

TERRESTRIAL IMPACT STRUCTURES

The TanDEM-X Atlas

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Africa, North/Central America, South America

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Asia, Australia, Europe

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Impact cratering is one of the fundamental processes in the solar system and, with all certainty, beyond. This process played a major role when the planets and their moons began to form from the protoplanetary disk, and throughout planetary evolution since then. On Earth, impacts of certain size even affected the evolution of life.

Lunar and interplanetary spaceflight over the past 50 years has provided us with detailed maps of the old, impact-crater covered surfaces of our Solar System neighbors. For Earth, the global impact crater record only represents a fraction of the bombardment that our planet has had to endure. Tectonic activity, erosion and weathering, and post-impact burial under sedimentary covers have erased most of the terrestrial impact history. Many of the remaining recognized crater structures have either been modified almost beyond recognition, or are buried entirely.

Mapping what is left of the terrestrial impact record from a satellite platform in low-earth orbit is often obscured by dense clouds and dust-laden air layers in our atmosphere; or even the lack of solar illumination prevents us to see the bare ground. Remote sensing methods developed in the past decades have given us tools, however, to tackle the challenge of mapping the Earth's surface with high precision.

Between 2010 and 2016 the German TanDEM-X radar X-band mission, operated and managed by DLR, the German Aerospace Center, generated the first global space-borne terrestrial digital elevation model of high resolution, based on Synthetic Aperture Radar interferometric measurements. We have used these data and produced the first topographic atlas of all currently confirmed terrestrial impact structures. This book provides the readership with the basic principles of impact cratering, of radar remote sensing, and of the TanDEM-X mission. It addresses the updated terrestrial impact crater record with more than 200 high-resolution maps, supplemented by geological descriptions and a plethora of field photographs for most structures. Thus, our atlas provides a comprehensive overview of the impact crater record for each continent.

