



Triassic charophytes from Cerro Puntudo locality (San Juan, Argentina, Figure 1) are studied by the first time using scanning electron microscopy in combination with energy-dispersive X-ray spectrometry (SEM-EDS). The charophyte remains analyzed (Figure 2 A) consist of gyrogonites belonging to the Porocharoideae and Stellatocharoideae subfamilies (Porocharaceae) (Benavente et al., 2012). These gyrogonites are associated to thalli in the Oncolitic limestones facies of the Cerro Puntudo Formation (Anisian, 243.8 ± 1.9 my, Mancuso et al., 2010) (Figure 2 B).



Figure 1. Location map of the Cerro Puntudo depocenter, Cuyana Basin.

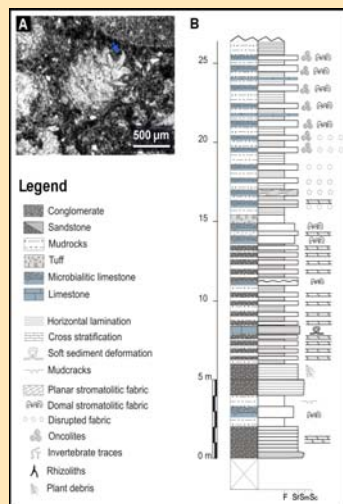


Figure 2. A. Gyrogonite with a neck-like apex (arrow), diagnostic of the Stellatocharoideae subfamily. B. Base of the log section of the Cerro Puntudo Formation (Triassic) at the Cerro Puntudo depocenter.

The formation is part of a complete nonmarine succession in the Cuyana Basin, W Argentina (Figure 1). Gyrogonites belonging to three different strata of the succession were analyzed.

Charophyte preservation is assessed by means of chemometrics, which combines chemical measurements (e.g., spectroscopic data) and mathematical or statistical methods (e.g., multivariate analysis) (e.g., D'Angelo and Zodrow, 2011).

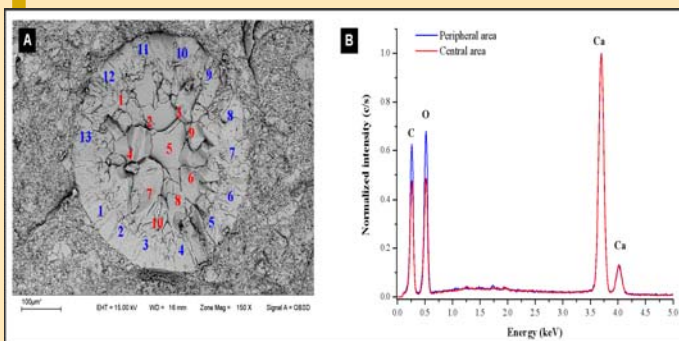


Figure 3. A. Backscatter electron image of a gyrogonite specimen showing locations of EDS measurement points (point numbers are color-keyed to B). B. Normalized EDS X-ray spectra of representative gyrogonite areas.

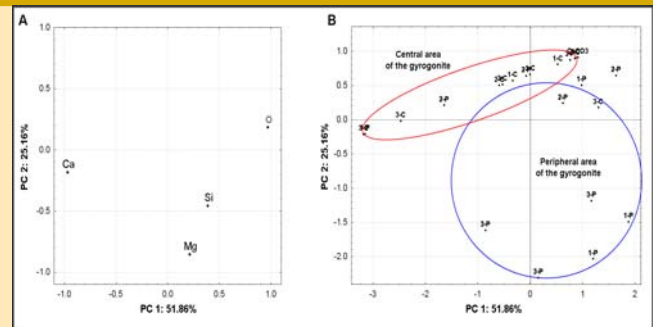


Figure 4. PCA. A. Plot of component loadings. B. Plot of component scores. Approximate delimited elliptical zones are used for clarity only and do not have any statistical significance.

In this chemometric study SEM-EDS is used to derive spectroscopic data which are then analyzed by principal component analysis (PCA). This is a powerful combination for investigating preservation features (major and minor chemical components) of gyrogonites. SEM-EDS spectra show the presence of O, Ca and minor elements (e.g., Si and Mg), indicating a predominantly calcium carbonate (CaCO₃) composition (Figure 3 A, B).

PCA model supports differences obtained between central and peripheral areas of the gyrogonites, indicating a higher CaCO₃ content (or lower Ca concentration) in the central part of the gyrogonites (Figure 4 A, B).

Conclusions

No considerable differences were found among gyrogonites from the three different strata analyzed, implying a similar preservation mode. This suggests a differential diagenetic pattern for the external cell of the gyrogonite and its centre. These data also have implications about the chemical composition of the paleolake water (Si and Ca availability) and the provenance and catchment areas.

Acknowledgements

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References

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