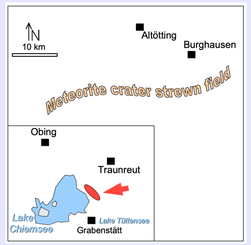
Many of a kind: the Digital Terrain Model and a new cluster of larger and smaller craters accumulate the Chiemgau meteorite impact strewn field

87th Annual Meeting of the Meteoritical Society 2025 (LPI Contrib. No. 3088) #5312.pdf
The poster can be enlarged considerably on the monitor.

Kord Ernstson[1] and Jens Poßekel[2]
[1]University of Würzburg, D-97074 Würzburg, Germany (kernstson@ernstson.de). [2]Geophysik Poßekel Mülheim, Germany (possekeljens@gmail.com)

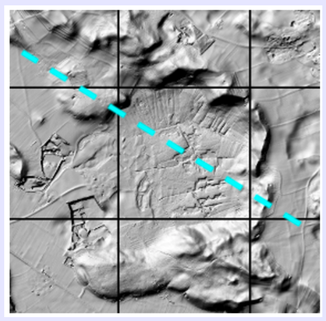
Introduction: The Digital Terrain Model DTM (in Germany the DGM 1 [1]) maps the topography of the earth's surface with a dense data network obtained from laser scanning from an airplane (LiDAR). The DTM data used here for a 1 m x 1 m grid at a vertical resolution of 10 cm capture the bare ground without buildings and vegetation, even in dense forests and swamps.

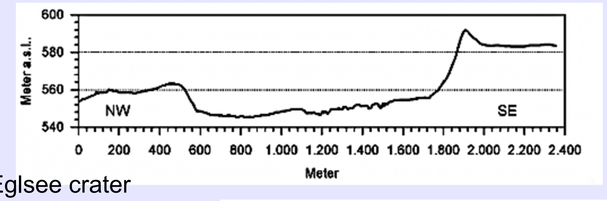


Location map of the crater cluster.

We have been using the DGM 1 for several years to systematically search the Chiemgau impact strewn field for new impact findings using this extremely high-resolution method, which has now led to well over 100 new structures. Here we report on a newly mapped cluster of impact craters at Lake Chiemsee, which once again calls into question previous glacial geological assumptions about a Lake Chiemsee glacier.

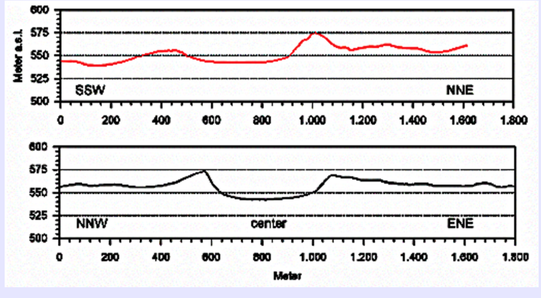
Larger craters - DGM 1 maps and profiles

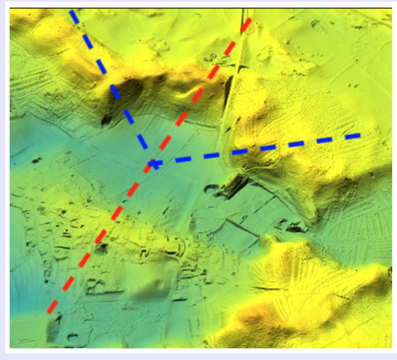




Eglsee crater

Note the horseshoe shape of the crater rim walls opened to southwest and pointing to a common oblique impact trajectory.



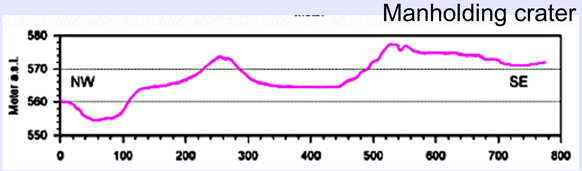


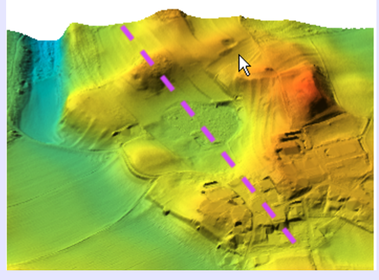
Hart crater

Note the strong exaggeration of the maps.

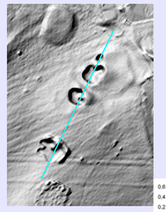
The DGM 1 profiles show a depth-diameter ratio of the order of 1 : 50 establishing the very flat signature, so different from commen impact cratering considerations.

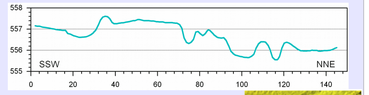
Manholding crater



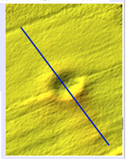


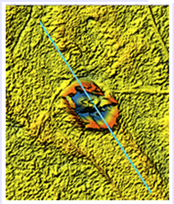
Smaller craters - DGM 1 maps and profiles



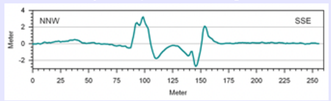


Shaded relief, m a.s.l.

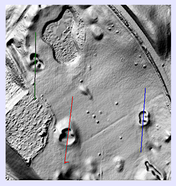


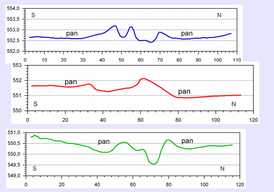


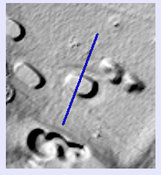
DGM 1 terrain surface, after removal of a trend field by low-pass filtering.

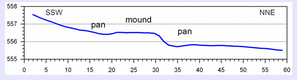


Note the strong exaggeration of the maps.

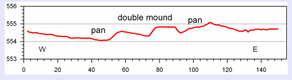


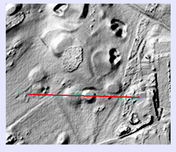




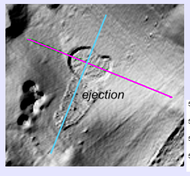


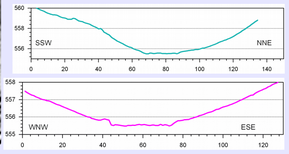
Crater pans with central mounds.

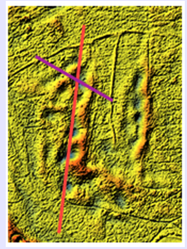


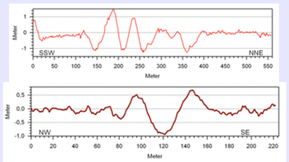


Shaded relief maps, m a.s.l.



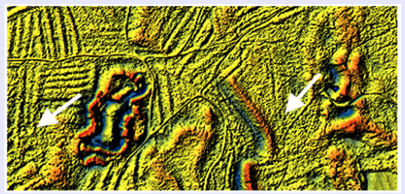


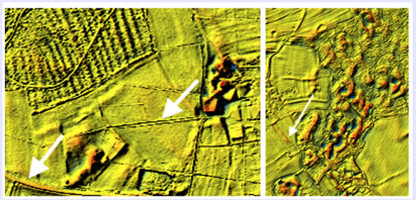


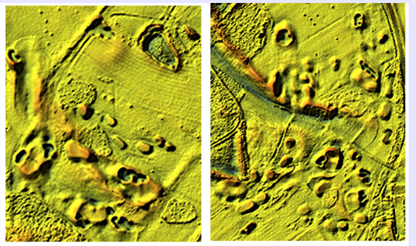


Chains of rimmed craters.

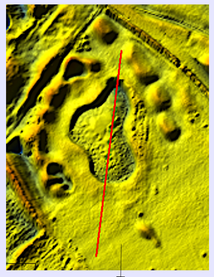
Complex airburst impact cratering







Multiple crater sets forming shorter chains and piles. The white arrows point to the remarkable displacements of the chain craters elongated in the same direction.

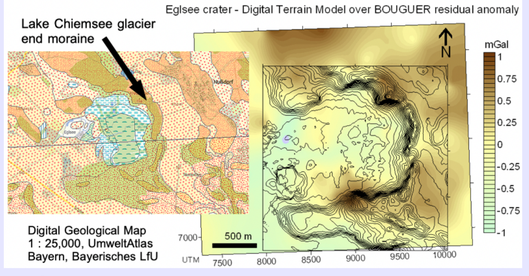


(DGM 1 terrain 3D surface after removal of a trend field by low-pass filtering.)

Enigmatic complex rimmed triplet impact structure encircled by a two-thirds chain of periodic circular mounds.

Discussion

- The relatively limited area has yielded remarkable results in terms of the number, distribution, and grouping of craters and other impact features.
- As shown in the past [2], their formation as ice age dead ice holes or through geogenic and anthropogenic processes can be ruled out in the most cases.
- The extremely high-resolution DGM 1 has ushered in a new era of impact research, particularly with regard to the new, profound insights from low-altitude touchdown airburst impacts.
- Such a process has also been assumed for some time for the Holocene Chiemgau impact [4-7], and the results discussed here continue to leave no doubt about the origin of what is currently probably the most significant Holocene impact event worldwide.
- The new results at Lake Chiemsee once again call into question previous glacial geological assumptions about a Lake Chiemsee glacier [3].
- We understand the “old” geologists and ice age researchers, for whom the morphology around Lake Chiemsee, with its moraines and dead ice holes, was naturally the remnants of the last Würm ice age, even if geomorphologically many landforms made it difficult to attribute these to glacial processes dating back more than 10,000 years.
- It cannot be emphasized enough that it is only with the application of extremely high-resolution digital terrain models that the true nature of many morphological features in the post-glacial Alpine foreland can be understood.



Ice age vs. meteorite impact: The Eglsee crater in the current standard geological map as Würm ice age formation and as Digital Terrain Model DGM 1 topographic map superimposed on the gravity Bouger anomaly map. The comparison reveals the difference between the ice age moraine interpretation and the extremely sharp-cut rim wall of the impact crater excluding a more than 10,000 years old end moraine. According to recent research, the Chiemgau impact took place around 900-600 BC [2].

References: [1] © Bayerische Vermessungsverwaltung (2024); Data source: Geoportal Bayern www.geoportal.bayern.de. [2] Chiemgau Impact: A Bavarian meteorite crater strewn field. https://www.chiemgau-impact.com. [3] Darga, R: Auf den Spuren des Inn-Chiemsee-Gletschers. Verlag Dr. Friedrich Pfeil, München 2009. [4] Ernstson, K. and Poßekel, J. (2024) AGU 24, Abstract #EP01-29. [5] Ernstson, K. and Poßekel, J. (2024) LPSC 55th, #1658. [6] Poßekel, J. and Ernstson, K. (2025) LPSC 56th, #2770. [7] Ernstson, K. et al. (2024) LPSC 55th, #1641.