



Magneto-Biostratigraphy of the Upper Cretaceous and Lower Paleogene, Poty Quarry section of Northeastern, Brazil: Implications of asteroid and volcanism induced changes in paleoenvironment in a shallow marine setting.



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INTRODUCTION

- The Cretaceous-Paleogene (K/Pg) boundary mass extinction at ~66 Ma is one of the “Five Big Mass Extinctions” of the Phanerozoic, and two catastrophic events, namely Chicxulub asteroid impact (CAI) and Deccan flood volcanism (DFV), have been linked for the mass extinction (Schulte et. al., 2010; Font et. al., 2018)
- K/Pg **MASS EXTINCTION**: 60 – 75% Biodiversity extinct on Earth.
- The Poty Quarry section, a shallow marine deposits, covering the Cretaceous-Paleogene transition is exposed in a cement mining factory in the Paraíba Basin of NE Brazil. (Fig 1).
- The most complete geological record in South America on the K-Pg transition (Albertão, 1996; Nascimento et. al., 2011; Rodrigues et. al., 2014)
- The late Maastrichtian is represented by the Gramame Formation, and early Danian is represented by Maria Farinha Formation. Arguably, the section also contains an impact related Tsunami bed at the K/Pg boundary transition. (Albertao & Martins, 1996; Fauth et. al., 2005; Rodrigues et. al. 2014)

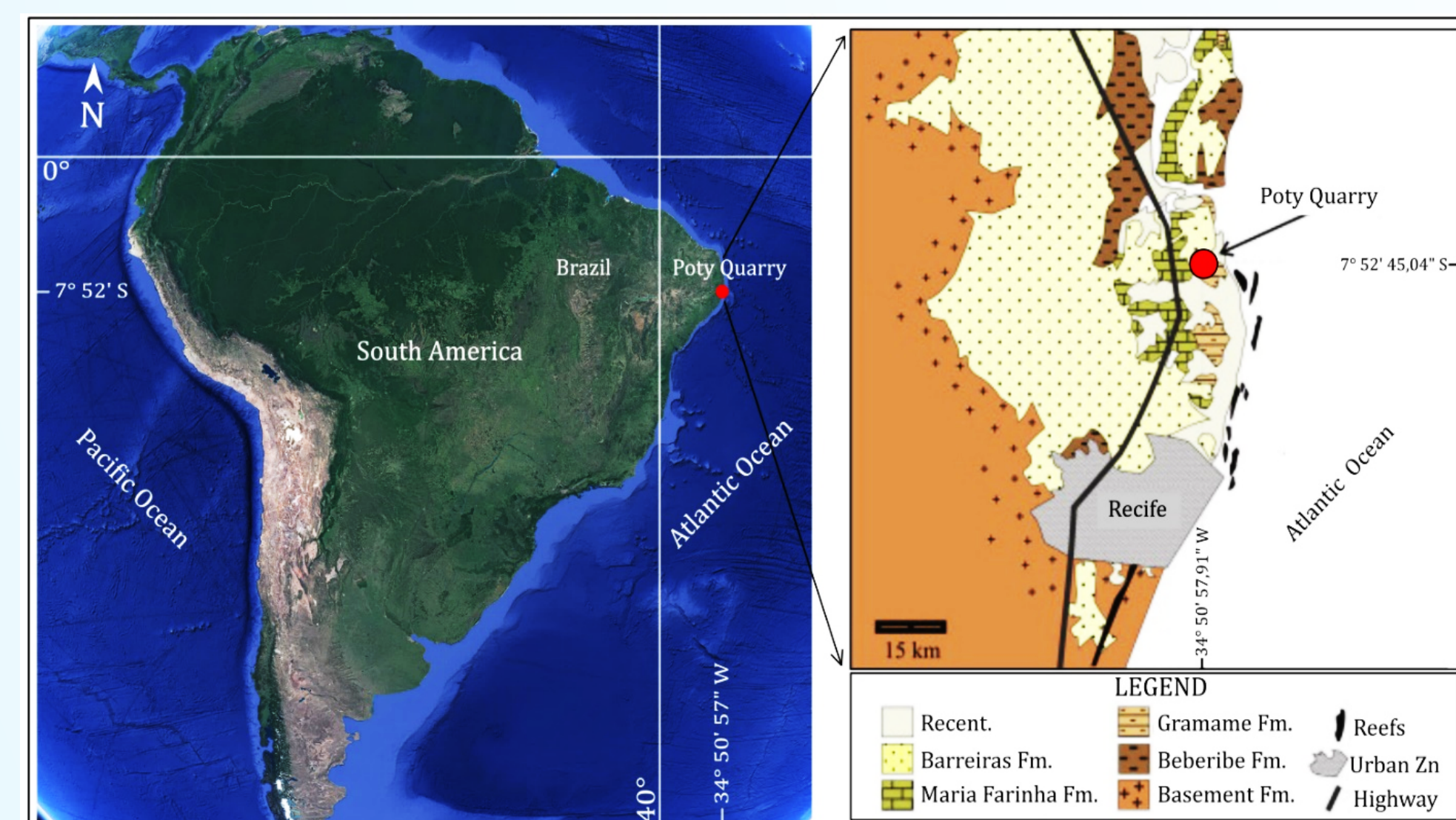


Figure 1: Map of the Poty Quarry, inside the Paraíba Basin, northeast region, Brazil.

METHODOLOGY

- Magnetic Susceptibility (MS)
- Natural Remanent Magnetization (NRM)
 - Alternating Field Demagnetization (AF)
 - Thermal Demagnetization (TH)
- Isothermal Remanent Magnetization (IRM)
- Anhyseretic Remanent Magnetization (ARM)
- Thermomagnetic curves
- Hysteresis loop
- First Order Reverse Curves (FORCs)

112 samples

RESULTS AND DISCUSSION

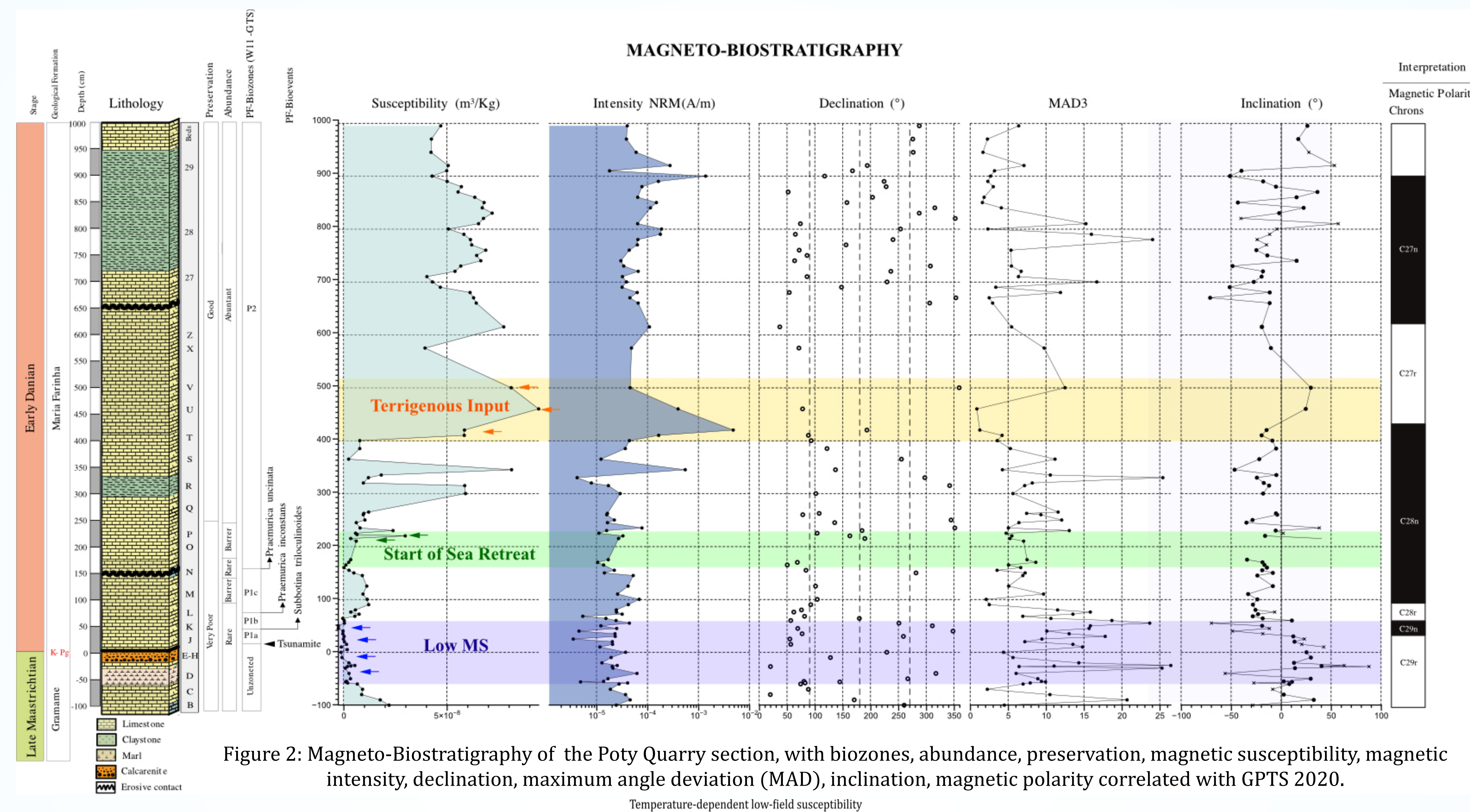


Figure 2: Magneto-Biostratigraphy of the Poty Quarry section, with biozones, abundance, preservation, magnetic susceptibility, magnetic intensity, declination, maximum angle deviation (MAD), inclination, magnetic polarity correlated with GPTS 2020.

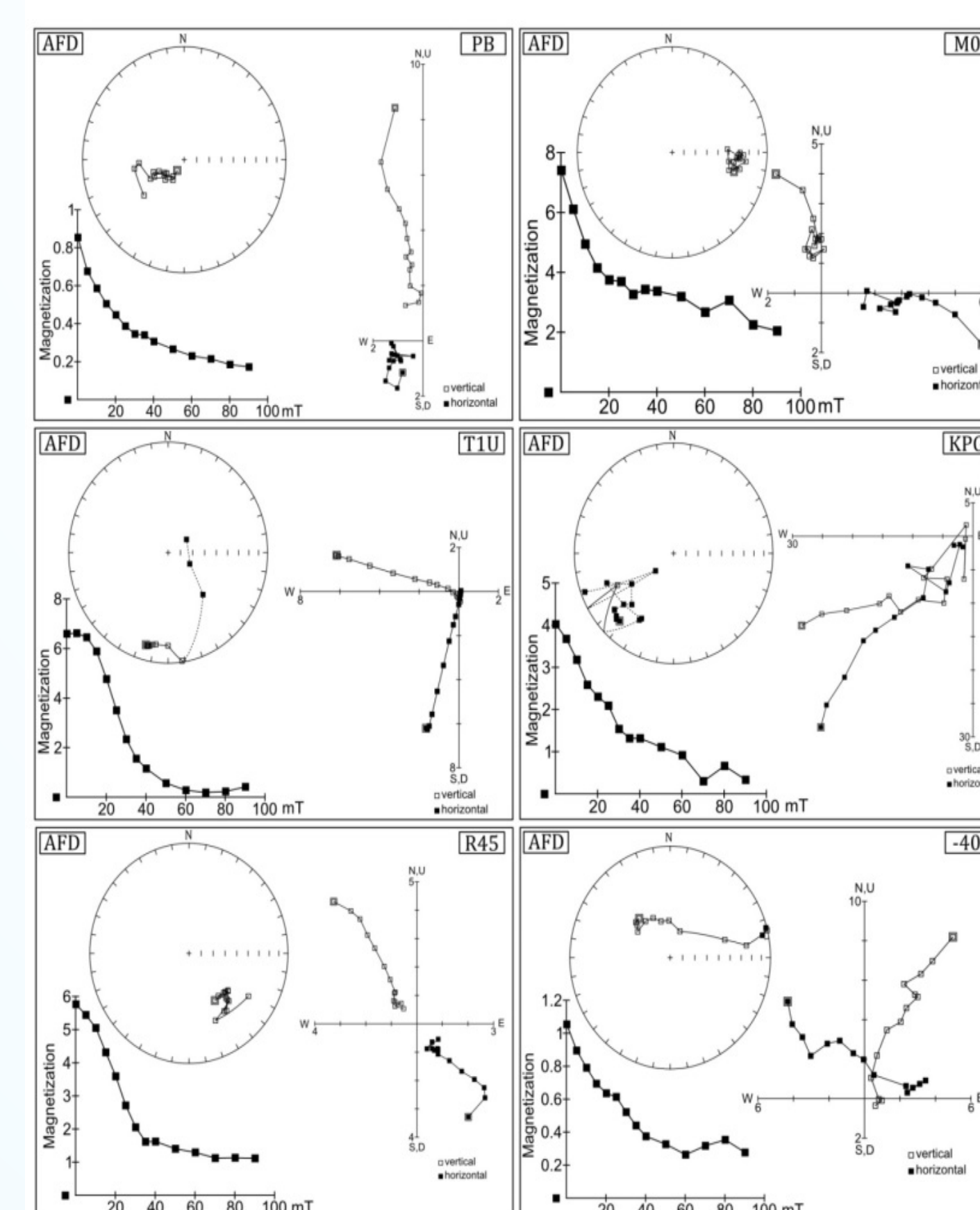


Figure 3: Natural Remanent Magnetization (NRM) - Alternating Field Demagnetization (AF).

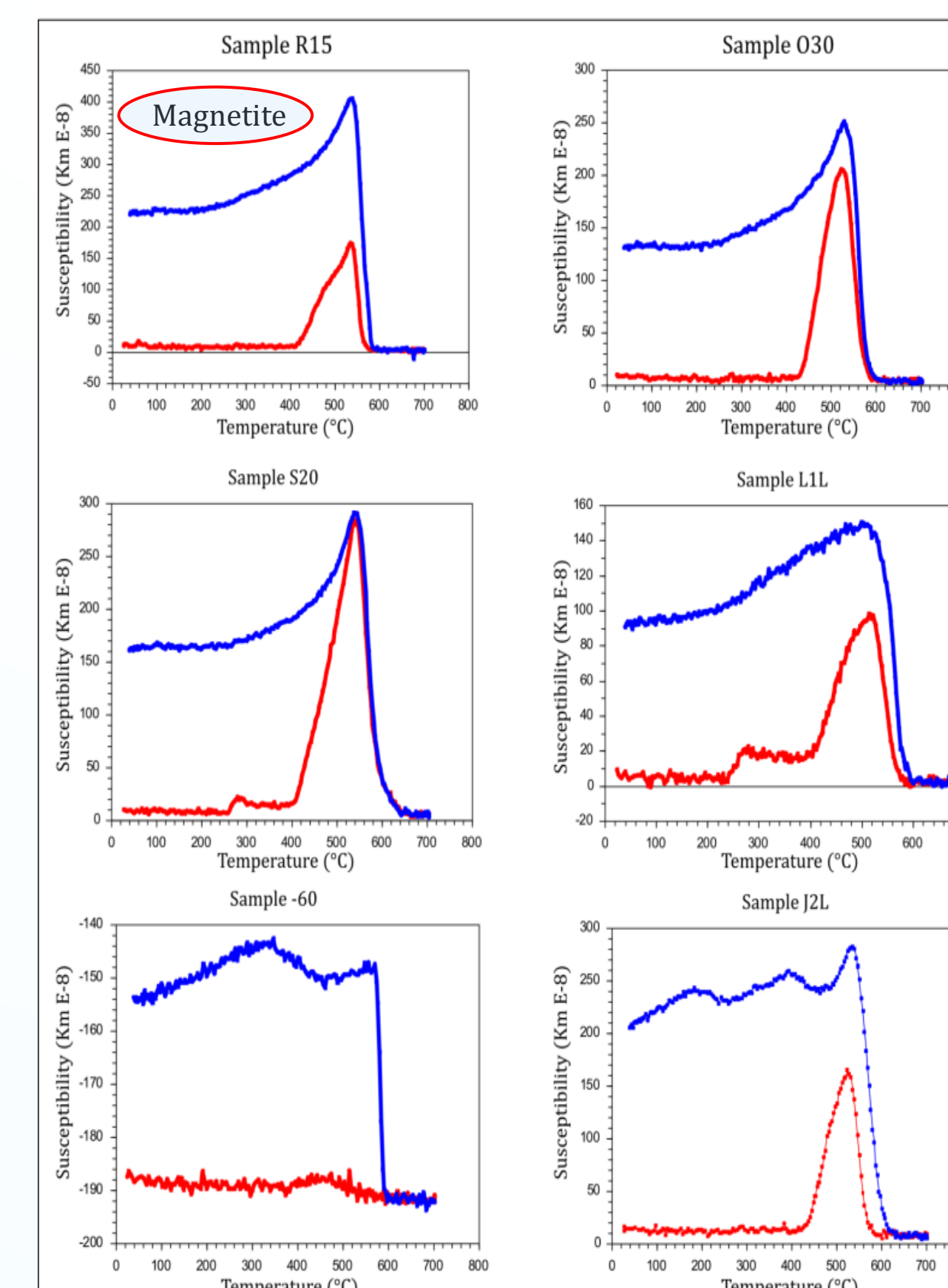


Figure 4: Thermomagnetic curves

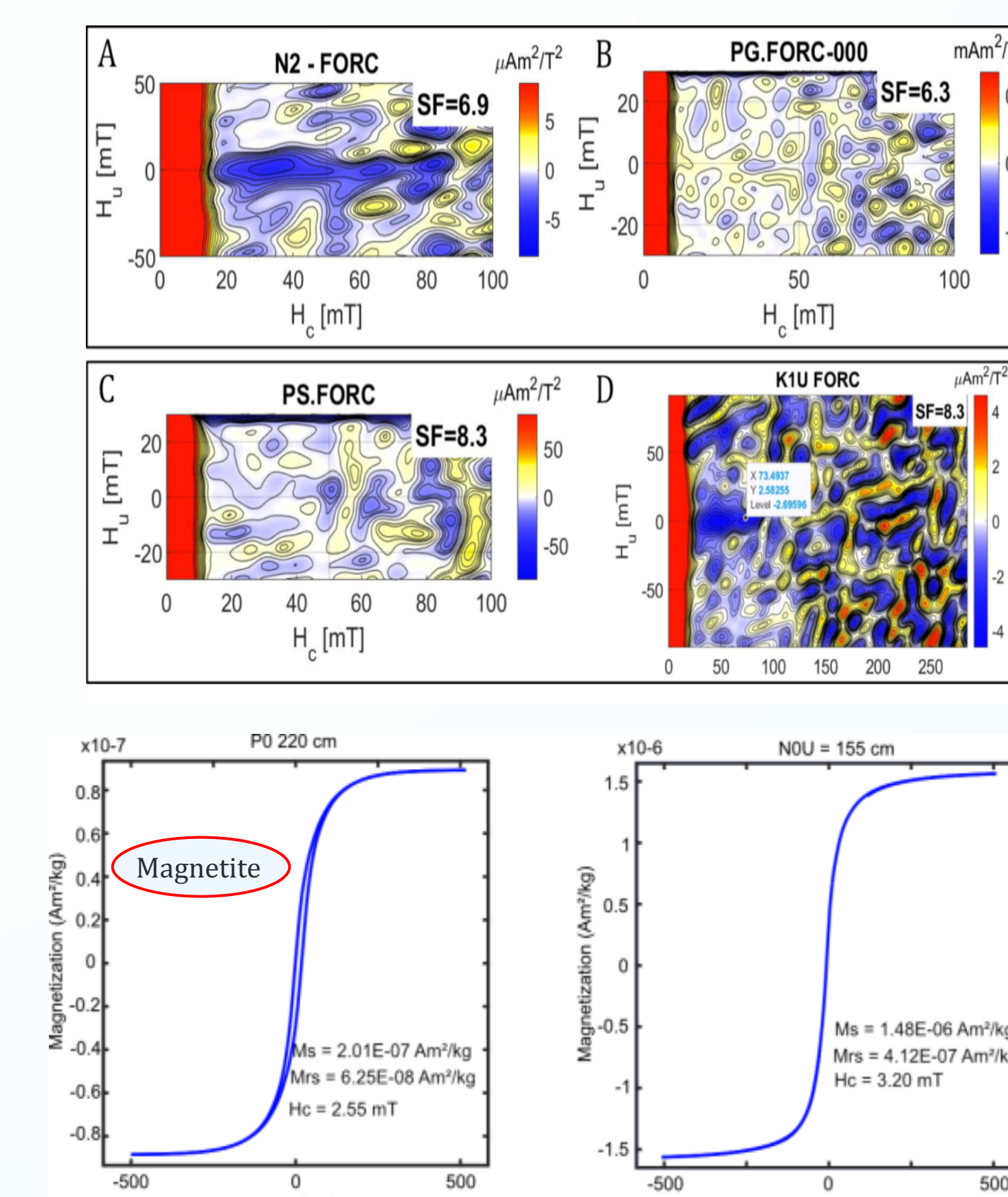


Figure 5: First Order Reverse Curves (FORCs) and Hysteresis loop.

CONCLUSION

- Poty Quarry provides a pre and post-catastrophe marine sedimentation, recording two types of paleoenvironments in its stratigraphy.
- The magnetic mineralogy investigations indicate low magnetic susceptibility, in the lower part of the outcrop (near K-Pg) indicating a critical, unstable environment that influences all other magnetic parameters.
- The integrated magnetic, biostratigraphic and sedimentological data allow us to indicate the possible environmental changes that occurred, during the K/Pg boundary, with greater precision.
- The data indicate a major environmental crisis and show a characteristic interval of anoxic marine environment in the early Danian, which corresponds with other stratigraphic sections studied worldwide, such as in Gubbio in Italy and Bidart in France.
- Magnetostratigraphic data survey it was possible to determine the C29r, C29n, C28r, C28n, C27r, C27n, magnetozone according to GPTS 2020 (Gradstein et. al., 2020). (Fig. 2)

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