

Application of Parker-Oldenburg Algorithm to map Moho Discontinuity using Gravity Data in Western North America Cordillera

*Mohammad Shehata^{1,2}, Hideki Mizunaga²

1. Department of Geology, Faculty of Science, Port Said University, Egypt, 2. Department of Earth Resources Engineering, Faculty of Engineering, Kyushu University, Japan

Parker–Oldenburg algorithm was applied to airborne gravity data in the western USA to map the Moho discontinuity. F-H Parasnis method was also applied to the gravity data to estimate the Bouguer reduction density for calculation of the Bouguer gravity anomaly. The inversion process uses the Oldenburg equation (Oldenburg, 1974), which is a rearrangement of Parker’ s equation (Parker, 1973), to estimate the depth to the undulating interface from the gravity anomaly by means of an iterative process. These formulas are shown as follows,

The resulted Moho depth map shows depths ranging from 9 km to 50 km. Moho anomalies showed good spatial correlation with the major physiographic provinces in the study area. The subduction trench of the Farallon remnants (Juan de Fuca and Gorda) was mapped at the north of the Mendocino Triple Junction (MTJ). The subducting plates show north-east dipping direction with low dipping angle. The effect of the subduction appears in the structure at the northern part (i.e. Cascade Mountain, Walla-Walla plateau and Northern Rocky Mountains), whereas the southern part is affected by the transform movement of the Pacific Plate yielding a set of basins (Central Valley, Great Basin and Wyoming Basin). Results of this research, in conjunction with other information of the area, provide a new information for the analysis of the tectonic framework of the western North-America.

References

Oldenburg, D.W., 1974. The inversion and interpretation of gravity anomalies. *Geophysics* **39** (4), 526–536.

Parker, R.L., 1973. The rapid calculation of potential anomalies. *Geophysical Journal of the Royal Astronomical Society* **31**, 447–455

Keywords: Parker–Oldenburg algorithm, Moho Discontinuity, Airborne Gravity Data, Northern America Cordillera