

GSI^{3D} Research Consortium Newsletter

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Seasons Greetings!

Welcome to the GSI^{3D} Research Consortium newsletter where we hope to share information and developments about the GSI^{3D} software, exciting applications and research using GSI^{3D}; plus news from within the user community and useful knowledge about the GSI^{3D} Consortium team here at the British Geological Survey (BGS).

News and Information.

On Friday the 11th of November Swisstopo kindly organised a half day GSI^{3D} workshop in parallel with the 9th Swiss Geoscience Meeting in Zurich. Holger Kessler held the workshop which included presentations about building and using geological models as well as a hands on session where the 25 participants built their own model in GSI^{3D}. The feedback was extremely positive and we have had several requests from attendees for trial licenses. If any other consortium members are interested in holding a workshop or training course, please get in touch with us or via the BGS Enquiry Service (enquiries@bgs.ac.uk). Many thanks again to Salomè and Roland at Swisstopo for all their efforts and organisation.



Holger Kessler and Steve Mathers representing the GSI^{3D} Consortium on the BGS stand at GSA 2011 in Minneapolis in October.

GSI^{3D} Workshop

The core team have decided to hold the next GSI^{3D} Research Consortium Workshop later on in 2012 (not in March, as indicated in the last newsletter), to allow the team to focus on important developments to the GSI^{3D} software. The next workshop is now pencilled-in for autumn 2012, further details will be given when available.

We are growing!

The BGS has created a Vacancy for a full-time Java developer to assist with the development of GSI^{3D}, including implementing functionality for the Research Consortium. This post will be based at our Nottingham, UK offices. For further details please see our vacancy advertisement on the BGS website. <http://www.bgs.ac.uk/news/VACANCY/IRC39401JavaDeveloperAdvert.pdf>



Steve Mathers presenting a keynote address on behalf of BGS at the China Geological Survey and Chinese Academy of Geological Sciences 3D modelling workshop in Hangzhou in November.

Geological 3D modelling of Quaternary sequences in the surroundings of the city of Bern, Switzerland.

Salomè Michael, Roland Baumberger and Nils Oesterling.
Swiss Geological Survey (Swisstopo).

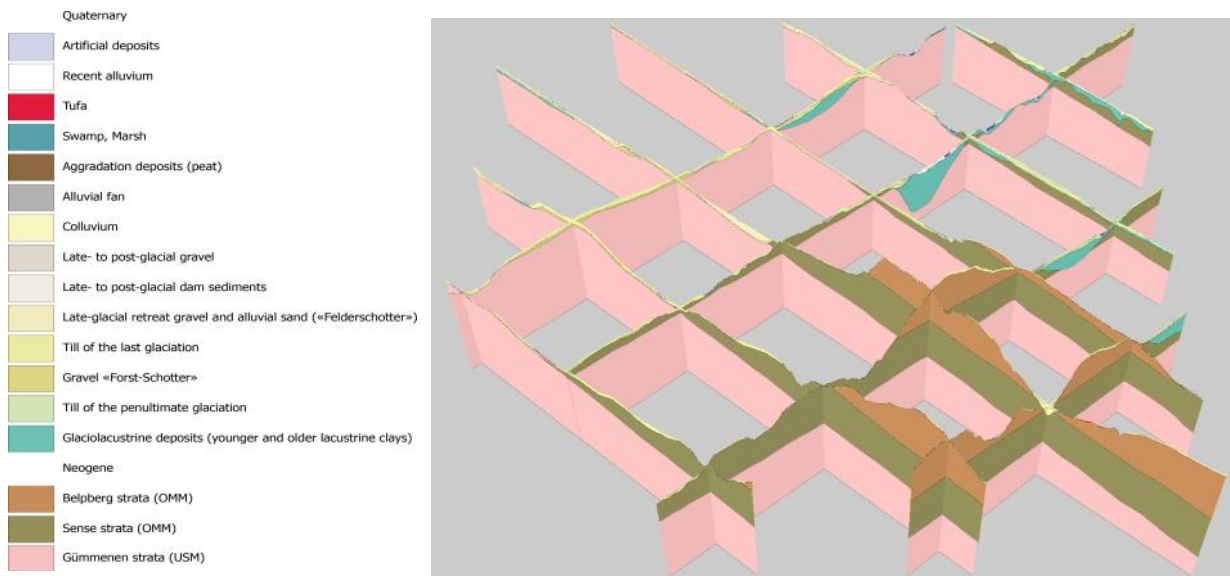


Fig. 1: Lithostratigraphic units used for the Bern model. Fig. 2: Fence diagram with the main cross sections, constructed on the basis of the Geological Atlas of Switzerland 1:25'000. View from the South.

The Swiss Geological Survey swisstopo (SGS) establishes the domain of geological modelling in three dimensions for Switzerland. Geological 3D models will be built in different scales and resolutions covering different topics. These must be valid, geologically consistent as well as of high quality and accuracy. The planned geological 3D models will comprise bedrock as well as superficial Quaternary formations. The latter ones are modelled using GSI3D, which shows strong advantages over other geological modelling software packages in terms of handling stratificate sequences, lenses and other thin deposits.

The following data has been used to build up the geological 3D model of Quaternary sequences of the surroundings of the city of Bern: (1) Geological Atlas of Switzerland 1:25'000 (GA25), map sheet no.100 Bern and its lithostratigraphic units (Fig. 1), (2) Digital Elevation Model (DEM) of the earth surface 1:10'000, (3) borehole data, (4) cross sections and (5) DEM of the bedrock surface.

The borehole data used shows two different quality standards: One part provides detailed downhole data of the Quaternary units and their composition, the other one only contains information about the depth of the bedrock surface.

The cross sections previously constructed by the SGS on the basis of the GA25 build a fence model over the area of interest (Fig. 2). In addition to these main cross sections further ones have been constructed in GSI3D to correlate boreholes and outcrops. Supplementary, helper sections were necessary for specific areas, such as for the construction of valley infills or alluvial tracts; otherwise GSI3D would calculate the units as a very thin layer on the DTM (Mathers et al., 2011).

Because the construction of a geological 3D model is always linked with a good deal of interpretation, the accuracy of such a model varies as a function of the distance to the trusted data, its quality and distribution. For a good quality control of a geological 3D model, it is useful to have a quality map of the trusted data, where the two-dimensional reliability of the model is represented. As the available borehole data in the surroundings of Bern, used in the introduced Quaternary 3D model, has a heterogeneous distribution and two different quality standards (see above), the SGS created in a first approach a quality map with the inverse distance weighting (IDW) interpolation method based on borehole information density (see Fig 3). However for a final quality assessment further investigations are required.

After calculation, the Quaternary 3D block model (Fig. 4) is exported to the Move™ software and therein combined with a bedrock model (Fig. 5).

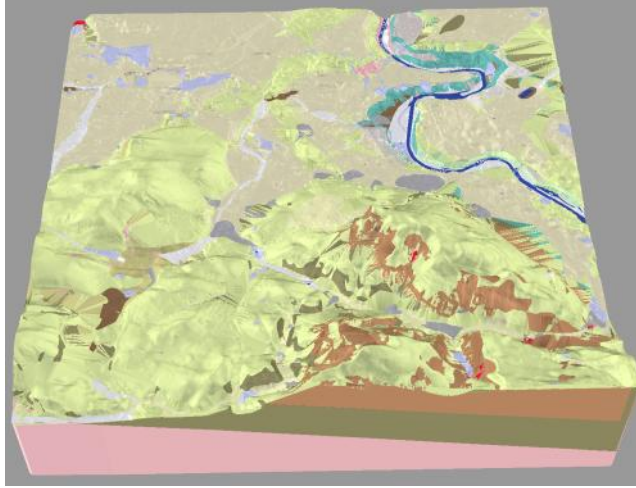
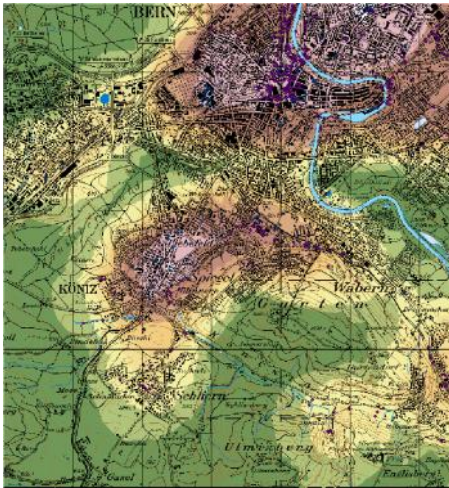


Fig. 3: Quality map for the Bern model, created with IDW interpolation method (distance 900; exponent 0.5) based on the bore-hole information density. Fig. 4: Block model; view from South to North, with three times vertical exaggeration.

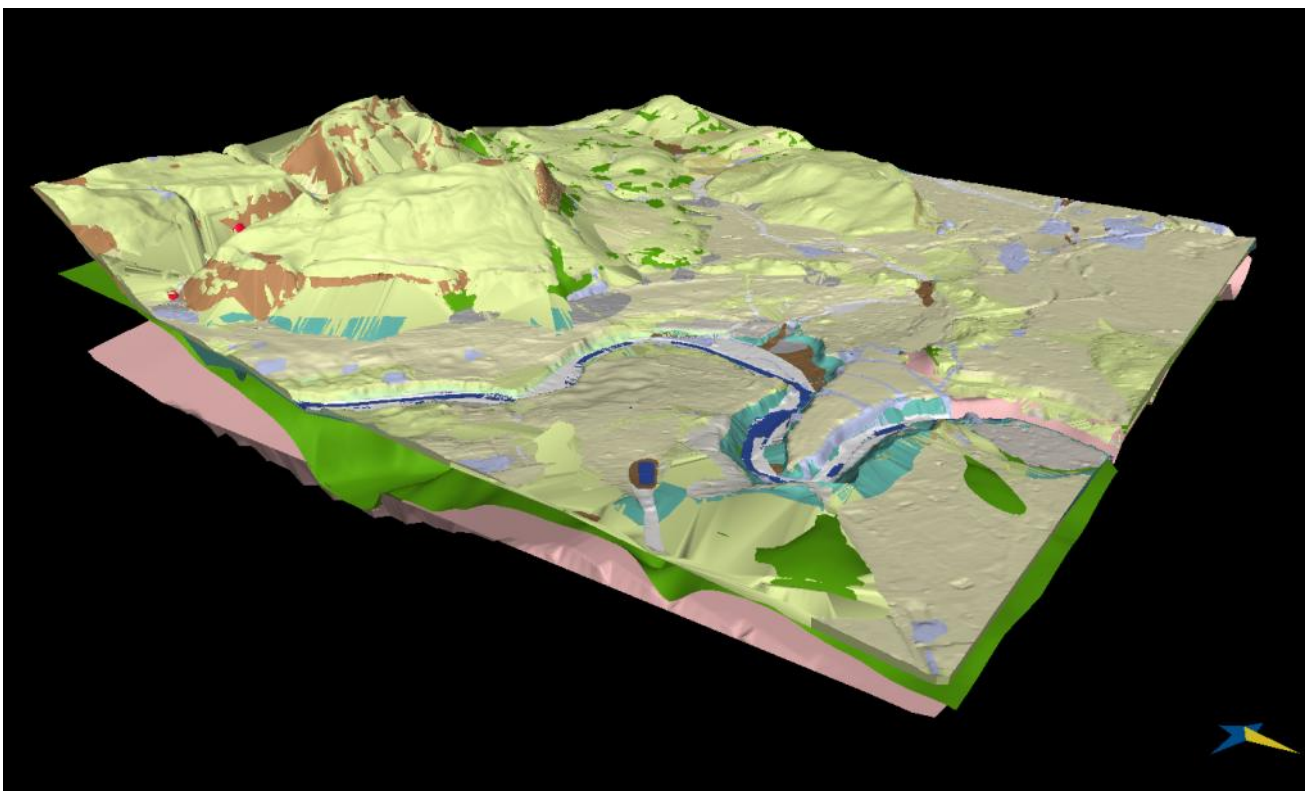


Fig. 5: Compilation of the 3D models of bedrock formations and Quaternary sequences in Move™. View from the Northeast.

REFERENCES

Mathers, S J, Wood, B & Kessler, H. 2011: GSI3D 2011 software manual and methodology, British Geological Survey Internal Report, OR/11/020, 152pp (<http://www.gsi3d.org.uk>)

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The GSI3D Research Consortium website can be found at www.gsi3d.org.uk and for any enquiries please contact our Enquiries team on enquiries@bgs.ac.uk .

If you would like to contribute to our Newsletter, or have any comments please contact the Consortium Manager eward@bgs.ac.uk .

Helpdesk Clinic

The helpdesk team is working on improving communications with the user community and will soon be releasing a web based forum where users can share ideas and issues via a discussion boards and where we will be posting notes about bugs and forthcoming developments. As always we would welcome any comments on this.

Ricky Terrington has compiled a very useful document on how to check geological models built with GSI3D. The report can be found here.
<http://nora.nerc.ac.uk/15038/1/IR11057.pdf>

...and in case you haven't decided what to eat for Christmas yet below is what the development team had to eat at our team meeting last week. (contains a few insider items)



GSI3D Christmas menu – £20.11 Per person

Starters

*Timbale of zero-displacements in a subcrop jus.
Pastry Envelopes stuffed with rasterised worms
Mushrooms with salt diapirs and pan-fried ontologies*

Mains

*Griddled Mole on a Skua with an ad-hoc ragu
Tinned Spaghetti with a Delaunay sauce
Slow roasted Groundhog with balatine of Sherwood Sandstone and a bald earth reduction.
Pan seared white elephant with committee of headless chickens in a counterproductive beurre.
4D volume fillets served with an XML caviar and drizzled semantic foam.*

Desserts

*Bedrock layer cake with triangle tuile and scattered chocolate data points.
Death by Chocolate Triangulation (a.k.a. Toblerone Surprise)
Horizontal slices of Frozen Modele Gateau (available with added thyme)*

Followed by

Java coffee and C++ biscuits

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