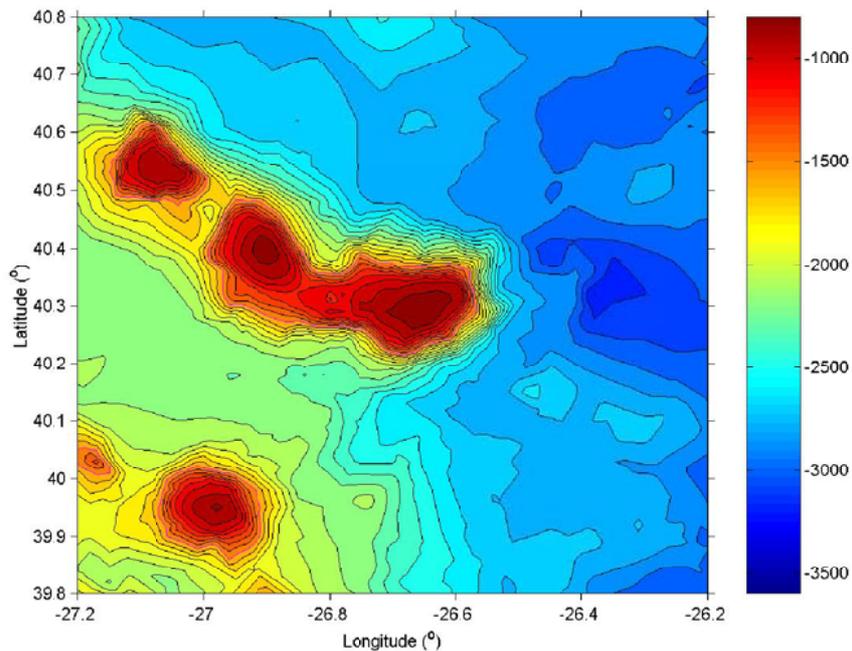


The Bathymetry of Sedlo and Seine Seamounts

Bernd Christiansen, Igor Bashmachnikov
and Felix José



2nd edition

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Cover graph: Bathymetric
map of Sedlo Seamount

Contact:

Dr. Bernd Christiansen
Universität Hamburg,
Institut für Hydrobiologie und
Fischereiwissenschaft
Zeiseweg 9
D-22765 Hamburg
Germany
bchristiansen@uni-hamburg.de

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Introduction

The OASIS study sites, Sedlo Seamount and Seine Seamount, are two fairly isolated seamounts in the NE Atlantic (Figure 1). Sedlo Seamount is located ca 100 nm north of the Azores. It rises from a water depth of more than 2500 m to a minimum summit depth of 750 m. It has an elliptical shape and features three summits along a NW-SE axis. Seine Seamount lies about 100 nm north-east of Madeira. It is a near-circular seamount which rises from more than 4000 m depth to a summit plateau at 160-170 m.

Bathymetric measurements at the two OASIS target seamounts were performed during cruises with R.V. *Arquipelago*, R.V. *Meteor* and R.R.S. *Discovery* to Sedlo Seamount, and with R.R.S. *Discovery* and R.V. *Poseidon* to Seine Seamount. Only on R.V. *Meteor* a swath bathymetry system („Hydrosweep“) was available. A detailed bathymetric survey using this system could only be performed at the southeastern part of Sedlo Seamount during cruise *Meteor* 60/1. Weather conditions and time constraints did not allow for a similar survey at Seine Seamount.

Different bathymetric maps have been produced for the two study sites, all using only part of the existing data. A next step will be to integrate all existing data to get more reliable maps of the two areas, in particular of Seine Seamount.

Maps

Sedlo Seamount

Sedlo Seamount bathymetry has ship-track observations which cover most of the area. In Figure 2 the data (except for the *Meteor* data set) were gridded into a $0.01 \times 0.01^\circ$ grid in those places where the ship-track density was high enough. In each grid point the average value was used. In the area with insufficient ship-track density, Etopo2 gridded bathymetry was added.

The existence of a small seamount to the south of the south-eastern summit of Sedlo SM, which was originally drawn according to one track of R.V. *Arquipelago*, is still questionable. Also, a deep through just to the east of Sedlo, based on Etopo2 data, does not seem to correspond to reality.

This is supported by the recent *Meteor* bathymetric data set produced with swath bathymetry (Figure 3). The relatively high swell during the survey was a problem on certain tracks. The map shows some strange features mainly at the western upper slope which are most probably due to noise caused by ship movement.

In Figures 4 and 4a, the data from R.V. *Meteor* were smoothed and incorporated in the existing map. The resulting map shows the general picture of the three summits at Sedlo Seamount with a higher resolution at the eastern summit, which is the main area of interest for the OASIS project.

Figure 5 shows a 3D representation of Sedlo Seamount based on the data used in Figure 2.

Seine Seamount

Seine Seamount bathymetry is based on Etopo2 and *Discovery* and *Poseidon* ship tracks. The unfiltered data show deep trenches on the south-western and north-eastern sides of the seamounts. The hints of existence of such trenches can also be found in Etopo2 data set (Figure 6).

At the same time, those very deep abrupt trenches look rather unrealistic and sometimes contradict some of our tracks. As a result, the data were filtered to get a smoother environment (Figure 7).

During cruise Poseidon 309, bathymetric data were recorded during tracks of towed gear (MOCNESS and and photo sled). These data were incorporated in the map which was produced after Sandwell and Smith (1996), using data from satellite gravimetry. Figures 8 and 8a shows the resulting map including the data points from the Poseidon echosounder readings.

Figure 9 shows a 3D representation of Seine Seamount based on the data used in Figure 6.

References

Sandwell, D.T. and W.H.F. Smith (1996) *Marine Gravity from Satellite Altimetry*
http://topex.ucsd.edu/marine_grav/mar_grav.html

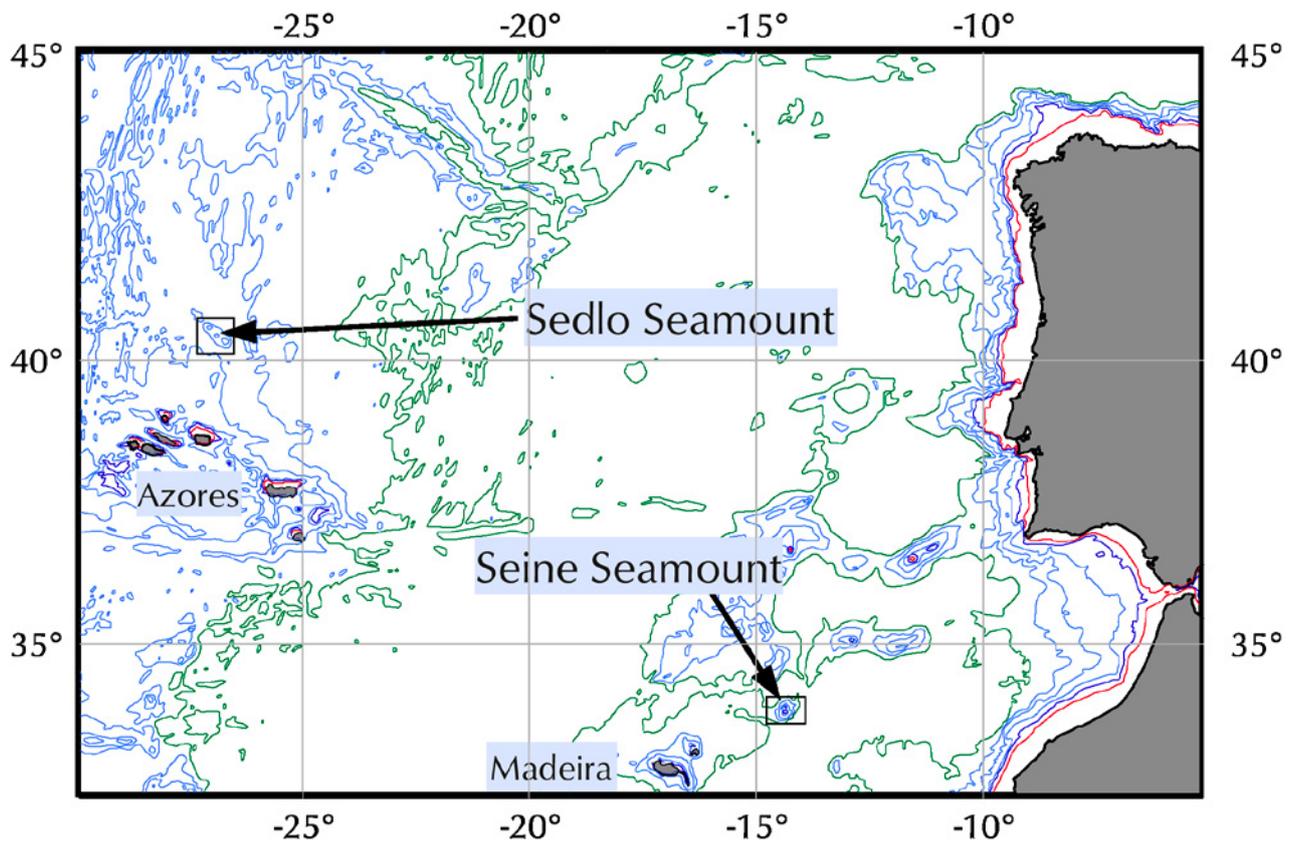


Figure 1: The OASIS study sites in the NE Atlantik.

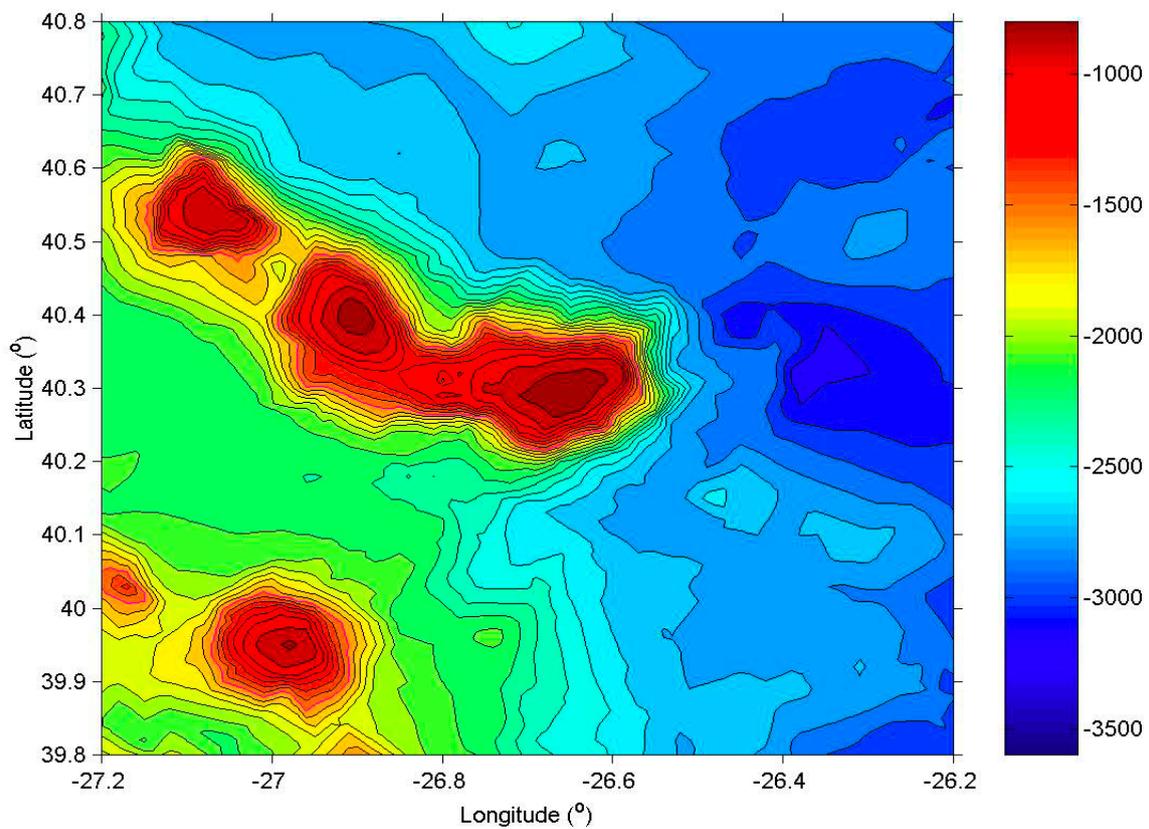


Figure 2: Sedlo SM bathymetry from Etopo2 and OASIS ship tracks.

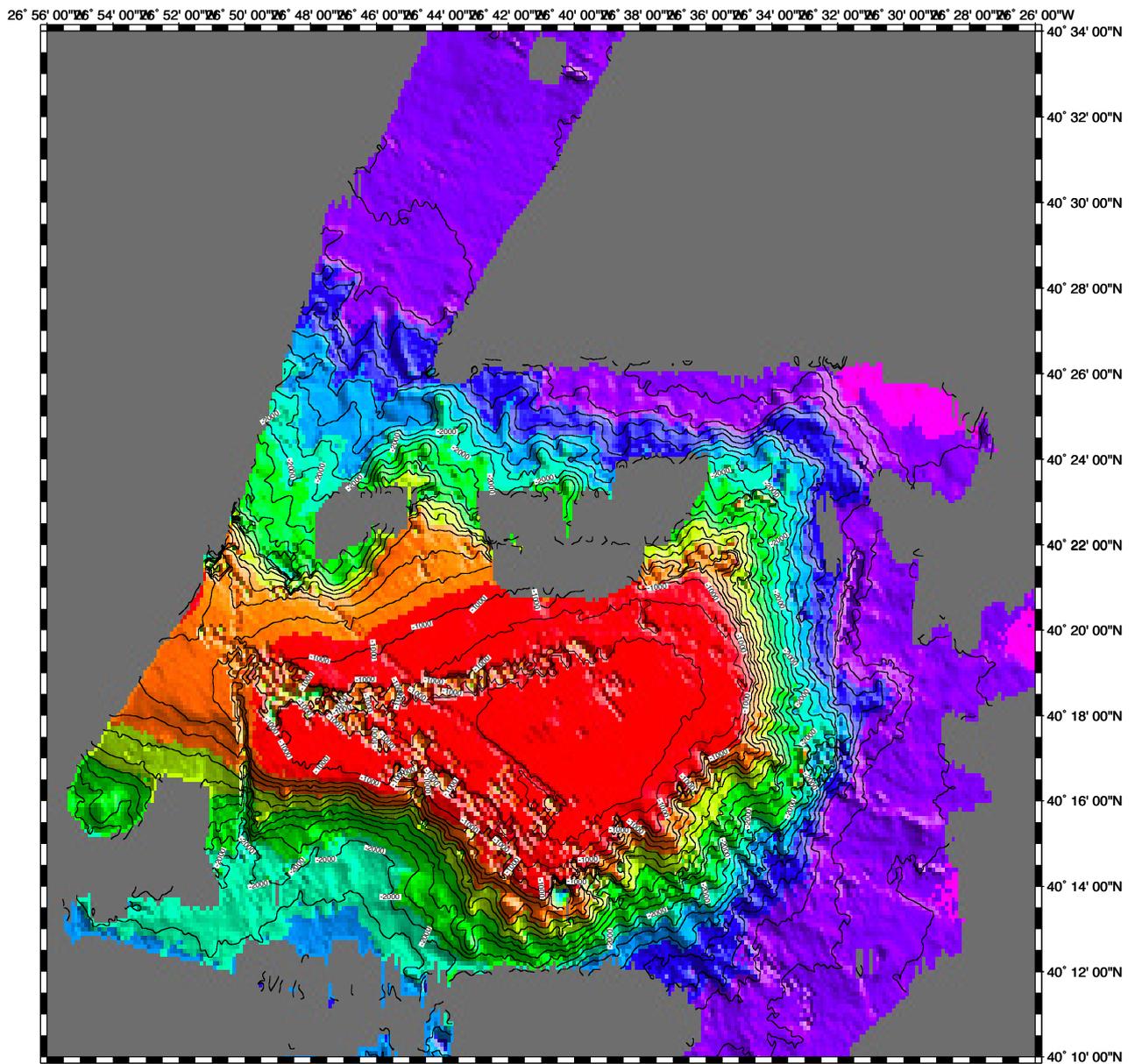


Figure 3: Sedlo Seamount, topography of the southeastern summit from *Meteor* hydrosweep data

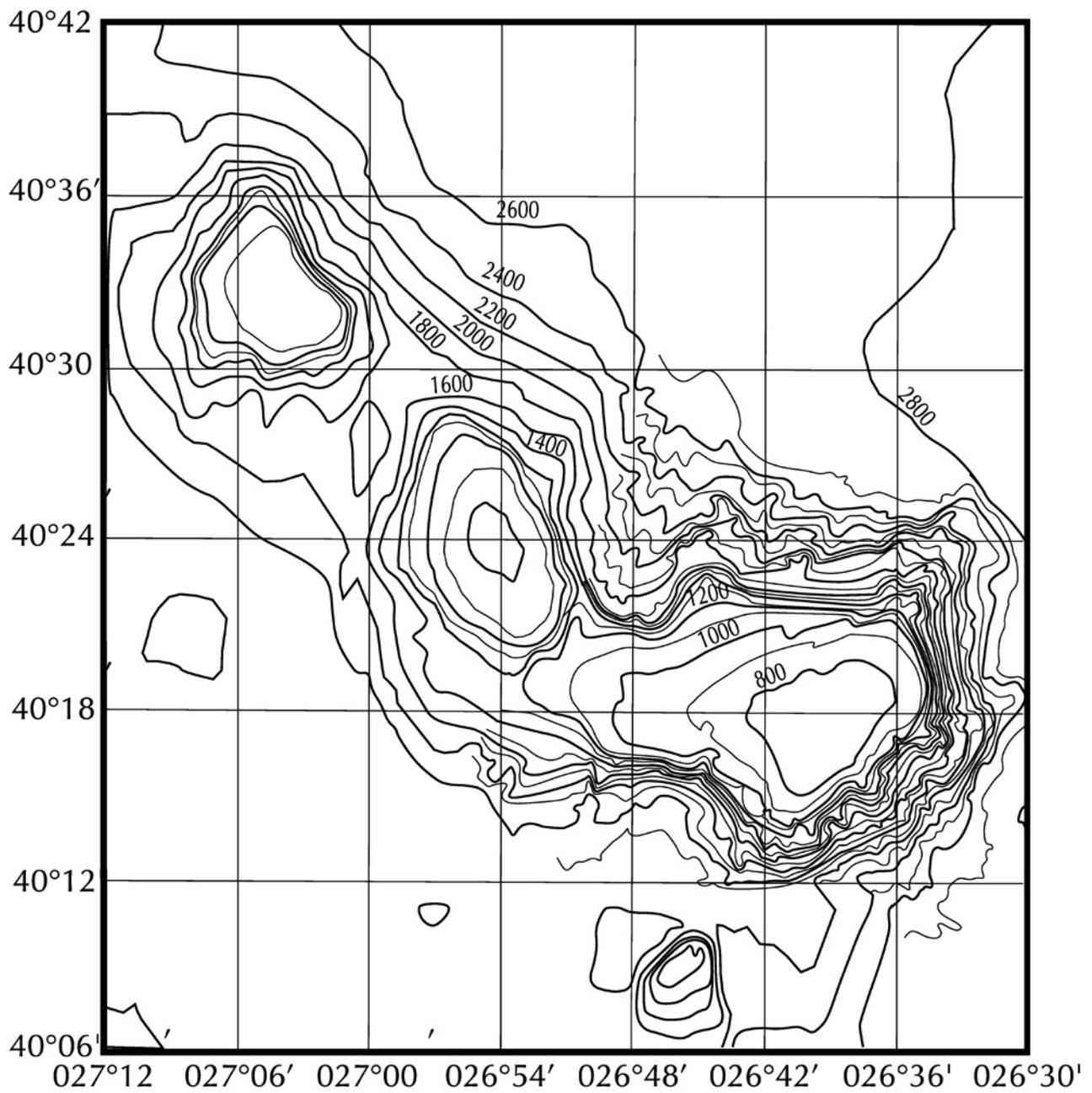


Figure 4: Sedlo Seamound, composite map based on data from R.V. *Arquipelago* and R.V. *Meteor*

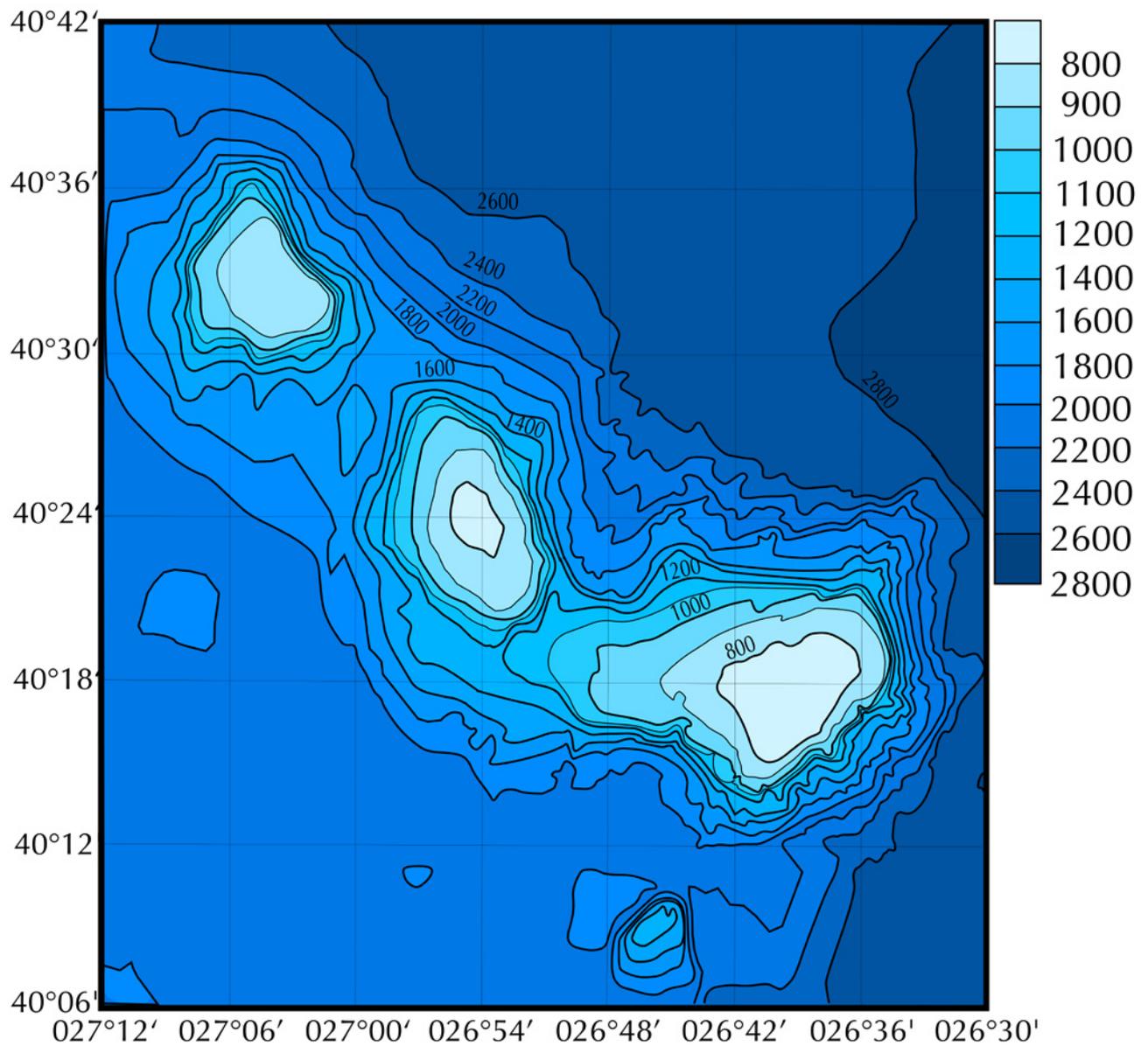


Figure 4a: Sedlo Seamount, same as Figure 4, colour version

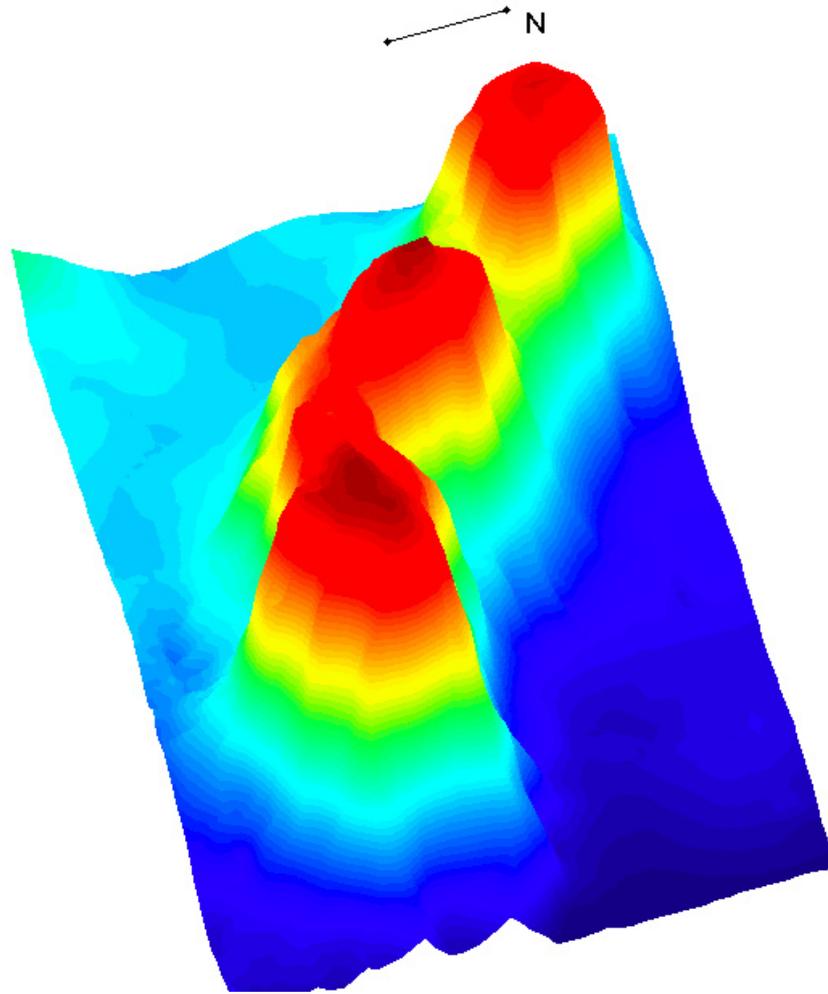


Figure 5: 3D representation of Sedlo Seamound

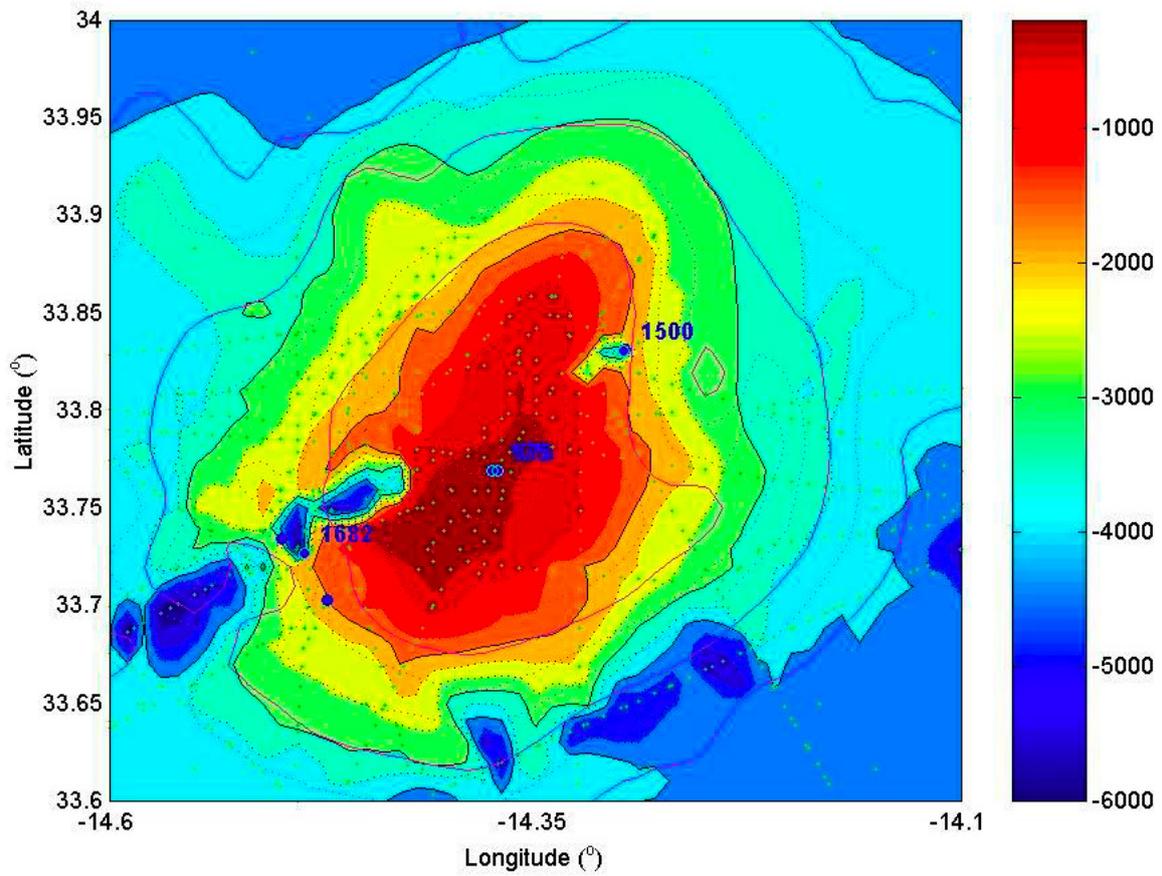


Figure 6: Seine SM bathymetry from Etopo2 and OASIS ship tracks. The data points, used for interpolation, are marked with green dots. Purple counters are the overlaid Etopo2 bathymetry alone, solid counters mark 1500, 3000 and 4000m depths. Blue dots are mooring and CTD positions, used as reference points.

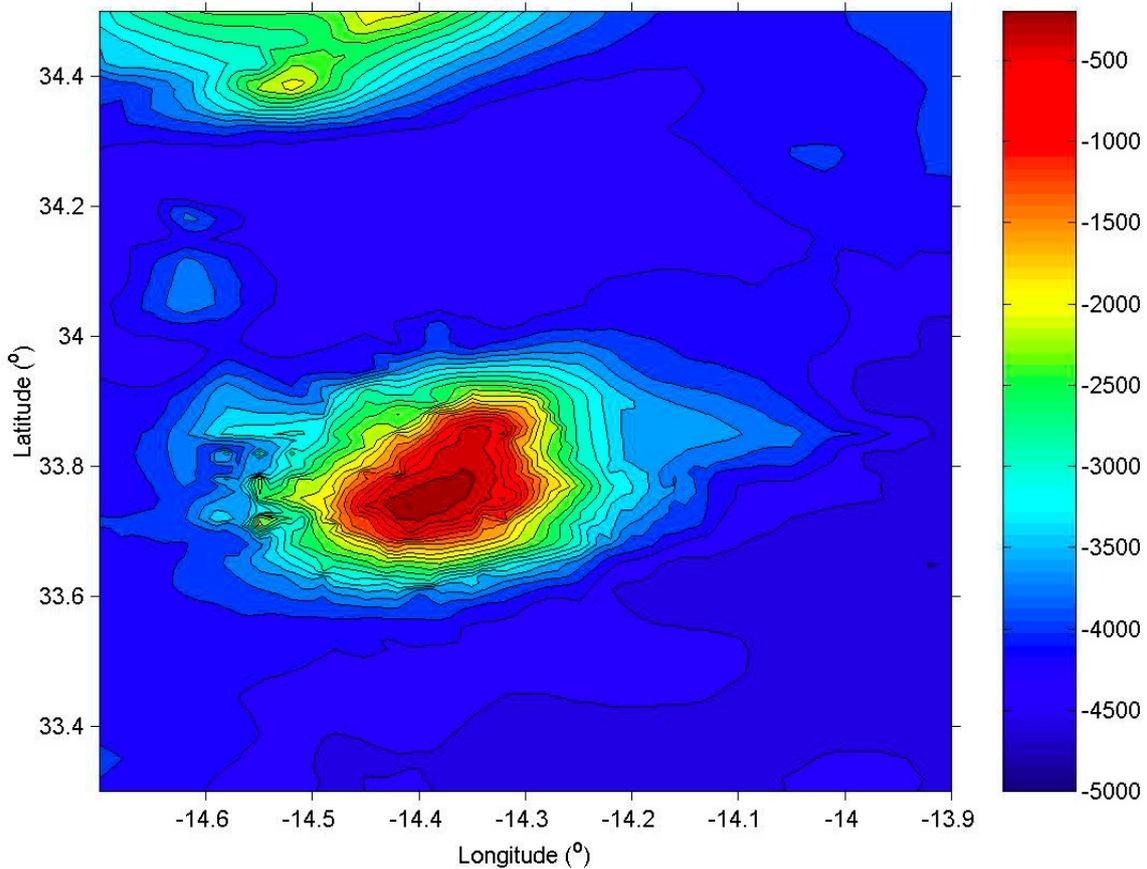


Figure 7: Same as Figure 6, but data smoothed

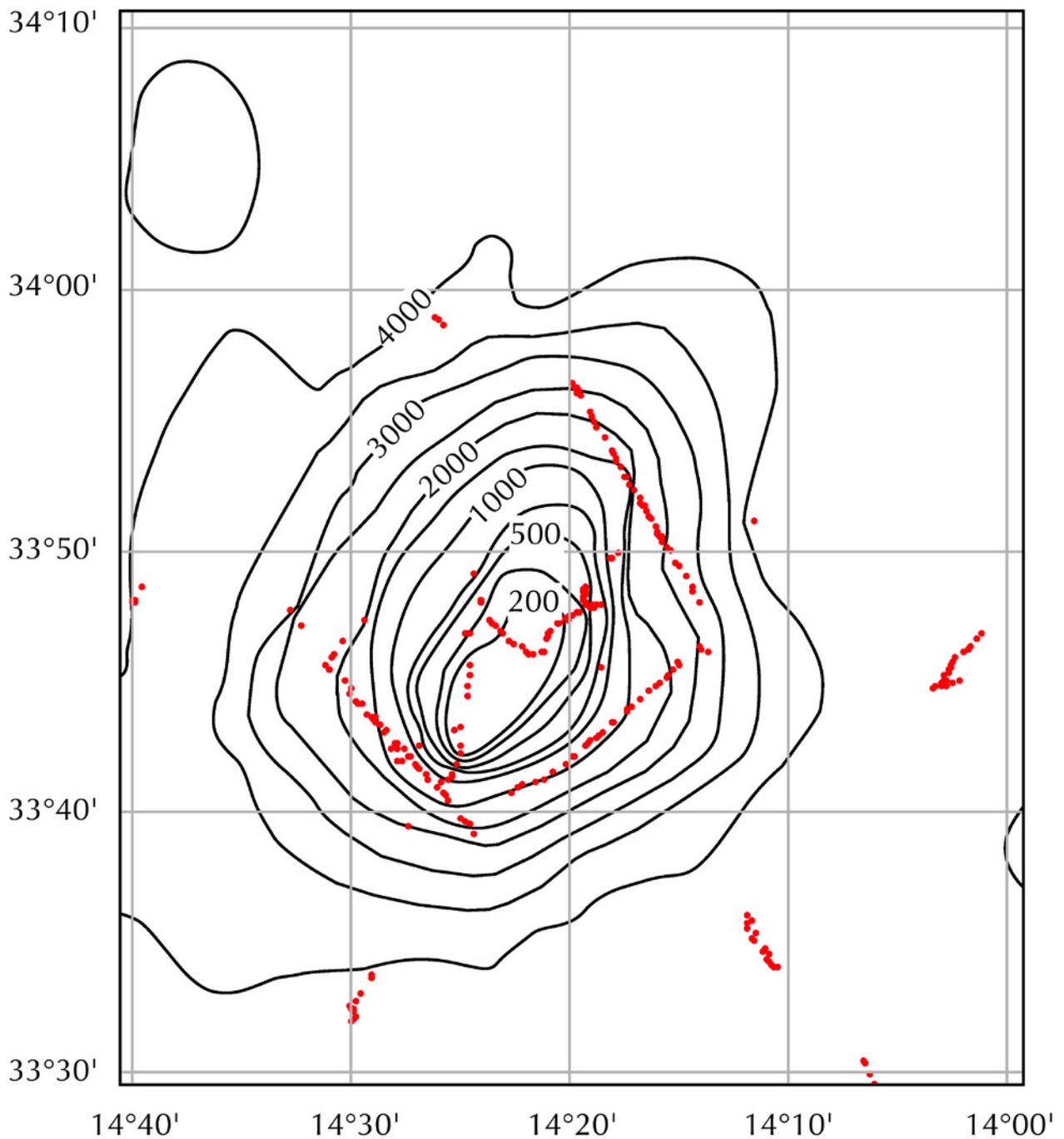


Figure 8: Seine Seamount, bathymetric map based on data from satellite gravimetry and R.V. *Poseidon* soundings. Red dots denote locations of soundings during *Poseidon* cruise 309.

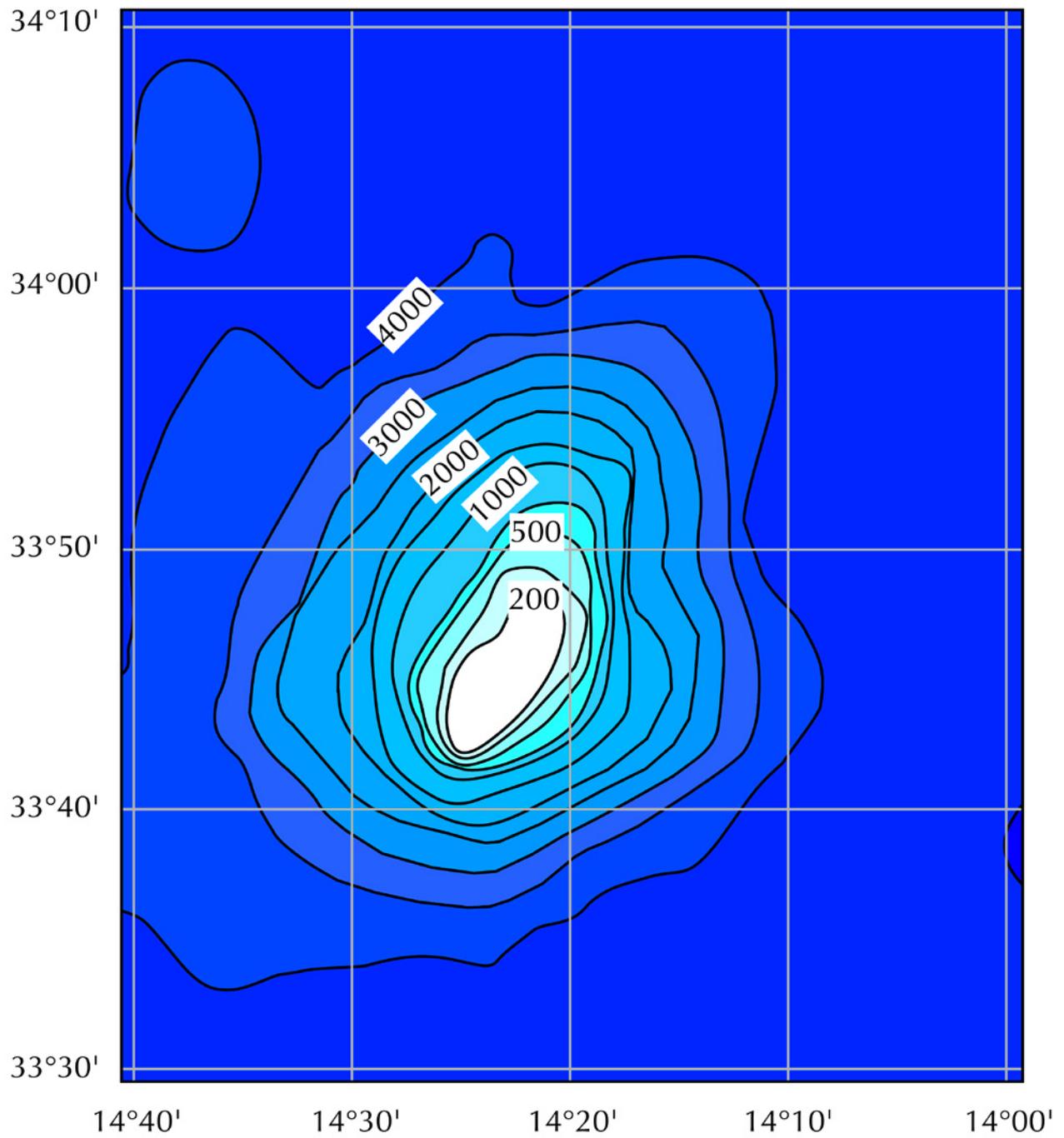


Figure 8a: Seine Seamount, same as Figure 8, colour version.

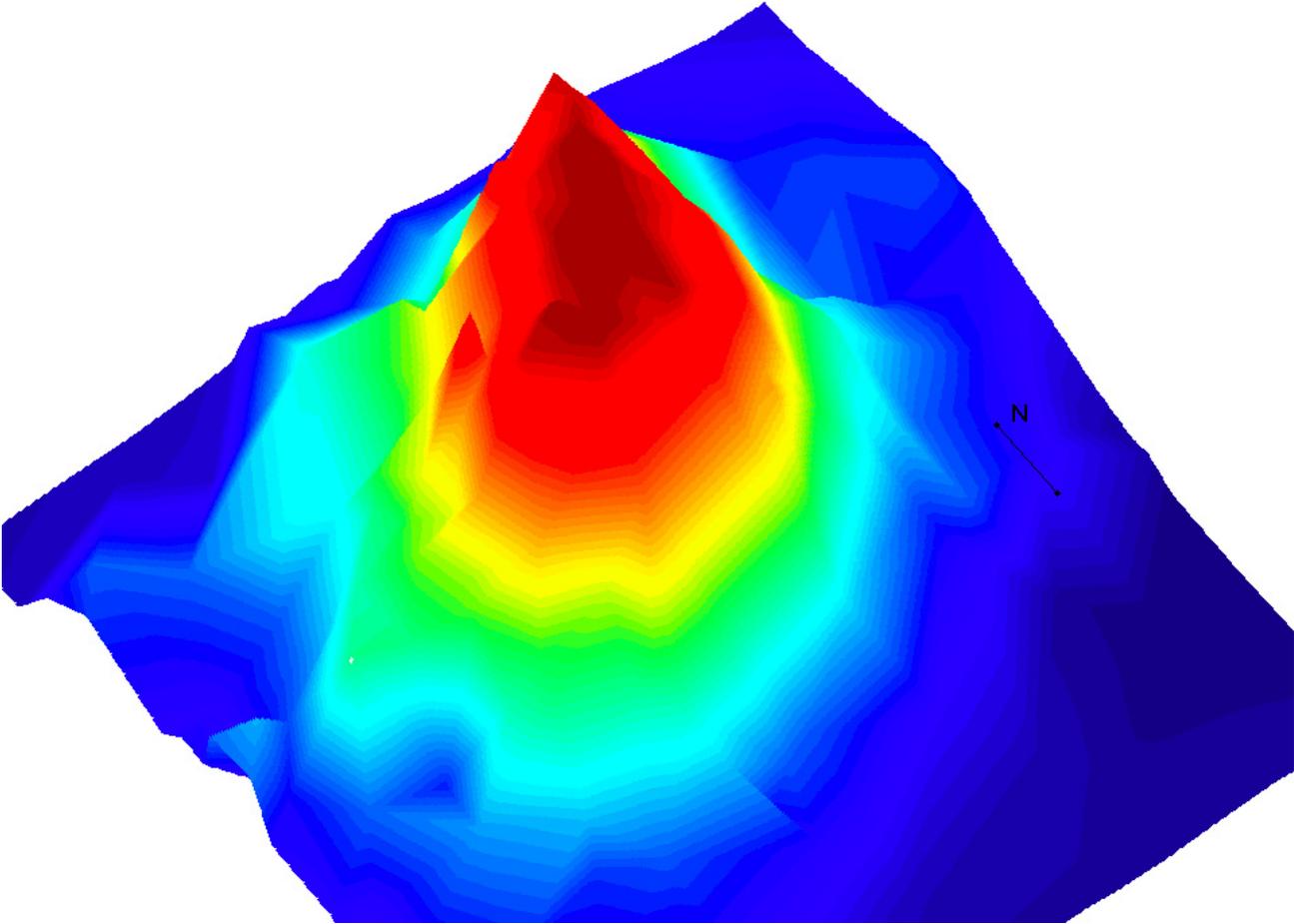


Figure 9: 3D representation of Seine Seamount