Cryptotephra fingerprinting of 1458 CE and 426 BCE volcanic events in East Antarctic ice cores

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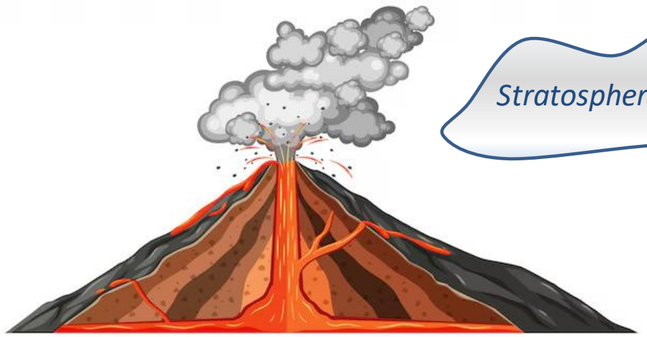
Stratospheric Sulphate and tiny tephra reach polar regions cores

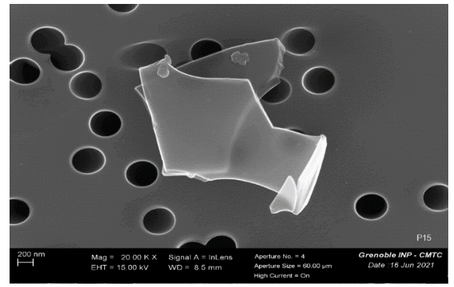
Breakthrough in elemental analysis of micron-sized tephra in polar ice :

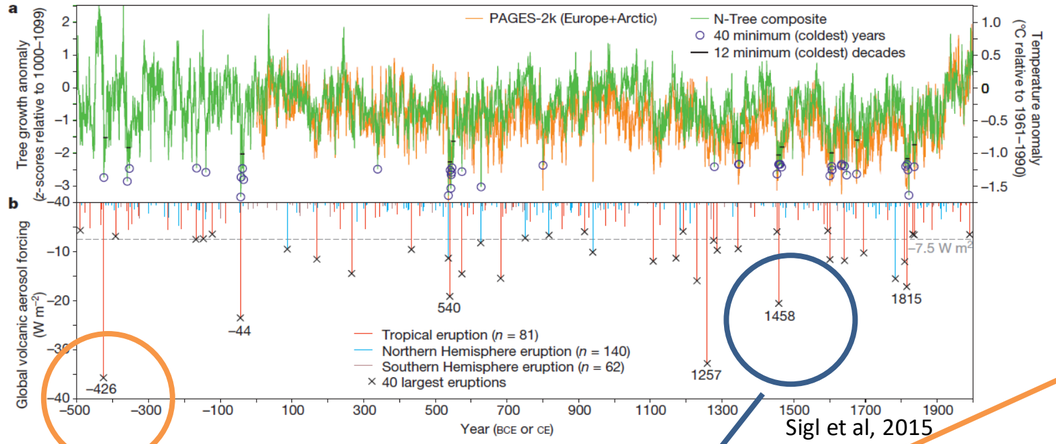
Once upon a time in Vanuatu.....

Two 10km wide sleeping calderas, feed the local legends...

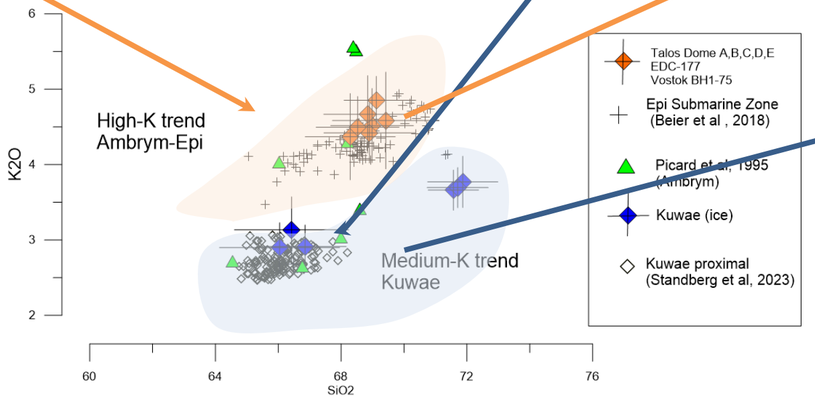
While their respective imprints in Antarctic ice cores may tell us part of their story....

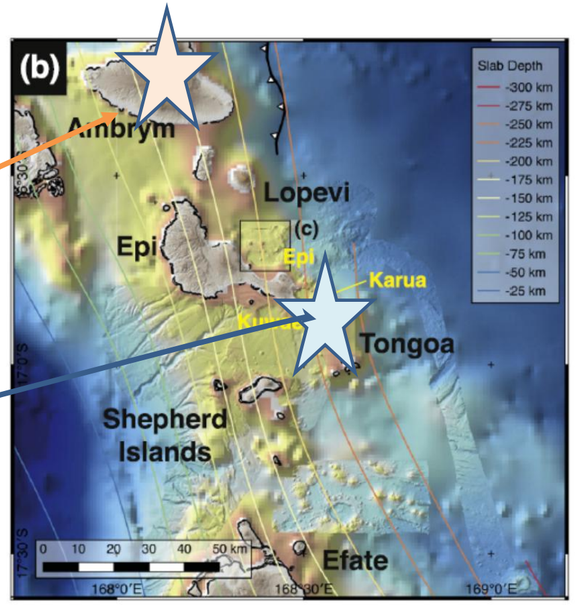


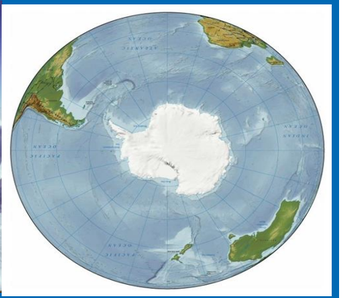




Sigl et al, 2015

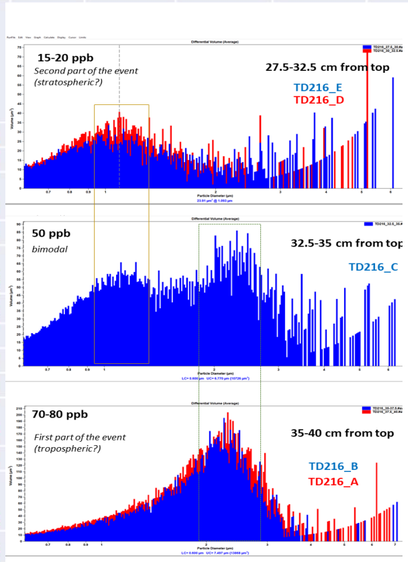


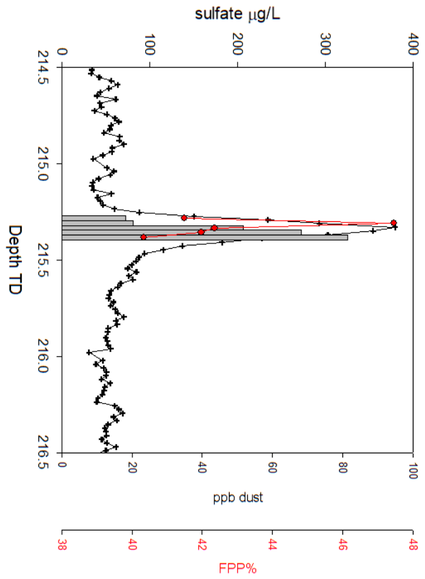




Method / results

Label	nb of data	SiO2	TiO2	Al2O3	FeO*	MgO	CaO	Na2O	K2O	ATs
24-18-D	45	66,80	0,64	14,79	5,86	1,32	3,79	3,89	2,91	61,5
s		1,31	0,11	0,62	1,04	0,33	0,58	0,57	0,29	16,7
25-1-D	33	66,78	0,64	14,61	6,24	1,21	3,17	4,15	3,19	37,7
s		1,82	0,19	1,00	1,18	0,34	0,75	0,61	0,44	19,3
LCD-5 D	22	66,20	0,67	14,59	6,31	1,27	3,67	4,37	2,92	40,98
s		1,91	0,13	0,63	1,46	0,32	0,74	0,49	0,33	20,24
24-18-R	80	71,77	0,45	13,76	3,73	0,52	2,17	3,92	3,68	54,7
s		0,97	0,12	0,55	0,64	0,18	0,44	0,50	0,27	17,9
25-1-R	14	71,55	0,47	13,89	3,77	0,53	1,99	4,14	3,66	46,3
s		0,80	0,14	0,57	0,45	0,09	0,31	0,45	0,27	17,1
LCD-5-R	24	71,75	0,44	13,49	3,71	0,49	2,00	4,29	3,82	37,96
s		1,12	0,15	0,36	0,84	0,11	0,23	0,41	0,34	18,86





- Appropriate microprobe (EPMA) settings provide reliable compositions for tephra as small as 1 micron preserved in polar ice cores.
- We study the 426 BCE and 1458 CE events from 3 different ice cores and propose Ambrym and Kuwae caldera (Vanuatu) as the source.

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