This presentation participates in OSPP

Outstanding Student & PhD candidate Presentation contest

EGU22-11499

25th May 2022

Session ERE2.4 – Exploration, utilization and monitoring of conventional and unconventional geothermal resources

Reservoir Geology of the Cretaceous-Cenozoic Transition in the context of Geothermal Exploration in the Geneva Basin and neighbouring France (SWITZERLAND & FRANCE)

Ph.D. PROJECT (2019-2023)

Aurélia Crinière[1,@] and Andrea Moscariello[1]

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[@] Aurelia.Criniere@unige.ch

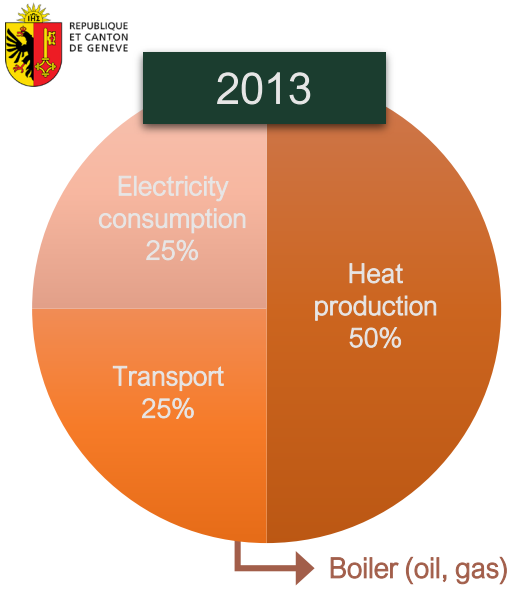
UNIVERSITÉ DE GENÈVE
FACULTÉ DES SCIENCES

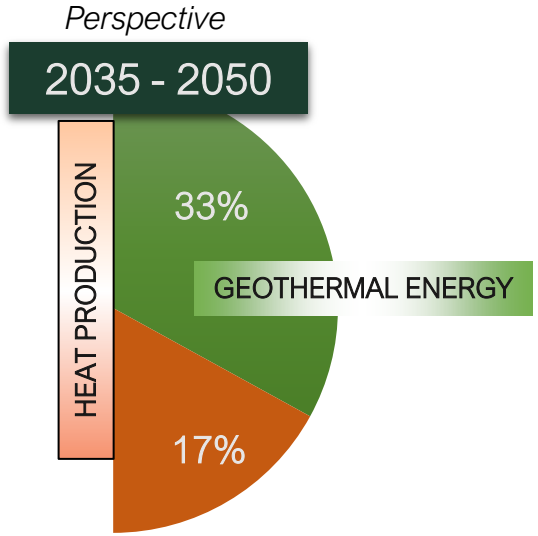
GE-RGBA
GEOENERGY
RESERVOIR GEOLOGY
AND BASIN ANALYSIS GROUP

SIG

GEOTHERMAL EXPLORATION IN GENEVA SINCE 2013

GEOTHERMIES PROGRAM





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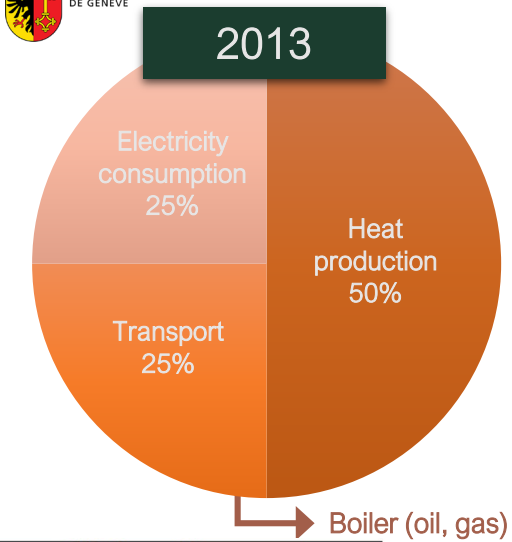
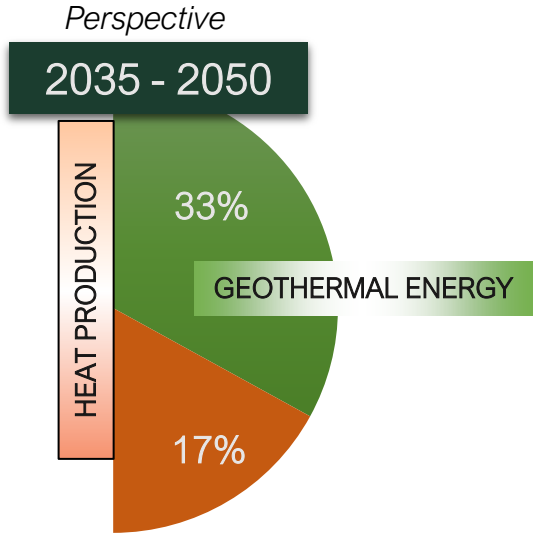
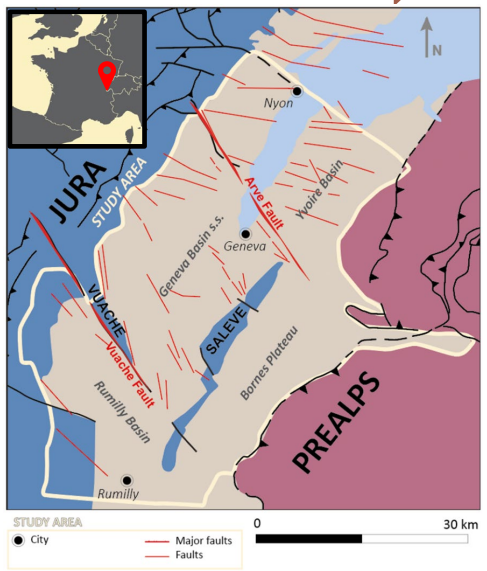
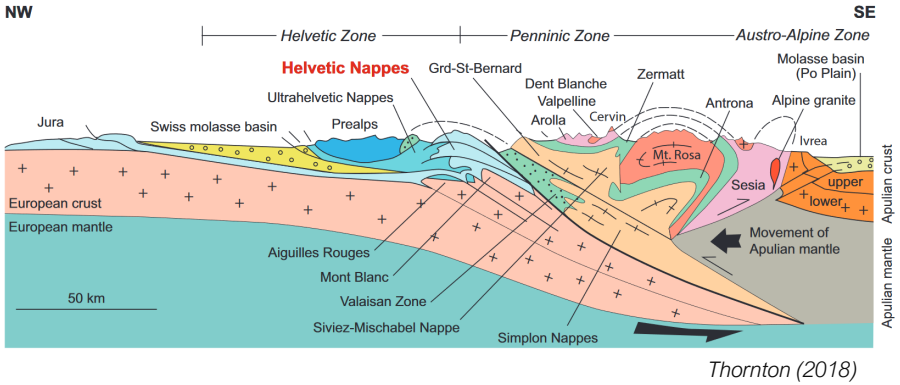




FORELAND SEDIMENTARY BASIN





Thornton (2018)

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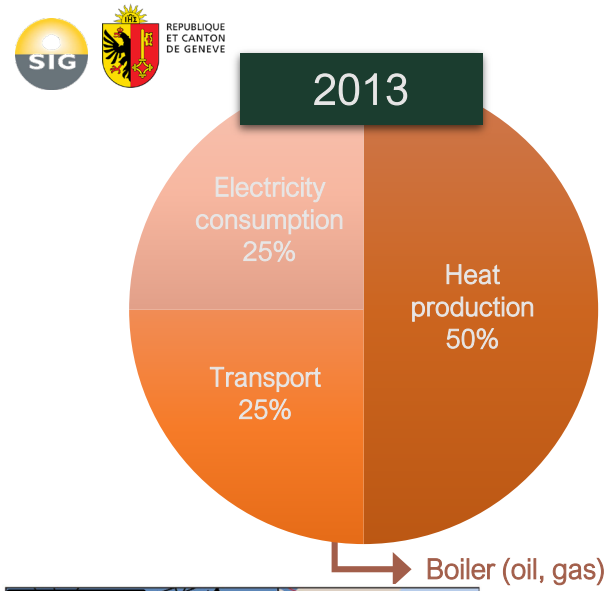
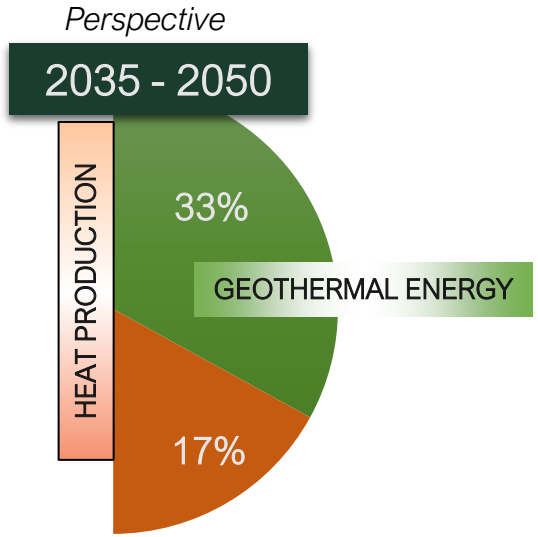
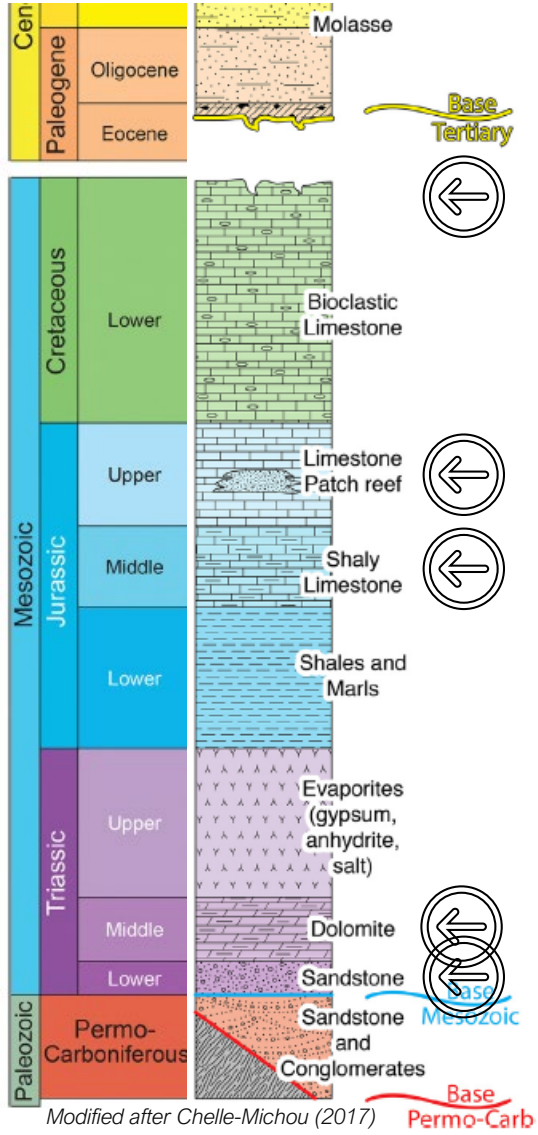
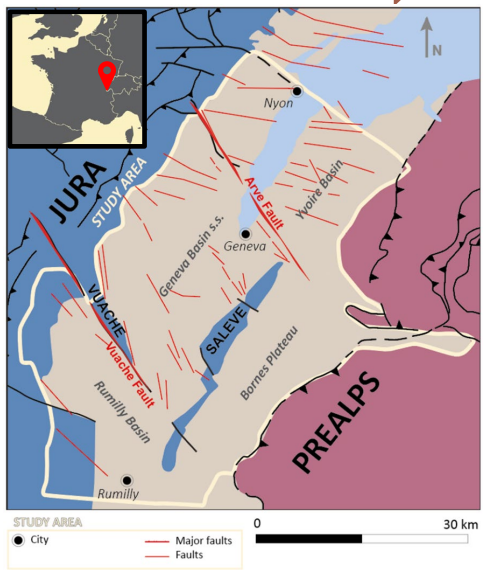




FIVE RESERVOIR TARGETS: FOCUS ON THE CCT



Modified after Chelle-Michou (2017)



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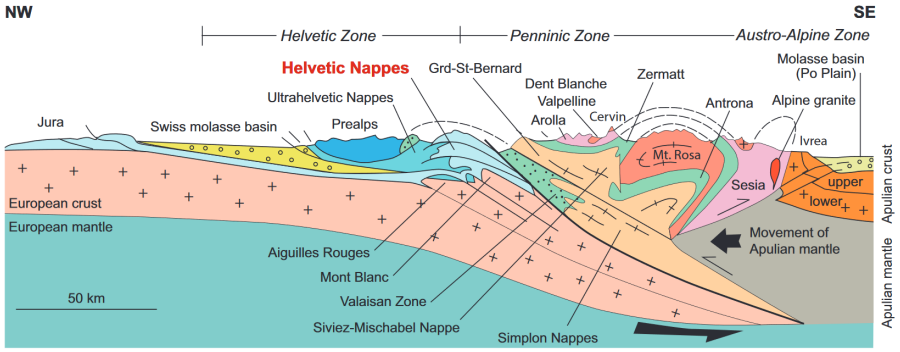

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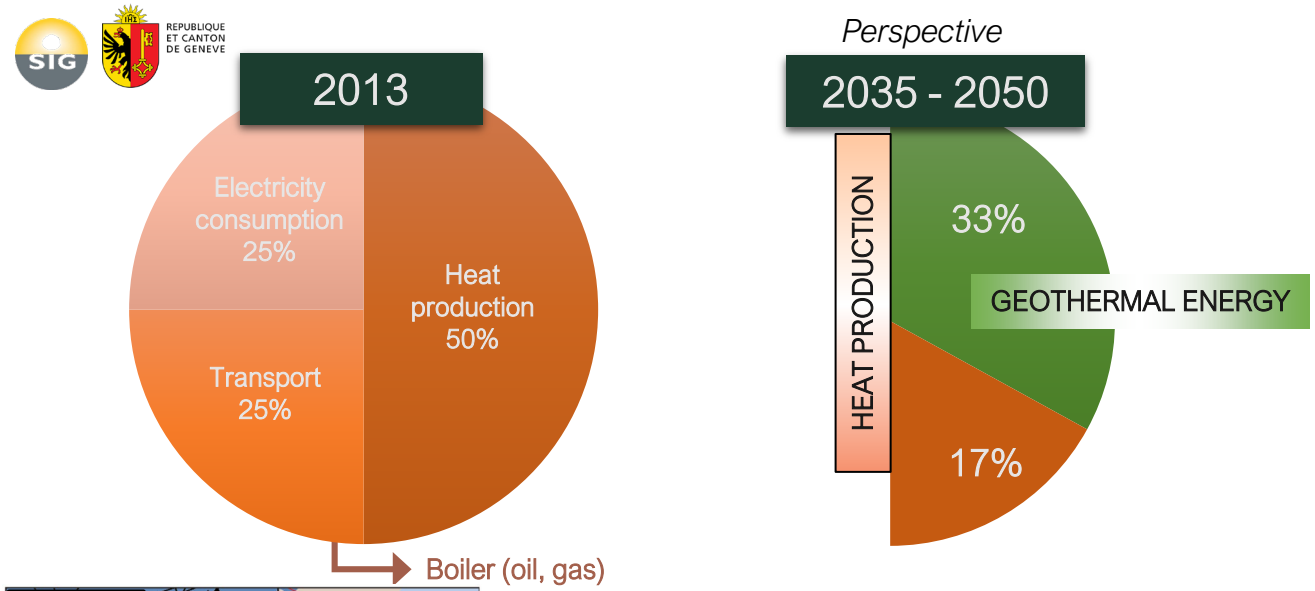

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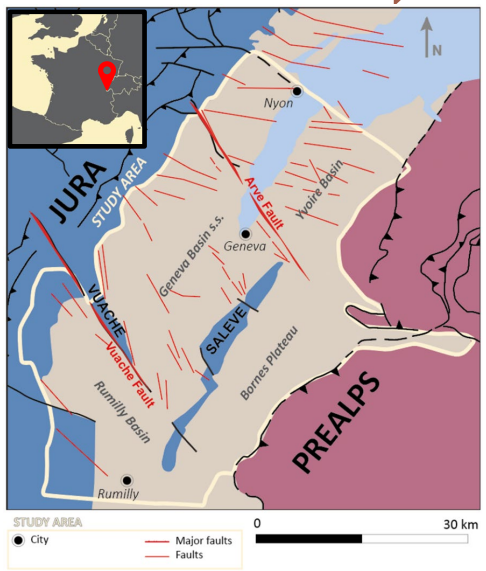

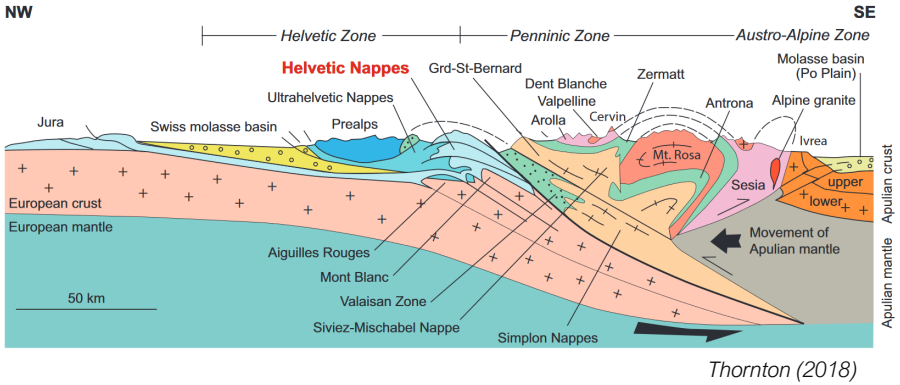

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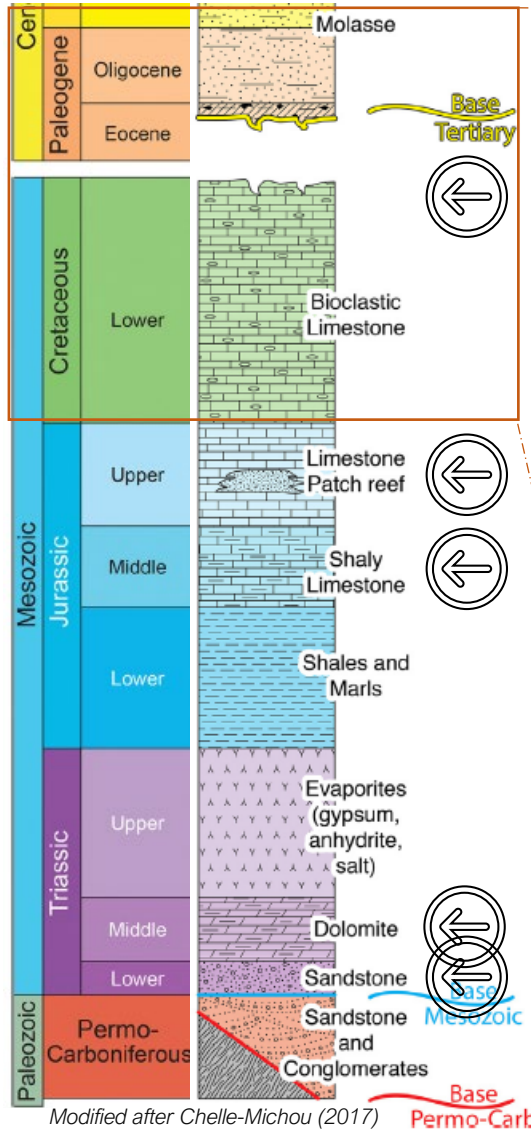

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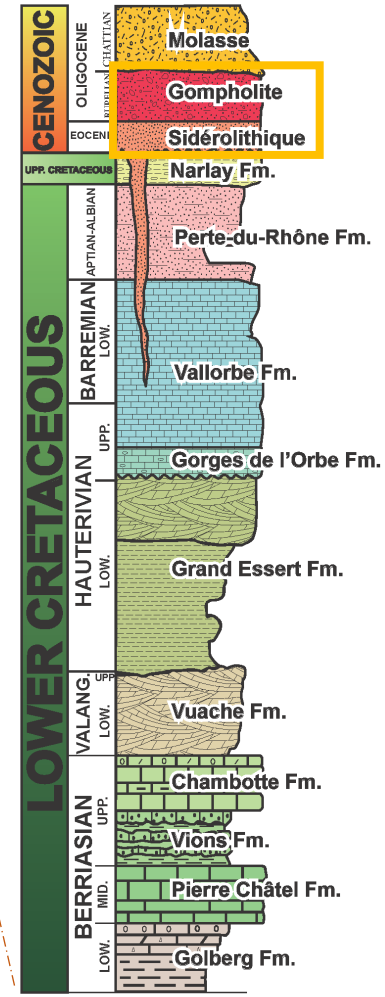

Modified after Charollais (2013) and Strasser (2016)

MULTI-APPROACH METHOD TO CHARACTERIZE THE CCT

SEDIMENTOLOGY

Outcrops, wells (cores, cuttings,reports)

PETROGRAPHY

Optical microscope

MINERALOGY

QEMSCAN
XRD

PETROPHYSICS

Porosity-Permeability
Geophysics logs

GEOCHEMISTRY

ICP-MS

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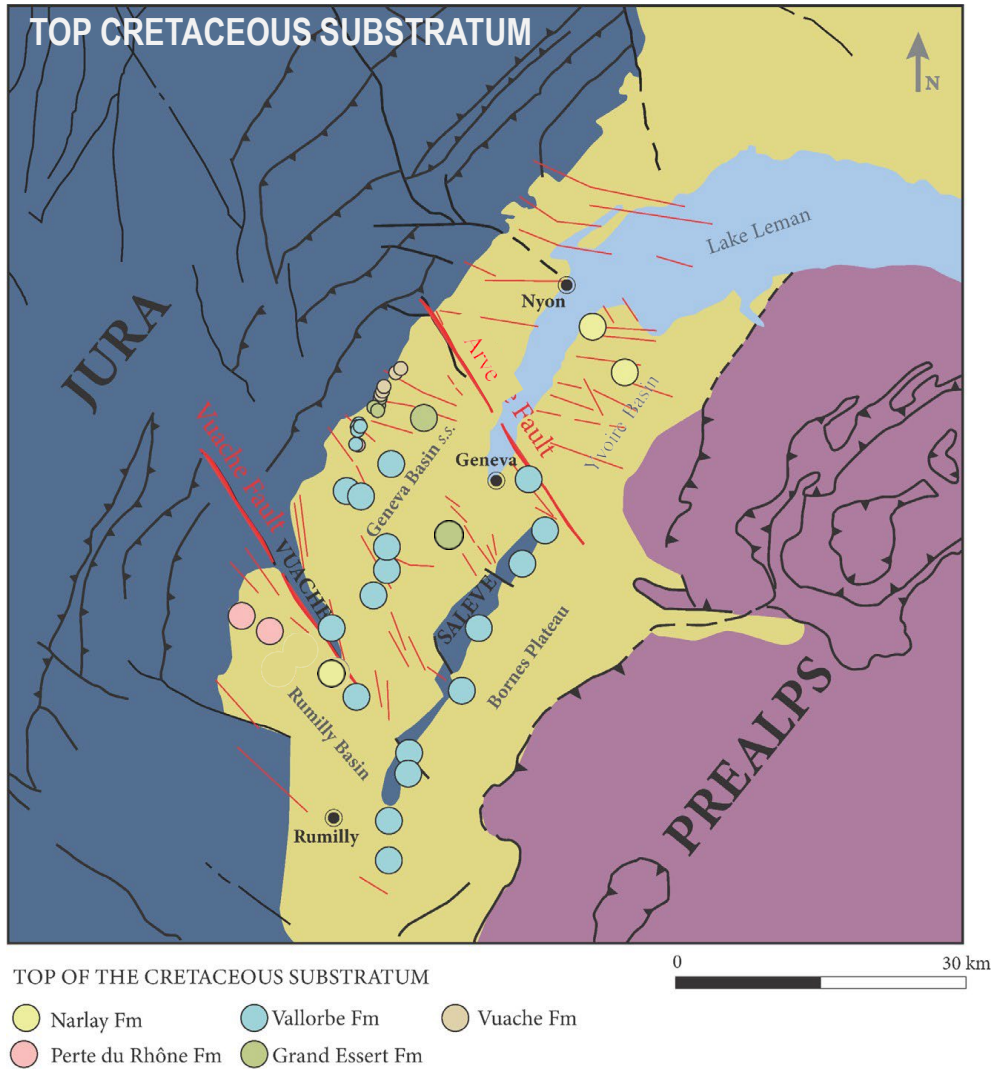

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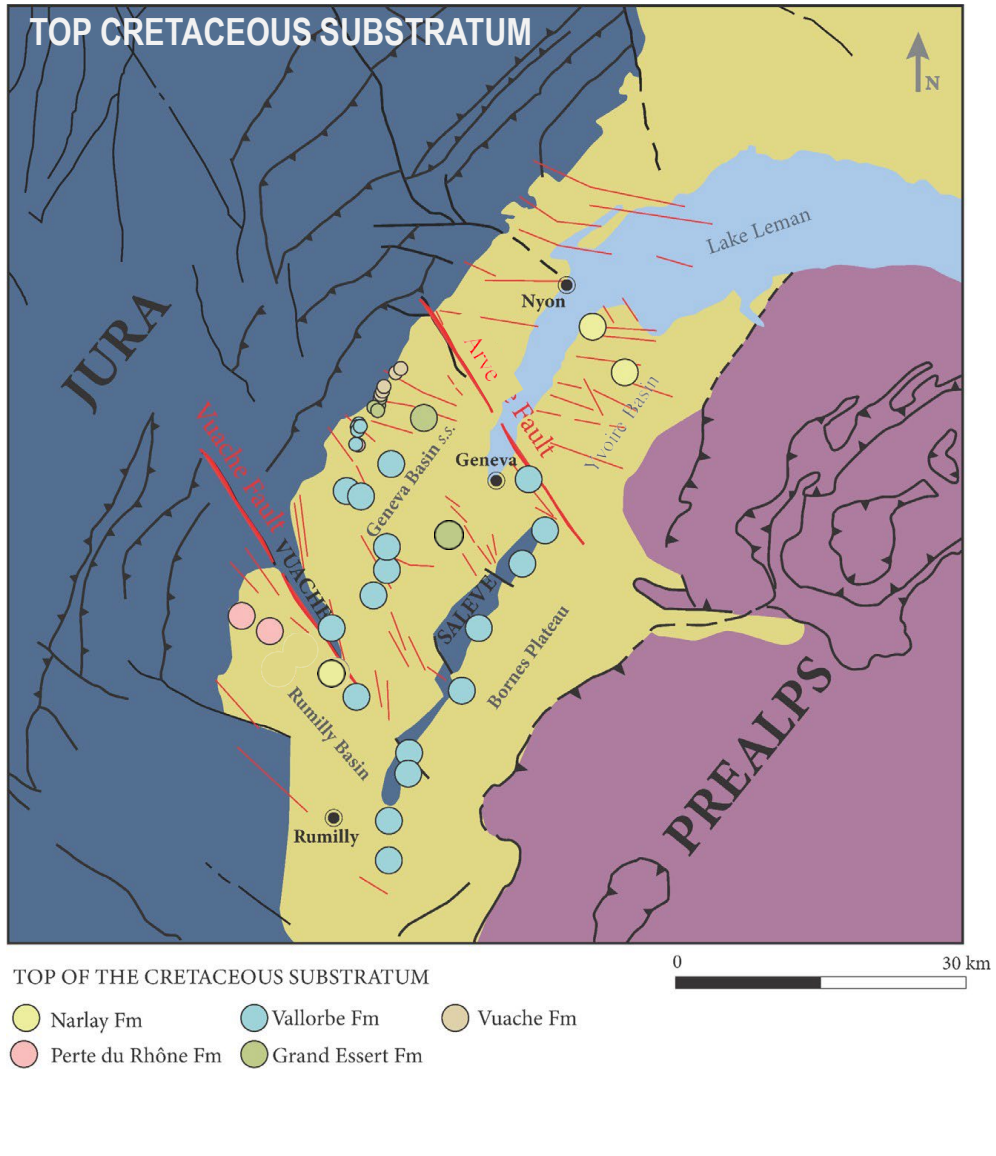

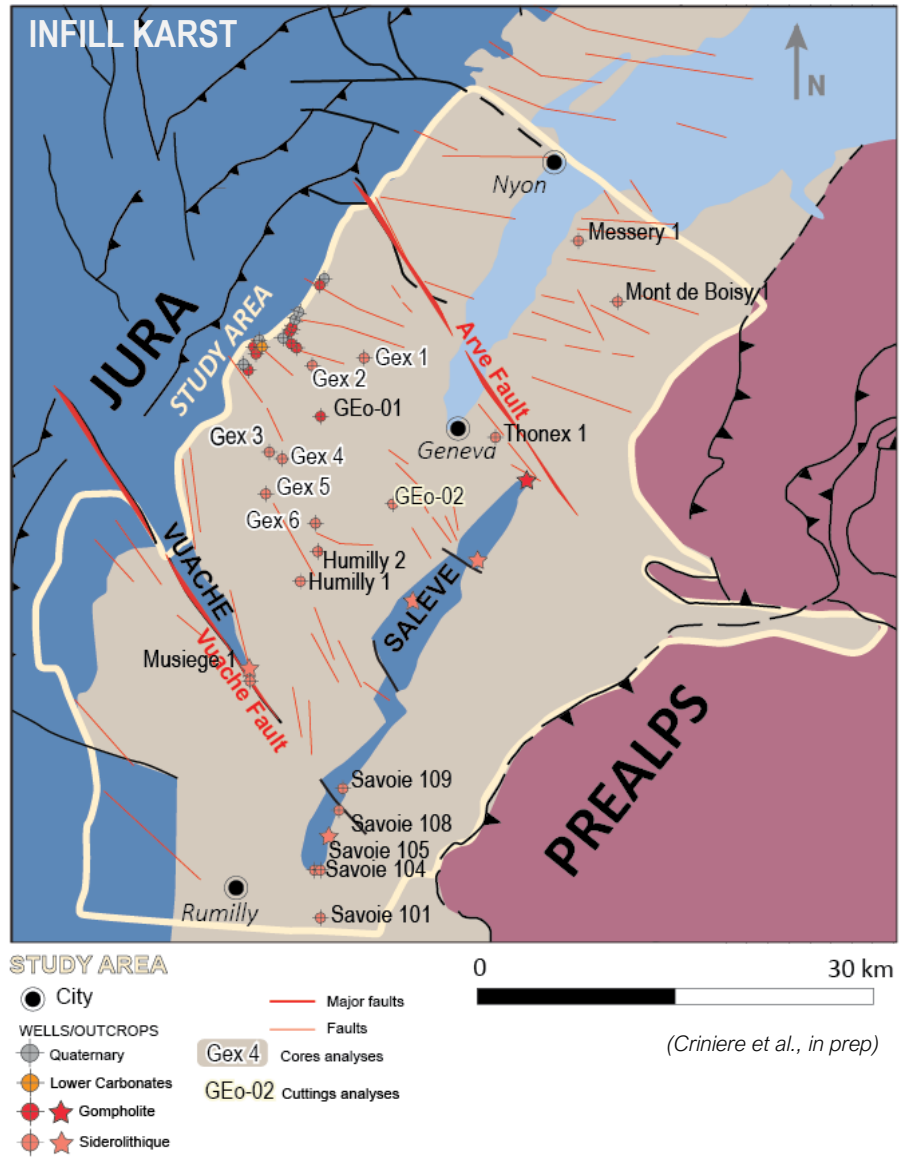

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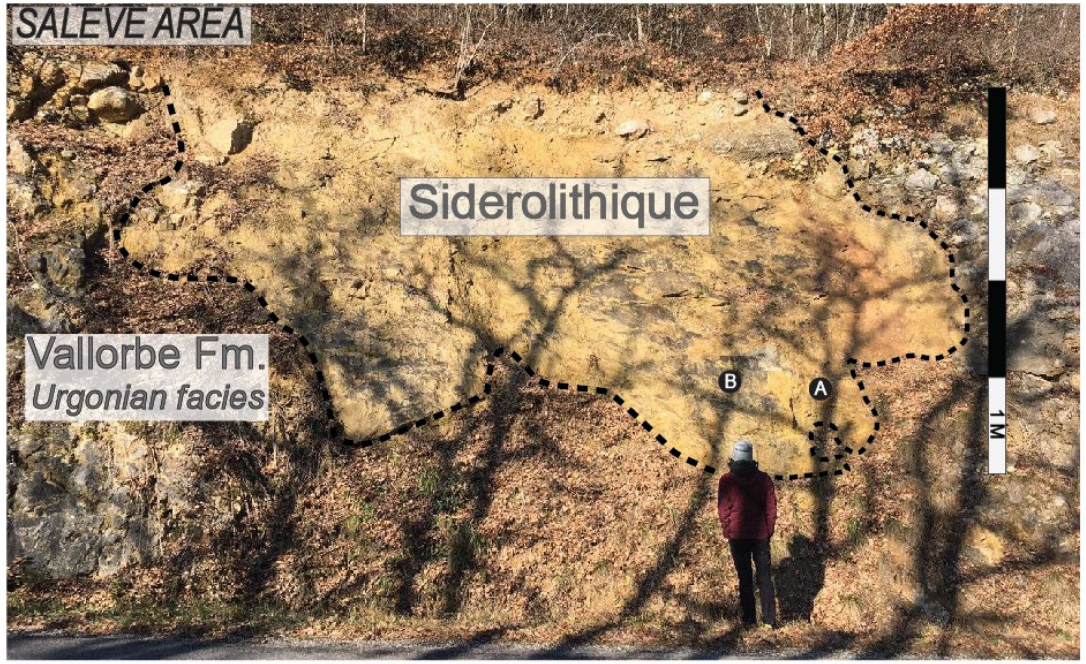
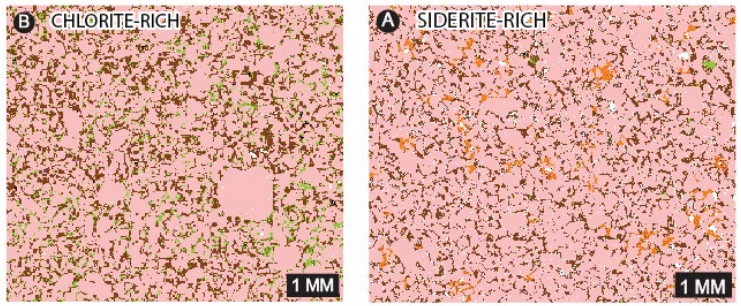
PALEOGENE FACIES HETEROGENEITIES

SIDEROLITHIQUE: MINERALOGICAL VARIATION



Quartz Kaolinite Siderite Chlorite



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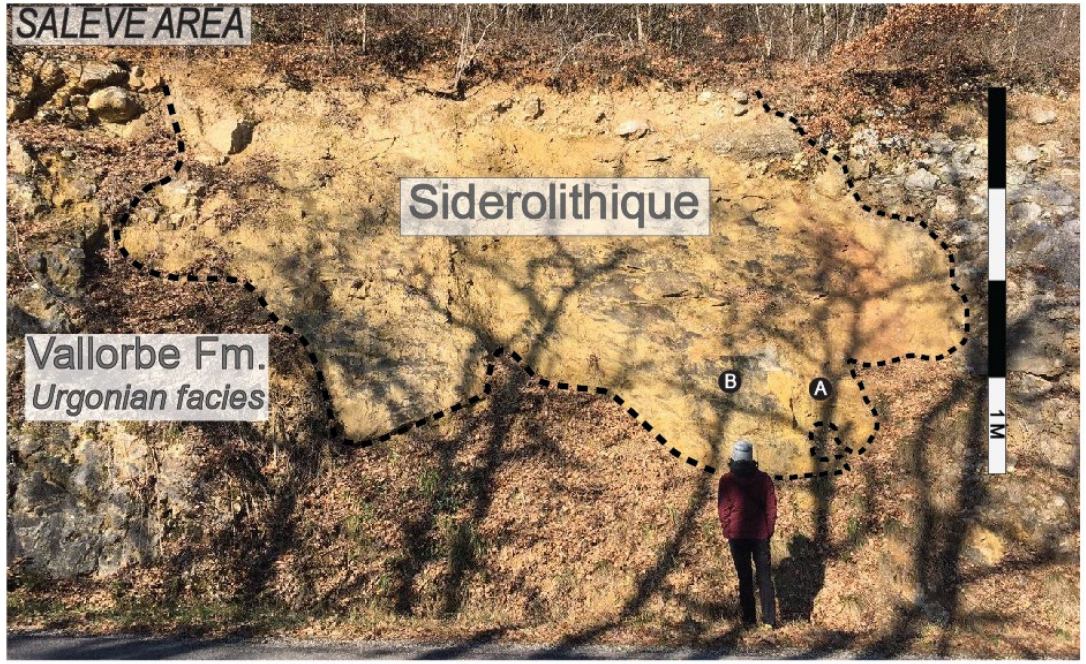

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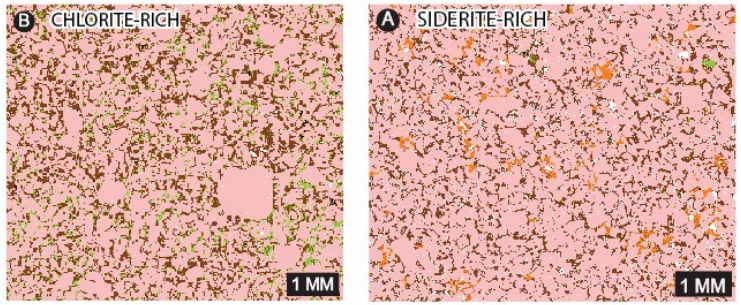

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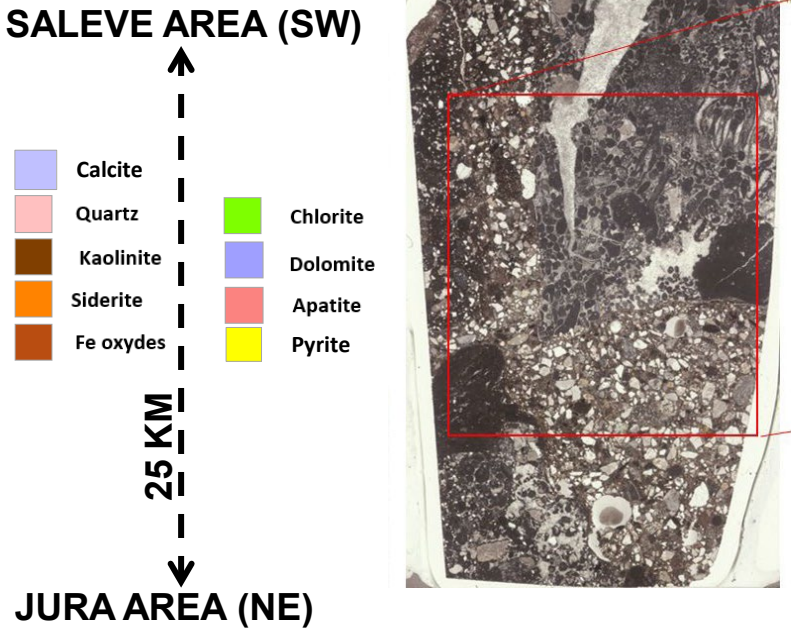
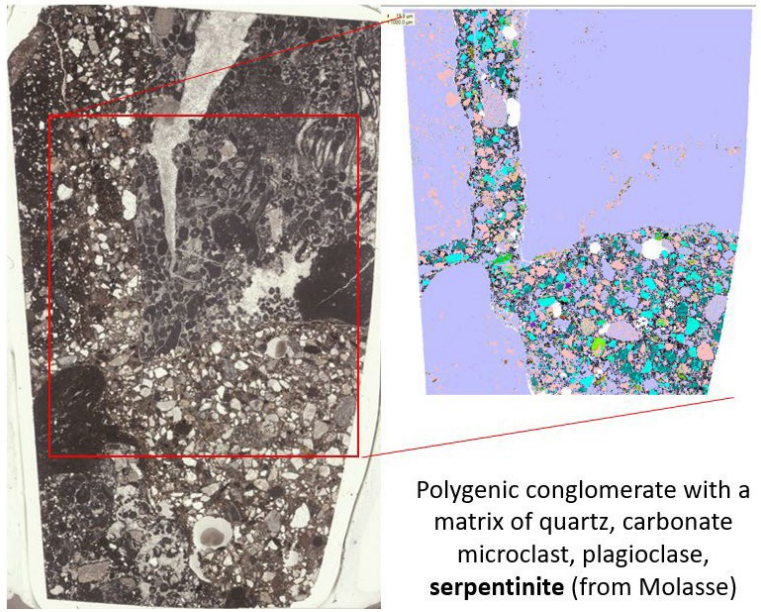
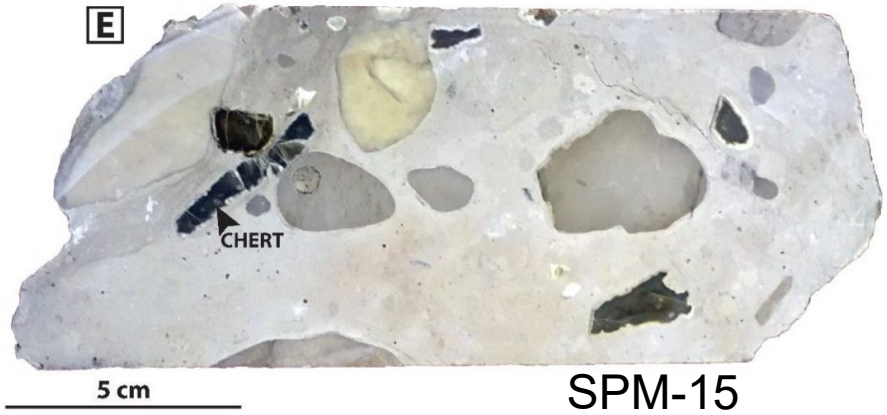
GOMPHOLITE: MATRIX VARIATION

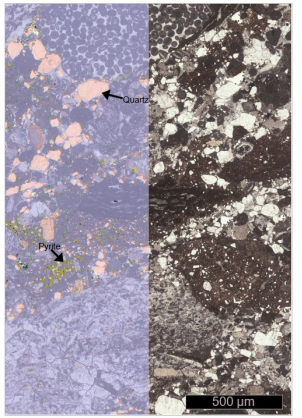




Polygenic conglomerate with a matrix of quartz, carbonate microclast, plagioclase, **serpentinite** (from Molasse)

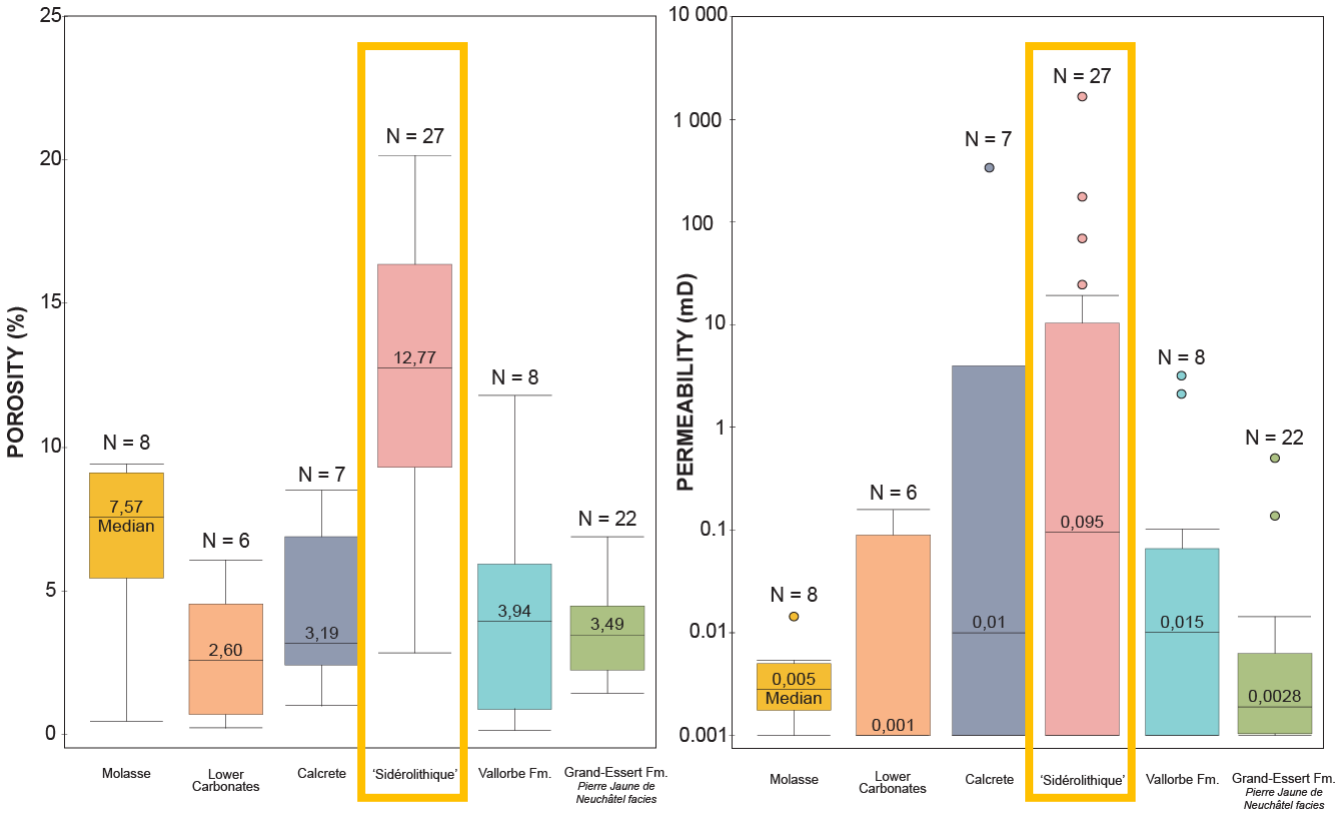


SPM-15



GEOTHERMAL AND RESERVOIR POTENTIAL

PORO-PERM SORTED BY FACIES FROM GEX WELLS



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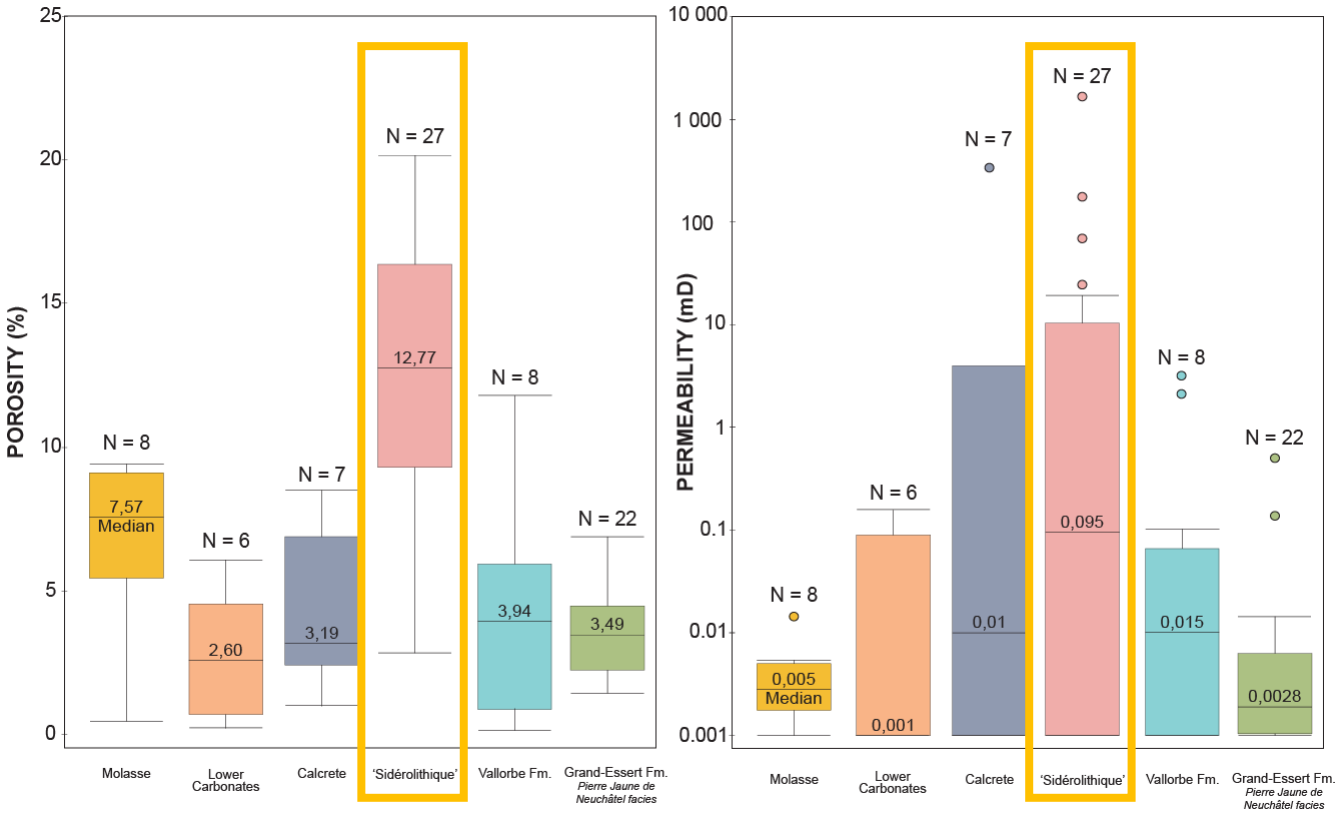
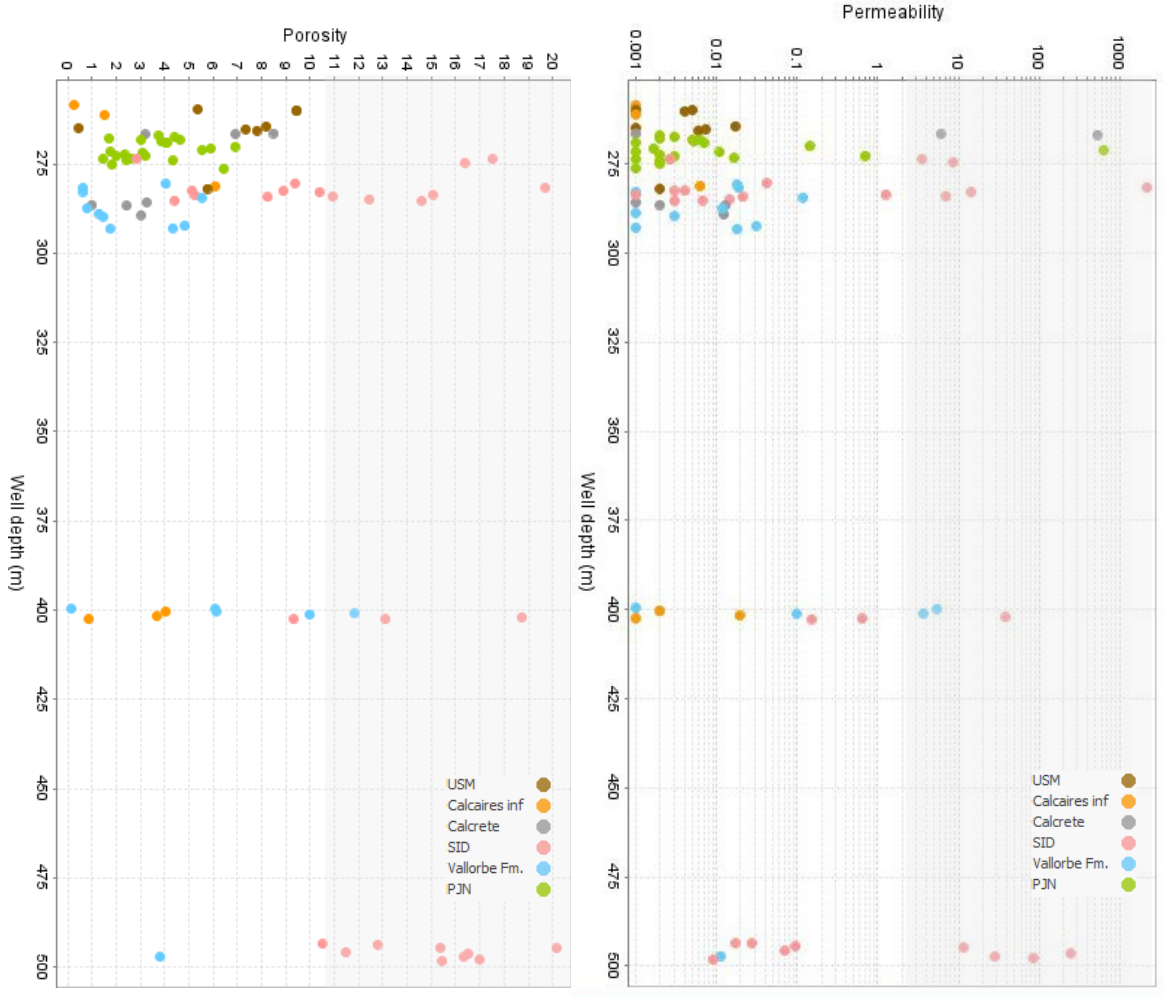


NO REDUCTION OF PORO-PERM WITH DEPTH



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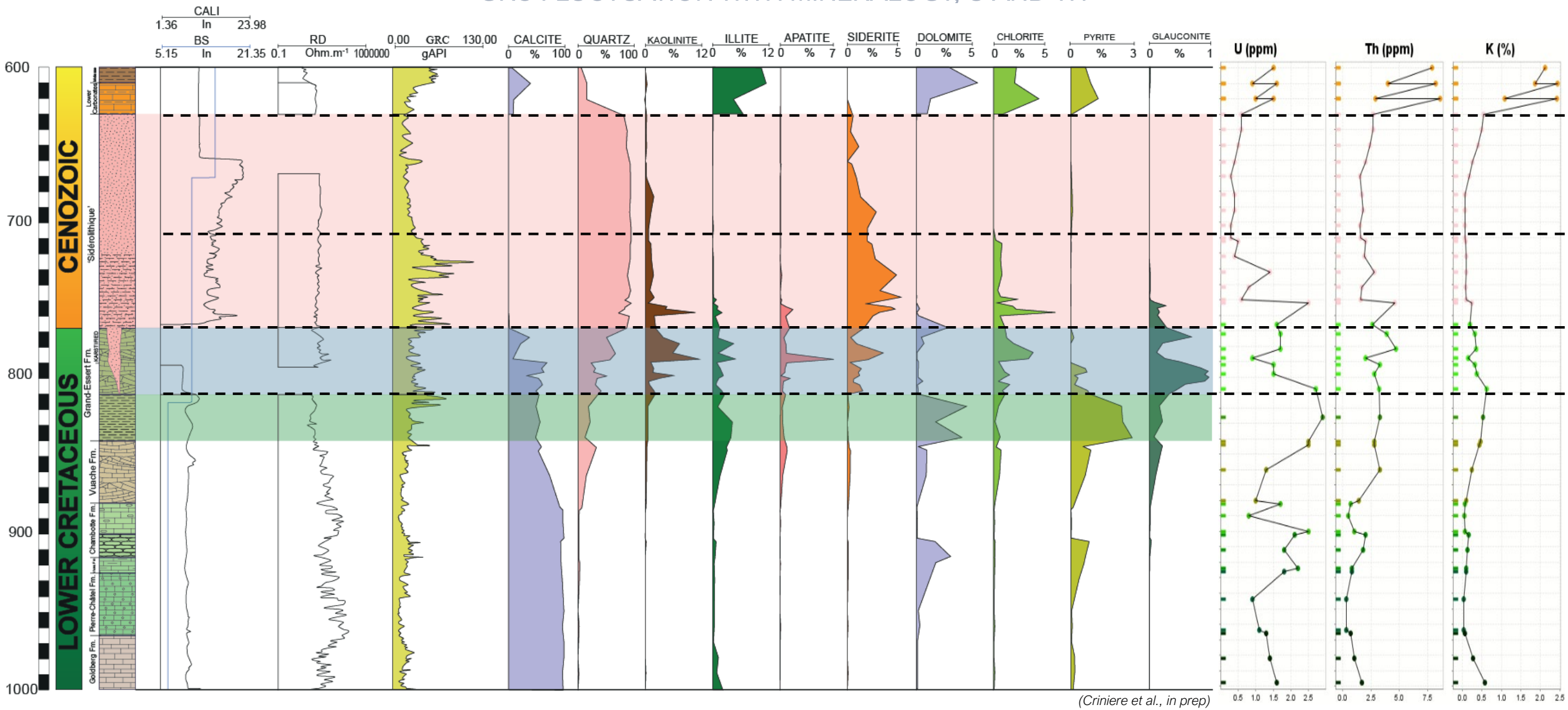
GEOPHYSICS-MINERALOGICAL-GEOCHEMICAL CORRELATION

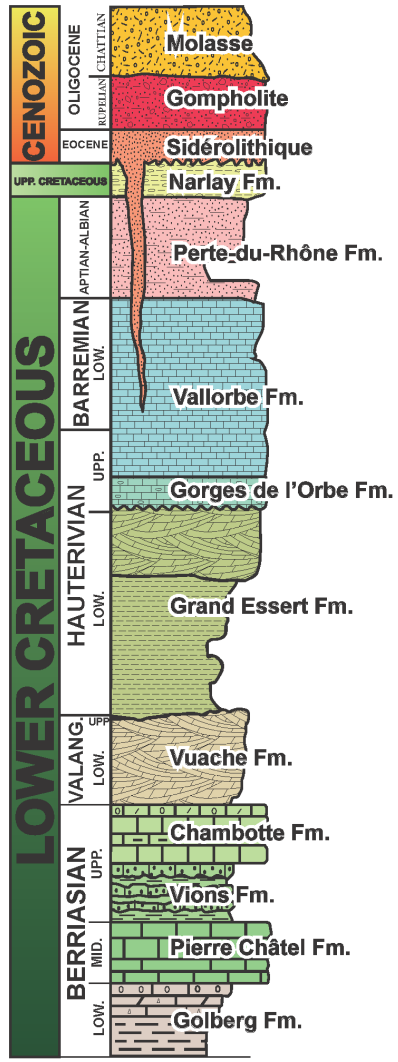
GRC FLUCTUATION WITH MINERALOGY, U AND TH



(Criniere et al., in prep)

FACIES PREFERENTIAL DISTRIBUTION

- **Gompholite** (conglomerate facies): **Basin margins** (foot of the Jura and the Salève)
  Max. thickness: **110 m** in SPM-11 well
- **Siderolithique** (sandstone facies): In **karst** along the basin (with important thickness in faulted area).
  Max. thickness: **170 m** in GEo-02 well
- Subsurface **depth ranging of the CCT**: **31.20 m** (SPM-3 well) – **1376 m** (Thônex well)



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MICROFACIES VARIATION

- **Top Cretaceous substratum**: **Variable facies along faults** because of the strong negative accommodation
- Infill karst: **Complex diagenetic history**

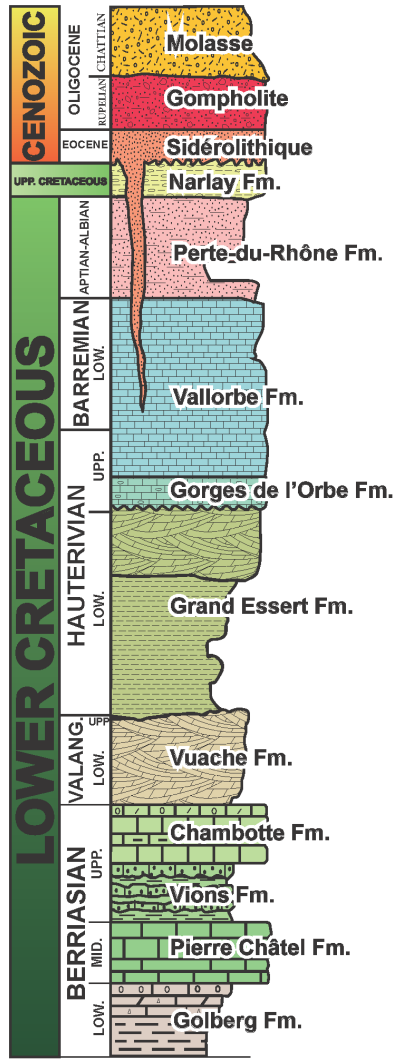
  SIDEROLITHIQUE

  Variable content of **kaolinite**, **siderite** and **chlorite**

  GRC variation at the **bottom**: **clay-rich content** (kaolinite and chlorite)

  GOMPHOLITE

  Two different sources (the Jura and the Alps) due to the **different mineralogical content of the matrix**.



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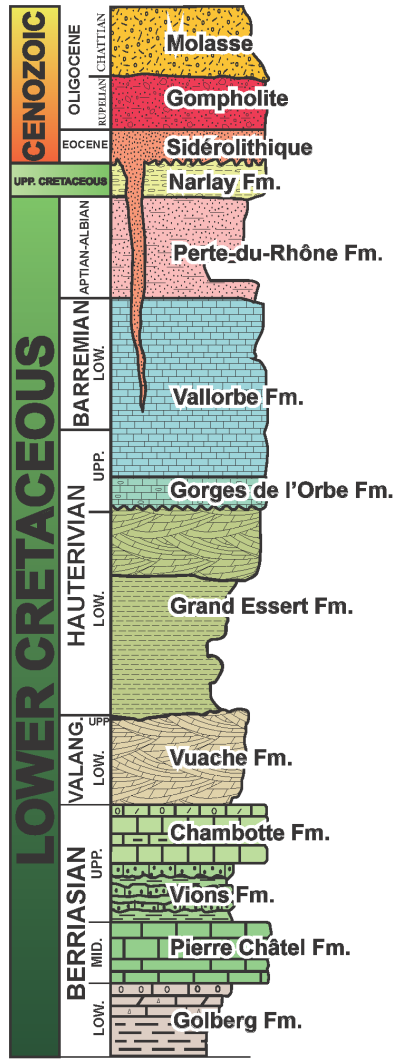
RESERVOIR POTENTIAL

- GEX wells: **Siderolithique** porosity from **0 to 20%**, permeability can reach **several hundred of mD**
- **No reduction** of porosity or permeability **with depth**



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Acknowledgements
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