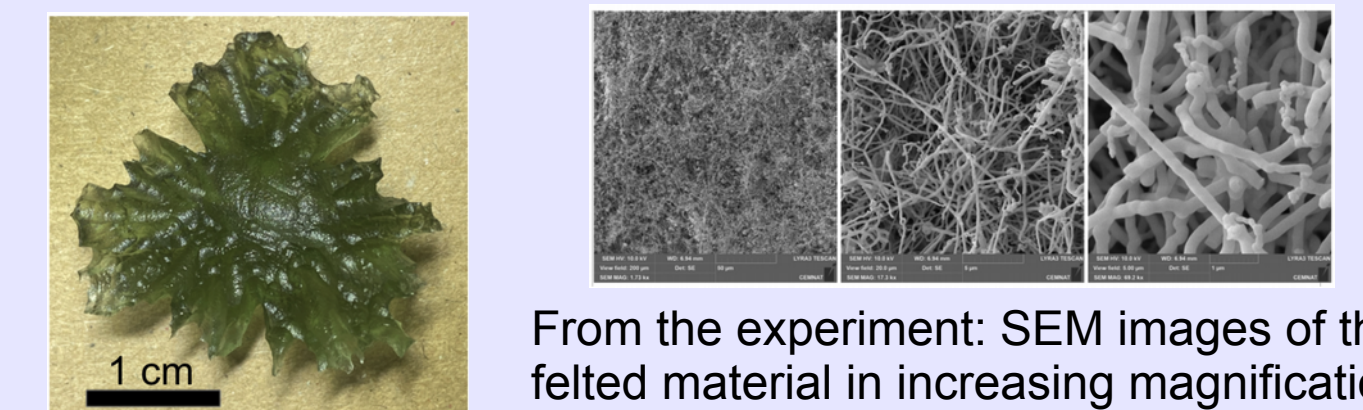
Diametral DTM profiles across crateriform structures. Note the great variability from simple over wavy to bulged and multiring structures. 20 m horizontal and 0.2 m vertical scale bars.

Two of a kind: the Czech sunstones and the Ries impact alemonites [8]



Moderate shock effects (planar deformation features (PDF) and planar fractures (PF) in quartz, strong kink banding in mica) from alemonite (DE) and sunstone (CZ) samples.

Lechatelierite in Moldavite tektites: New Analyses of Composition [9]



From the experiment: SEM images of the felted material in increasing magnification.