



# True-3D Goes Operational – Recent Trends in Auto- stereoscopic Geovisualisation

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11 March 2011

# Why True-3D?

According to so far unpublished statistically indicative studies more than 60 % of all users of topographic or hiking maps are not able to derive the relief information spontaneously (studies carried out in the 1970s and the 1980s; the subjects were members of alpine climbing courses with academic education).

Autostereoscopy - Projects at the Institute for Cartography dealing with autostereoscopic visualisation techniques since 1995

TECHNISCHE  
UNIVERSITÄT  
DRESDEN

Institute for Cartography

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2011

In recent years, and in particular since 2010, the term "3D" has increasingly been appearing in the media, mostly in connection with TV screens. The 3D technology inevitably leads us away from the world of television and home cinema. There are many different visualization techniques for creating truly three-dimensional visualizations. If the viewer perceives an object spontaneously and without any further viewing aids in a three-dimensional manner, the authors talk about autostereoscopic, true-3D visualizations. Up to now, there are not yet fully suitable for cinema or home entertainment. Ideal for cartographic purposes they are definitely very useful as demonstrated by various products and studies carried out at the Institute for Cartography. For about fifteen years True 3D Visualization Group has been working with various autostereoscopic visualization techniques that allow the user to perceive a spatial impression of the geoinformation or that permit to see multi-view effects combined in one single map. The present poster shows the projects of students respectively PhD students at the Institute for Cartography. A subsequent one will be dedicated to its other projects dealing with autostereoscopic visualization techniques.

Studies

Concept of the digital globe icon.  
C. Knust 2007

Pre-Thesis Claudia Knust, 2007  
Conception of a digital historical globe for the Mathematical-Physical Salon for the visualization on 3D-display. Cooperation with the State Art Collections Dresden, Mathematical-Physical Salon, Zwinger Palace, Dresden, Germany. Technique: penumbral barrier technique.

PhD Thesis Kai-Ingo Heibrock, 2007  
Geo-Visualization Tools for Participatory Urban Planning – The Case of Triebitz, Leobach. Kartographische Blaubeine, Vol. 35. Technique: lenslet full map.

Fig. 2: Map of actual level one of Leipzig.  
L. Lehmann, C. Knust 2007

Fig. 3: Selected results of the studies.  
C. Knust/Kirchnerbauer 2004

PhD Thesis Katharina Kirchnerbauer, 2004  
Empirical cartographical analysis of a true-3D visualization using the example of a topographic high mountain pass. Mensch & Buch, 161 pp. Technique: prism mask technique.

Parameter	Prism Mask	Lenslet Full Map	Penumbral Barrier	Other
Resolution	High	Medium	Low	Variable
Color Depth	Full Color	Grayscale	Grayscale	Full Color
Viewing Distance	Near	Middle	Far	Variable
Field of View	Wide	Narrow	Wide	Variable
Cost	High	Medium	Low	Variable
Portability	Low	Medium	High	Variable
Integration	Easy	Difficult	Easy	Variable
Application Areas	Navigation	Education	Art Installation	Various

Pre-Thesis Thomas Grünemann, 2004  
Analysis of the fundamentals for cartographic true-3D visualization with the help of the lenslet full map technique. Technique: lenslet full map technique.

Fig. 4: Parameters of some selected lenslets from different producers.  
T. Grünemann 2004

Fig. 5: Details view from the Dresden 3D-Display.  
F. Lohmann 2002

Pre-Thesis Stefan Lehmann, 2002  
Development and prototypical implementation of a geovisualizer for the Dresden 3D-Display. Technique: prism mask technique.

Figures taken from the different theses respectively from corresponding presentations of the respective authors.

References:  
Fig. 2 © PhD Thesis K. Heibrock 2007, CD-ROM attachment, fig. present/lehmann.jpg  
Fig. 3 © PhD Thesis K. Kirchnerbauer 2004, 65 slides, fig. 7.8  
Fig. 4 © Pre-Thesis T. Grünemann 2004, p. 21, table 3.2  
Fig. 5 based upon PhD Stefan Lehmann 2002, geovisualizer.pdf  
Fig. 6 © Diploma Thesis K. Bräuer 2011  
Fig. 7 © PhD Thesis T. Schreiner 2008, CD-ROM attachment, fig. ds\_27.tif  
Fig. 8 © PhD Thesis K. Bräuer 2011, CD-ROM attachment, fig. studententwurf\_rinde  
Fig. 9 © Diploma Thesis M. Schneider 2008, CD-ROM attachment, fig. studententwurf\_rinde  
Fig. 10 © Diploma Thesis S. Lehmann 2003, The Dresden True-3D Atlas, screenshot of the visualization

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Products

Diploma Thesis Katharina Bräuer, 2011  
True-3D visualization of glacier retreat in the Dachstein Massif, Austria using cross-media hand- and touchy displays.  
Product: analog, lenslet full map.

Fig. 6: Map of the glacier retreat in the Dachstein Massif, Austria 2011

Fig. 7: The digital Bible Globe.  
C. Knust 2008

Diploma Thesis Claudia Knust, 2008  
Creation of a digital globe for an autostereoscopic display based on an historical star globe from Willem Jansson Blaeu. Cooperation with the State Art Collections Dresden, Mathematical-Physical Salon, Zwinger Palace, Dresden, Germany.  
Product: digital, true-3D film using a parallax barrier 3D-display.

Pre-Thesis Jana Schneider, 2008  
Cartographical 3D-mapping by visualisations using lenslet full map technique – Creation of an autostereoscopic view of bathymetric data of a sector of the Scotia Sea. Cooperation with Foundation Alfred Wegener Institute for Polar and Marine Research (AWI), Bathymetry, Bremerhaven, Germany. Product: analog, prototype, lenslet full map.

Fig. 8: Sea floor map of a sector of the Scotia Sea.  
Jana Schneider 2008

Pre-Thesis Christian Marschner, 2006  
Implementation of an Instrument Approach Procedure Chart Using Lenslet Full Map Technique. Cooperation with German Aerospace Center (DLR). Product: analog, lenslet full map chart.

Fig. 9: Instrument approach procedure chart.  
C. Marschner 2006

Diploma Thesis Thomas Grünemann, 2004  
Creation of a true-3D high-mountain map based on the lenslet full map technique. Product: analog, lenslet full map.

Fig. 10: High mountain map of the Grimsby Massif.  
Thomas Grünemann 2004

Diploma Thesis Stefan Lehmann, 2003  
The Dresden True-3D Atlas – Conception and prototypical implementation of a geographically oriented application for the Dresden 3D-Display.  
Product: digital, interactive application using the prism mask 3D-display D4D

Fig. 11: The Dresden True-3D Atlas.  
S. Lehmann 2003

Pre-Thesis Robert Scherzer, 1998  
Applications of holographic visualization techniques using the example of the hologic map of the Dachstein Massif. Products: analog, holographic stereogram.

Fig. 12: Holographic stereogram of the Dachstein Massif, Austria. R. Scherzer 1998

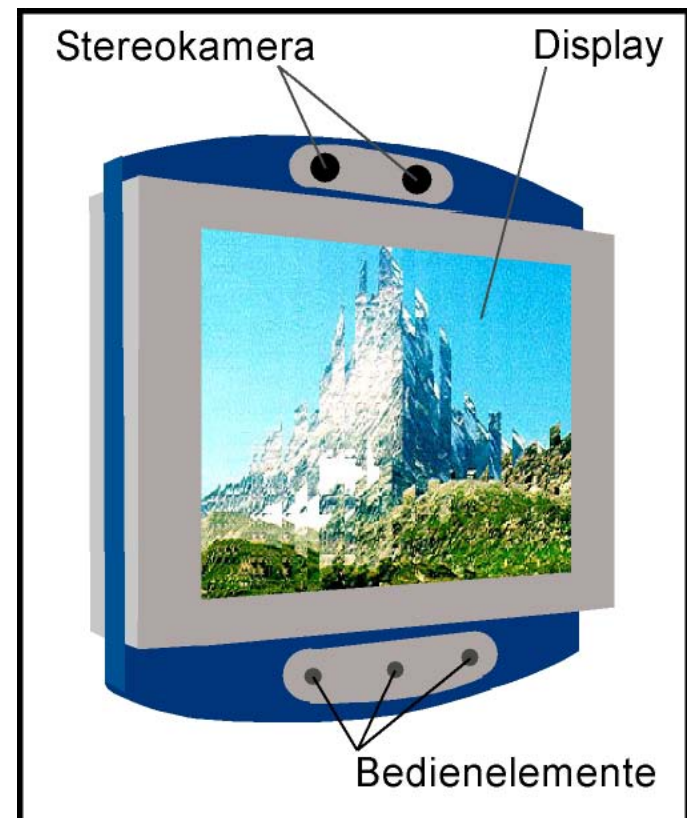
# The Dresden True-3D-Atlas

Diploma Thesis,  
Stefan Liehmann,  
2003

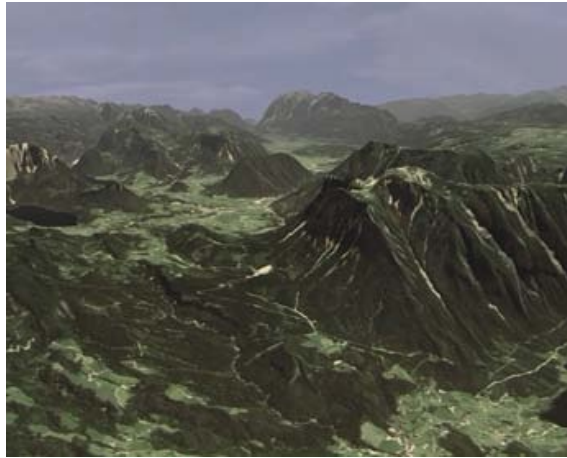


## Dresden 3D-Display (D4D)

- Autostereoscopic Display
  - Normal flat screen +
  - Additional: Prism mask
- Control mechanism  
Stereo camera  
Pattern recognition



## Prism Mask – Principle



+

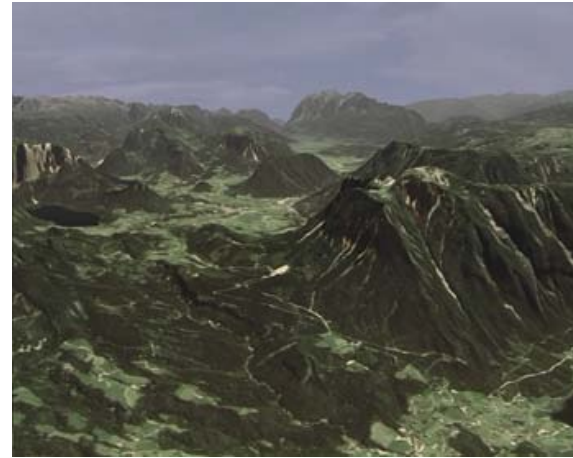


Image for the  
left eye

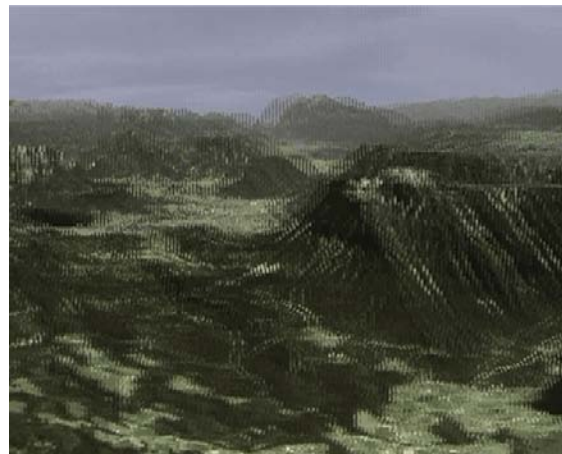


Image for the  
right eye

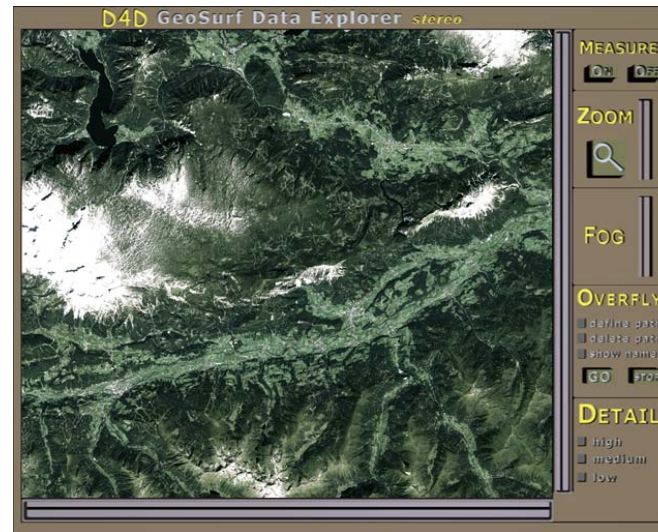
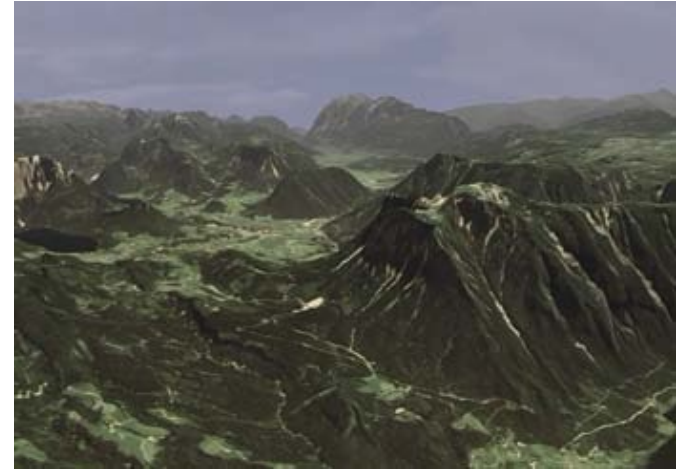


Interlaced image



## Presentation – Structure of the menu

- Landscape
- Urban
- Interactive



# The Digital Terrestrial Globe from Blaeu 1645

Creation of a digital globe for an  
autostereoscopic display based  
on an historical globe from  
Willem Janzsoon Blaeu

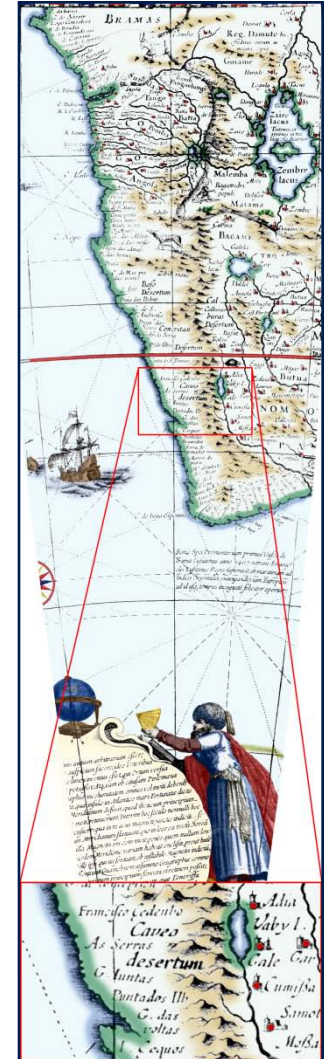
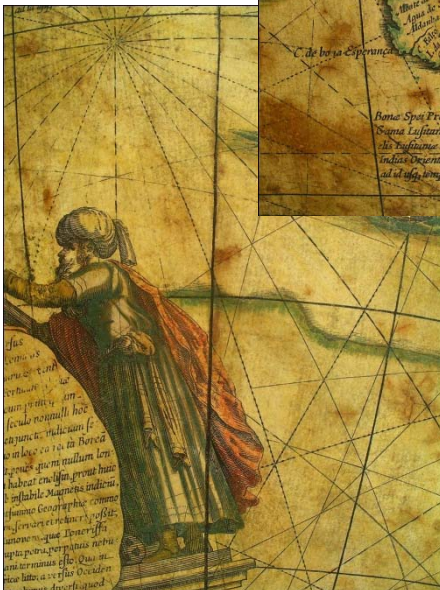
Diploma Thesis

Claudia Knust, 2008





## Data



21 March 2011

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## Result



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Thank you for your attention

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