Writing an Effective Plain Language Summary

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ADVANCING EARTH AND SPACE SCIENCE

A Plain Language Summary (PLS) is a way to summarize a scientific study and its results in terms that are accessible to people outside of a specific scientific circle. The example below, taken from a research article published in *Paleoceanography and Paleoclimatology*, is broken down to show the four key elements that make an effective PLS and how the language from an Abstract can be modified for a Plain Language Summary.

Example from Paleoceanography

	ABSTRACT		PLAIN LANGUAGE SUMMARY
Topic overview	Many explanations for Eocene climate change focus on the Southern Ocean—where tectonics influenced oceanic gateways, ocean circulation reduced heat transport, and greenhouse gas declines prompted glaciation. To date, few studies focus on marine vertebrates at high latitudes to discern paleoecological and paleoenvironmental impacts of this climate transition.	**What does a non-expert reader need to know about the topic to understand your paper?** • Contextualizes area of study for readers with limited background knowledge of the subject	The body temperature of sharks is regulated by their surrounding waters and so there are limited species in cold, polar regions. In the past, there were periods of time (e.g., a geologic time period called the Eocene, 56–33.9 million years ago) where the Earth was much warmer and sharks were abundant in ocean waters all over the globe. For instance, fossil shark teeth have been found in Eocene sediments in Antarctica, which provides an example of this distribution.
Paper overview	The Tertiary Eocene La Meseta (TELM) Formation has a rich fossil assemblage to characterize these impacts; Striatolamia macrota, an extinct (†) sand tiger shark, is abundant throughout the La Meseta Formation. Body size is often tracked to characterize and integrate across multiple ecological dimensions.	**What did you set out to investigate?** • Explains what the paper aims to do • Describes where the data come from • Explains purpose of research	We analyzed the chemistry of these fossil shark teeth, which provides environmental clues to understand how the climate changed during the Eocene. We also measured shark tooth size, which is related to the length and age of shark, to understand the life stage of sharks living in the area.
Paper findings	†S. macrota body size distributions indicate limited changes during TELMs 2–5 based on anterior tooth crown height (n = 450, mean = 19.6 ± 6.4 mm). Similarly, environmental conditions remained stable through this period based on δ18OPO4 values from tooth enameloid (n = 42; 21.5 ± 1.6‰), which corresponds to a mean temperature of 22.0 ± 4.0°C. Our preliminary εNd (n = 4) results indicate an early Drake Passage opening with Pacific inputs during TELM 2–3 (45–43 Ma) based on single unit variation with an overall radiogenic trend.	**What was the most significant result or conclusion in your paper?** • Provides overview of paper's findings • Accessible to readers with limited background knowledge of the subject	Our study found that sand tiger sharks of all ages lived in this location and water temperatures recorded by their teeth stayed constant over time, despite the clear continental movement and changes in ocean circulation.
Key takeaways	Two possible hypotheses to explain these observations are (1) †S. macrota modified its migration behavior to ameliorate environmental changes related to the Drake Passage opening, or (2) the local climate change was small and gateway opening had little impact. While we cannot rule out an ecological explanation, a comparison with climate model results suggests that increased CO2 produces warm conditions that also parsimoniously explain the observations.	**Why should a reader care about your findings?** • Suggests focus for future research	Future studies of ancient climate should consider the potential of shark teeth to contribute to their analyses and geologic reconstructions.

Kim, S. L., Zeichner, S. S., Colman, A. S., Scher, H. D., Kriwet, J., Mörs, T., & Huber, M. (2020). Probing the ecology and climate of the Eocene Southern Ocean with sand tiger sharks Striatolamia macrota. *Paleoceanography and Paleoclimatology*, 35, e2020PA003997. https://doi.org/10.1029/2020PA003997

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