IGMAS+: a success story of a 3-D potential field modelling software (EGU22-9388)

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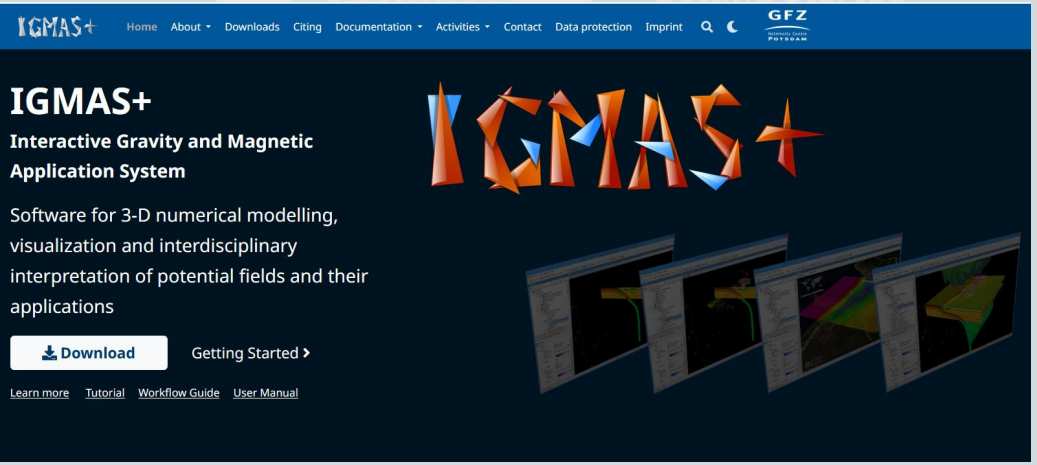

https://igmas.git-pages.gfz-potsdam.de/igmas-pages/

DISPLAY MATERIAL

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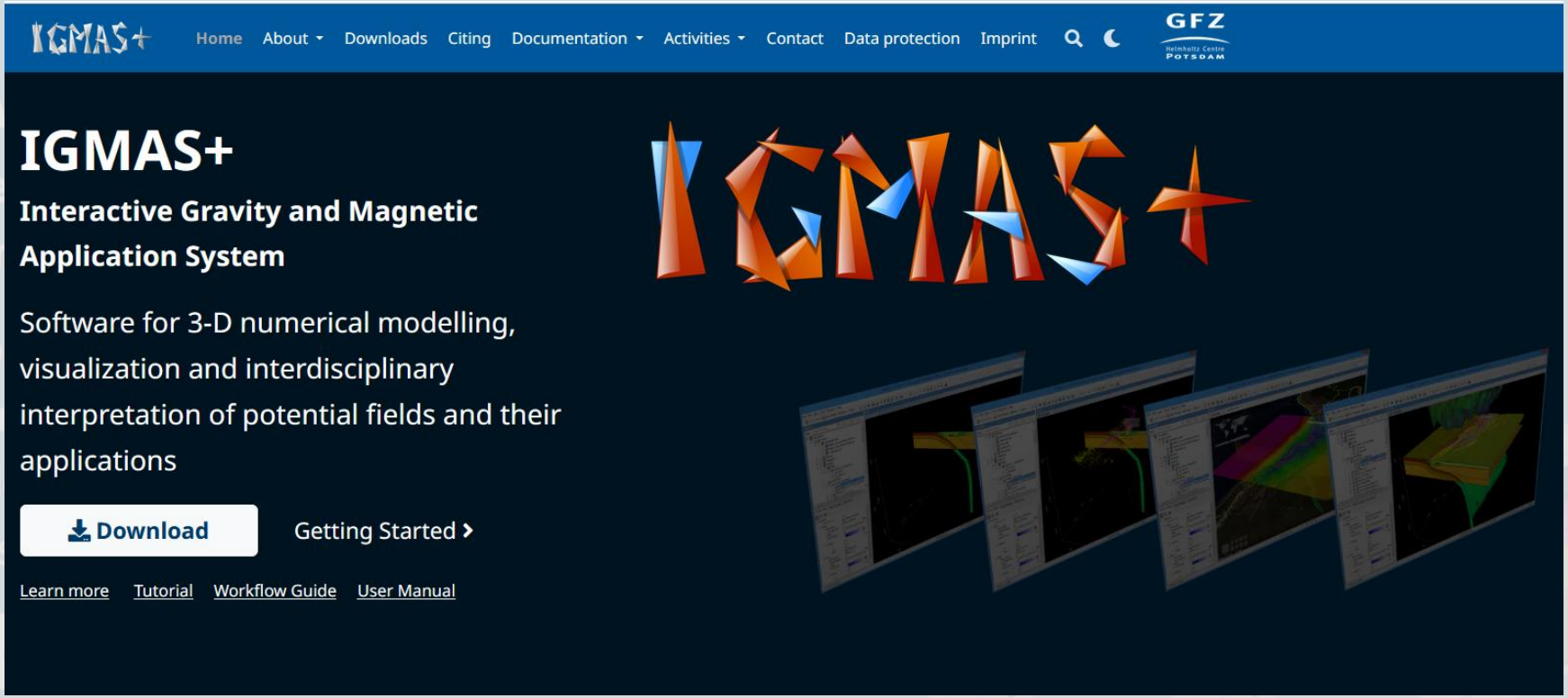

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3-D gravity and magnetic modelling appreciably improves the results of distinct depth imaging projects. This regards especially to areas of strong lateral seismic velocity and density contrasts and corresponding imaging problems. Typical areas where grav/mag modelling has been successfully used are sub-salt and sub-basalt settings.

What makes **IGMAS+** highly efficient and user-friendly is that it allows adjusting the geometries and physical properties of modelled subsurface bodies interactively, i.e. while the corresponding calculated and measured potential field components are visualized together with independent observations.

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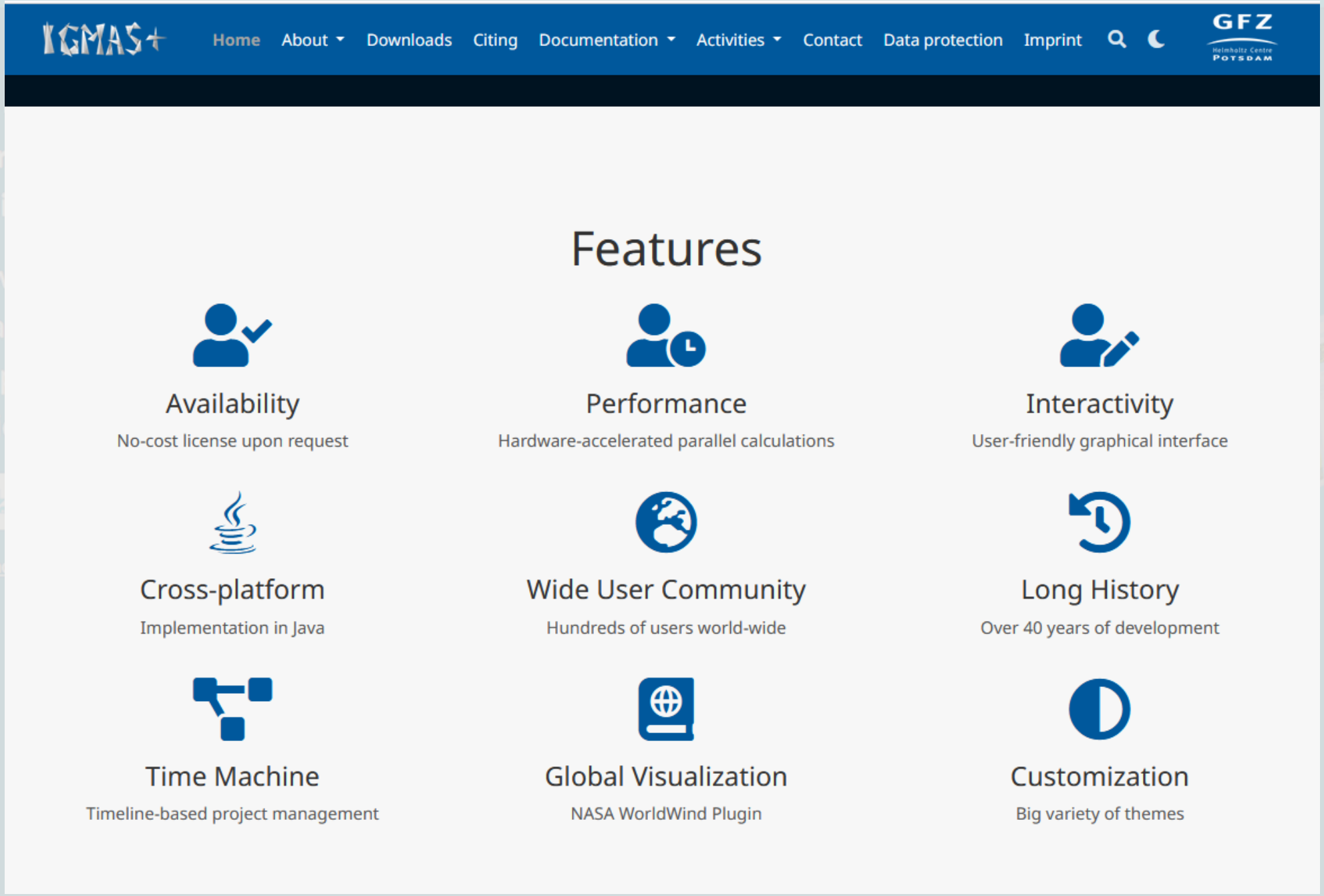

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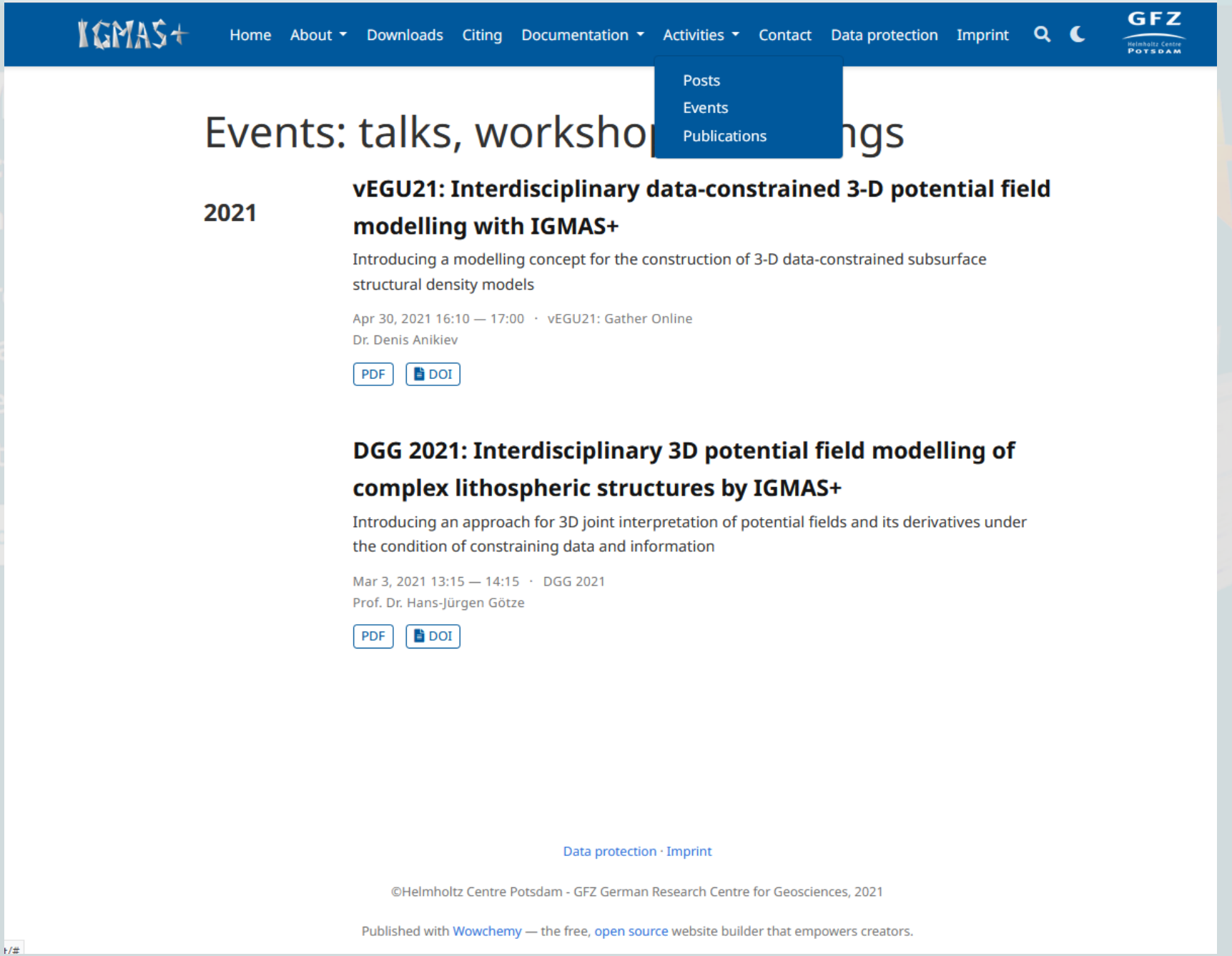

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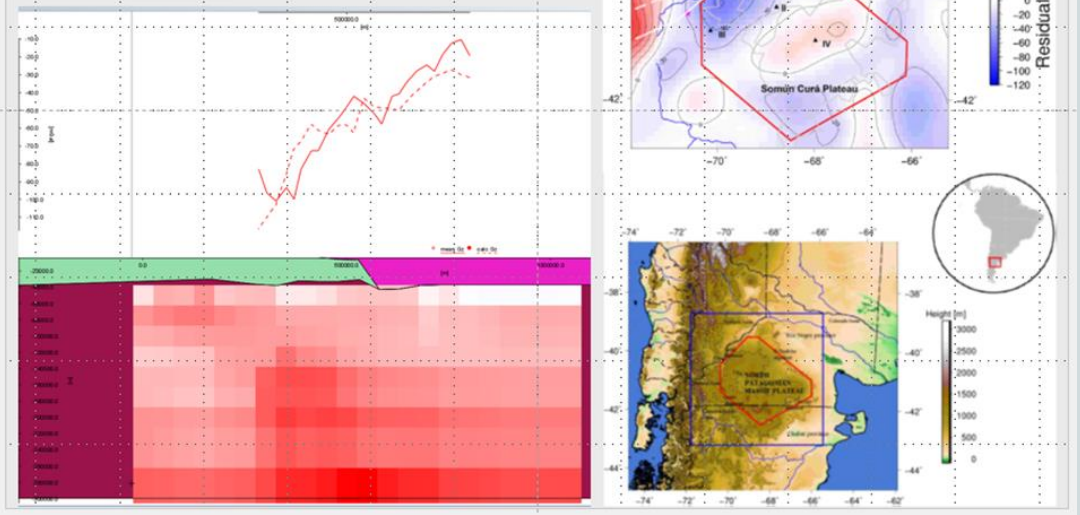
Typical applications are modelling at a lithospheric scale:

(c) Hybrid modelling by voxels and polyhedrons

Gómez Dacal et al. (2017):

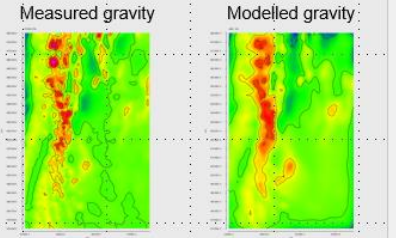
- Extension: 500 km (E-W)*500 km (N-S)
- Depth: 300 km
- Lateral resolution: 50 km
- Distance between sections: 50 km
- Tomographic models were used to create a voxel cube

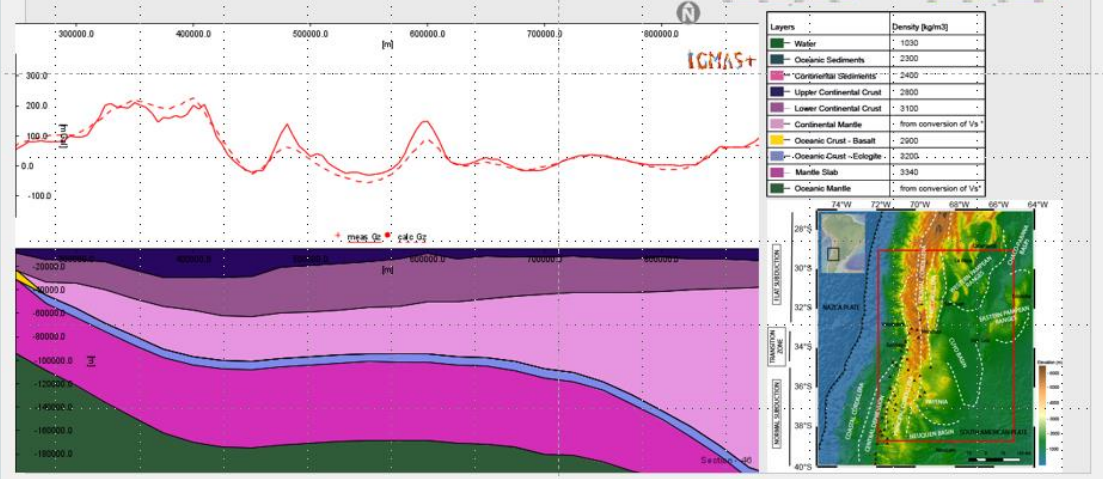


(b) Input by interfaces/geological layers

Rodriguez Piceda et al. (2020, under review):

- Extension: 700 km (E-W)*1100 km (N-S)
- Depth: 200 km
- Lateral resolution: 25 km
- Distance between vertical sections: 25 km
- Bodies with constant density (except for the lithospheric mantle: a voxel cube from Vs tomography was used)



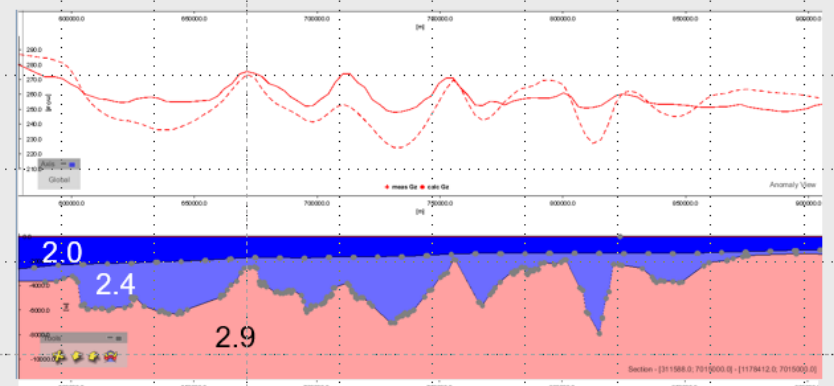


Typical applications are modelling at a rather local scale:

The advantage of variable densities

Capel & Faust Basin Offshore Australia

Vert. Exaggeration: 5



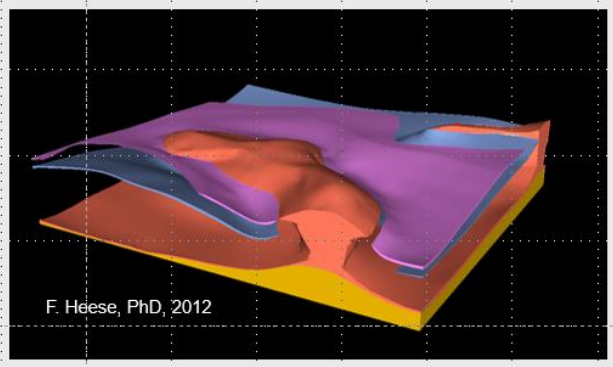
The improvement of the adaptation of measured and modelled gravity by introducing a stratified density distribution in the Earth's crust

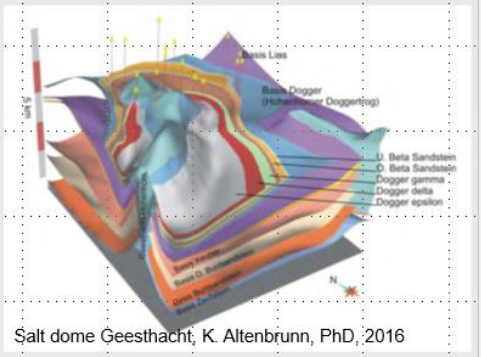
Input by interfaces/geological layers

Complicated models describe:
Salt structures -
500 000 triangels and
even more.

Often the layers very thinn and models consist of numerous layers (up to 30).

Grid data for 3D modelling by:
GOCAD
PETREL




Salt dome Geesthacht, K. Altenbrunn, PhD, 2016

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How to cite

Please consider paying us back by citing our articles and technical papers when you publish papers containing results or illustrations obtained using **IGMAS+**.

Please also use the official **IGMAS+** logo in your presentations and posters.

When in doubt, please cite the **IGMAS+** software as follows:

> Götze, H. J., & Lahmeyer, B. (1988). Application of three-dimensional interactive modeling in gravity and magnetics. *Geophysics*, 53(8), 1096-1108.

Application of three-dimensional interactive modeling in gravity and magnetics

H.-J. Götze, B. Lahmeyer

Cite DOI

and

> Schmidt, S., Anikiev, D., Götze, H. J., Gomez Garcia, À., Gomez Dacal, M. L., Meeßen, C., Plonka, C., Rodriguez Piceda, C., Spooner, C., & Scheck-Wenderoth, M. (2020, May). IGMAS+-a tool for interdisciplinary 3D potential field modelling of complex geological structures. In *EGU General Assembly Conference Abstracts* (p. 8383).

IGMAS+ – a tool for interdisciplinary 3D potential field modelling of complex geological structures

S. Schmidt, D. Anikiev, H.-J. Götze, À. Gómez-García, M. L. Gomez Dacal, C. Meeßen, C. Plonka, C. Rodriguez Piceda, C. Spooner, M. Scheck-Wenderoth

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IGMAS+ Online Tutorial

1. Introduction
2. Setting up a density model
3. Modelling field components and gradients
4. Fitting gravity anomalies
References

Home / IGMAS+ Online Tutorial / 2. Setting up a density model

2. Setting up a density m

For the modeller, each compilation of a density/susc ys consists of two activities that result from a theore dy must be defined which contains a mass/magnetic material (here density and/or susceptibility), and the distances from stations where the gravity and/or magnetic fields were measured. Therefore, model stations must be defined (see below).

At first, the origin point of the model (its zero point) has to be fixed, which is not only the origin of model geometry, but also of model stations, of the corresponding gravity/magnetic fields which should be matched, of the voxel cube and of any available additional map information, for example from a geographical and/or a digitized geological map.

We start with the explanation on how to handle the bodies and continue with the explanation for stations.

2.1 Model bodies

In **IGMAS+**, density in space can be defined either in terms of

1. triangulated polyhedra surrounding a certain volume of constant density (Fig. 2.1) or
2. a 3D **voxel cube** (Fig. 2.2) containing numerous voxels, each carrying its own density value.

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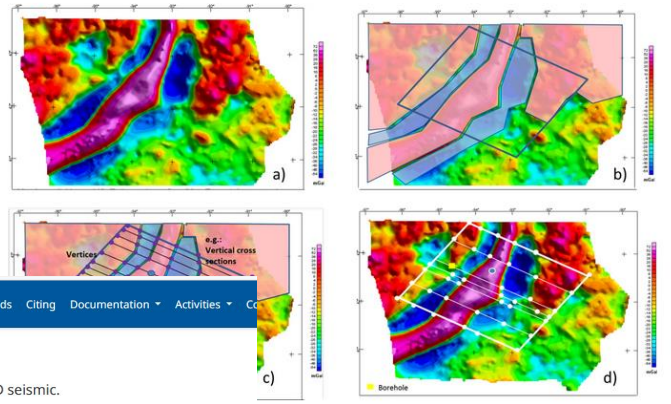
In case the model is built on **working sections** (Fig. 2.3), there are no vertices located between the working sections. The user therefore should define the number, spacing and horizontal orientation (strike direction) of these working sections

1. to keep sufficient control of model geometries throughout the interactive modelling process and
2. to allow for a proper analysis of elongated gravity anomalies (i.e., orient working sections perpendicular to the strike of major anomalies).

Working sections are always parallel (Fig. 2.4).



ortant when defining the geometry of the model bodies by s should be modelled. (b) Select the area to be modelled. (c) odelled and define the intersections of the sections with the ctions and the intersections are really important to model the anomaly correctly.

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IGMAS+ Online Workflow Guide

1. Introduction
2. Before Starting
3. Getting Started
4. User Interface

- by defining vertical sections,
- by loading predefined horizons or
- by loading a voxel cube e.g. from 3D seismic.

4.2 What you see on the monitor

After you have started **IGMAS+** you see this screen...

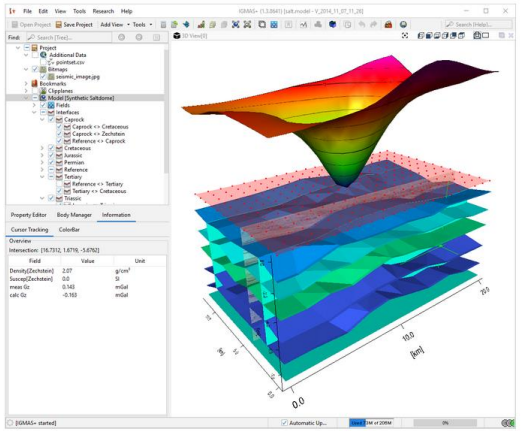

FIGURE 4.1: Screen shot

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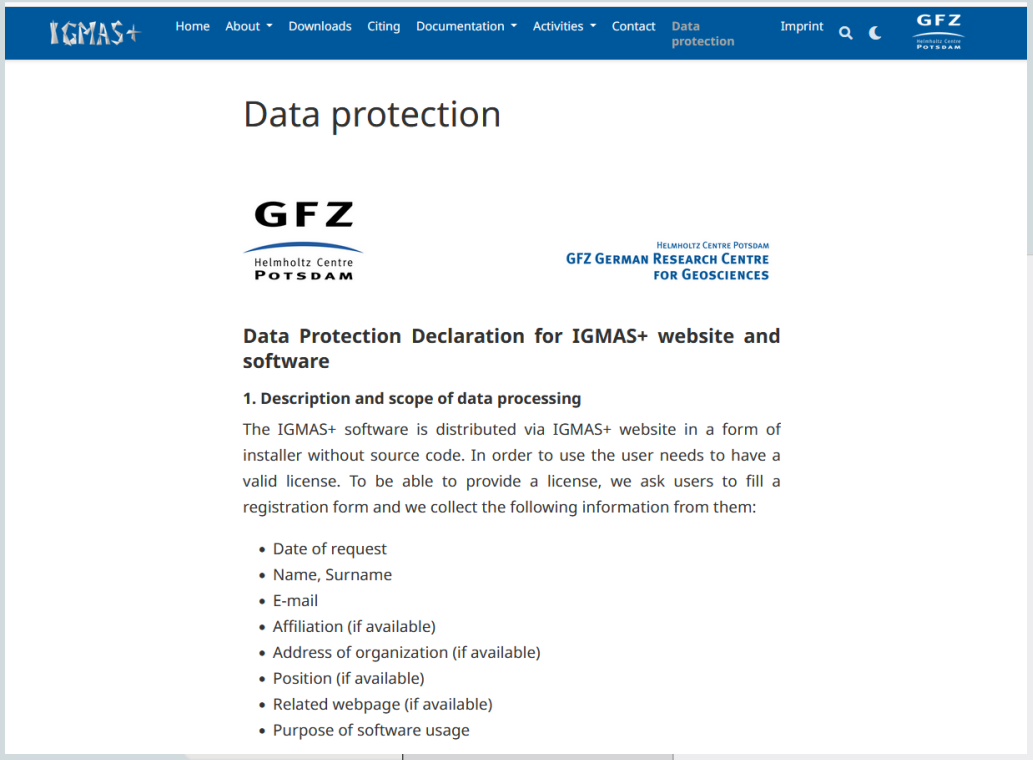

https://igmas.git-pages.gfz-potsdam.de/igmas-pages/files/IGMAS_User_Manual.pdf

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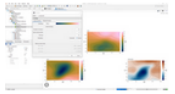
Posts

Security note: log4j library is not used in IGMAS+

IGMAS+ is not affected by the recently disclosed Log4Shell vulnerability.

Dr. Denis Anikiev
Dec 14, 2021 · 1 min read · Announcement

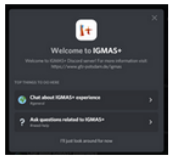
IGMAS+ Release v1.4.8707



This release adds a new WMS server, KML/KMZ file input and extends visualisation settings

Dr. Denis Anikiev
Jul 13, 2021 · 2 min read · Release

IGMAS+ Discord Server



Welcome to the IGMAS+ Discord server

Dr. Denis Anikiev
Apr 30, 2021 · 1 min read · Announcement

IGMAS+ Release v1.4.8690

This release adds new themes, graphic improvements and extends macOS support

Dr. Denis Anikiev
Mar 28, 2021 · 2 min read · Release

Data protection · Imprint

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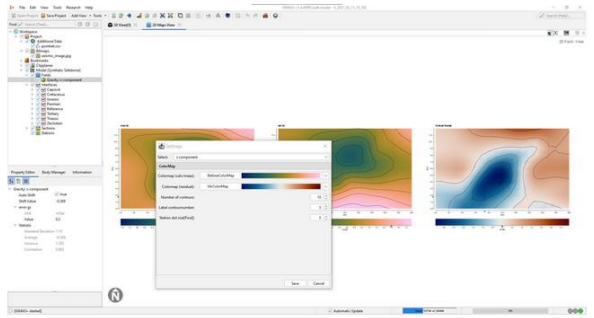
IGMAS+ Release v1.4.8690

Release notes

Dr. Denis Anikiev
Mar 28, 2021 · 2 min read · Release



Overview

Our new release will please users with a big variety of interface themes: 58 new themes thanks JFormDesigner were added.

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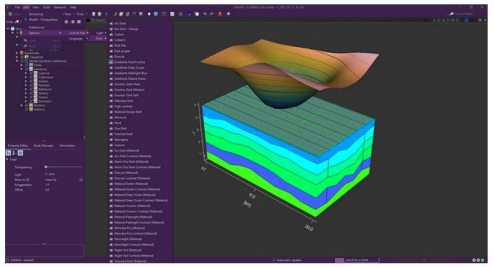
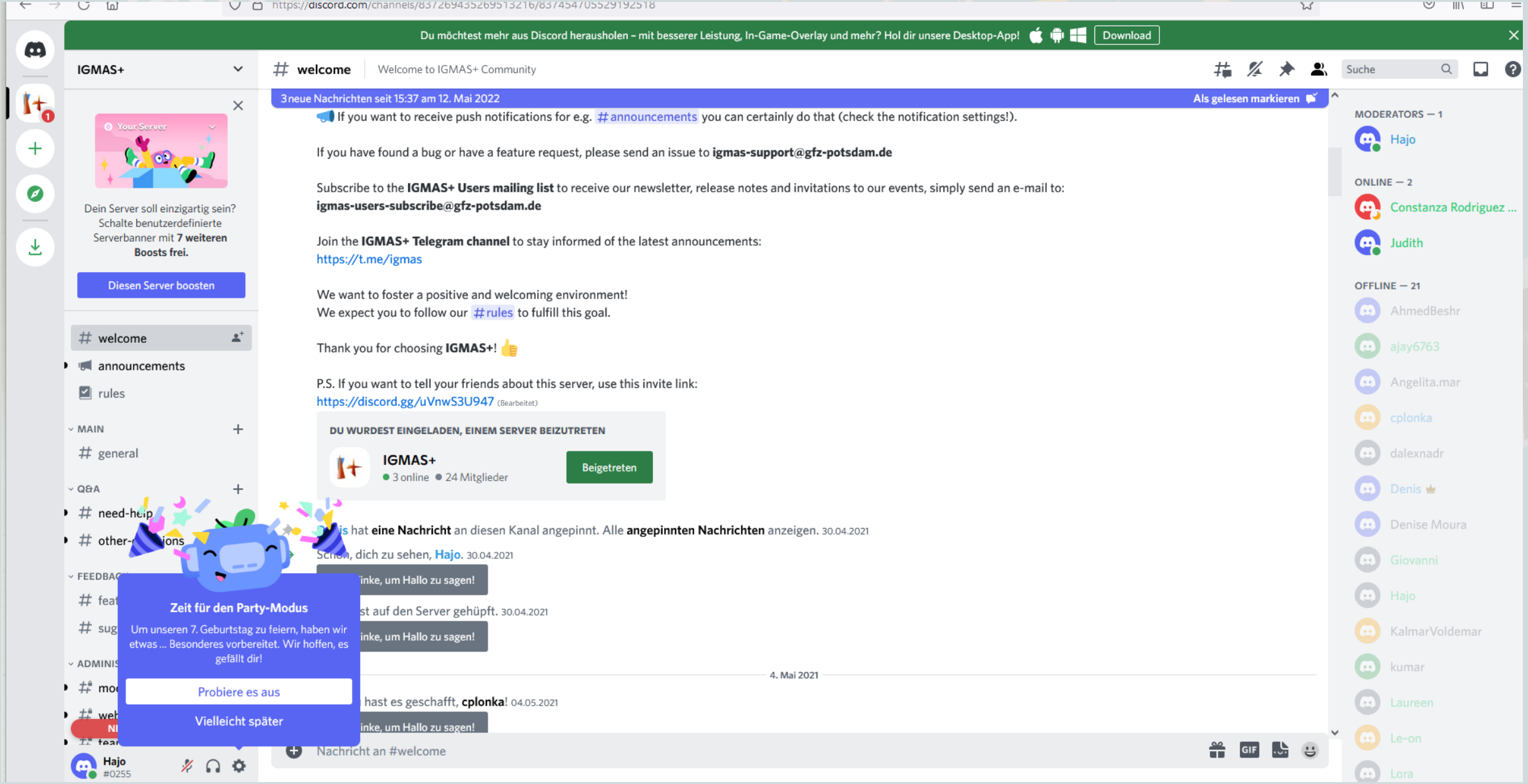


In this version we payed special attention to the problems with installation on macOS. Now **IGMAS+** can be easily installed and started on macOS versions up to 10.13.

Unfortunately OpenGL is deprecated in macOS since version 10.14 Mojave. As a consequence, **IGMAS+** officially supports macOS versions only older than 10.14. We regret that this might cause serious inconveniences for macOS users.

Suport and user interaction: Discord



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