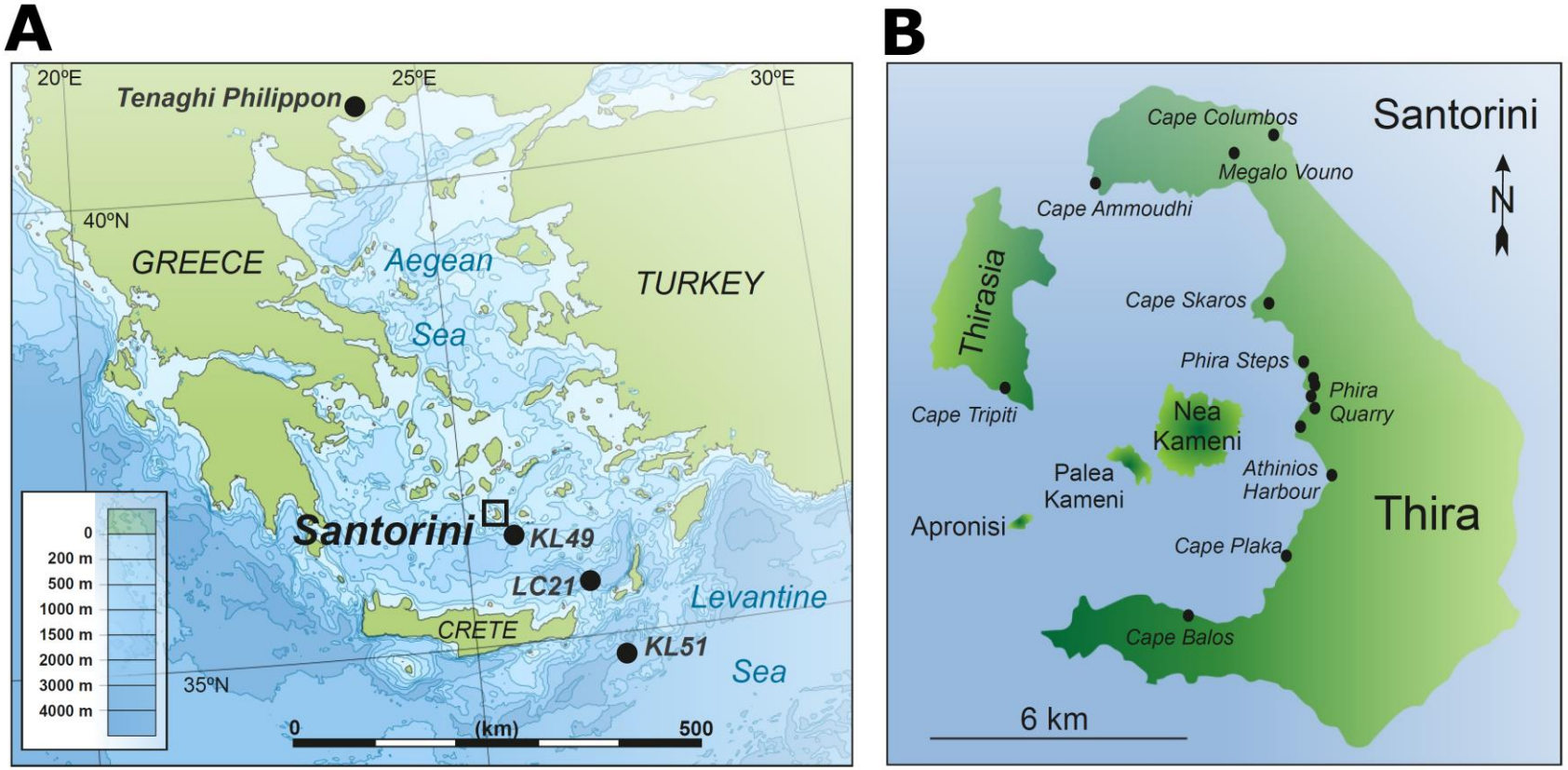
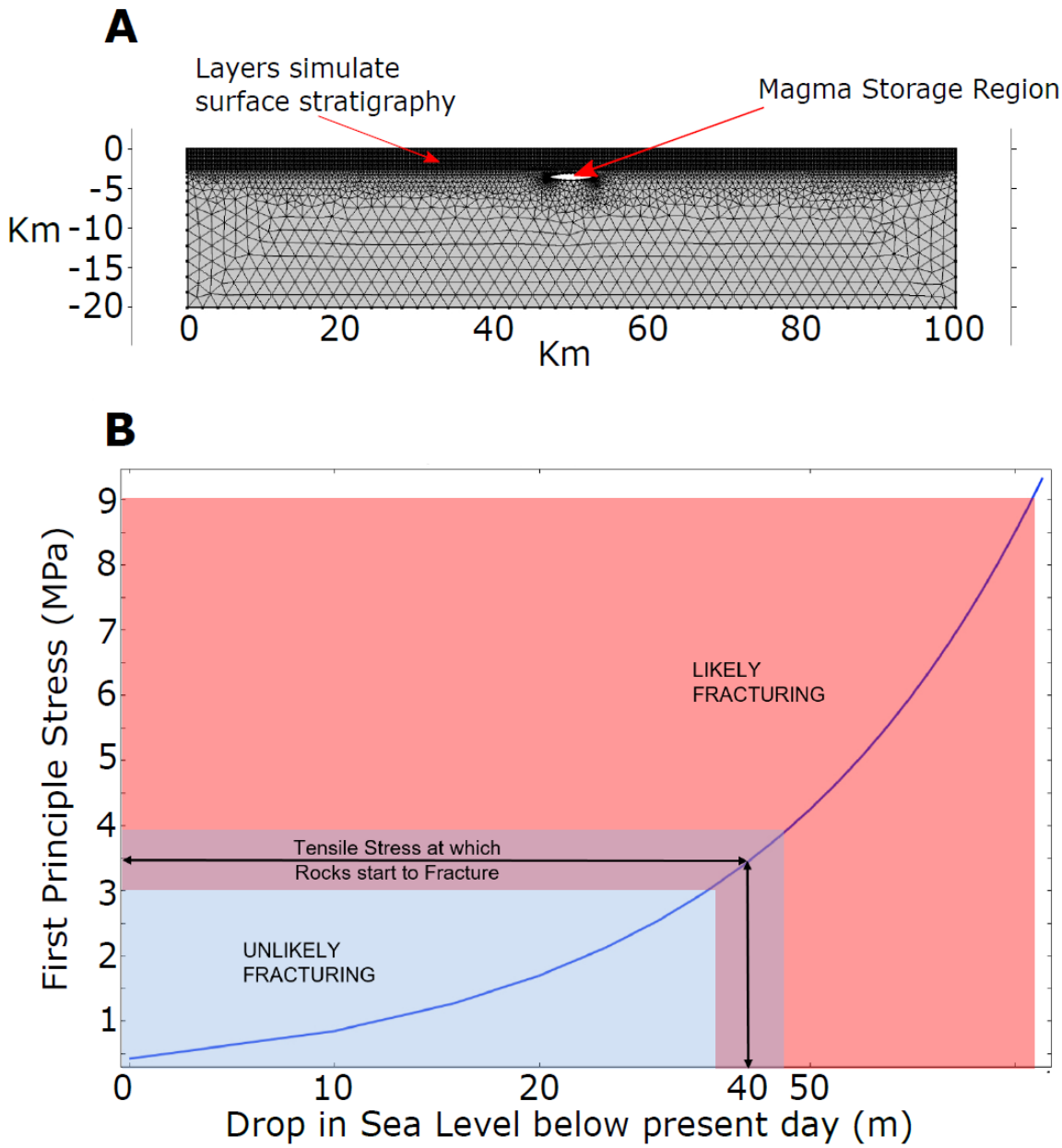
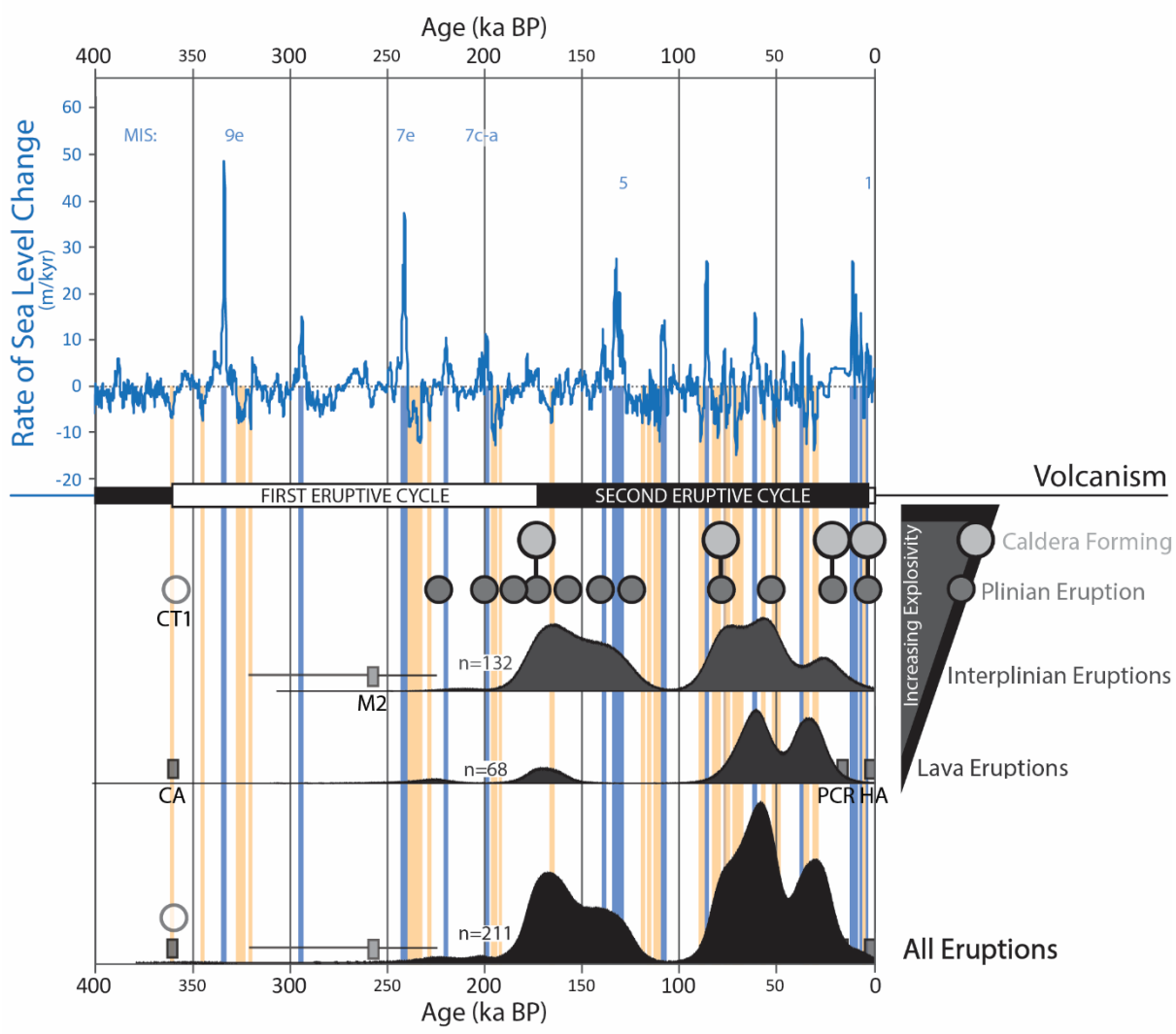
Supplementary Information.



Supplementary Figure 1. (after Wulf et al., 2019) A) Map showing the location of Santorini (black box) and of the marine cores (black dots) which contribute both the sea-level record (core LC21) and the tephrochronology dates for the Plinian eruptions which constrain Santorini's eruption history (KL49, KL51, LC21-from 20). B) The islands of Santorini and the locations of stratigraphic sections contributing to Santorini's chronology and eruption count estimates 43, 44, this study. While the palaeostratigraphy is derived from locations in the caldera wall (Thera and Therasia islands), the central island of Nea Kameni is the location of historical eruptive activity (after the Late Bronze Age Eruption at 3.6 ka),



Supplementary Figure 2: A) shows the COMSOL model geometry B) Graph shows the relationship (blue line) between the first principle (tensile) stress at the top of the magma storage region and the fall in sea level below the present day. Note the x-axis is exponential, creating a curved line. The relationship between the first principle stress and the drop in sea level is actually linear in an elastic model. The likely range of tensile strengths (tensile stress at which rocks start to fracture) is between 3 and 4 MPa[22,23] with an average of 3.5 MPa, this defines our modelled prediction that a 40 m drop in sea level being large enough to allow magmatic excess pressure p_e (see equation in the main text) to fracture the roof of the magma reservoir and for dykes to begin to propagate.



Supplementary Figure 3. Santorini's eruptive stratigraphy (lower panels) aligned to the P_{max} rate of sea-level change (blue curve)[12,24]. Where both the chronology and the number of eruptions are well constrained, the eruption time series (lower half of diagram) is represented by kernel density estimates (grey/back) with the number of events of each type shown (total n=211). Where the number of events is either difficult to determine or the dating is very imprecise, eruptive events have been represented in grey boxes or circles (most likely date) with whiskers for the error (if known). The height of the boxes does not imply the number of events. These events are labelled to allow simple reference to the existing literature; CT1= Cape Therma 1, CA=Cape Alai Lavas, M2= interplinian deposits[3]. PCR=Post Cape Riva lavas and HA= Historical Activity. Vertical beige bars denote time periods of rapid sea level fall (>8m/kyr), whereas vertical blue bars indicate times of rapid sea-level rise, phenomena previously proposed as a potential influence on volcanic activity[25,26]. At Santorini, there does not appear to be any relationship between the timing or type of volcanic activity and the rate of sea-level change.

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Date/deposit type Plinian = major explosive eruption Interplinian = minor explosive eruption Lavas= individual lava flows	Dated horizon or interval name (nomenclature follows previous studies[2,4])	Date (ka)	Date 2SD	Number of lavas	Maximum estimate of number of interplinian units in most detailed stratigraphic section available (used as estimate for number of events- Main Text Fig.4)	Estimate of number of interplinian events from the number of correlated interplinian deposits	Minimum estimate of number of interplinian events (from palaeosol/weathering horizon evidence)	Comments/dating method	Reference
Plinian + 2 Lavas	Cape Therma 2 and lowest Alonaki lava	224	10	2	0	0	0	K/Ar Also a date of 257+62 ka from related lava in Rhyodacites of NE Thera 2 is a minimum number of lavas[2]	2
Interval	M3	-	-	0	1	1	1	This single interplinan deposit is separated from the Cape Therma 2 by weathering horizon and is so thought to occur after the Alonaki lavas, as these are contemporary with the Cape Therma 2 Plinian eruption.	Observation- this study.
Plinian	Cape Therma 3	200.2	0.9	0	0	0	0	Tephrochronology	7
Interval	M4	-	-	0	0	0	0	There are layers at the base of LP1, which are described as “precursors of LP1”[19]; we therefore count them as belonging to the same eruptive event as LP1 at 185.7 ka and not in this interval.	2
Plinian	Lower Pumice 1	185.7	0.7	0	0	0	0	Tephrochronology	7

Interval	M5	-	-	0	0	0	0	-	2
Plinian	Lower Pumice 2	176.7	0.6	0	0	0	0	Tephrochronology	7
Lava	Lowermost Simandiri Lava	172	8	1	0	0	0	Ar/Ar	2
Interval	M6 (including Simandiri Lavas at 172+-8ka)	-	-	6	29	10	16	-	3
Plinian	Cape Thera	156.9	2.3	0	0	0	0	Tephrochronology	7
Interval	M7	-	-	0	15	5	3	-	3
Plinian	Middle Pumice	141.0	2.6	0	0	0	0	Tephrochronology	7
Interval	M8	-	-	0	14	9	7	-	4
Plinian	Vourvolous	126.5	2.9	0	0	0	0	Tephrochronology	7
Interval	M9 (including Cape Columbos Tuff)	-	-	0	2	1	2	-	4,7
Interplinian eruption event	M9-2	121.8	2.9	0	1	0	0	Tephrochronology	7
Interval	Repose Period (with Palaeosol)	-	-	0	0	0	0		N/A
Plinian	Upper Scoria 1	80.8	2.9	0	0	0	0	Tephrochronology	7
Interval	M10a (including Megalo Vouno Cinder Cone- inferred to occur synchronously with, or just after, Upper Scoria 1)	-	-	0	25	25	4	-	4,5,6,7
Lava	Skaros Lavas base	67	18	1	0	0	0	Ar/Ar	2
Interval	Skaros Lavas	-	-	29	10	10	10	No detailed logs exist for the interplinian eruptions in this interval so only a	5,6,20

								minimum estimate of the number of events can be defined	
Interval	M10b	-	-	0	5	5	1	-	4
Plinian	Upper Scoria 2	54	6	0	0	0	0	Ar/Ar	2
Interval	M11a	-	-	2	15	6	2	-	4,6
Lava	Lower Therasia Andesite	48.2	2.4	1	0	0	0	Ar/Ar	6
Interval	Repose Period	-	-	0	0	0	0	-	N/A
Lava	Theresia Lavas base	39.4	2.2	1	0	0	0	Ar/Ar	6
Interval	Therasia Lavas	-	-	25	5	5	5	includes the Cape Tripiti pumice which is dated by Wulf et al. (2020) at 27.5 +/- 1.4 ka (Wulf et al., 2020)	6
Lava	Theresia Lavas top	24.6	1.3	1	0	0	0	Ar/Ar	6
Interval	M11b	-	-	0	8	5	3	-	4
Plinian	Cape Riva	22.0	0.6	0	0	0	0	Tephrochronology	7
Interval	M12	-	-	0	3	2	1	-	4,21
Plinian	Late Bronze Age (Minoan) eruption	3.6	0.8	0	0	0	0	Radiocarbon	8

Supplementary Table 1. Chronological constraints and estimates of the number of eruptions of each type through time used to create the Kernel Density Estimates shown in figure 4.

Date/deposit type	Dated horizon or interval name	Date (ka)	Date 2SD	Number of lavas	Number of interplinian events	Comments/dating method	Reference
Lavas and minor interplinian deposits	M1 interval- Cape Alai Andesites+ minor pyroclastics	Not known although and average K/Ar dates of, 345+/- 88 is reported for the Cape Alai lavas n Druitt et al., this date has large amounts of excess argon and large uncertainties as a result.	-	Unquantified but 60 m thick in caldera wall	Minimum of (2)-3 interplinian (felsic) eruptions (Vakhrameeva et al., 2018) and own observation; age relationship with Cape Alai lavas not clear. Minimum of 2 interplinian (mafic) eruptions (own observation).Unquantified	Constrained by date of overlying Cape Therma 1 eruption	2,10, This study
Plinian	Cape Therma 1 eruption	359	Not known	-	-	Dated by tephra preserved in a pollen stratigraphy (Tenaghi Philippon) in northern Greece. The pollen sequence shows that the eruption occurred during a glacial period (MIS 10) which is consistent with its occurrence during the sea-level low at ~350 ka (Fig. 4)	7, 10
Minor interplinian deposits	M2 interval	257	62	-	Minimum 2 (Vakhrameeva et al., 2019) but possibly as many as 8 eruptions (Wulf et al., 2020) based on the Tenhagi Philippon core.	There is little evidence on Santorini for a lot of eruptions in this interval, so 2 is more realistic, although correlations from Tenhagi Philippon cores to deposits on Santorini are still preliminary.	7,11
Lavas	Post Cape Riva (M12 interval)	20.2	2	Unknown, but lava shield estimated at 2.2–2.5 km^3.	-	Known and dated from lithic clasts preserved within the Minoan deposits. Age thought to represent beginning of the effusive activity after the Cape Riva eruption. This lava shield was destroyed during the Minoan (LBA) eruption and caldera formation.	9
Lava and Interplinian eruptions	Historical Activity	Post Minoan eruption (3.62 ka to present)	N/A	Minimum of 12 evident on Nea and Palaea Kameni	Unquantified	N/A	2, 17

Supplementary Table 2. Evidence of eruptive activity at Santorini with either low chronological precision or unquantified numbers of deposits/events. These events are represented in grey on figure 4.