

## Myths and Misinformation about Tunguska and Cosmic Airbursts

Mark Boslough<sup>1</sup>, Peter Brown<sup>2</sup>, Andy Bruno<sup>3</sup>, Paul Chodas<sup>4</sup>, Gareth Collins<sup>5</sup>, Tyrone Daulton<sup>6</sup>, Alan Harris<sup>7</sup>, Christian Koeberl<sup>8</sup>, Ania Losiak<sup>9</sup>, David Morrison<sup>10</sup>, Olga Popova<sup>11</sup>, Darrel Robertson<sup>12</sup>, Elizabeth A. Silber<sup>13</sup>, and Matthias van Ginneken<sup>14</sup>

<sup>1</sup>Los Alamos National Laboratory, <sup>2</sup>University of Western Ontario, <sup>3</sup>Northern Illinois University, <sup>4</sup>Jet Propulsion Laboratory, <sup>5</sup>Imperial College London, <sup>6</sup>Washington University in St. Louis, <sup>7</sup>MoreData! Inc., <sup>8</sup>University of Vienna, <sup>9</sup>Institute of Geological Sciences, Polish Academy of Sciences, <sup>10</sup>NASA (retired), <sup>11</sup>Institute of Geosphere Dynamics, <sup>12</sup>NASA Ames Research Center, <sup>13</sup>Sandia National Laboratories, <sup>14</sup>University of Kent

Public understanding of impact hazards requires factual explanations by subject matter experts and accurate reporting, but the 24-hour news cycle and social media have reinforced the incentive to sensationalize cosmic events and exaggerate threats from the sky.

The 1908 Tunguska airburst has contributed greatly to our understanding of impact hazards. It has also spawned more than a century of myth and misinformation, some of which has even taken root within the scientific community. Many falsehoods about Tunguska have innocent origins and are simple misunderstandings that have become “factoids” through repetition. Others appear to be manufactured disinformation intended to bolster clickbait, discredit mainstream science, and/or support pseudoscience. Here are a few examples.

**If the Tunguska object had arrived 4 hours, 47 minutes later, it would have destroyed St. Petersburg.** False. This assumes a geocentric orbit in which only Earth’s rotation matters. In reality, Earth’s motion around the sun would have caused it to miss by a half million km.

**The Tunguska explosion flattened more than 80 million trees.** False. This is based on a preliminary estimate of the tree fall area before the first aerial survey showed that it was much smaller. It is probably a factor of four too high.

**The vapor jet from a Tunguska-sized airburst expands radially outward at the surface as a base surge.** False. A base surge is a density-driven flow. An airburst jet is buoyant and driven by inertia. After its downward momentum is depleted, it rises back into the sky.

**The Tunguska airburst melted surface materials and deposited diamonds, shocked quartz, and iridium.** False. No shocked or impact-fractured quartz has ever been found that was caused by the Tunguska event because shock pressures were six orders of magnitude too low. The air shock at the surface and thermal radiation were not hot enough to melt anything.

**The “Tunguska crater” image.** Internet stories about Tunguska often use a photograph of a circular feature, implying that it was created by the event. It was not. We have learned that it is a clearing at (58°13'53.0"N, 100°15'32.4"E), about 300 km south of the Tunguska epicenter, called “Devil’s Cemetery”. Searches on the local name “чертово кладбище” reveal that it is widely associated with Russian conspiracy theories and pseudoscientific speculation.

We will continue to add to our list of examples.