

# What's wrong?

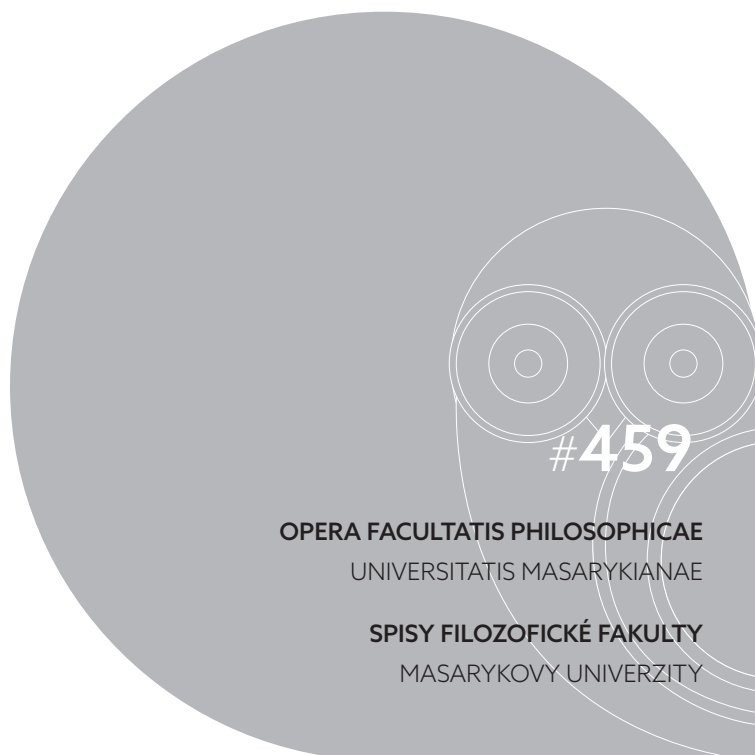
Hard science and humanities – tackling the question of the absolute chronology of the Santorini eruption

Věra Klontza-Jaklová



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MASARYKOVA UNIVERZITA



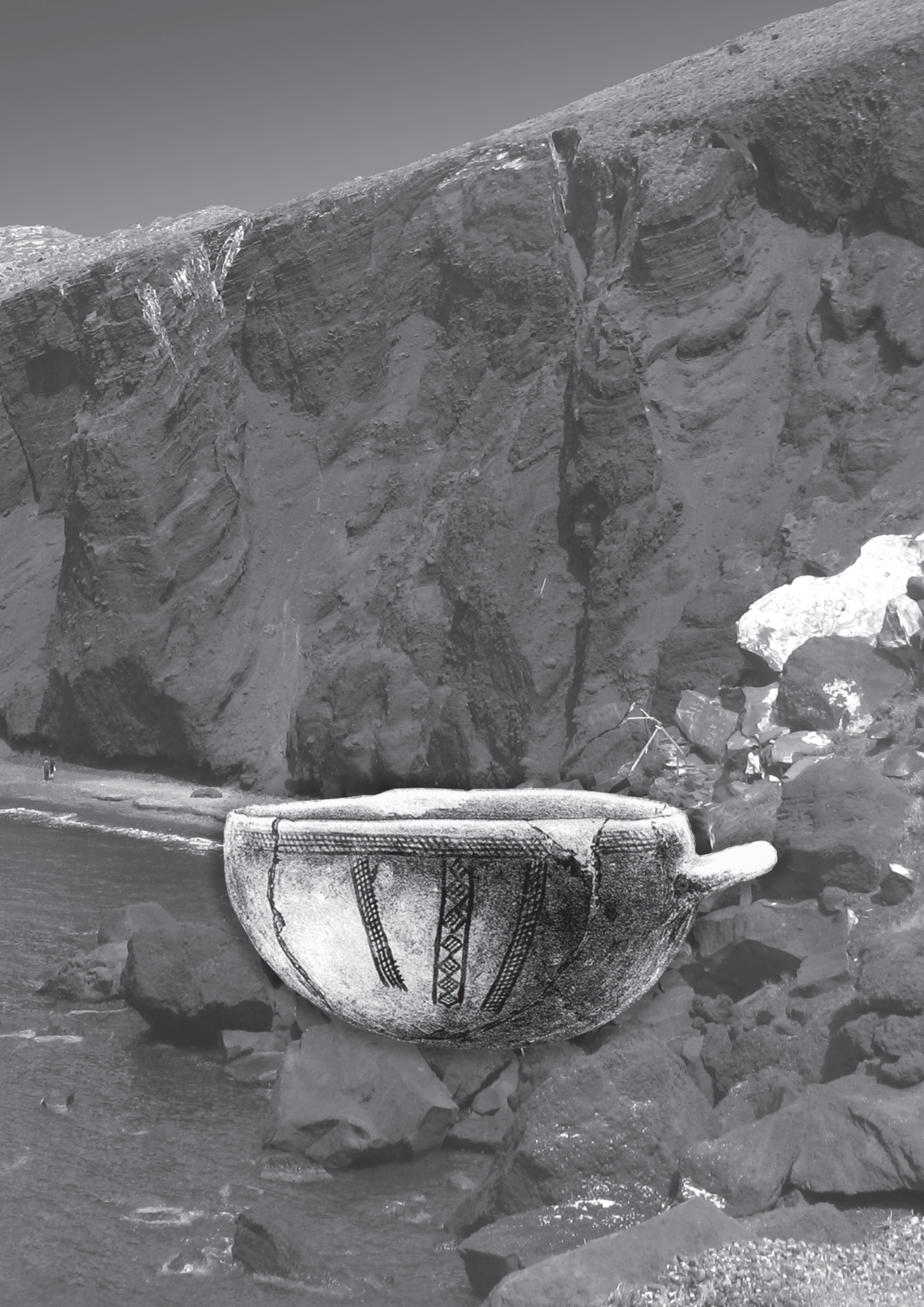


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# PREFACE

The absolute chronology of the Late Bronze Age volcanic eruption in Santorini and its effects across the wider region has been a focus of my research since I studied archaeology at Charles University in Prague (Klontza-Jaklova 2008; 2012a; 2014). This topic, the problem of placing the event within the absolute chronology, is one of the most frequently discussed and studied topics of Aegean prehistory, especially since the mid 1970's, when the first radiocarbon dates from the region were published and the difference between those dates and archaeological/historical dates appeared. The debate is invariably lively and creative, sometimes even passionate. One particularly dramatic phase ended at the turn of the millennium when two monographs were published (Manning 1999; Friedrich 2000). In the subsequent few years several conferences dealt with the problems of assigning an absolute date to the Santorini eruption and absolute chronology in general (Cornell University 2006, Copenhagen 2007, Halle 2011<sup>1</sup>) and, circa ten years later, both above mentioned authors reviewed and re-edited their monographs (Friedrich 2009; Manning 2014). The very intensity of the debate provided adequate reason to place it (or the most significant representations of each opinion) on the pages of *Antiquity* (2014: 88/339). (More on the history of research can be found in chapter 1.3). Albeit the bibliography of this volume is bulky (about a fifth of the text), and my own, admittedly heuristic, approach has been continuous and meticulous for years, it has proved impractical to collect all the publications related to the topic or even to establish with any degree of accuracy how many exist. Thus, for the purpose of this publication, I have, of necessity, created just a choice of illustrative books and articles.

What, you may ask, can I add to the work of so many esteemed scholars? What is the aim of this monograph? Obviously, it is yet another review of the opinions; one in which I do not even try to compare the results of each method or approach. I try instead to compare the methodologies and approaches, their limits and uncertainties and I examine mainly those scientific

methods which seem to make sense for use in archaeology. I use the critical methodology of 'hard' science for 'autocriticism' of the humanities, since I am primarily trained in the humanities. I am an archaeologist and, although I collaborate intensively with physicists, I don't feel competent to criticize their methods. I aim simply to underline the points where they may not be accurate or can introduce errors. I am, however, rigorous in criticizing archaeological results. I agree with David Warburton: "...it is not chronological debate but methodological debate. (...) There is a fundamental problem and it must be admitted that that problem is fundamentally archaeological." (2009, 295)

The problem of absolute chronology is not just a physical problem. Apart from the absolute and relative physical values (in Newtonian and quantum mechanics), time possesses a philosophical meaning which can vary in different periods, regions and societies, including our own. (Klontza-Jaklova 2011). Problems with chronology cannot be solved by physical science alone. It is also a part of human history and is one of the dimensions wherein human lives are realized. We need solutions to answer the historical questions we ask but we need to test our methods, their validity and accuracy.

One could argue that the problem of 120 years offset between the possible dating scales is not significant for the Late Bronze Age or that we should resign ourselves to this problem because, at present, it looks as though we are not in a position to find convincing arguments or reach consensus. However, I cannot agree with such opinions. Archaeology, as a part of the humanities, tries to explain the interactions between people, societies and their environments, the evolution and changes in their ways of thinking and understanding of the world around them, or us. We even try to define the regularities of human actions and interactions throughout time across the Earth. In this understanding of and approach to archaeology the time frame is crucial, even, or indeed especially, in the Late Bronze Age, when a large part of the Mediterranean was organized in states with characteristics



similar to those of our, modern states (Klontza-Jaklová 2013). The correct absolute date of the Santorini Bronze Age eruption is essential for synchronization not only of Mediterranean and Near Eastern chronologies but also of pan-European chronologies because the northern European regions, although lacking written records, were nonetheless part of the ‘global’ trade network and one large cultural *koiné* (Kristiansen and Larsson 2005; Bouzek 2013).

I would like it to be noted that, while a multidisciplinary and transdisciplinary approach is obviously needed, co-operation and communication between humanities and hard sciences is still problematic, difficult and accompanied by a lot of misunderstandings. We often fail to trust each other, primarily because we don’t understand the approaches, limits and methodologies of the other discipline. The “Santorini problem” is one of the fields where communication between humanities and natural sciences is intensive.

So, this volume’s target is to evaluate the methodology of the humanities, in particular of contemporary archaeology, and attempt to offer some new methods and approaches in order to evaluate the ‘weight’ of each piece of possible archaeological evidence.

The problems I am going to present are very complex. It was extremely difficult for me to understand all the details and it took me a long time to become familiar with the large bibliography and various scientific methods. During the process I have changed my mind many times. However, this book is far from representing the end of my involvement with the topic; the “investigation” into the actual date of the oft-mentioned eruption continues apace and I fully intend to be a part of it.

### Acknowledgments

This volume would never have been concluded without help and support from a great many people.

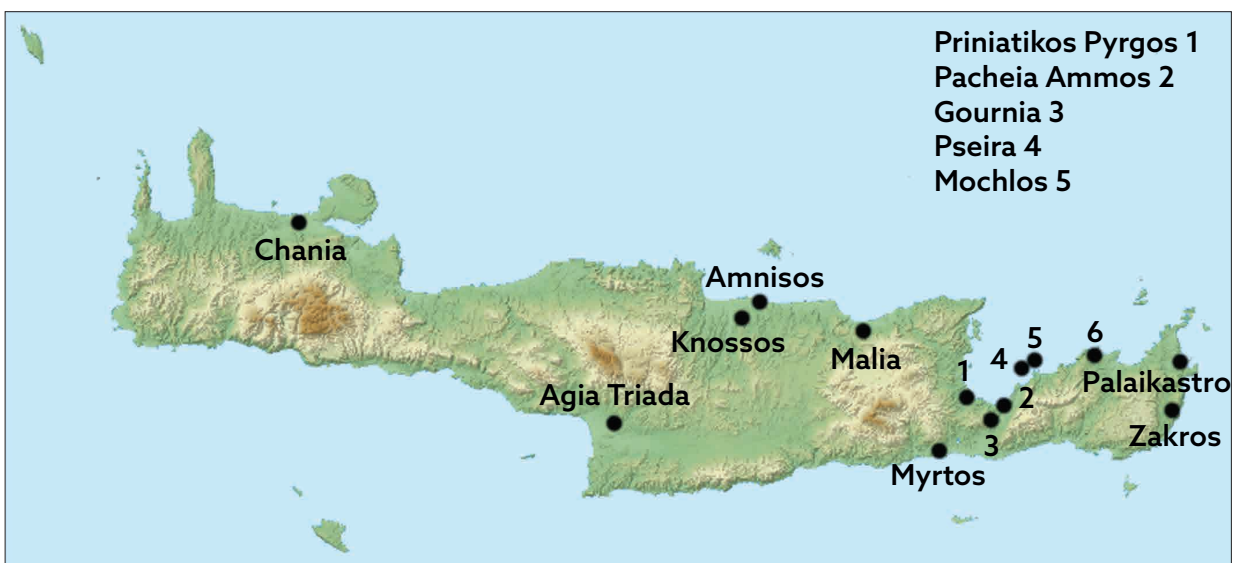
I am sorry that the order in which they are presented here does not necessarily reflect the extent of their help, which I greatly appreciate. I am also sorry that I have not been able to acknowledge by name all who have assisted me over the years. I am very grateful to Masaryk University for their brave decision to support the publication, to INSTAP for financial support for my research and to the INSTAP Study center for East Crete and the Institute for Classical Archaeology in Vienna for permission to use their libraries. I owe many thanks to Prof Phillip Betancourt, Prof Jan Bouzek, Dr Thomas Brogan, Dr Ricardo Fernandes, Mgr Manolis Klontzas, Prof Floyd McCoy, Dr Alexander J. MacGillivray, Prof Jennifer A. Moody, assoc. Prof Jana Mynářová, Prof Jeffrey Soles and many other colleagues and friends for their never ending patience in explaining to me the details of their research, for sharing their enthusiasm for the topic with me and constant support for my efforts to conclude this volume. I will never thank enough my friend and colleague Dr Sue Bridgford for her multiple edits of the manuscript and her patience with my English. I am also grateful to all of my students, on whom I first tested my arguments, for their comments, support and motivation. I especially want to thank to Michael Smíšek for the data he has collected and shared with me and Barbora Ruffini for her help with the editing of the manuscript.

I have already mentioned the invaluable help of my husband Manolis Klontzas, but my son Odysseas deserves a special mention for the incredible patience with which he accompanied and assisted me on some of my surveys on Santorini and Crete.

I would like to dedicate this book to my father – a physicist – who supported and observed the process of this book’s birth with immense interest and exceptional love; he was always happy to help and discuss. Unfortunately, he passed away before the manuscript was finished.



**Map 1** / Map of the Aegean showing major sites mentioned in the text. (Illustration by author)



**Map 2** / Map of Crete showing major sites mentioned in the text. (Illustration by author)





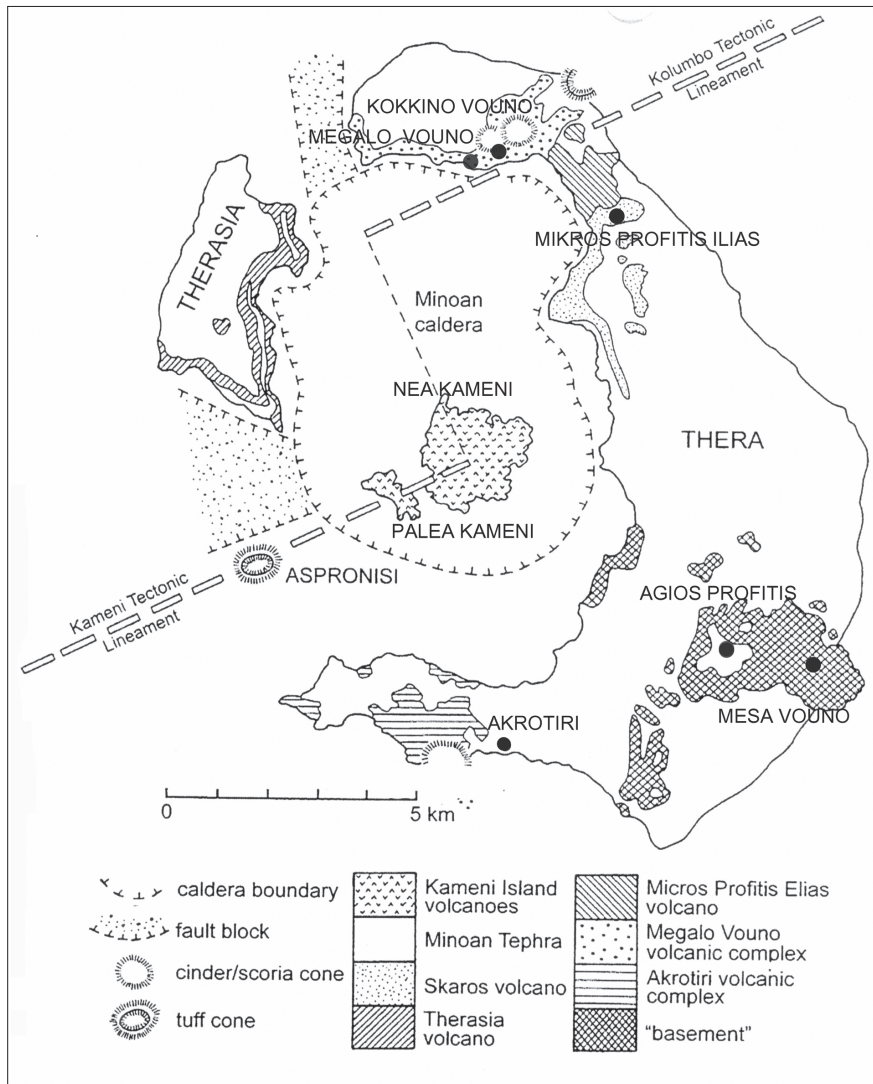
**Map 3**

Map of the Near East and Egypt showing major sites mentioned in the text. (Illustration by author)



**Map 4**

Map of Cyprus showing major sites mentioned in the text. (Illustration by author)



**Map 5**

Map of contemporary Santorini (Thera) island system. (Illustration modified by author, from McCoy 2017)

Chronology		CRETE	GREECE	EGYPT	CYPRUS	Near East	Europe Reinecke	Europe Conventional	
HIGH	LOW								
1700	1800	MM IB	MH II	SIP	MC II	MB I	BA3	EBA	
	1700	MM II							MH III
		MM III	MH I		LC IA	MB II	BB2 (BC1)		
	1600	LM IA						LH IIA	DYN XVIII
		LM IB	LH IIB		LC II	LB II	BD		
	1500	LM II						LH IIB	DYN XVIII
		LM IIIA1	LH IIIA		B				
		LM IIIA2	LH IIIB						
		1300	LM IIIB		LH IIIC				

**Table 1**

Simplified chronological overview.





# 1. INTRODUCTION

## 1.1 The Santorini archipelago

### 1.1.1 Geographic and geological overview

The group of islands and islets around Santorini (Fig. 1), circa 120km North of Heraklion, belongs to the Cyclades and comprises a main island and four adjacent smaller uninhabited islets, together with three further islets of volcanic origin, which lie southwest of and at some distance from the main group. The largest main island, also called the ring island, has an area of 76.2km<sup>2</sup>. The main island and some of the islets once connected to it were formed on a base of sedimentary limestone (also containing metamorphed limestone, such as phyllite, and volcanic rocks) and were created circa 120k years ago, when the sediments were deformed and lifted up by the Alpine orogeny. (McBirney 2009, 68; McCoy 2017). Today the main body of the island consists of volcanic materials which were piled high by numerous eruptions. Circa 12 Plinian eruptions, during the last

120k years, have been recognized within the volcanic strata (McCoy 2009, 76, Fig. 3).

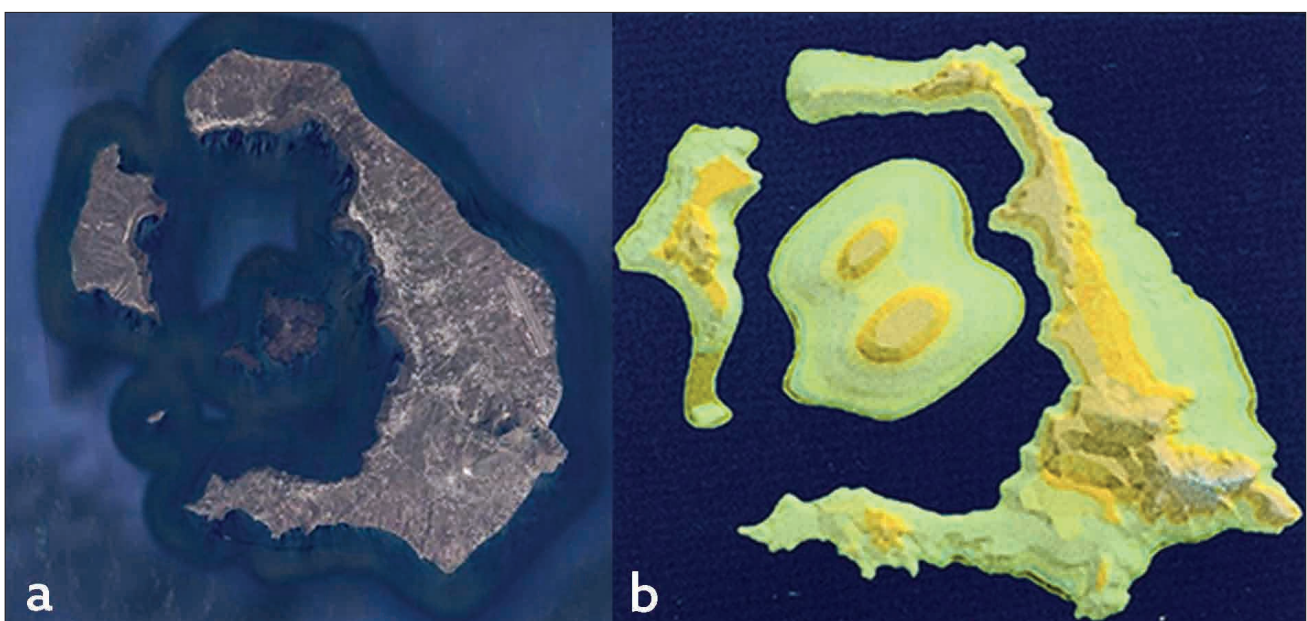
The highest point of the island is Agios Profitis<sup>2</sup>, which is 565 m above sea level (Fig. 2). Other peaks include Megalo Vouno<sup>3</sup> (330 m asl), Mesa Vouno (369 m asl, Fig. 3), Mikros Profitis Elias<sup>4</sup> (314 m asl) and Kokkino Vouno<sup>5</sup> (283 m asl). These (except Agios Profitis and Megalo Vouno) are volcanic cones and were created by deposits of lava and ash.

Based on the latest census in 2011 the island had 15,550 inhabitants.

The islet of Therasia, which, until the Bronze Age eruption, might be connected with the main island, was abandoned after the eruption and earthquake of 1956.

The small islet of Aspronisi<sup>6</sup> was formed from the white pumice of the Bronze Age eruption and its highest point is 60 m above sea level. (Fig. 1, 4, 5).

These three islets lie around a central basin, known as the caldera, which is up to 400 m deep and 84km<sup>2</sup> in area. The caldera is shaped by four depressions.



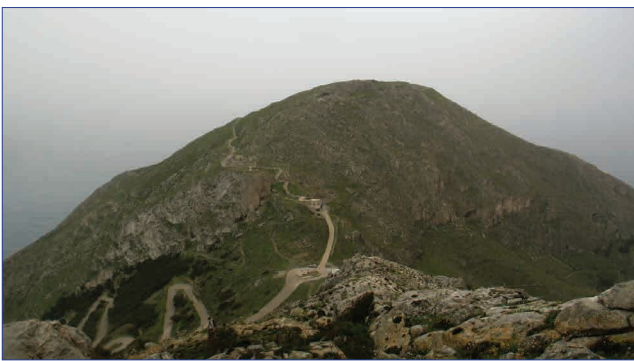
**Fig. 1** / Santorini: a) contemporary shape of the island, b) reconstructed island's shape before the Minoan eruption. (Illustration by author after McCoy 2009; 2017.)



## 1. Introduction



**Fig. 2** / Agios Profitis. (Photo by author)



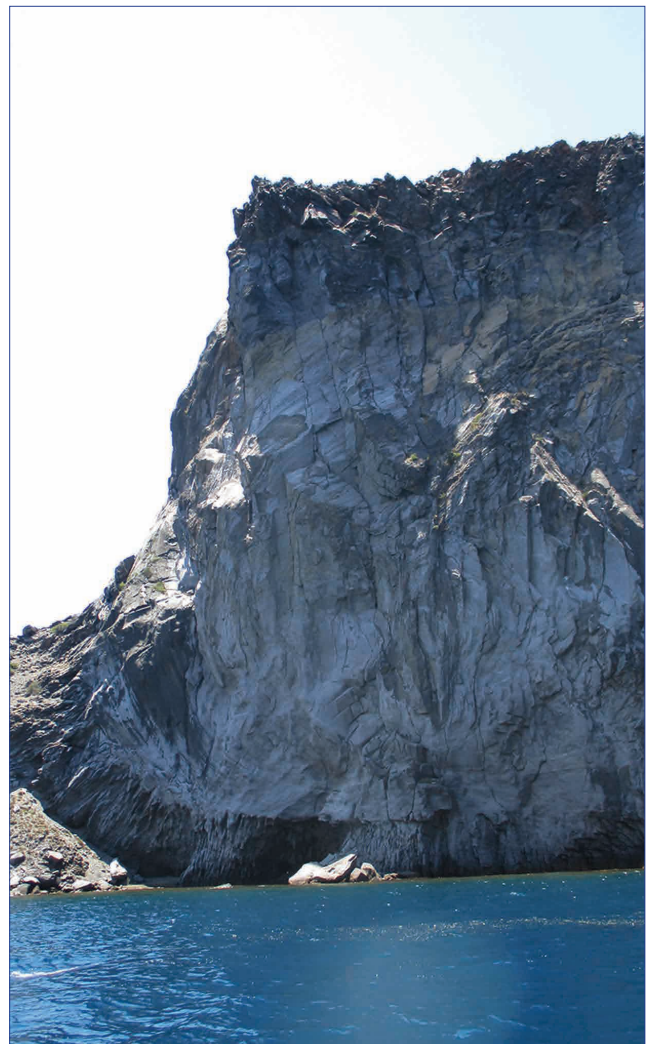
**Fig. 3** / Mesa Vouno. (Photo by author)



**Fig. 4** / Aspronisi. (Photo by author)



**Fig. 5** / View from Nea Kameni to Palea Kameni and Aspronisi. (Photo by author)



**Fig. 6** / Cliff of Palea Kameni. (Photo by author)

In the centre of the caldera is Palea Kameni<sup>7</sup> (Fig. 5, 6), an active volcano, which arose after the Bronze Age eruption. Part of this islet sank in the late Middle Ages. The Church of Saint Nicolas (Fig. 7) was built there, atop layers of lava flows, the latest volcanic layer of the region.