Contribution à l'étude des déviations de la verticale dans la région du Tessin et au Nord-Ouest de l'Italie

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CONTRIBUTION A L'ÉTUDE
DES DÉVIATIONS DE LA VERTICALE DANS
LA RÉGION DU TESSIN ET AU NORD-OUEST
DE L'ITALIE

THÈSE
présentée à
l' ÉCOLE POLYTECHNIQUE FÉDÉRALE
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pour l' obtention
du titre de Docteur ès sciences techniques
par

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Das Problem der Modellkonstruktion konnte nur in sukzessiven Näherungen gelöst werden, so dass der Reihe nach vier Modelle eingeführt wurden.

1. Ein Modell der Ivrea-Masse,
   zusetzlich
2. ein Modell der Po-Ebene,
3. ein Modell der Nord-Ost-Masse,
4. ein Modell der Süd-Ost-Masse,

die auf den Karten 2 und 4 eingetragen sind. Innerhalb jeder Approximation wurde das Referenzellipsoid implizit neu gelagert; überdies ist die Verträglichkeit des endgültigen Modells mit den gravimetrisch bestimmten Lotabweichungen (siehe das II. Kapitel (2.8)) geprüft worden.

SUMMARY

The presented paper deals with the problem of interpolation of plumbline deflections. As well known, reasonable results to this problem are obtained for a certain area if the reduced plumbline deflections, which are the differences between astronomically determined plumbline deflections and the corresponding values computed from the visible mass distribution, have a smooth trend. Considering an area where such anomalies are less smooth such a method leads generally to unsatisfactory results. The computation of topo-isostatic plumbline deflections requires the assumption of a certain process of regularisation in the crust of earth. Therefore the reduced plumbline deflections result from the discrepancy between the actual structure of the crust of the earth and the one which has been assumed. The resulting discrepancies can be explained by the following causes:

1. The influence of inhomogenity of the masses above the geoid, which generally are assumed to have a constant density.
2. The influence of more distant masses which are neglected in the computation.
3. The influence of masses below the geoid, causing discrepancies with respect to the isostatic model, on which the computation of the topo-isostatic plumbline deflections are based.
In this paper the effect of the cause mentioned first is considered to be of stochastic nature. The second cause is assumed to be systematical in a way to be taken care by a simple mathematical expression. There remains the third cause, the influence of which depends from the type of model assumed for the mass distribution below the geoid.

The construction of the presented model is mainly based on gravimetric and astronomical data. The basic idea is, that the gradient of the constructed disturbing potential $T$ can be approximated by the relation

$$
\xi_m = \xi_a - \xi_{ti}, \ \eta_m = \eta_a - \eta_{ti} \text{ and } \Delta g_m = \Delta g.
$$

The problem of model construction was solved by successive approximations, introducing sequently four models:

1. a model of the Ivrea-mass, and additionally
2. a model of the Po-plane,
3. a model of the North-East mass,
4. a model of the South-East mass.

The assumed masses are shown in the maps two and four. For each approximation the ellipsoid of reference was independently placed. Furthermore the compatibility of the final model with the gravimetrically determined plumbline deflections was examined (compare capital II (2.8)).