DISCOVERY OF EVIDENCE OF EXPLOSIVE HYDROVOLCANICS IN INTERTRAPEAN BEDS OF MADHYA PRADESH, INDIA

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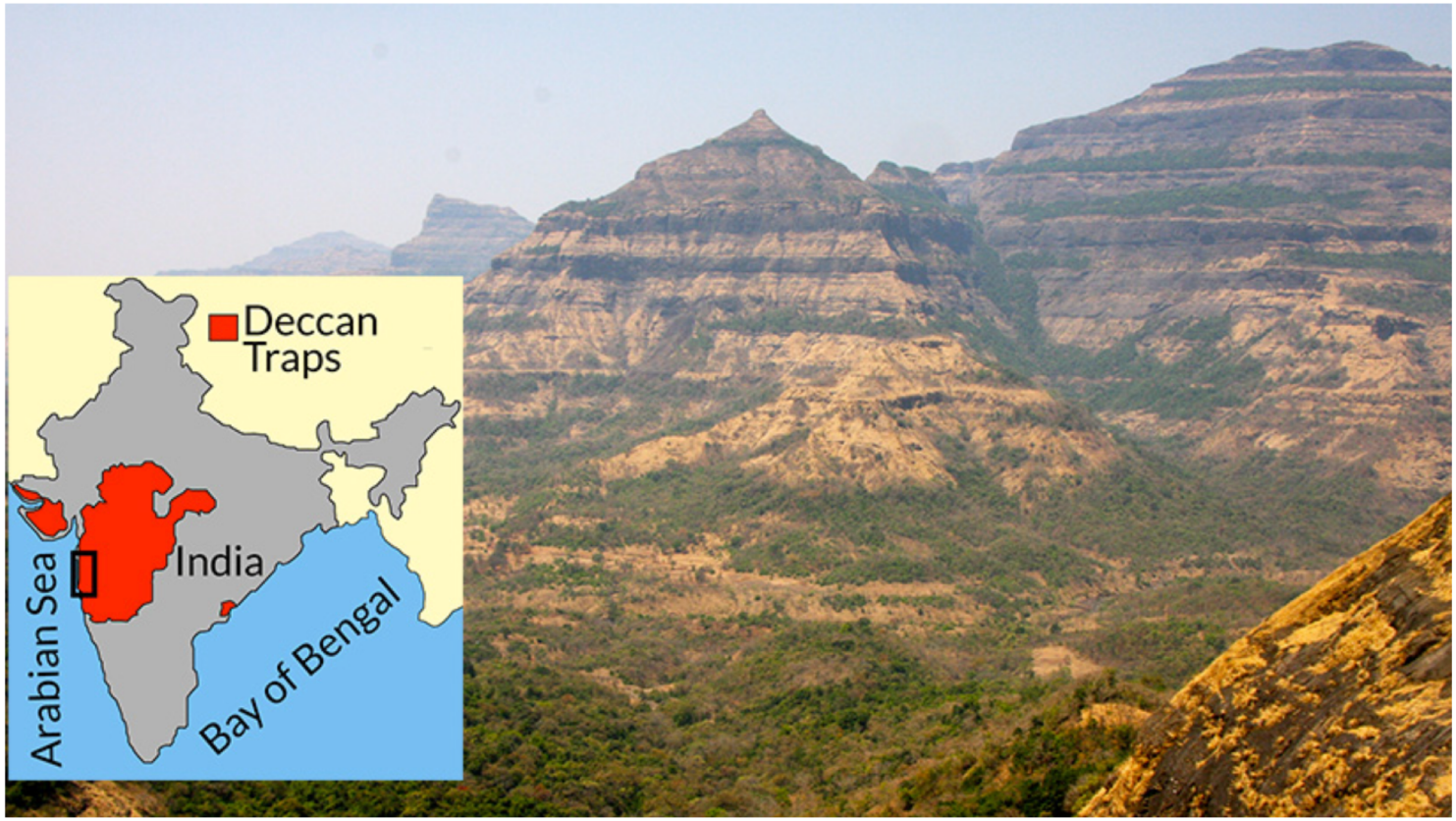
Introduction to Intertrapean Beds

The Intertrapean beds are thin sedimentary sequences, ranging between tens of centimeters to meters in thickness. These beds were deposited in the intermittent, apparently quiescent periods between two successive volcanisms and are sporadically exposed in isolated patches at widely separated geographical areas in the peripheral regions of the Deccan volcanic province. The present study was conducted in one such newly uncovered and well preserved intertappen beds in Gandhwani of Madhya Pradesh.

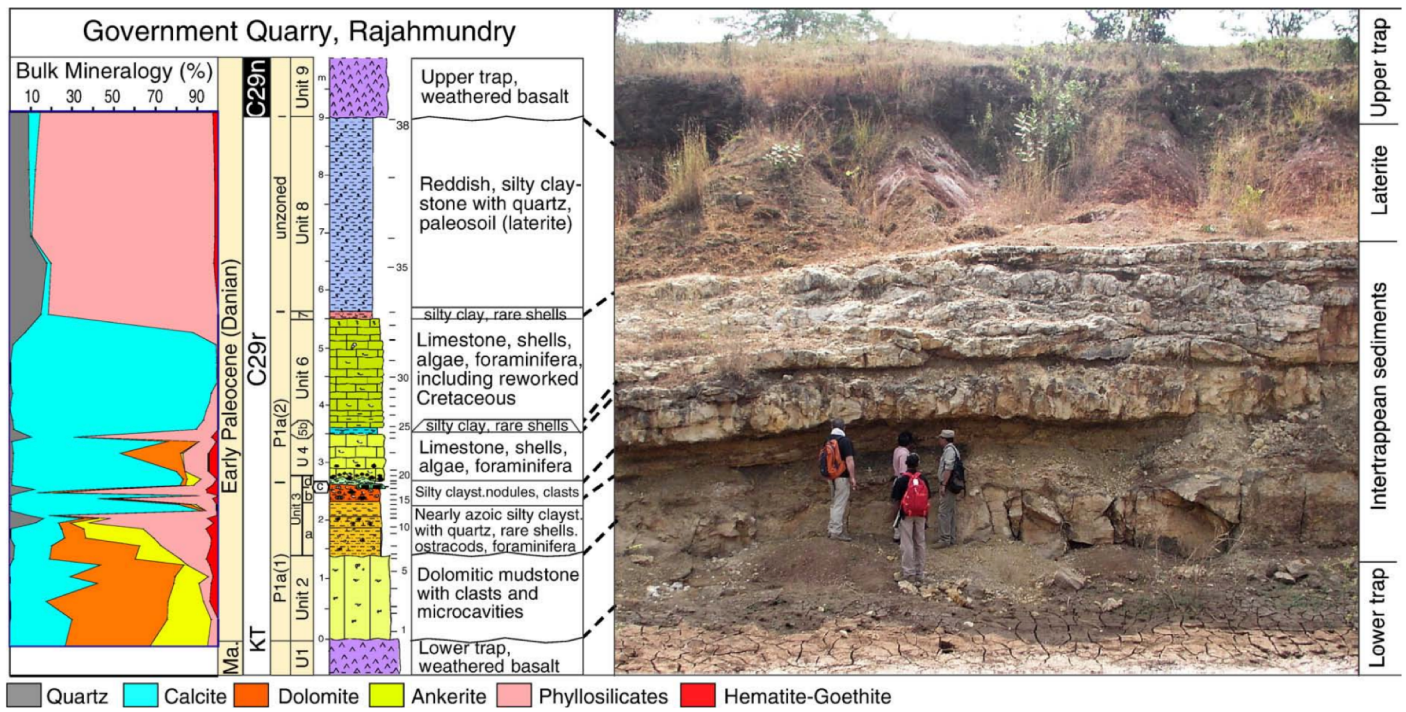
The Deccan Trap



LAVA LAYERS Floods of lava formed the layers of rock in India's Deccan Traps. Scientists sampled these layers (from location marked with a box on the map) and found that an increase in Deccan volcanism occurred within 50,000 years of the Chicxulub asteroid impact and the extinction of the dinosaurs.

MARK RICHARDS/UC BERKELEY (PHOTO); PAUL RENNE/BERKELEY GEOCHRONOLOGY CENTER (MAP)

Intertrapean Beds



Main Deccan volcanism phase ends near the K–T boundary: Evidence from the Krishna–Godavari Basin, SE India.

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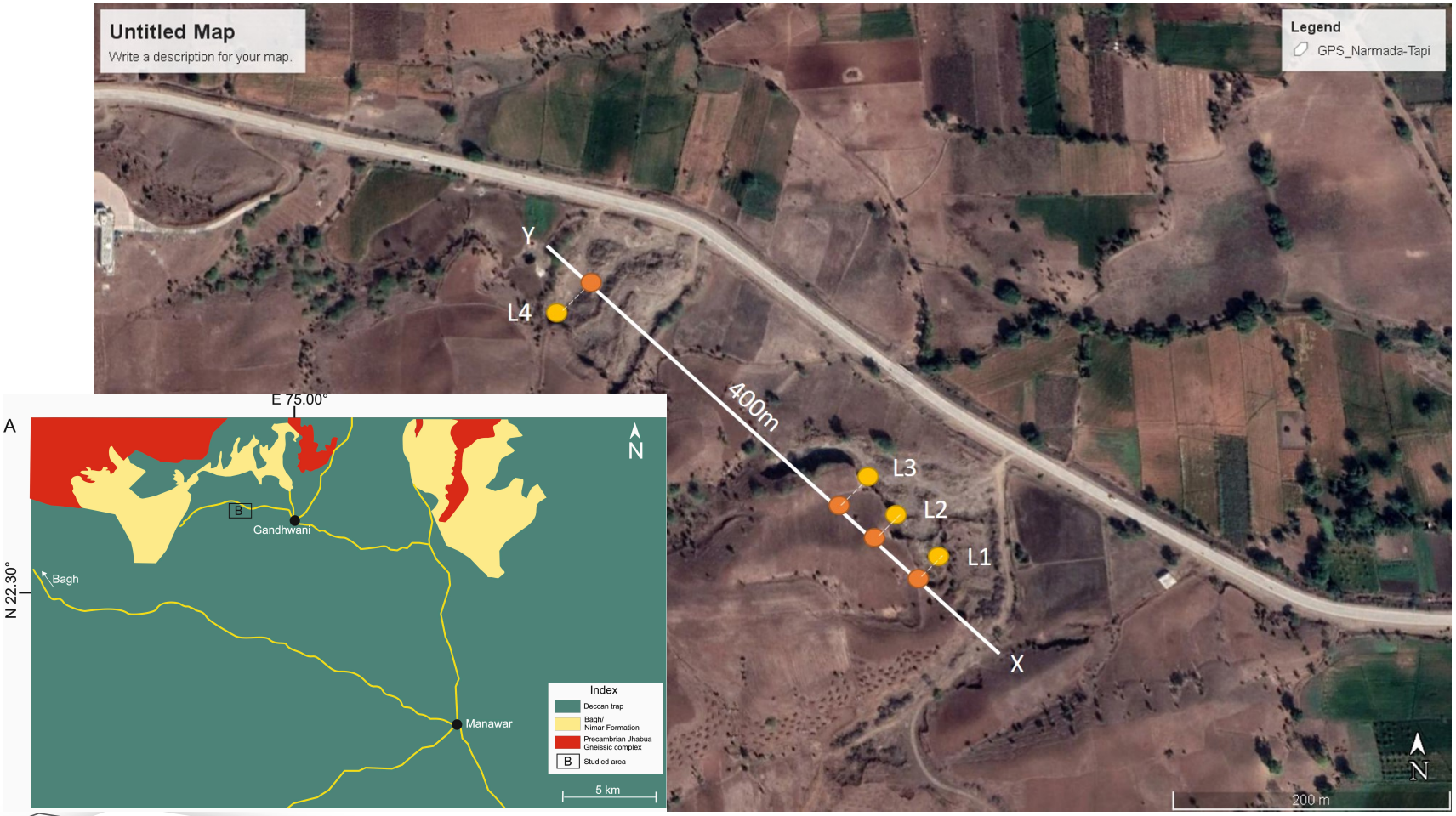
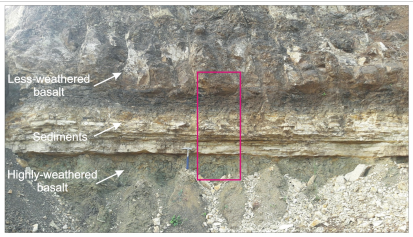
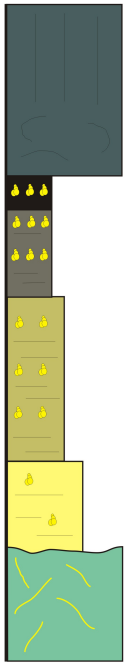
Location Map of **Gandwani Nala Section** the new section of intertrapean in

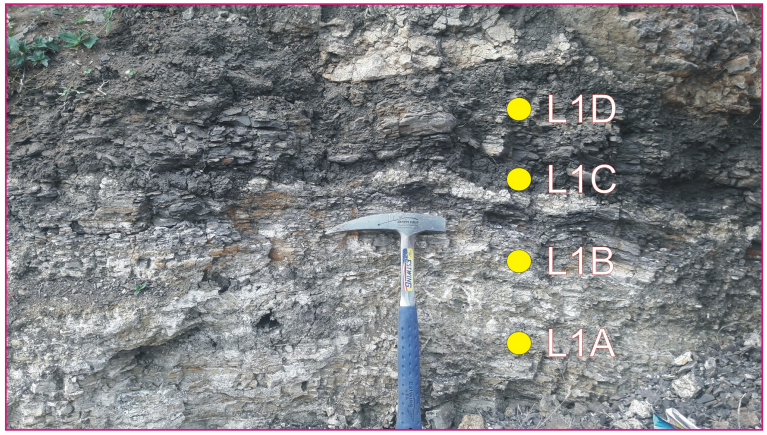


Lithological Description

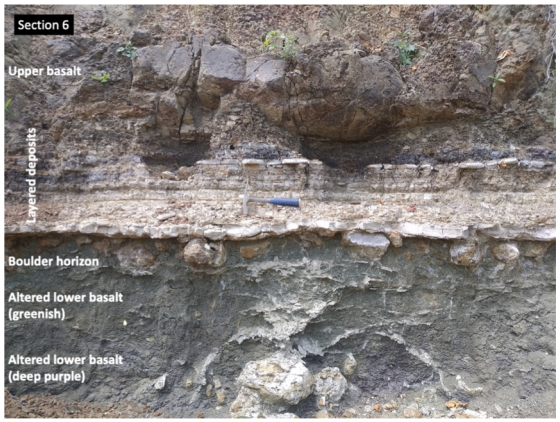




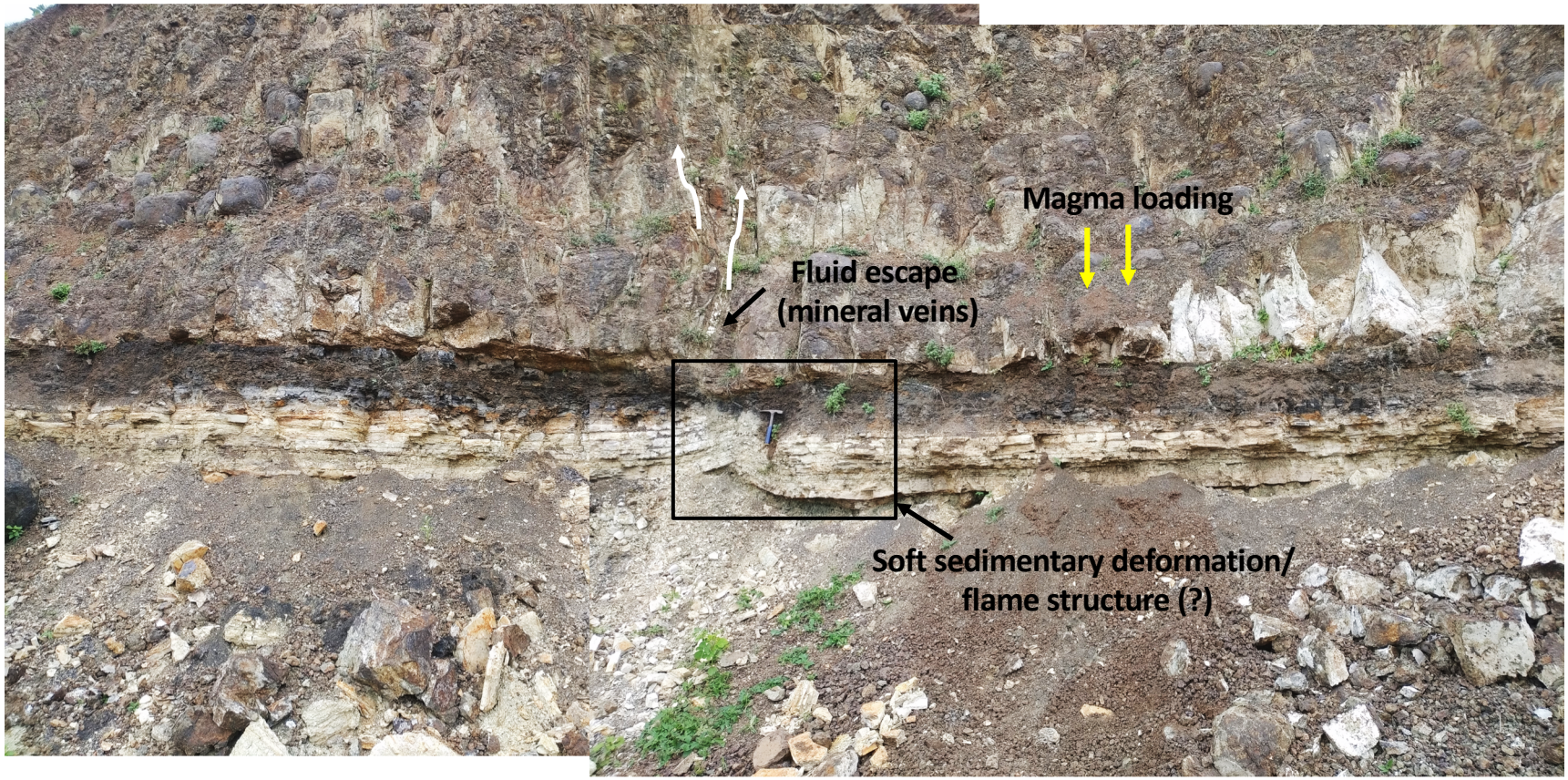
Location 2



Location 1



Faulting, soft sediment deformation and water escape along the fault zone due to magma overloading



Lithological Description

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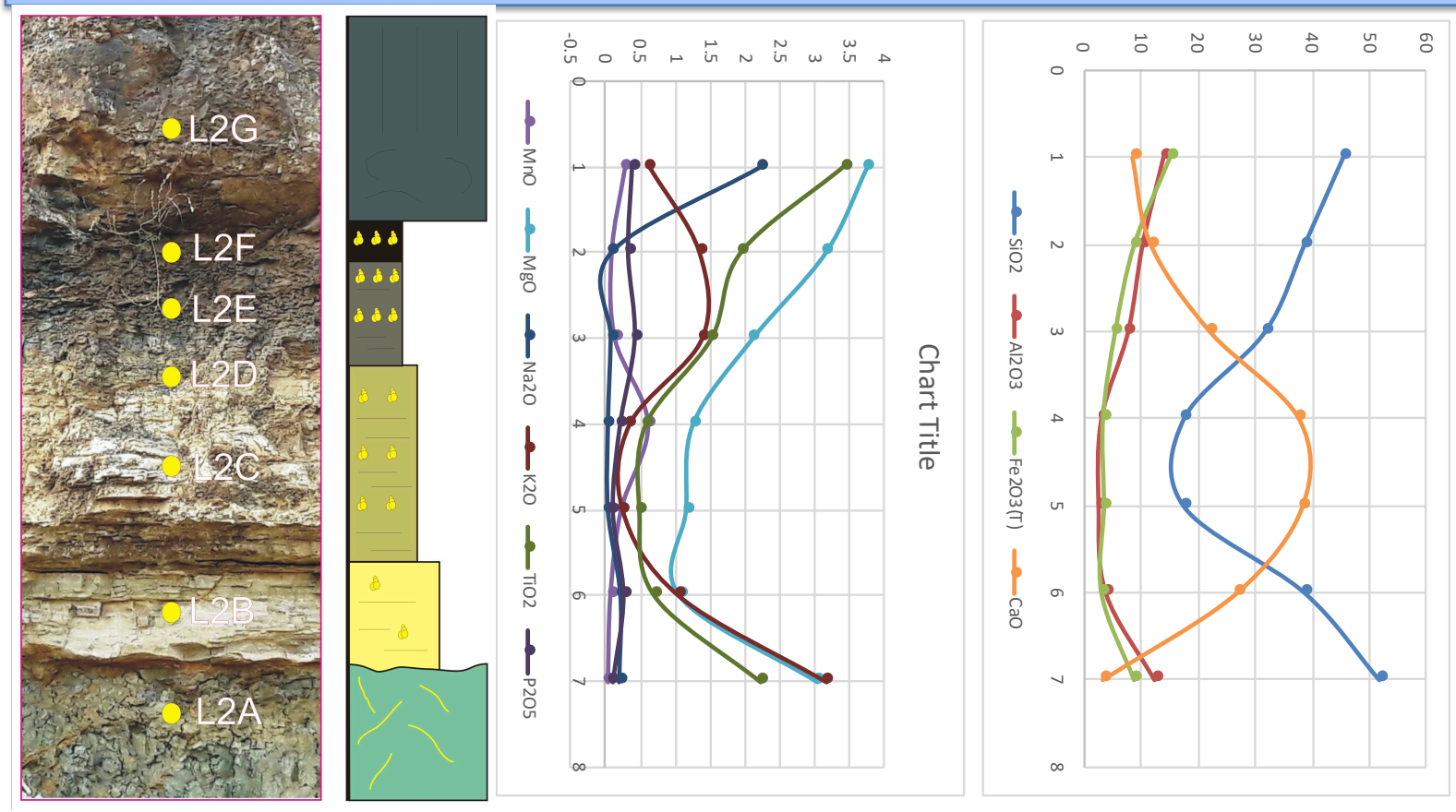
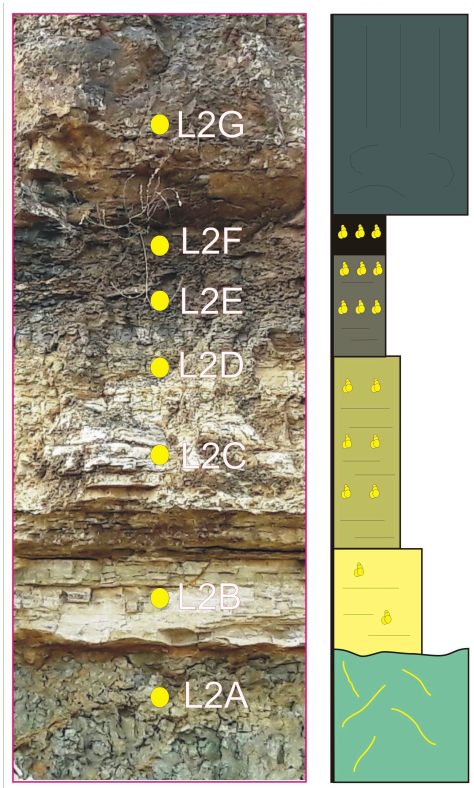
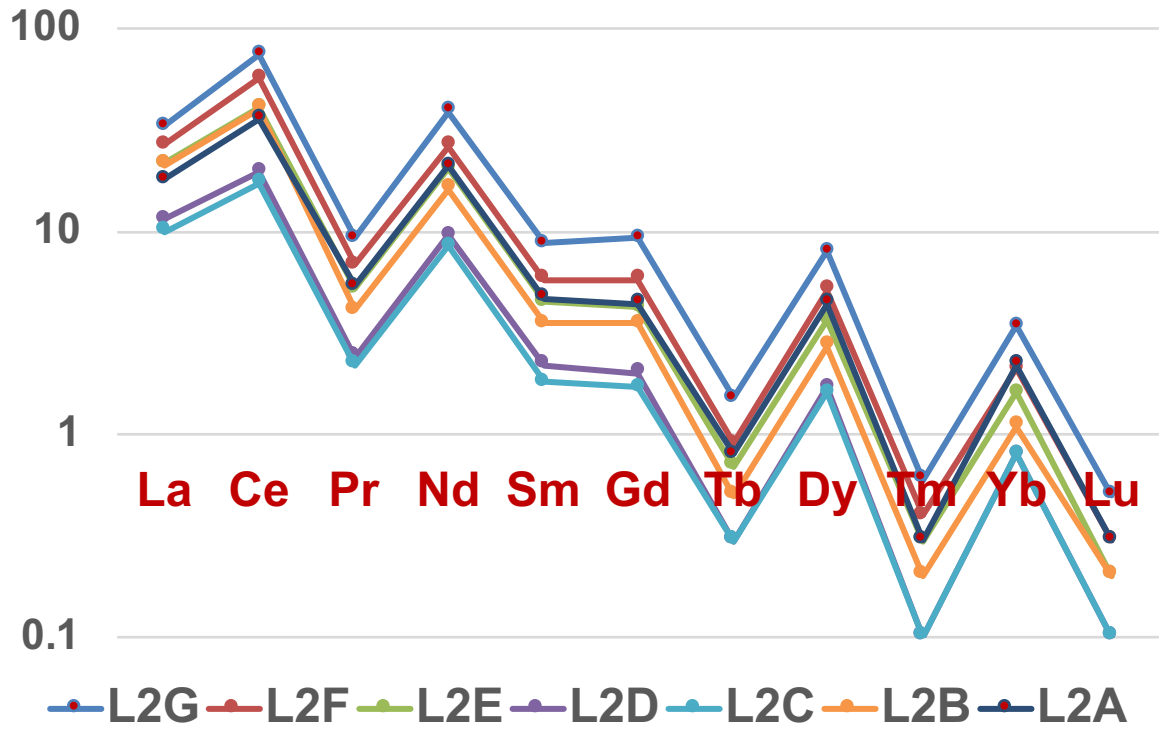
Geochemical Signature: Major Oxides

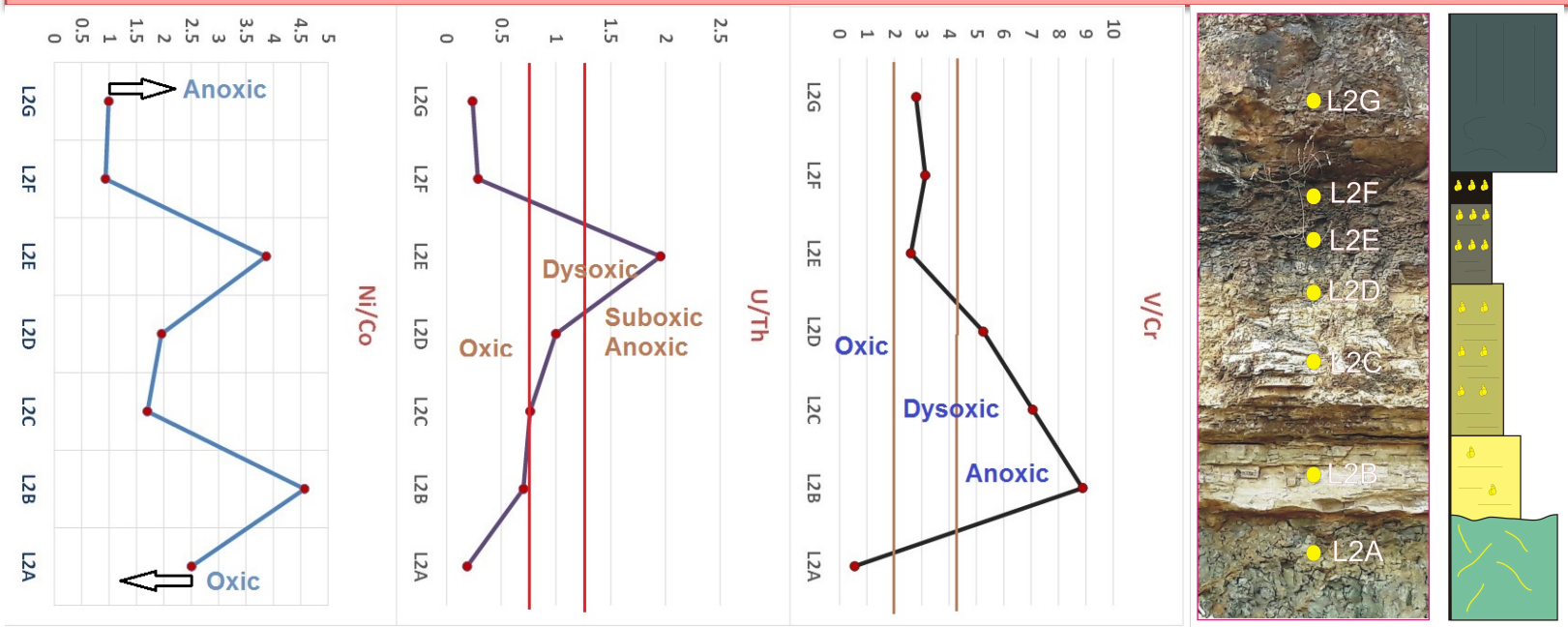


Geochemical Signature: REE



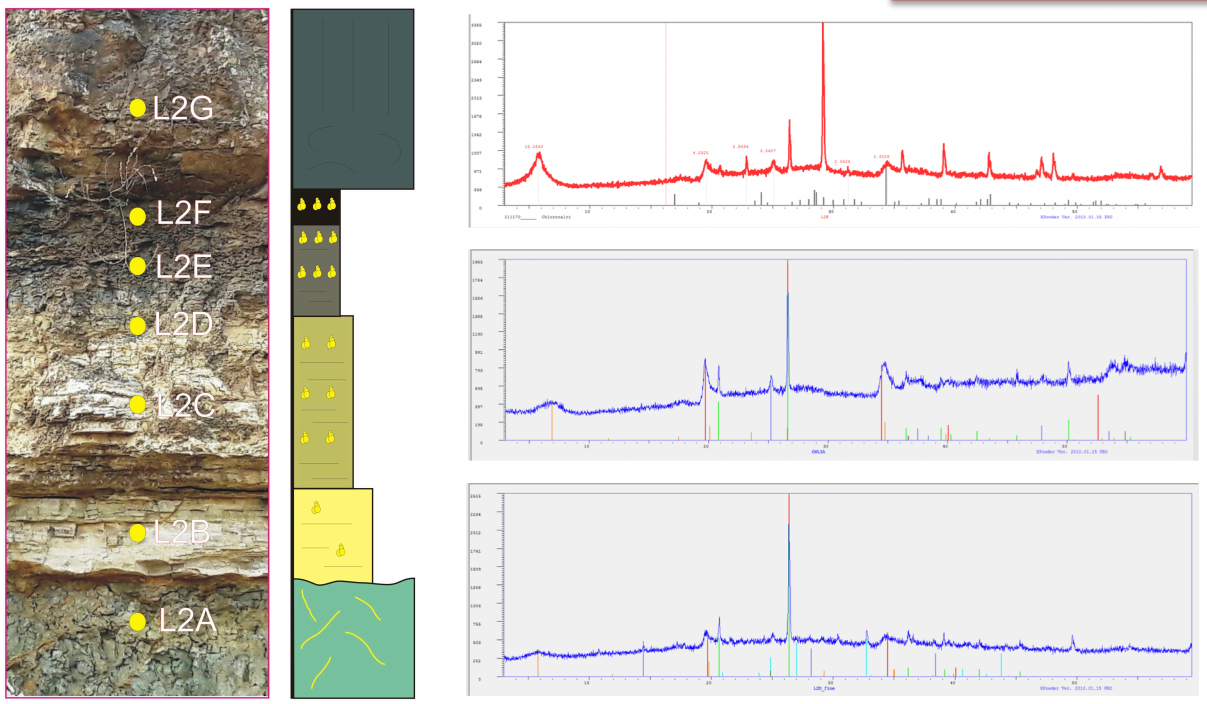


Geochemical Signature of Paleo Redox



The geochemical signature of these newly exposed intertrappen beds show dysoxic to anoxic (i.e. Ni/Co>1, V/Cr>2 and U/Th>0.75) conditions prevailed with a strong marine influence (Sr/Ba ratio >0.5), during the formation of Gandhwani intertrapean sequence.

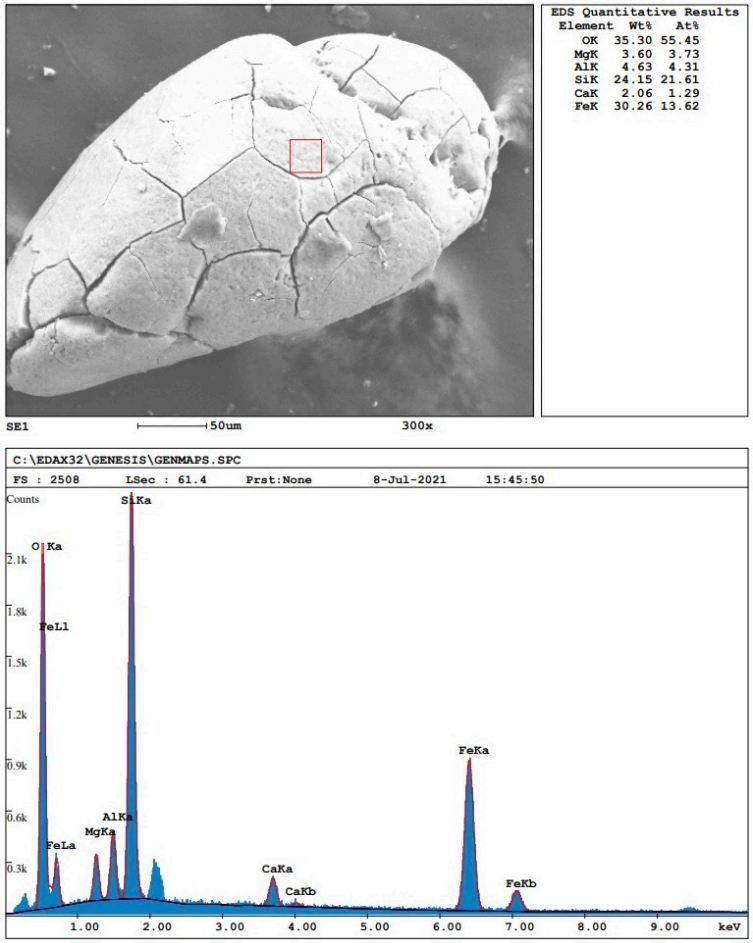
XRD mineralogy



Mineralogical analysis revealed an rapid upward diagenetic changes of Celadonite [K(Mg,Fe++)(Fe+++,Al)[Si4O10](OH)2] to Nontronite [Na0.3Fe+++2(Si,Al)4O10(OH)2•n(H2O)], an Fe^3 rich member of smectite, Celadonite is almost exclusively found associated with basic-eruptive rocks in deep-marine environments due to low-grade metamorphism, <250°C. On the other hand Nontronite is usually forms above the basalt on the seafloor at temperatures <70°C where hydrothermal fluids mix with sea water. Such a rapid change indicates sudden changes in overall geologic setting.

SEM-EDS:
Micro Analysis of the Lapilli

Quenching cracks formed by the contact between hot fragments and liquid water

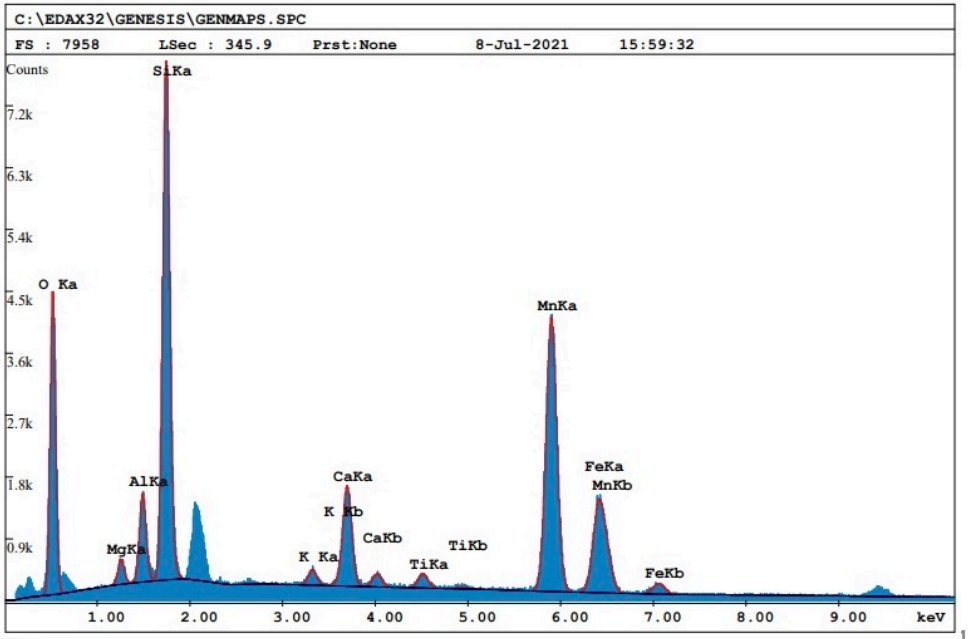


SEM-EDS:
Micro Analysis of the Lapilli

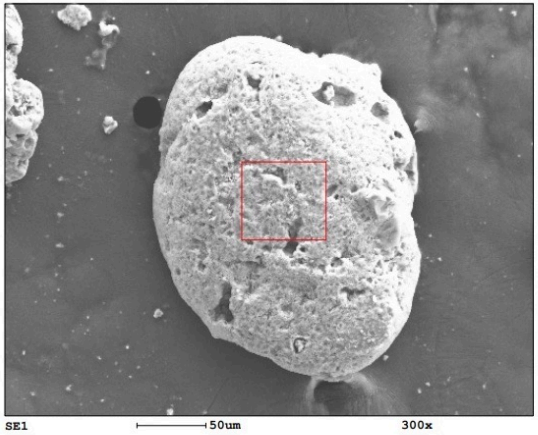
EDS Quantitative Results

Element	Wt%	At%
OK	23.61	43.50
MgK	1.41	1.72
AlK	4.22	4.61
SiK	21.59	22.66
KK	0.74	0.55
CaK	4.94	3.63
TiK	0.98	0.60
MnK	31.55	16.93
FeK	10.96	5.79

Spherical Lapilli with spherical vesicular indicates explosive volcanic eruption

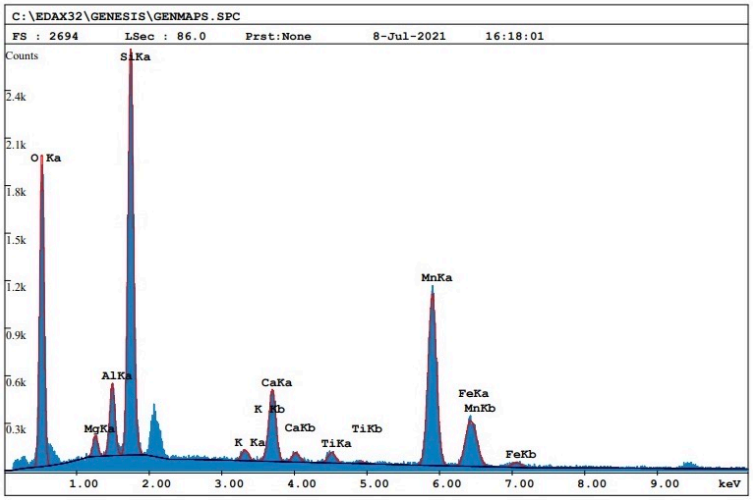


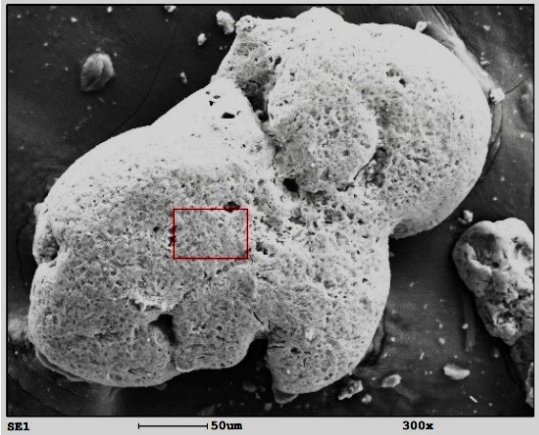
SEM-EDS:
Micro Analysis of the Lapilli



EDS Quantitative Results

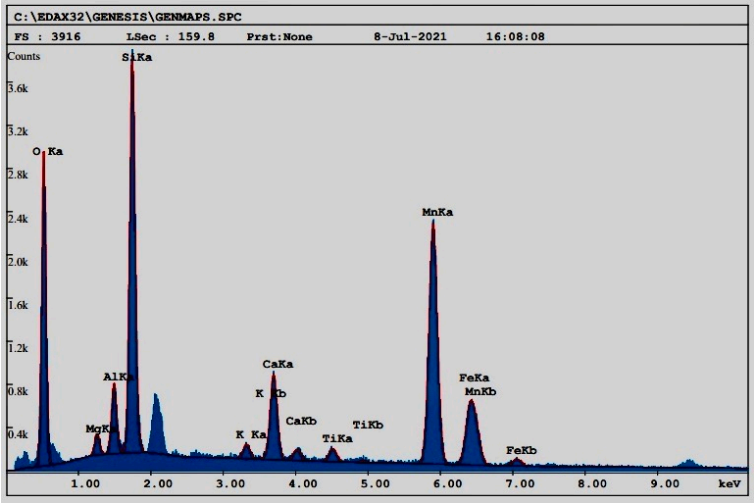
Element	Wt%	At%
OK	31.92	52.89
MgK	1.51	1.64
AlK	4.39	4.32
SiK	21.99	20.76
KK	0.69	0.47
CaK	4.82	3.19
TiK	0.98	0.54
MnK	26.90	12.98
FeK	6.79	3.22



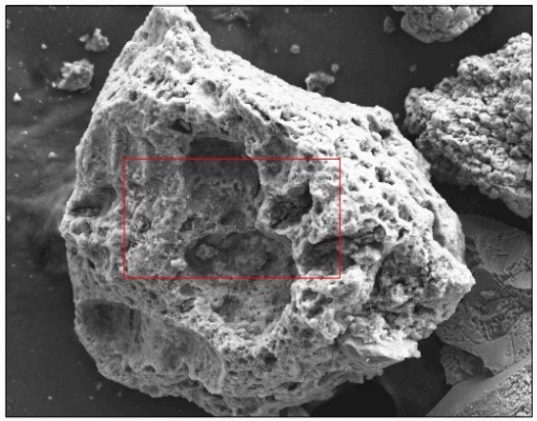


EDS Quantitative Results

Element	Wt%	At%
OK	27.82	49.20
MgK	1.42	1.66
AlK	3.94	4.14
SiK	19.22	19.37
KK	0.80	0.58
CaK	4.91	3.47
TiK	1.05	0.62
MnK	32.48	16.73
FeK	8.35	4.23

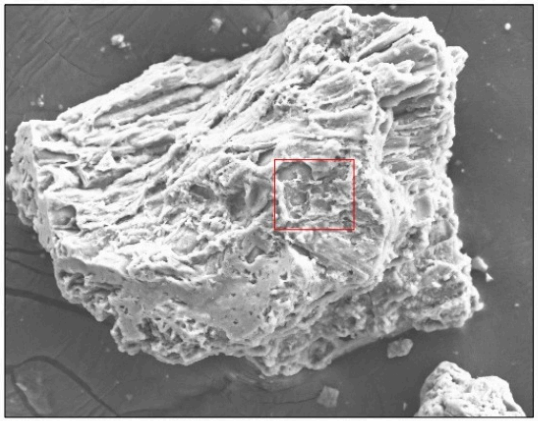


SEM-EDS:
Micro Analysis of the Volcanic Ash



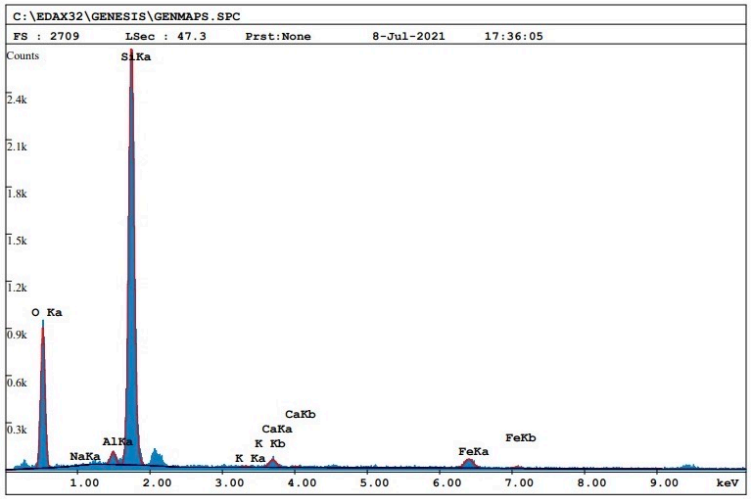
EDS Quantitative Results

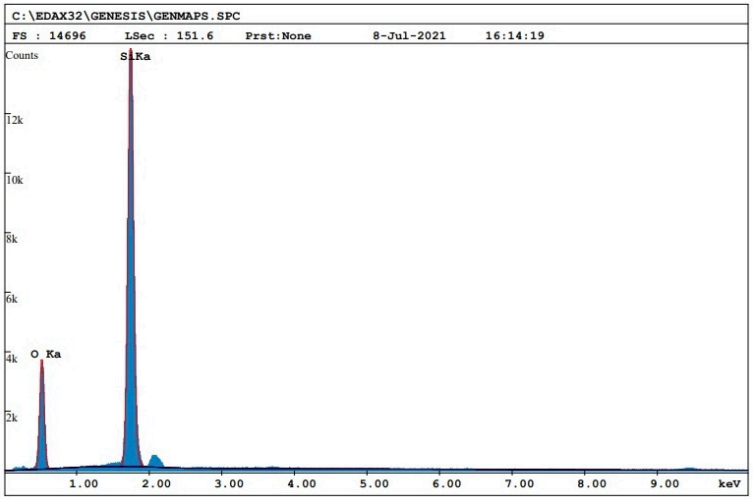
Element	Wt%	At%
OK	42.13	57.39
NaK	0.08	0.08
AlK	1.55	1.25
SiK	49.39	38.32
KK	0.25	0.14
CaK	1.63	0.89
FeK	4.97	1.94



EDS Quantitative Results

Element	Wt%	At%
OK	42.18	56.16
SiK	57.82	43.84





Not a Conclusion
Rather an Interpretation!

The discovery of the volcanic ash and micro-lapillies in the middle of studied sections, which were concealed by several phases of alterations since it's deposition during Late Cretaceous, indicates that the intertrapean may not represent a quiescent geologic period, but rather a violent episode full of proximal to distal explosive hydro-volcanism that was followed by basalt flooding, at the end of Cretaceous.

Thank you!

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