

Deep weathering in the semi-arid Coastal Cordillera, Chile

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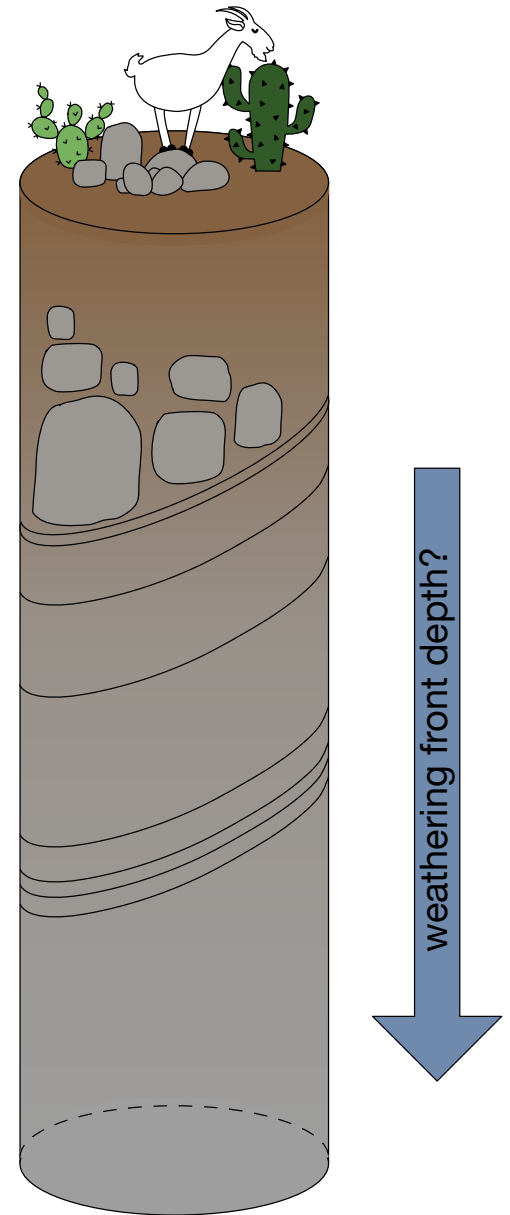
Depth of the weathering front?

🌵 **Weathering front = bottom of the critical zone**

🌵 **Depth is linked to fluid flow and oxygen transport**

🌵 **Well studied in humid climate zones, mostly unknown in semi-arid and arid climate zones**

➡ **What is the depth of weathering in semi-arid climate?**





Semi-arid field site Santa Gracia in central Chile





Soil (Zone I)
~0.15 m



10 cm

Saprock (Zone II)
~9.00 m

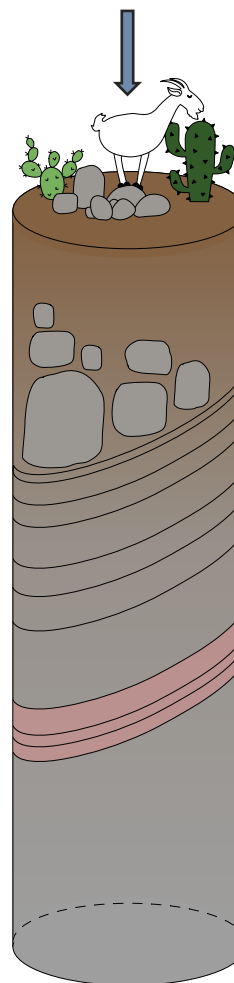


10 cm

Saprock (Zone III)
~25.00 m



10 cm



10 cm

Saprock (Zone IV)
~50.00 m



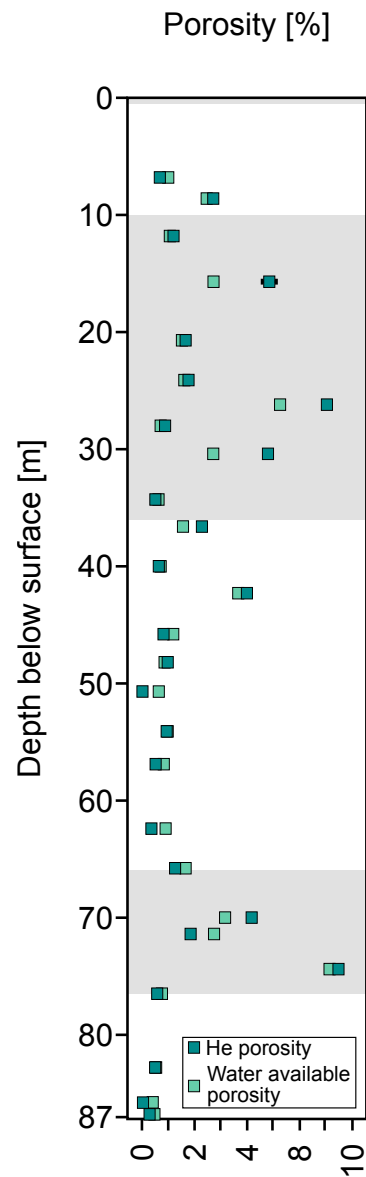
10 cm

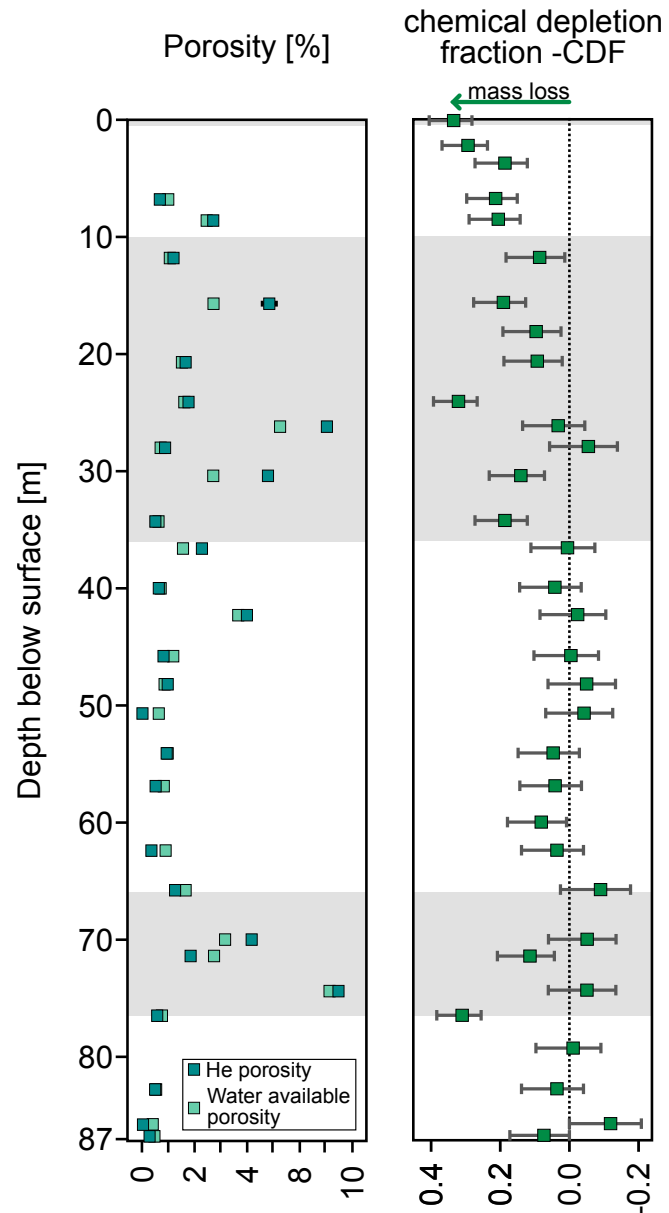
Red Saprock (Zone V)
~72.00 m



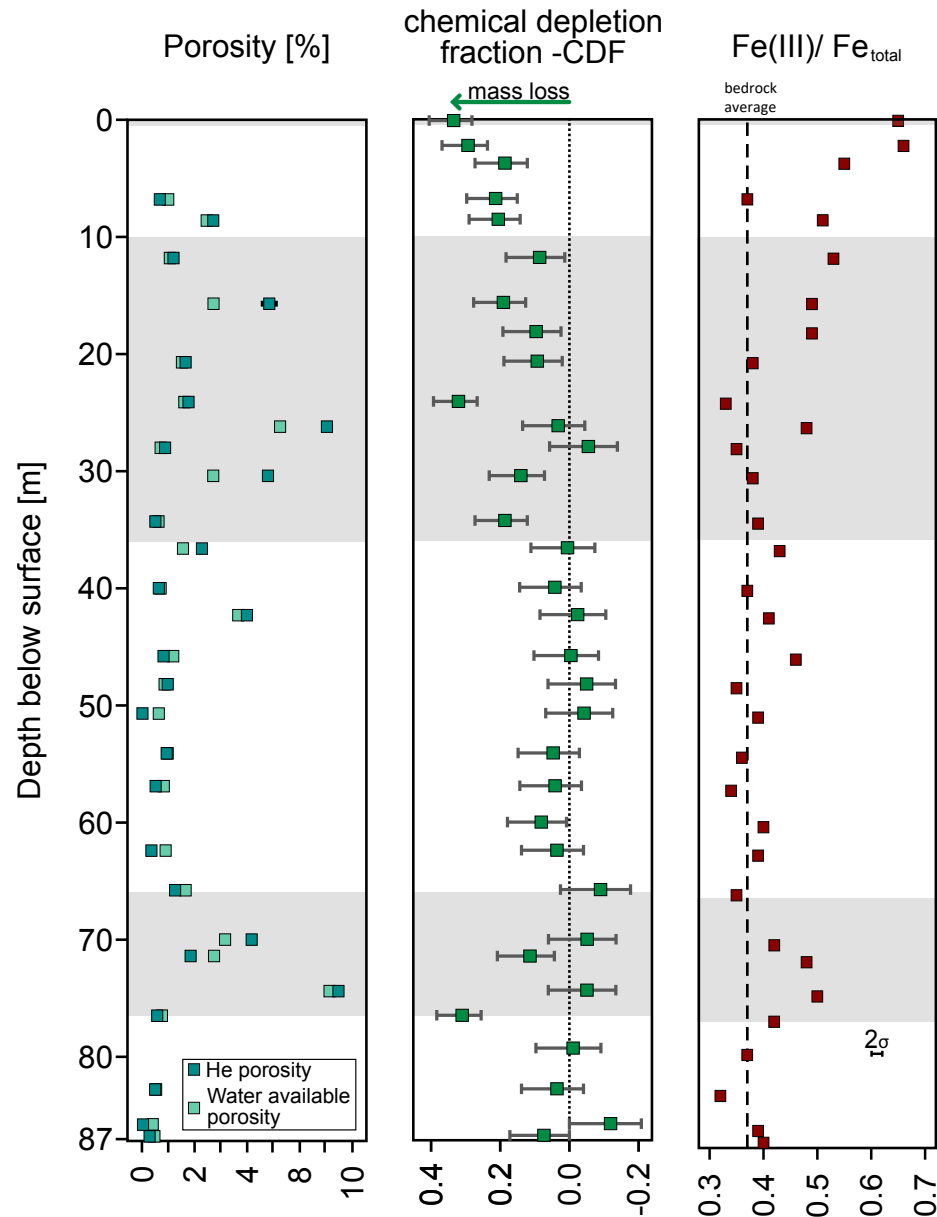
10 cm

Fresh bedrock (Zone VI)
~87.00 m





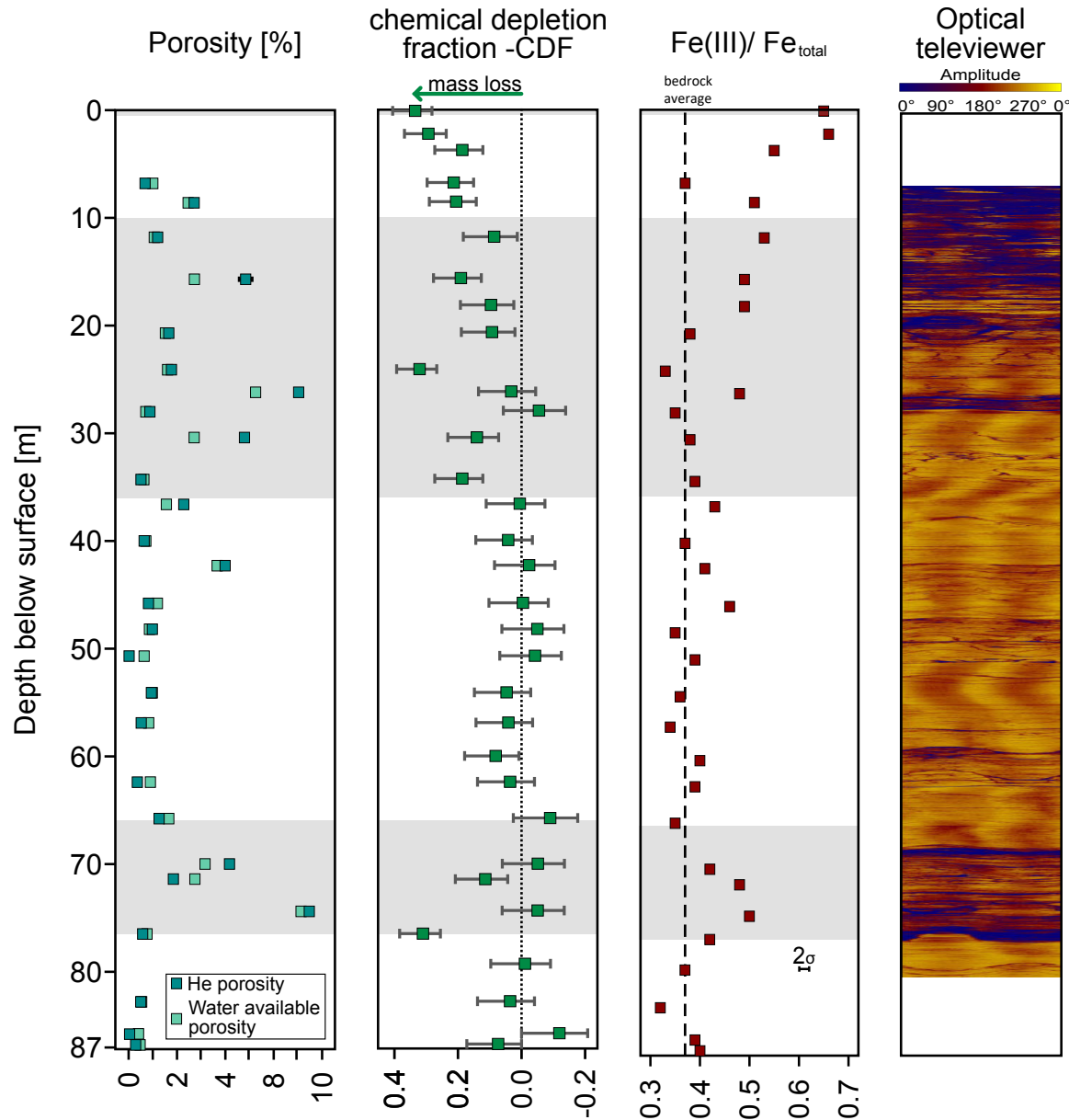
CDF = bulk chemical mass loss relative to an immobile element (Zr)



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**Fe(III)/Fe_{total}:
higher ratio = more Fe oxidation**



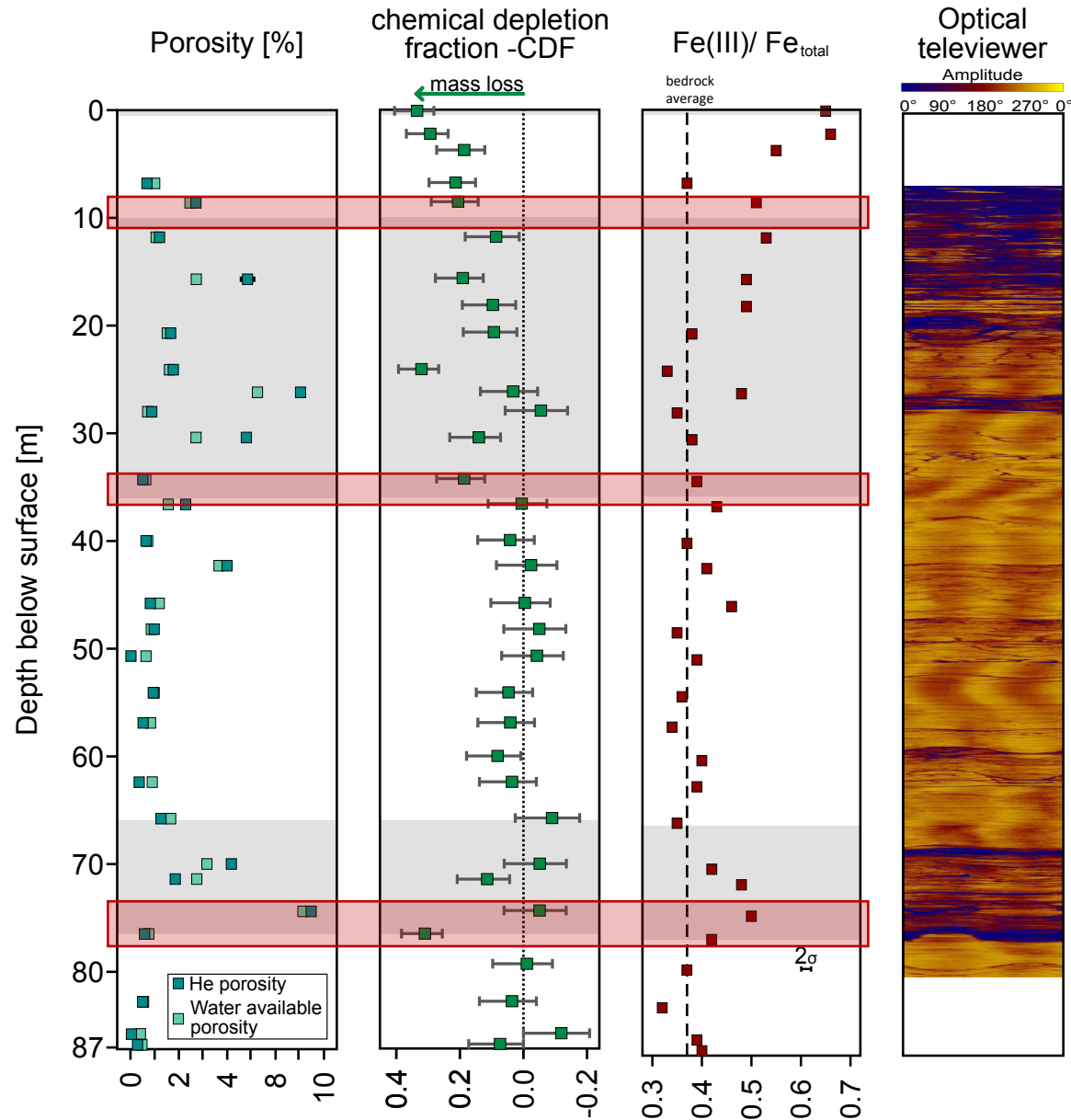
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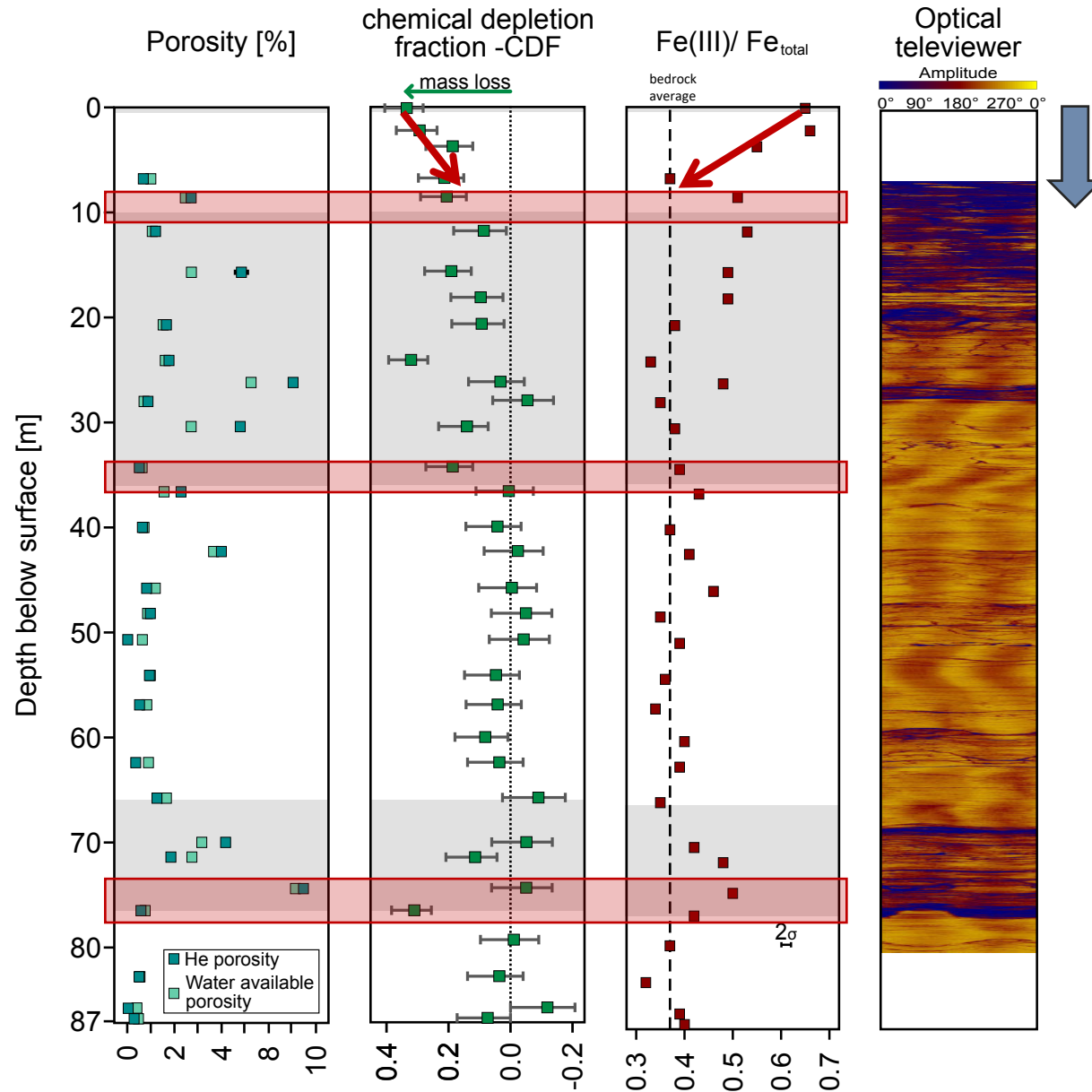
High porosity, mass loss, and Fe oxidation located at fractures



➡ Weathering front

➡ Weathering front

➡ Weathering front



➔ **Surficial weathering**

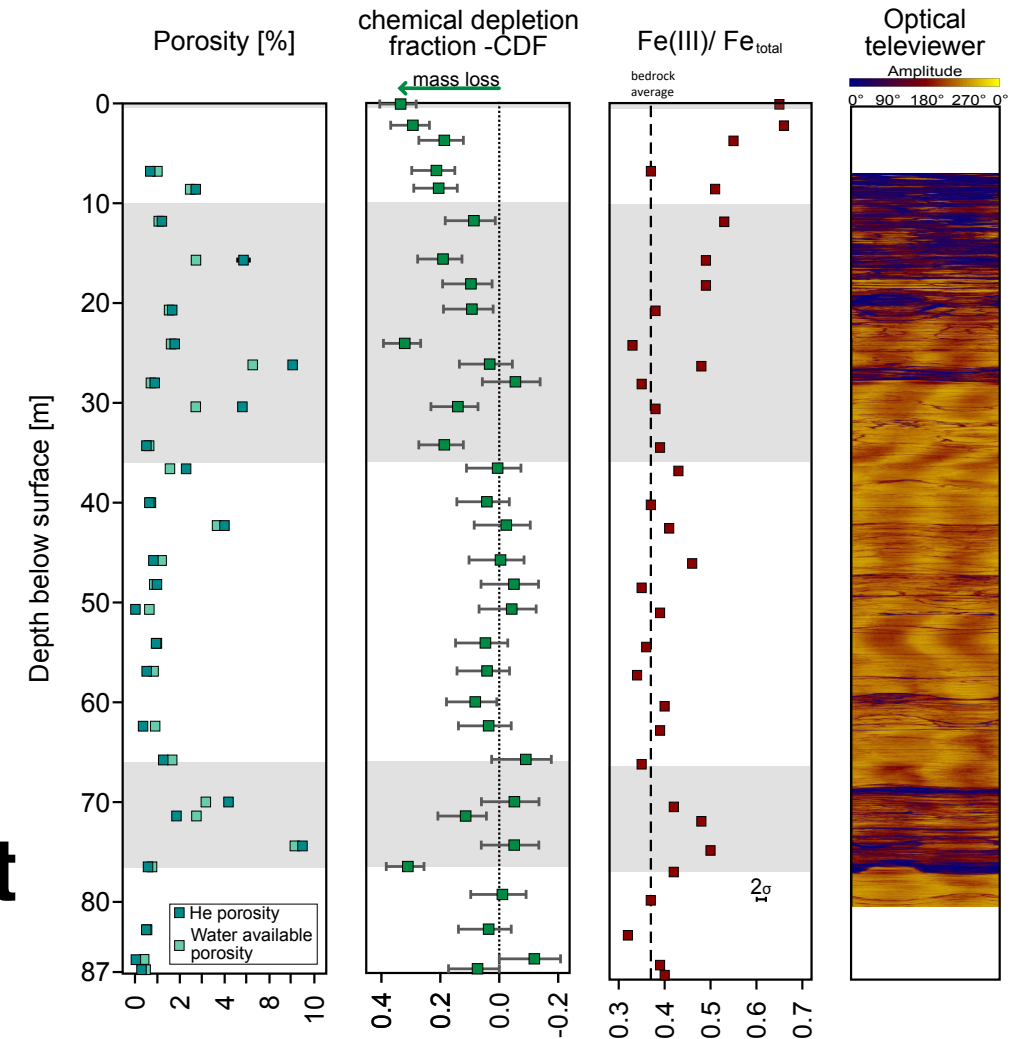
➔ **Weathering front**

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Conclusions & take away

- 🌵 **Multiple weathering fronts**
- 🌵 **Deepest front located at 76 m**
- 🌵 **Tectonic fractures provide transport pathways**
- 🌱 **Strong surficial weathering only at the upper 10 m, deeper only at fractures**



Thank you!



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Krone et al. (2021), *Scientific Reports*

