

**DEEP IMPACT MISSION: LOOKING BENEATH  
THE SURFACE OF A COMETARY NUCLEUS**

Edited by

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## FOREWORD

Deep Impact is NASA's answer to the media's concern that robotic exploration is becoming boring. Deep Impact does more than just address its scientific objectives. It attacks them. It is an active mission, an energetic mission, a mission on a mission! It is a risky mission whose architecture is complex. The two spacecraft must work together, communicate, co-navigate. The flyby spacecraft must see the impact site. The impactor is aimed at the lit surface for better imagery; perhaps it will hit in a shadowed area. We do not know well the physical properties of the cometary nucleus. Is it dense and rigid or is it friable with many voids like pumice? Will there be a deep crater or a shallow crater? Will the nucleus breakup? Will the impactor go right through the nucleus? Will the comet suddenly become active? There are models, theories, ideas and wild guesses as to what will happen but at this writing they can be all lumped together as scientific speculation, as we have never been this close to a comet nucleus before. It is new territory for space exploration and the planetary scientist.

This volume provides an in depth examination of the Deep Impact mission: the system architecture, the scientific payload, the history and dynamics of the target, 9 P/Tempel 1, and the expected properties of the nucleus and the coma. It also describes the expected results of the mission: remote sensing of the geology of the surface, the size of the crater and the spectroscopy of the materials ejected. The auxiliary observations from 1 AU are described as are the returned data and the ground system that processes it. Lastly there is a discussion of the Education and Public Outreach Program for Deep Impact.

Assembling this volume required the efforts of many individuals who graciously donated their time to this effort. The referees and authors deserve much appreciation as they proceeded with this project in near record time, producing a most readable and complete description of the mission. We wish to thank especially Marjorie Sowmendran who assisted in the editorial office, and kept the process moving smoothly and promptly to completion.

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