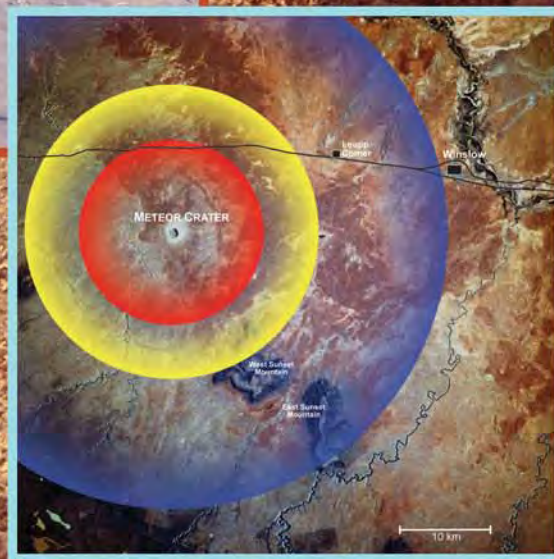


# GUIDEBOOK TO THE GEOLOGY OF BARRINGER METEORITE CRATER, ARIZONA

(a.k.a. Meteor Crater)



Fieldguide for the 70th Annual  
Meeting of the Meteoritical Society  
prepared by David A. Kring

# **Guidebook to the Geology of Barringer Meteorite Crater, Arizona (*a k a* Meteor Crater)**

Prepared by

**David A. Kring**

for the

70<sup>th</sup> Annual Meeting

of the

Meteoritical Society

August 2007

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## Table of Contents

|                             |  |     |
|-----------------------------|--|-----|
| Title Page                  |  | i   |
| Table of Contents           |  | ii  |
| Preface and Acknowledgments |  | iii |
| Chapter 1                   | Introduction                               | 1   |
| Chapter 2                   | Target Sequence                            | 6   |
| Chapter 3                   | Barringer Meteorite Impact Crater          | 24  |
| Chapter 4                   | Shock Metamorphism                         | 39  |
| Chapter 5                   | Crater Rim Uplift and Crater Wall Collapse | 47  |
| Chapter 6                   | Overtured Rim Sequence                     | 53  |
| Chapter 7                   | Distribution of Ejecta                     | 59  |
| Chapter 8                   | Projectile                                 | 67  |
| Chapter 9                   | Trajectory                                 | 74  |
| Chapter 10                  | Energy of Impact                           | 77  |
| Chapter 11                  | Age of the Crater                          | 79  |
| Chapter 12                  | Environmental Effects of the Impact        | 81  |
| Chapter 13                  | Post-Impact Lake                           | 86  |
| Chapter 14                  | Crater Rim East Trail Guide                | 89  |
| Chapter 15                  | Crater Floor Trail Guide                   | 113 |
| Bibliography                |  | 139 |

## ❖ Preface and Acknowledgments

The geological guidebook that follows has been prepared for the occasion of the 70<sup>th</sup> Annual Meeting of The Meteoritical Society in Tucson, Arizona, and a society field trip to the crater. The society last visited the crater in 1974 on a trip led by the late Eugene M. Shoemaker and one of his former students, Susan W. Kieffer, who is now the distinguished Charles R. Walgreen Jr. Chair at the University of Illinois. Like their guidebook, the following document provides a trail-oriented geological tour of the crater. The current guidebook relies heavily on the work of these authors, for which I thank them, but also incorporates lessons learned about impact cratering during the intervening 30+ years.

In addition, the geological processes involved in the formation of the crater have been broken down into a series of discrete topics. The goal is to illustrate how our understanding of those topics has evolved over the past 100+ years of study at the crater and how observations at the crater have influenced them. While our understanding of the processes involved in the crater's formation have grown, there are also a great number of topics that still need further research. In each section of the guidebook, I will try to identify those unresolved issues with the hope that those comments will spawn new studies.

I want to thank Drew Barringer, President of the Barringer Crater Company, and Brad Andes, President of Meteor Crater Enterprises, for their patience and response to countless questions and for agreeing to host The Meteoritical Society at the crater. I thank Carleton Moore for his insights about the crater, Canyon Diablo meteorites, and access to samples in the Nininger Collection at Arizona State University. I thank Carolyn Shoemaker for her insights about the crater and those of her husband. Both Carleton Moore and Carolyn Shoemaker are treasured colleagues who have guided many of the activities at the crater for many years. I also thank Bevan French for kindly stepping in to assist with a tour of the crater rim, while I lead a tour of the crater walls and crater floor. I thank Linda Chappell at the Lunar and Planetary Institute (LPI) for helping me obtain copies of some of the older publications about the crater. I thank Leanne Woolley and Ronna Hurd at LPI for their assistance with some of the illustrations in the guidebook. I thank the entire Publications and Program Services Department staff at the LPI for helping organize the field trip. Likewise, I thank the organizing committee of the 70<sup>th</sup> Annual Meeting of The Meteoritical Society for promoting the field trip.

As some of you may know, the Barringer family asked me to assume Gene Shoemaker's responsibilities at the crater after we lost him. At the time, David Roddy, who was another long-time advisor to the family, kindly tramped up and down the crater walls with me, providing a running commentary of crater lore. Unfortunately, we have since lost David too. I want to take this opportunity to thank both Gene and David for the insights they shared with me.

Finally, I thank the late Daniel Moreau Barringer, for without his work and insights we may not be here today, and members of the entire Barringer family, who have dedicated themselves to the preservation of this impact site for education and scientific research.

David A. Kring  
Houston

Meteor Crater (Barringer Meteorite Crater) formed 50,000 years ago when an asteroid plunged through the Earth's atmosphere and crashed into what would become central Arizona. Because of the crater's young age and the dry climate Meteor Crater is the best preserved impact crater on Earth. No humans were living in the region when the impact occurred. The iron meteorites found all around the area made that belief plausible. Gilbert came to the crater with instruments that he trusted could locate the giant buried mass of iron that he thought must still lie underground. When his dip needle instrument showed no indication of a local mass of iron he became convinced that Meteor Crater was formed by a volcanic steam explosion. Subject: Geology -- Arizona -- Meteor Crater -- Guidebooks. Subject: Meteor Crater (Ariz.) - - Guidebooks. Other copies: Look for editions of this book at your library, or elsewhere. Help with reading books -- Report a bad link -- Suggest a new listing. Home -- Search -- New Listings -- Authors -- Titles -- Subjects -- Serials. Meteor crater is located in desert with scarce vegetation cover. It is very impressive. Rims of crater are visible from far away and rise up to 45 m above the surrounding plains. When one reaches the rim, opens a grand view on approximately 1,200 m wide, up to 170 m deep crater. He thought that meteorite should have similar size to the size of the crater and that this giant mass of iron should be buried under the crater. Magnetic measurements did not show any significant mass of iron below the crater thus he concluded that this is explosion crater caused by volcanic processes. This hypothesis was widely accepted by the scientific community. Recommended books. The Barringer (Arizona) Meteorite Crater. A Grand Obsession: Daniel Moreau Barringer and His Crater. TAGS.

The crater has been named the Barringer Crater in honor of Daniel Barringer, who was first to suggest that it was produced by meteorite impact. It is also referred to simply as "Meteor Crater". The crater is located approximately 69 km east of Flagstaff, near Winslow in the northern Arizona desert of the United States. It is the largest impact crater yet discovered in the United States, and one of the best preserved on earth. Today the crater is about 1,200 meters in diameter, some 170 meters deep and is surrounded by a rim that rises 45 meter above the surrounding plains. The origin Guidebook to the geology of Meteor Crater, Arizona, prepared for the 37th Annual Meeting of the Meteoritical Society, August 7, 1974: Tempe, Arizona State University, Center for Meteorite Studies, Publication No. 17: 34-62 [reprinted 1988]. Anthony, J.W. et al. (1995) Mineralogy of Arizona, 3rd. ed.: 180, 274, 383, 403. U.S. Bureau of Mines (1995), Minerals Availability System/Mineral Industry Location System (MAS/MILS), U.S. Bureau of Mines, file ID #0040050319. USGS (2005), Mineral Resources Data System (MRDS): U.S. Geological Survey, Reston, Virginia, deposit ID #10283056. USGS Meteor Cr...

