3D Visualisation of Geodata: Gimmick, Hype or Necessity?

After a surprisingly lengthy delay, the geocommunity has caught on to the advantages of 3D visualisation; this technology has become a real hype in recent years. However, despite the increasing availability of 'real' 3D geodata, i.e. actual xyz datasets rather than 2.5D data, the majority of data processors and users have only taken pseudo-3D depictions into consideration. Is 'true 3D' still considered a gimmick or a hype rather than a necessity?

(By Manfred Buchroithner, TU Dresden, Germany)

In this context, consideration of a recent (2015) edition of the leading magazine called *3D Visualization World* reveals that four out of the five articles under the heading 'Latest News' deal with new remote sensing data or global mapping. None of them deal with 3D geovisualisation itself – irrespective of whether we understand '3D' to mean 'pseudo' 3D or actual stereoscopic 'true 3D'.

In a feature article in *GIM International* in 2013, I previously asked "How three-dimensional is 3D cartography?". Even now, almost three years later, the number of truly three-dimensional, i.e. autostereoscopic, geodisplays which can be spontaneously viewed without viewing aids like polarisation or anaglyph glasses has not increased significantly. Why not? Is 'true 3D' still considered a gimmick, a 'nice-to-have' rather than a 'must-have'? For several years, so-called lenticular foil maps have been the most prominent representatives on the hardcopy side. Recently, however, triggered by the TV and gaming industry, electronic softcopy displays have been undergoing a dynamic development.

Since the visual perception of normal-sighted persons is stereoscopic, it definitely makes sense to use modern technologies in order to generate geovisualisations for truly three-dimensional viewing. Besides their use for spatial modelling of georelief, these methods can also be applied for three-dimensional visualisation of thematic information with three or more parameters represented at different depth levels. By making use of particular visual processing mechanisms, the viewers are offered the possibility to derive three-dimensional objects spontaneously from an apparent 'one-image depiction'.

In recent studies, a joint German research team from Bochum University and TU Dresden was able to stringently prove by means of user tests that autostereoscopic thematic maps with geodata displayed at different viewing depths increase the speed of information extraction and may therefore also allow depiction of more data. At ICA's 2015 International Cartographic Conference in Rio de Janeiro, Brazil, the first true-3D (lenticular foil) map showing two superimposed surfaces of the Antarctic was on display. The bedrock beneath the ice shield can be viewed through a turquoise hexagonal wire-frame representation of the ice surface. This proves that we are now methodologically able to display two (or even more) planes on top of each other autostereoscopically, thus providing immense possibilities for various applications such as construction planning or mining to name but a few. Hence urban main networks, for example, could be displayed in their three-dimensional position beneath digital surface models or digital terrain models.

Is true 3D geovisualisation a gimmick, nice-to-have, hype or indispensable tool? As already indicated, under certain circumstances the new autostereoscopic possibilities of geovisualisation are necessary and efficient for analysis and replacement of actual physical models. Just a few days into 2016, the world-famous Argentinean film director and screenwriter Gaspar Noé, when asked why he loves to produce films in 3D, simply answered: "3D images are much closer to life". The same holds true for geodata!

Biography of the Author

Manfred Buchroithner has been Full Professor for Cartography at TU Dresden, Germany, since 1992. His major research interests centre around high-relief terrain and (true) 3D mapping using advanced remote sensing technologies. His professional activities are focused on the production of high-mountain trekking maps, 4D glacier mapping and laser scanning of caves. He has written and edited several books in the fields of cartography and remote sensing.