SOME REMARKS ON THE APPLICABILITY OF FORCES INDUCED BY GRAVITATIONAL POTENTIAL ENERGY ON REGIONAL SCALE

B. Andeweg*, D. Coblentz**, F. Beekman* & S.Cloetingh*
*Vrije Universiteit Amsterdam (NL) **University of Oregon (USA)
andb@geo.vu.nl/fax: +31-20-6462457

Gravitational body forces (i.e., buoyancy forces) play a major role in intraplate deformation. Gravitationally induced potential energy differences are being calculated assuming local isostasy over the scales of interest. It is for this reason that in previous studies modeling of stress fields and resulting deformation induced by these potential energy differences have been established only for larger scale (plate-wide) models or in a qualitative way. However, on a regional scale the assumption of local isostasy is less valid because flexural isostasy is more important. Therefore, application of the method on smaller scale requires some modifications and a reconsideration of the basic assumptions. We tested different scenarios for calculating the forces induced by gravitational potential energy variations across intraplate structures in a study area of about 20 x 4 degrees including part of the Mid-Atlantic Ridge and the Iberian Galicia margin. We present results of numerical calculations for models using (1) Bouguer inverted moho depth versus calculated moho depth (based on topography), (2) theoretical ocean floor depth versus filtered bathymetry (simulating flexural isostasy) and unfiltered bathymetry (local isostasy), and (3) for a plate reconstruction of 30 Ma. The various models produce significant differences in the stress component induced by the lateral variations in gravitational potential energy and therefore also in the predicted intraplate stress field in the study area.

1) EGS XXVI GENERAL ASSEMBLY Den Haag 1999

2) First submission

3) Some remarks on the applicability of forces induced by gravitational potential energy on regional scale

4) Andeweg, B.; Coblentz, D.; Beekman, F.; Cloetingh, S.

5) SE4: Intraplate stresses and sedimentary basin evolution

6) S. Cloetingh

7)

8)

9) poster

10) ASCII added

11)
Andeweg
Bernd
Drs.
Tectonics/Structural Geology
Vrije Universiteit Amsterdam
De Boelelaan 1085
1081 HV
Amsterdam
The Netherlands
31-20-4447353
31-20-6462457
andb@geo.vu.nl