Internet Appendix A30: Multidisciplinary

Figure A30.1 Illustrative Pitch Template Example on Climate Science (reverse engineered)

This example is reversed engineered based on: De Deckker, P., C. I. Munday, J. Brocks, T. O'Loingsigh, G. E. Allison, J. Hope, M. Norman, J-B. W. Stuut, N. J. Tapper, S. van der Kaars. (2014). Characterisation of the major dust storm that traversed over eastern Australia in September 2009; a multidisciplinary approach, Aeolian Research, 15, pp 133-149.

Pitcher's name	Marita Smith	FoR category	Multidisciplinary climate science	Date completed	17/3/15
(A) Working Title	Fingerprinting major dust storms: a multidisciplinary approach				
(B) Basic Research Question	In large dust storms, where is the dust sourced from and what is it comprised of?				
(C) Key paper(s)	P. De Deckker, R.M.M. Abed, D. De Beer, K.-U. Hinrichs, T. O'Loingsigh, E. Schefuß, J.-B.W. Stuut, N.J. Tapper, S. van der Kaars. (2008). Geochemical and microbiological fingerprinting of airborne dust that fell in Canberra, Australia, in October 2002. *Geochemistry, Geophysics, Geosystems*, 9(12), pQ12Q10. C.I. Munday, T. O'Loingsigh, N.J. Tapper, P. De Deckker, G.E. Allison. (2013). Utilisation of Rep-PCR to track microbes in aerosols collected adjacent to their source, a saline lake in Victoria, Australia. *Science of the Total Environment*, 450-451, pp 317 – 325.				
(D) Motivation/Puzzle	In September 2009, the southeast coast of Australia was blanketed by a major dust storm, now known as the 'Red Dawn' event. It was one of several major dust storms of the new millennium that reached as far as New Zealand. Airborne dust may have detrimental health effects, including asthma in humans, carrying disease to coral reefs and transferring toxic compounds to waterways. Airborne dust storms are a direct reflection of the alteration of the landscape by human practices, such as land clearance and grazing. The extensive drought in Australia appears to have made the continent more prone to major dust storms. Tracing the dust from these storms would provide a greater understanding of the relationship between sources and the impacted sinks.				
THREE	**Three core aspects of any empirical research project i.e. the "iDioTs" guide**				
(E) Idea?	An extensive multidisciplinary approach to dust analysis has never been conducted. Dust samples from several locations during the Red Dawn event were collected along the southeast coast in 2009. Additionally, samples would be sourced from key inland desert locations for comparison. By combining microbiology, geochemistry, lipid analysis, sedimentology and pollen analysis, detailed information about the dust sources will be obtained. This 'fingerprint' will provide detailed information about the compounds and organisms that were transported to new sinks along the southeast coast, and their possible negative or positive impacts on local ecosystems. Overall, this will yield a novel assessment of the trajectory of major dust events in Australia and provide important information for future dust storm events.				
(F) Data?	Dust samples will be analysed in several ways: - Microbiology: filters and rain samples will be used for culturing studies and DNA sequencing - Geochemistry: mass spectrometry and chromatography to study rare earth elements and isotopes, particularly strontium and				

	neodymium - Lipids: mass spectrometry and cation chromatography - Pollen: microscope analysis
(G) Tools?	- Chemistry laboratory for lipid separation; gas chromatograph (GC) for geochemical analysis - Bacterial filters for microbiological sampling on site; culturing and DNA sequencing equipment - Microscopy laboratory for pollen identification
TWO	**Two key questions**
(H) What's New?	This multidisciplinary approach to dust studies is novel and will yield a detailed 'fingerprint' of the dust sources.
(I) So What?	This study will facilitate the identification of key Australian dust sources and their unique composition. This will provide a reference library for future major dust events, enabling identification of dust from varied landscapes and vegetation zones from inland Australia. This will facilitate further research into these sources, which will aid prediction of future dust events. Furthermore, any negative constituents of the dust will be identified, contributing to public safety.
ONE	**One bottom line**
(J) Contribution	The primary source of the contribution will be a detailed analysis of the composition of the Red Dawn event.
(K) Other considerations	Is Collaboration needed/desirable? -Idea: no; -Data; yes –multi-institutional preferred -Tools; yes –representatives and funding from various institutions; specialized equipment housed at various institutions Target journals – *Quaternary Science Reviews, Aeolian Research* "Risk" assessment: -"no result" risk: low. The broad range of analysis should provide results in at least several of the analysis approaches. -"competitor risk"(i.e. being beaten by a competitor): low. Few samples from the Red Dawn event were collected in a methodical, scientific manner for analysis. Additionally, the scope of the analysis requires collaboration between several researchers. -risk of "obsolescence": Low. An understanding of extreme weather events linked to climate change is topical.