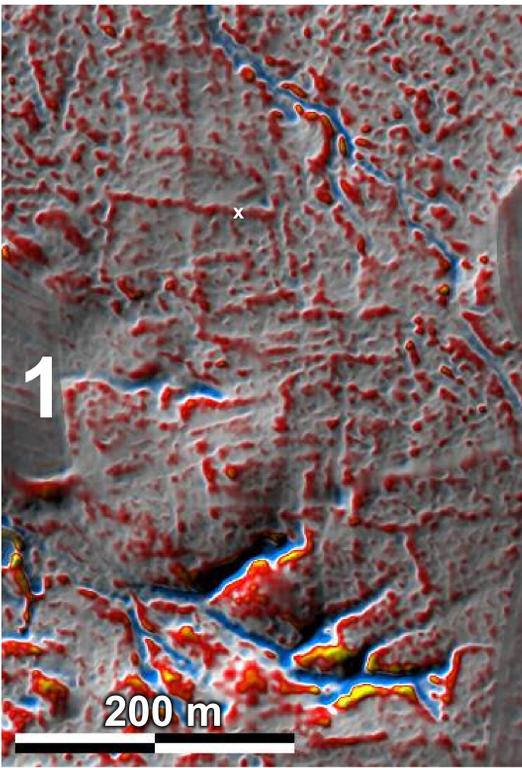


14C-dated celtic fields in the Dithmarschen moraine land

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The datings show a very inconsistent character:

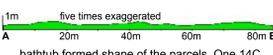
1 Odderade, Kr. Dithmarschen, Riesevothl-centre. Fragmentary celtic fields and field terraces, partly badly preserved. Surrounded by two settlement sites of late pre-roman iron age; in one terrace slope a pit of pre-roman iron age which could not be set into a stratigraphical context to the terrace slope. A 14C sample of embankment material (x) resulted in 1861-1613 BC (early bronze age).

2 Sarzbüttel, Kr. Dithmarschen, Riesevothl-southwest. More or less isolated fields bordered by embankments or terrace declines. Many of them seem to be reused during the middle ages, as the remains of striped fields show. A 14C sample from the root of a fallen tree (a) showed a date of 403-206 BC. Another sample from a terrace slope (b) gave a dating of 720-950 AD (early medieval).

3 Albersdorf, Kr. Dithmarschen, Falloh. Faintly recognizable celtic fields. A 14C sample (x) from an embankment dates from 411-256 years BC.

4 Nindorf, Kr. Dithmarschen. Celtic field remains preserved in woodland and – faintly – in neighbouring ploughed farmland. A 14C sample (x) from the crossing of two embankments results in a dating of 818-541 BC (late bronze age).

5 Odderade, Kr. Dithmarschen, "Primeigehöfz". Celtic field remains preserved in woodland and also at the neighbouring meadow. A cut shows the



bathtub formed shape of the parcels. One 14C sample (a) resulted in an age of 666-770 years AD, another – also from an embankment crossing (b) – shows a dating of 359-106 BC.

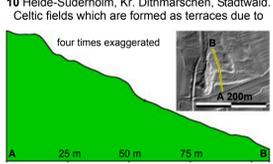
6 Frestedt, Kr. Dithmarschen, Süderholz. Celtic fields mainly preserved in woodland. C14-dating from a prominent embankment crossing; 2134-1833 BC (late neolithic) – a hidden grave mound?

7 Süderheistedt, Kr. Dithmarschen, Gehölb. More or less badly preserved celtic fields in woodland. C14-dating from the roots of a fallen tree at a border slope (x): 896-796 BC.

8 Windbergen, Kr. Dithmarschen, Heese (left) and Bielholz (right). Remains of larger celtic fields preserved in woodland, but partially also in farmland and meadows. A C14-dating from an embankment crossing in the Heese (x) resulted in 2909-2637 BC.

9 Hollingstedt, Kr. Dithmarschen, Krusenbusch-Nord. Faintly preserved celtic fields. A C14-dating from an embankment failed (too few material).

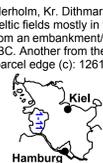
10 Heide-Süderholm, Kr. Dithmarschen, Stadtwald. Celtic fields which are formed as terraces due to



the strong decline. At the most prominent terrace border, a lot of carbonized barley grains, charcoal, tiny sherds and burnt flint were found (a). C14-dating from some barley grains: 85-245 AD.



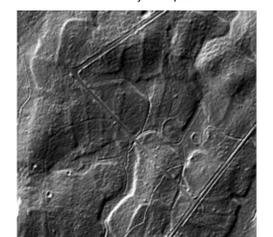
11 Heide-Süderholm, Kr. Dithmarschen, Süderholmer Wald. Celtic fields mostly in form of terraces. A C14-dating from an embankment/terrace edge (b) gave 796-491 BC. Another from the root of a fallen tree at a parcel edge (c): 1261-1048 BC.



How are these graphics made?

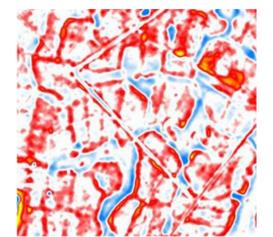
The shown graphics consist of two parts: a virtual relief view of the original or faintly smoothed data matrix and of a wall emphasizing graphic made of data which are filtered. Both parts are multiplied by normal picture processing.

Each the relief view and the wall emphasizing graphic are made by Global Mapper. For making an optimal relief view the standard values are less suited. I use an extremely low light direction altitude, a low value for vertical exaggeration and an extremely high value for ambient lighting. The standard azimuth is 315°, so the light comes from above left. Hillshade has to be activated. Such a hill-shaded virtual relief has a good 3D-effect, but structures which take course of exactly the light direction may disappear.

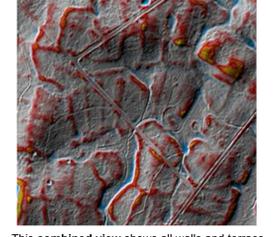


For making a wall emphasizing graphic you first have to produce a stronger smoothed matrix.

Afterwards, I use the difference between unsmoothed (or less smoothed) data and stronger smoothed data to construct a new matrix using the SURFER program. This matrix results in a presentation without hillshading, but using a self defined shader which brings red colour specially to faint walls and hills.

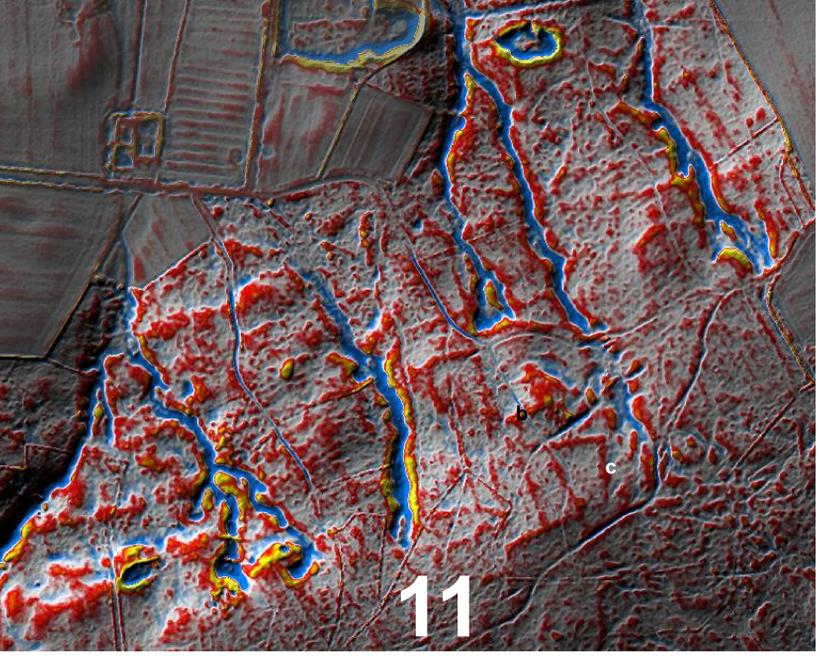
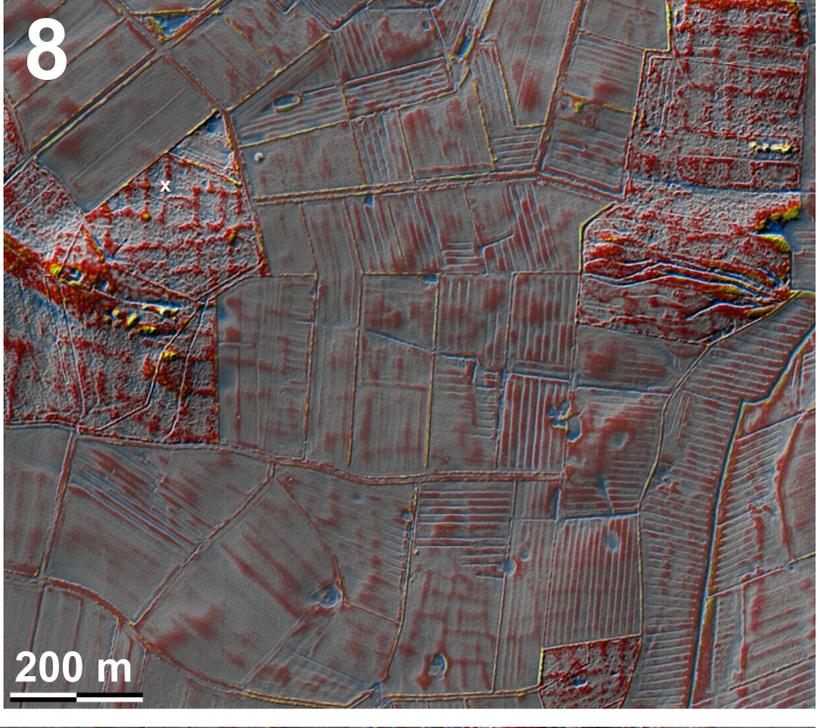
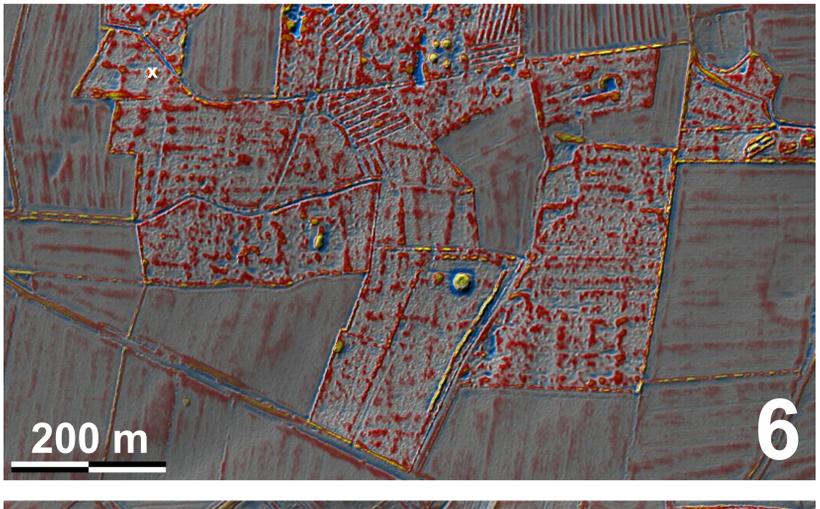
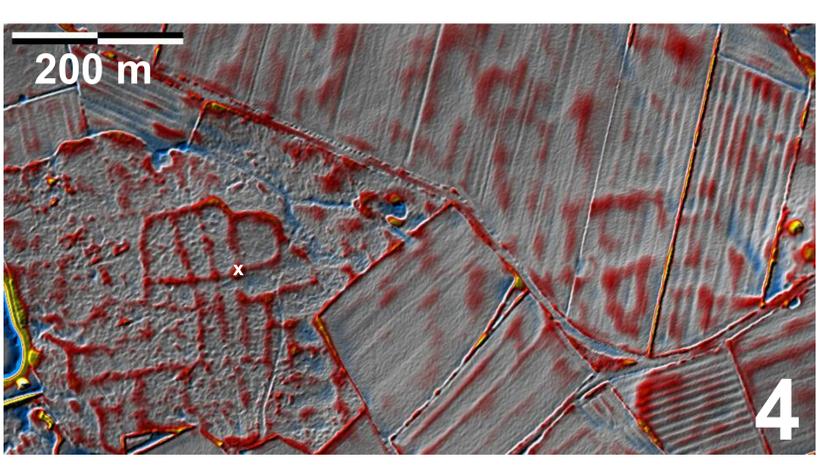
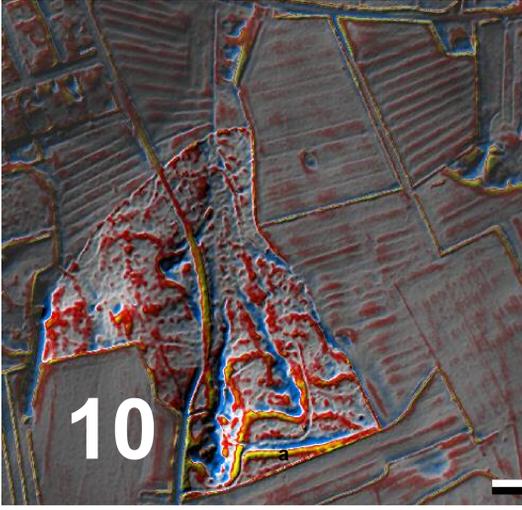
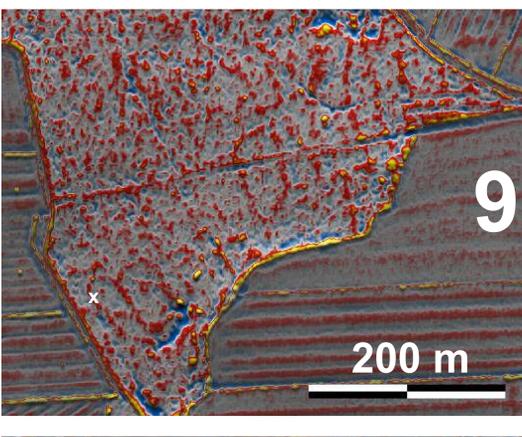
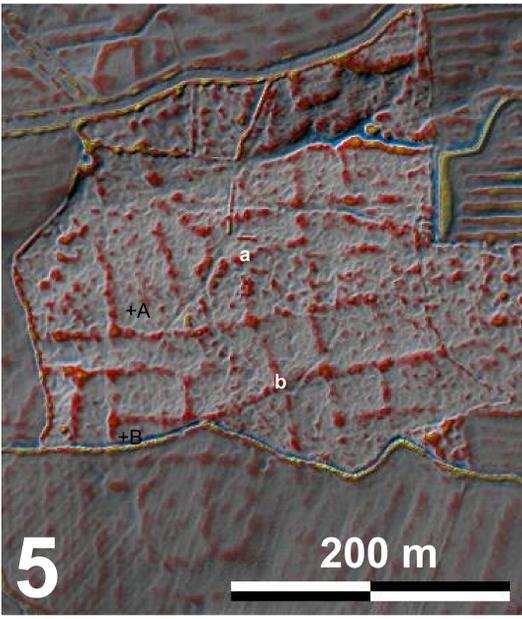
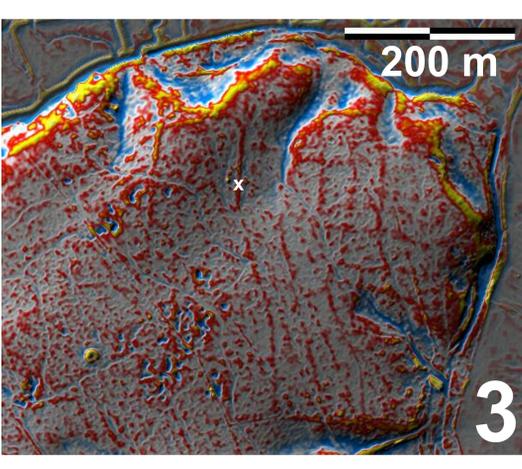
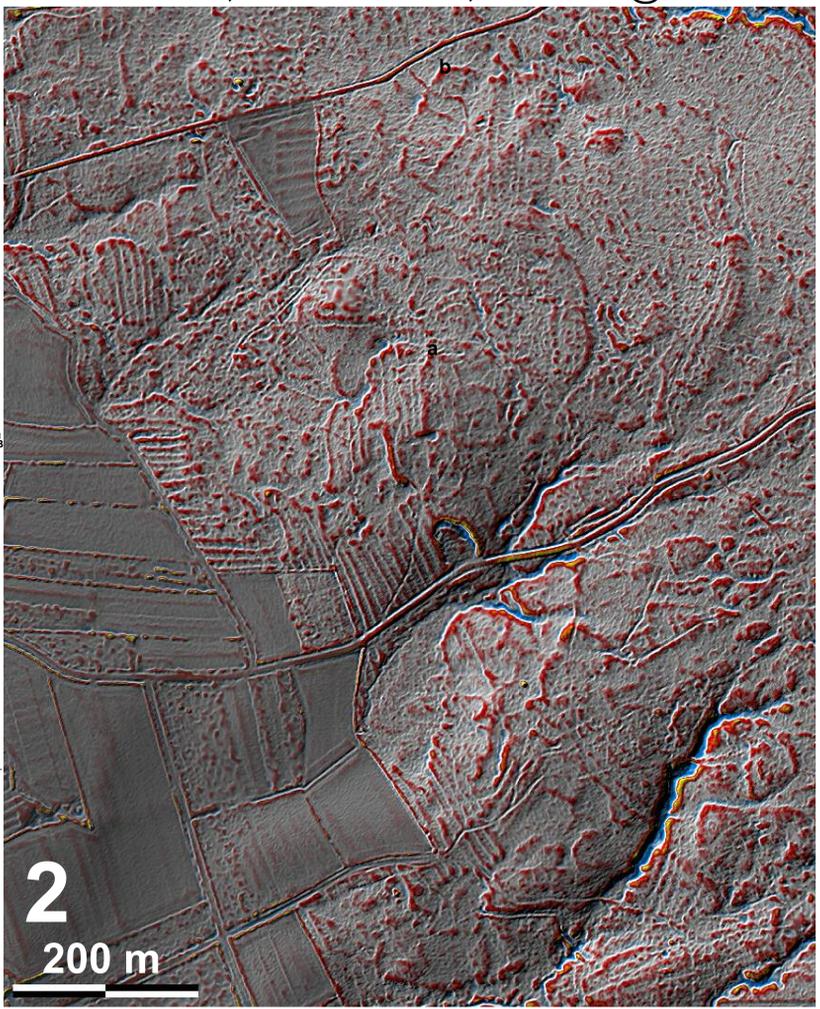


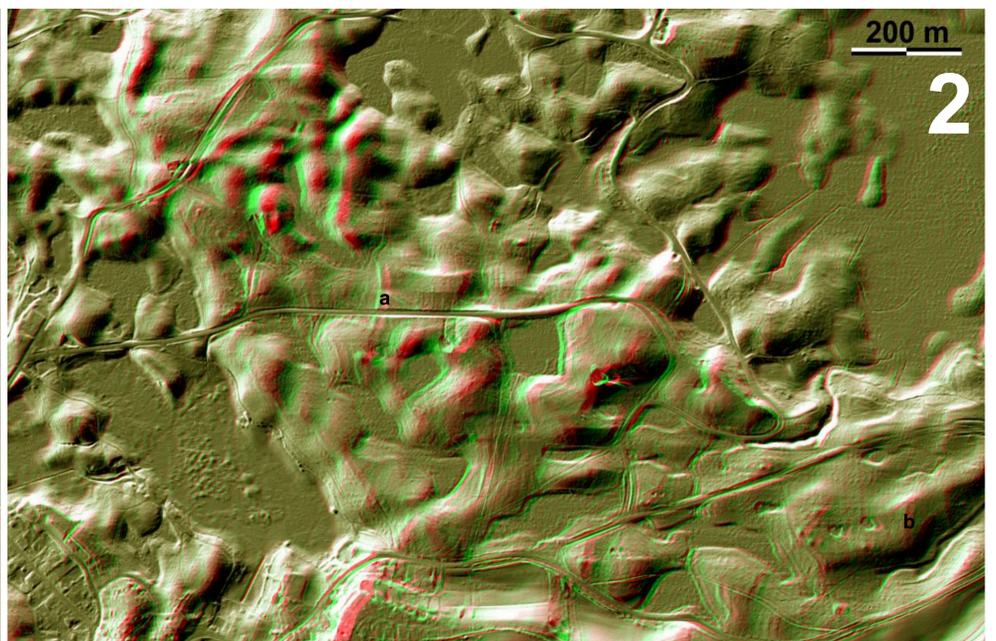
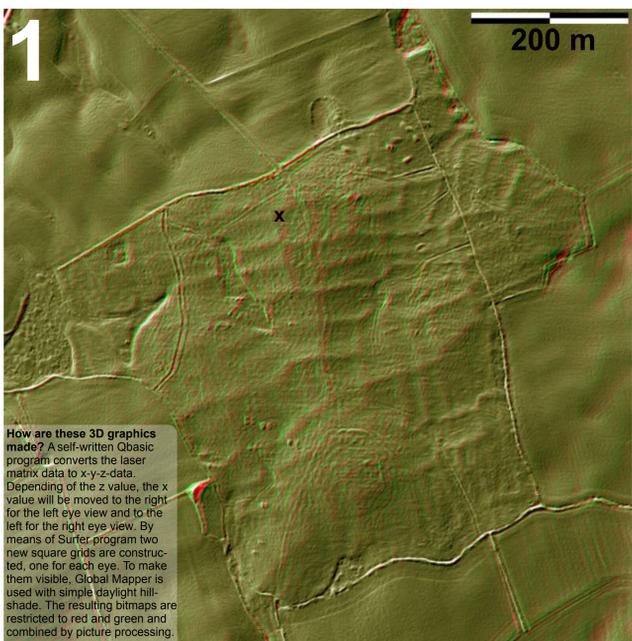
Those two views are saved as bitmaps and combined by normal picture processing by "multiplying" to a combined view:



This combined view shows all walls and terrace edges very clear, but they are hard to distinguish from each other. Anyway, it seems to be the best way of showing the celtic field structures. – Copyright of graphics: © Volker Arnold, Heide Laserscan data © L'VermGeo SH

The expenses of the 14C measurements were contributed by Sciencestarter crowdfunding (www.sciencestarter.de) and by the Verein für Dithmarscher Landeskunde e. V.





How are these 3D graphics made? A self-written Qbasic program converts the laser matrix data to x-y-z data. Depending of the z value, the x value will be moved to the right for the left eye view and to the left for the right eye view. By means of Surfer program two new square grids are constructed, one for each eye. To make them visible, Global Mapper is used with simple daylight hillshade. The resulting bitmaps are restricted to red and green and combined by picture processing.

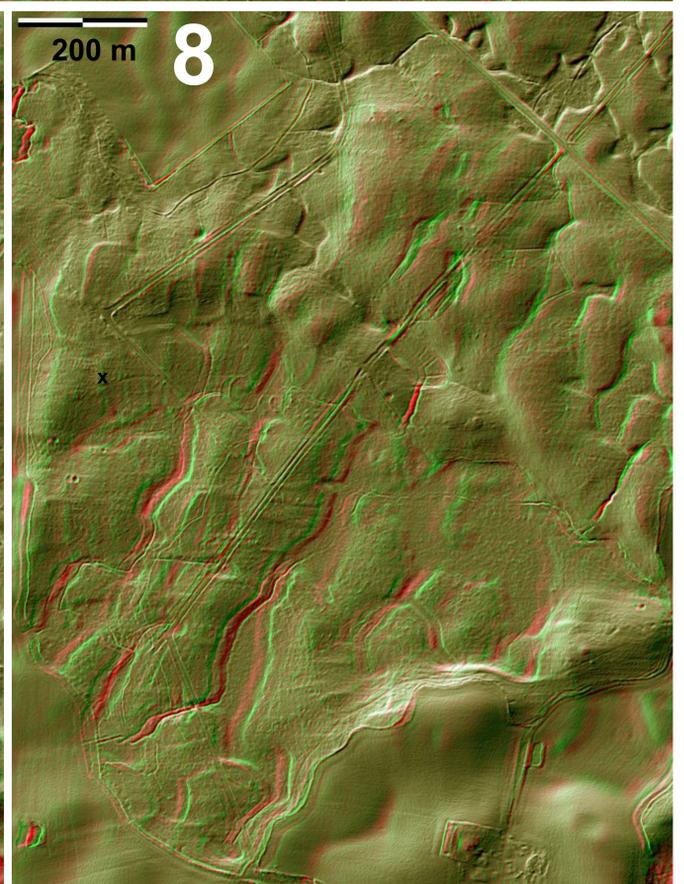
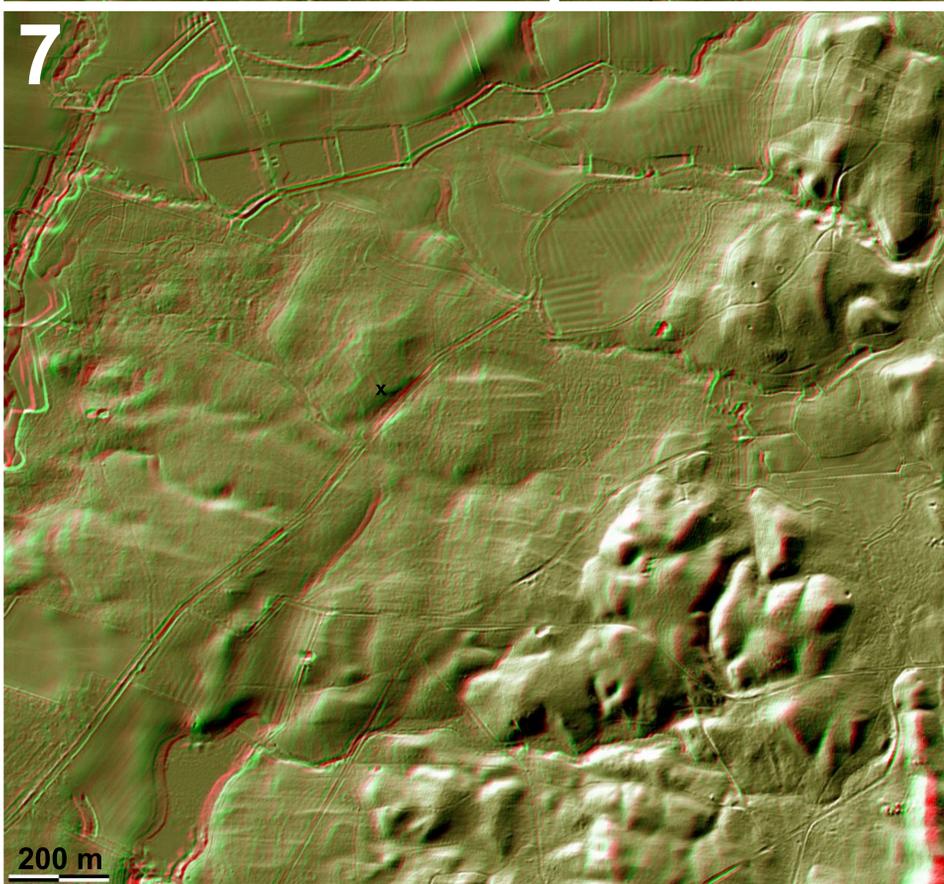
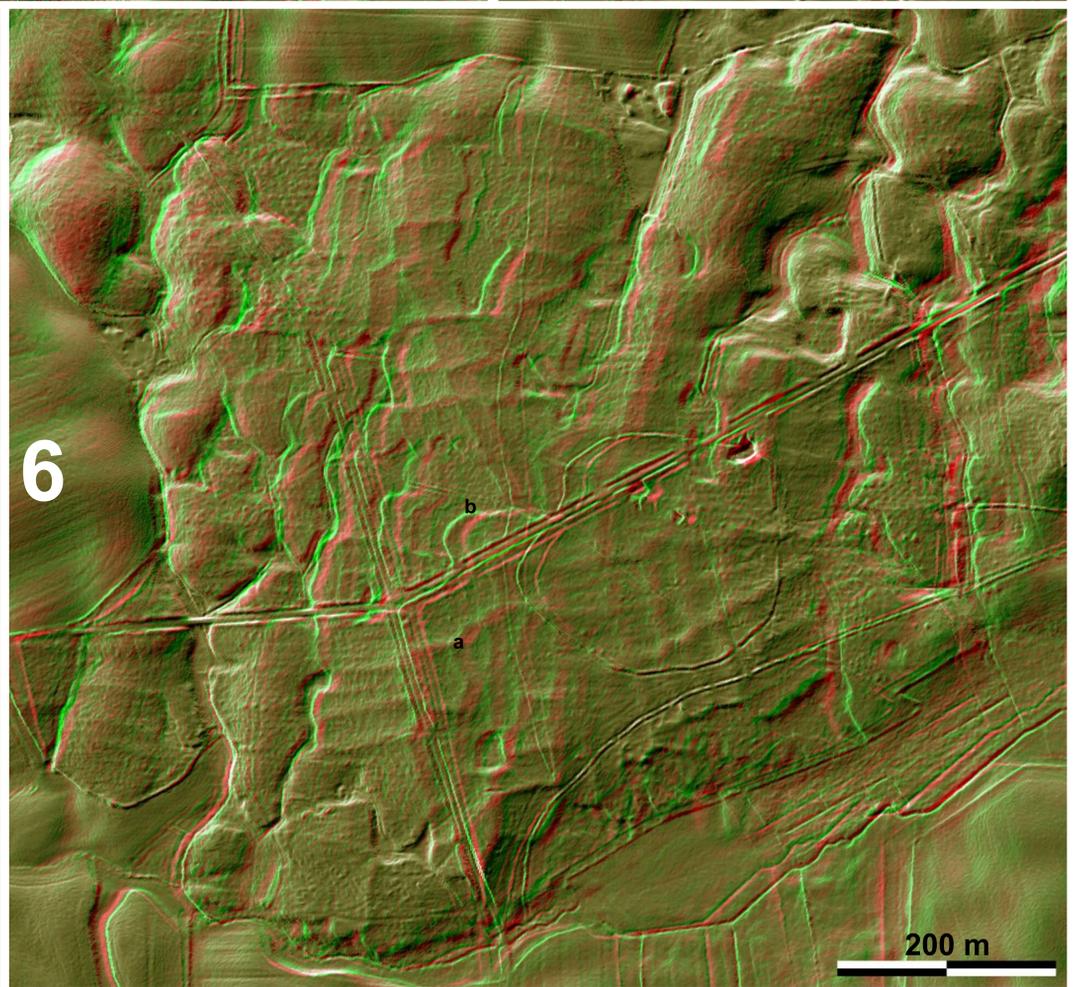
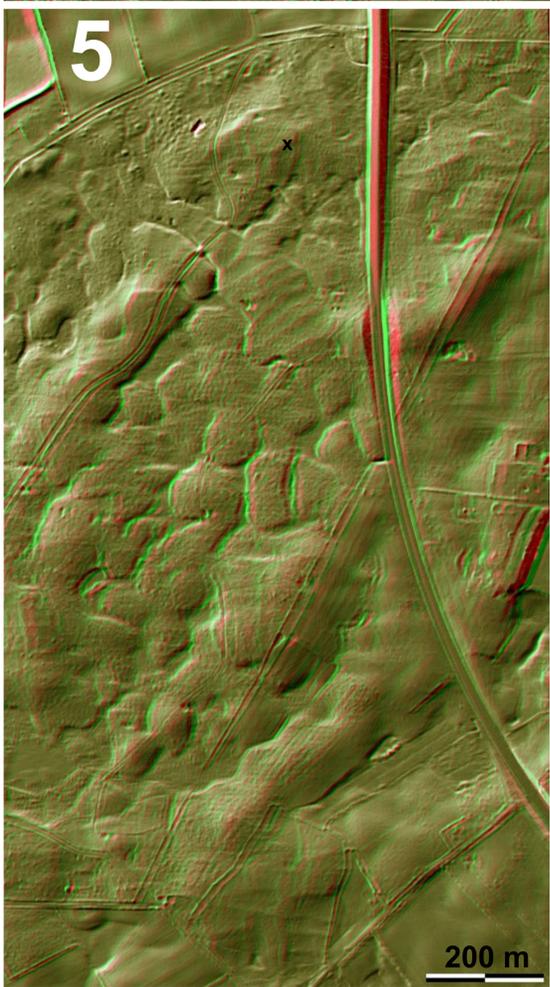
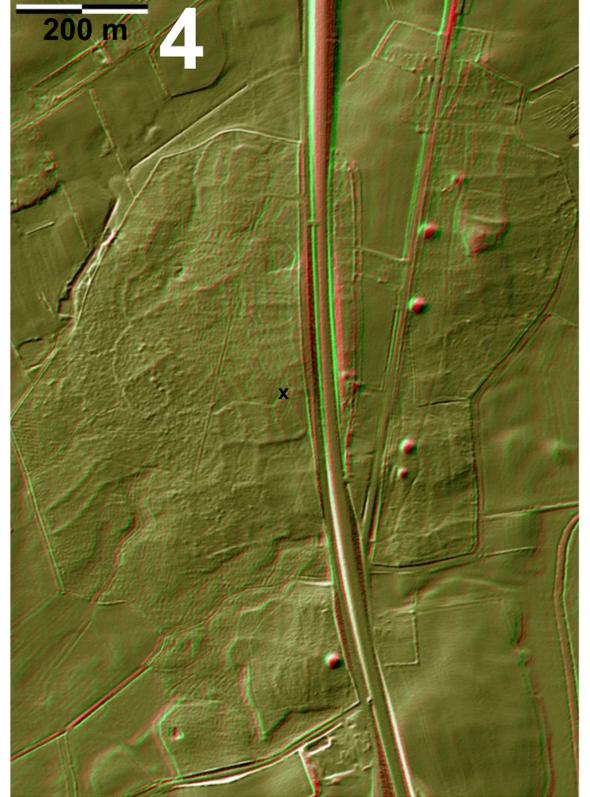
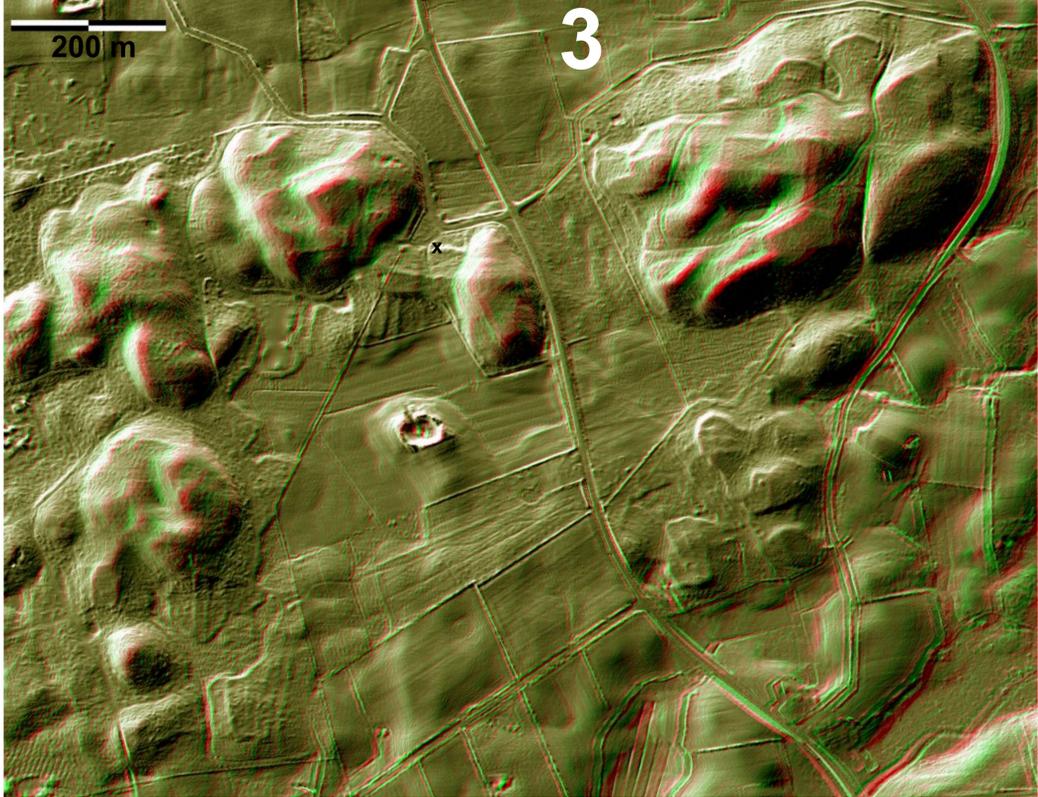
Eight 'celtic fields' of Schleswig-Holstein: LIDAR data seen in 3D by redgreen glasses

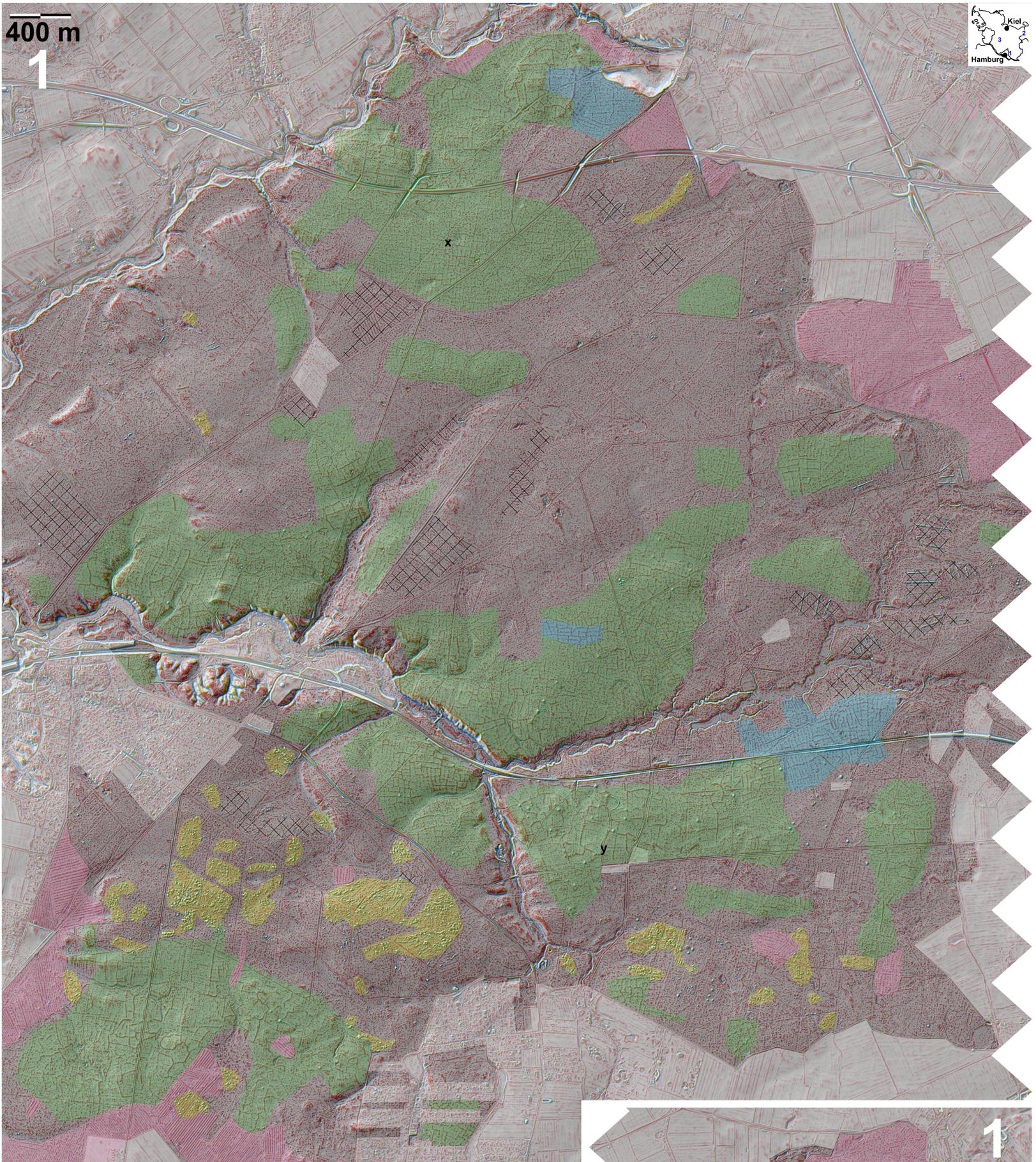
1 Kosel, Kr. Rendsburg-Eckernförde, celtic fields in the Ommer Holz, dated to 247-393 years AD. The environment is well explored by excavations (settlements of late roman iron age and viking age) and pollen analysis. - 2 Glücksburg, Kr. Schleswig-Flensburg, Friedeholz: remains of prehistoric fields. Two C14-datings resulted in 552-651 AD (a) and 406-557 AD (b). - 3 Idstedt, Kr. Schleswig-Flensburg, Gehege Karrenberg: four areas with celtic fields. 14C-dating (x): 179 BC - 4 AD. -

4 Sieverstedt, Kr. Schleswig-Flensburg, Pflanzkoppel. The celtic fields area is cut by the "Heerweg" (ancient road), accompanied by grave mounds. One of them was flattened by the celtic field peasants, who left a big heap of stones at the northeastern edge of the parcel. A C14-dating (x, 1304-1422 AD) seems to be too late. - 5 Schuby, Kr. Schleswig-Flensburg, Gehege Pöhl. At least three areas with celtic fields. It may be that a lot of the banks surrounded by declines had

been under culture, too. At the northern rim a lot of grave mounds. Immediately north of the mounds an urnfield was excavated, mainly with urns from younger roman iron age and migration age. C14-dating (x): 755-410 BC. - 6 Ulsby, Kr. Schleswig-Flensburg, Gehege Außelbek: the best investigated celtic fields area in Schleswig-Holstein. By pollen analysis the cultivation phase could be defined clearly: a striking decline of forest trees corresponds to an increase of grasses, cereals and

cereal weeds. One 14C-dating of a wall (a): 748-401 BC, another (b) failed obviously to date an initial charcoal layer in one of the muddy declines (432-633 AD). - 7 Trittau, Kr. Stormarn, Hahnheide, celtic fields. A C14-dating (x: 2402-2135 BC) seems to be too old. - 8 Pohnsdorf, Kr. Plön, Gehege Vogelsang. Finds from roman iron age are known from the farmland west of the forest. A C14 dating (x) resulted in an age of 551-944 AD. - All laserscan data © LVermGeo SH Hamburg

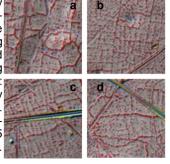




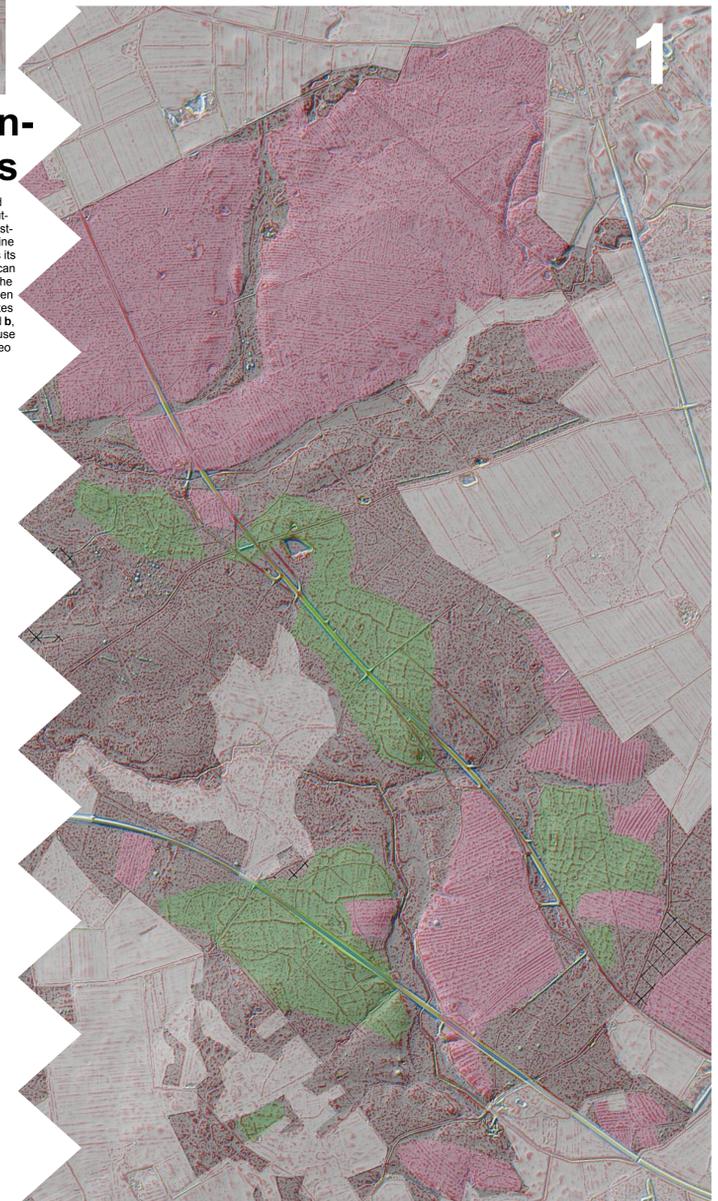
Germany's largest celtic fields area at the Sachsenwald and the Guttau and Schierenwald celtic fields

The Sachsenwald (Kr. Hgtn. Lauenburg) is the largest forest with ancient roots in Schleswig-Holstein (1). While the surrounding areas were colonized during the 12th century, the earls of Saxony-Lauenburg intended to keep this forest for their own purposes. Aside from ca. 750 grave mounds, it contains the largest area of celtic fields in whole Germany. They can be differentiated into 3 types: parcels of very irregular shape (a), parcels with more or less quadratic shape (b, both green marked) and parcels with oblong shape (c, blue).

Many of the celtic fields are only very faintly preserved and have the tendency to disappear without a distinctive outer border. There are parts with clearly recognizable leading embankments (d). Only in one case, a road can be realized between two accompanying celtic field embankments (left and y). Red: areas with striped floor of medieval or early new age. Yellow: areas with small dunes. Hatched: areas with recent surface damages by foresting. Two C14 dates: 892-1015 AD (x, too late?) and 91 BC-75 AD (y).



While the Sachsenwald is situated in old moraine, the similar celtic fields of the Guttauer Gehege (2) near Kellenhusen, Kr. Ostholstein lie in an unusually flat young moraine landscape. What makes them so special is its vicinity to the former Baltic sea. The walls can be followed down to about 1.30 m above the present sea level. This level must have been a bit lower during cultivation. Two C14-dates from embankments (a, 1271-1394 AD, and b, 1515-1797 AD) seem to represent a later use of the forest. - All laser values © LVermGeo



The celtic fields of Hohenlockstedt, Kr. Steinburg, Schierenwald (3) are one of the rare ones in the southwestern part of Holstein. They are situated also in a relatively flat old moraine landscape, faintly preserved and seem to "disappear" at their borders what means that the really cultivated areas must have been larger than recognizable. A 14C-dating of a wall (x, 1450-1266 BC) seems to be too old.

