重力探査法によるネパール・カトマンズ盆地の基盤構造の推定
Estimation of basement structure of Kathmandu valley, Central Nepal by using gravity survey method

*プラダン オム[1]、下山 みを[1]、小鹿 浩太[1]、小林 貴幸[1]、Santosh Dhakal[2]、Suresh Shrestha[2]、駒澤 正夫[1]、野崎 京三[1]、Sapkota Soma Nath[2]、Nepali Dinesh[2]、松山 尚典[1]、纐纈 一起[3]
*Om Pradhan[1], Mio Shimoyama[1], Kota Koshika[1], Takayuki Kobayashi[1], Santosh Dhakal[2], Suresh Shrestha[2], Masao Komazawa[1], Kyozo Nozaki[1], Soma Nath Sapkota[2], Dinesh Nepali[2], Hisanori Matsuyama[1], Kazuki Koketsu[3]

1. 応用地質株式会社、2. Department of Mines and Geology, Nepal、3. 東京大学地震研究所
1. OYO Corporation, 2. Department of Mines and Geology, Nepal, 3. Earthquake Research Institute, University of Tokyo

Gravity survey was conducted in Kathmandu valley from August to September, 2017 under the project ‘Integrated research on great earthquakes and disaster mitigation in Nepal Himalaya’, which has been started in 2016 and will continue for five years under the Science and Technology Research Partnership for Sustainable Development (SATREPS) program of Japan Science and Technology Agency (JST) and Japan International Cooperation Agency (JICA).

To estimate basement structure of Kathmandu valley, we conducted gravity measurement on total of 236 survey stations which were distributed over 15km×18km area to cover Kathmandu valley. The gravity survey was carried out by using two SCINTREX CG-5 gravimeters (S/N #918, #1052) with reading resolution of 0.001mGal. The locations of the measurement station (longitude, latitude and elevation) were decided by using differential GPS/GNSS instruments (JAVAD GNSS G3T) with the vertical accuracy better than 30 mm. The gravity base station and GPS base were established at same site at the premises of Department of Mines and Geology (DMG) which lies at almost central part of Kathmandu valley. The loop measurement method was adopted and everyday measurement was started and closed at DMG base station. The gravity acceleration at the DMG base station is established by gravimetric ties between DMG base station and existing Nagarkot-FAGB absolute gravity station (g=978494.8347 mGal).
The rock formation in the periphery of the Kathmandu valley consists mainly of limestone, schist and phyllite. We applied two layered model for the basement analysis considering sedimentary layer above basement rock. At least one of the boreholes data shows existence of phyllite rock in the basement. For this reason, we assumed Bouguer reduction density for topographic masses as 2.67 g/cm^3 (2,670 kg/m^3) for computing the Bouguer anomaly value. Due to lack of availability of average density of the sedimentary layer, we chose density difference between basement rock and sediment layer as 0.37 g/cm^3, so that the residual Bouguer anomaly distribution satisfies the controlling data at one deep drilling spot and six circumference outcrops of bedrocks in a least squares fashion (Komazawa, 1995). The preliminary result (Fig.1) conforms to somewhat complex pattern of paleo river valley system, unlike a simple basin structure. Basement lows elongate in not only E-W direction, but also N-S or other direction resulted in that the ‘Y’ shaped paleo valley can be assumed to be confluence at the central part of the present valley. The depth to the bedrock is estimated to be 600 to 700 m from the present ground surface. Typical cross-sectional shape of the paleo valley is characterized by an inverted trapezoid with the width of about 5 to 6 km, height of about 600 to 700m, and the dip angle of the slope on both sides about 20 degrees.

キーワード：カトマンズ盆地、重力探査、重力異常、ブーゲー異常、地下構造
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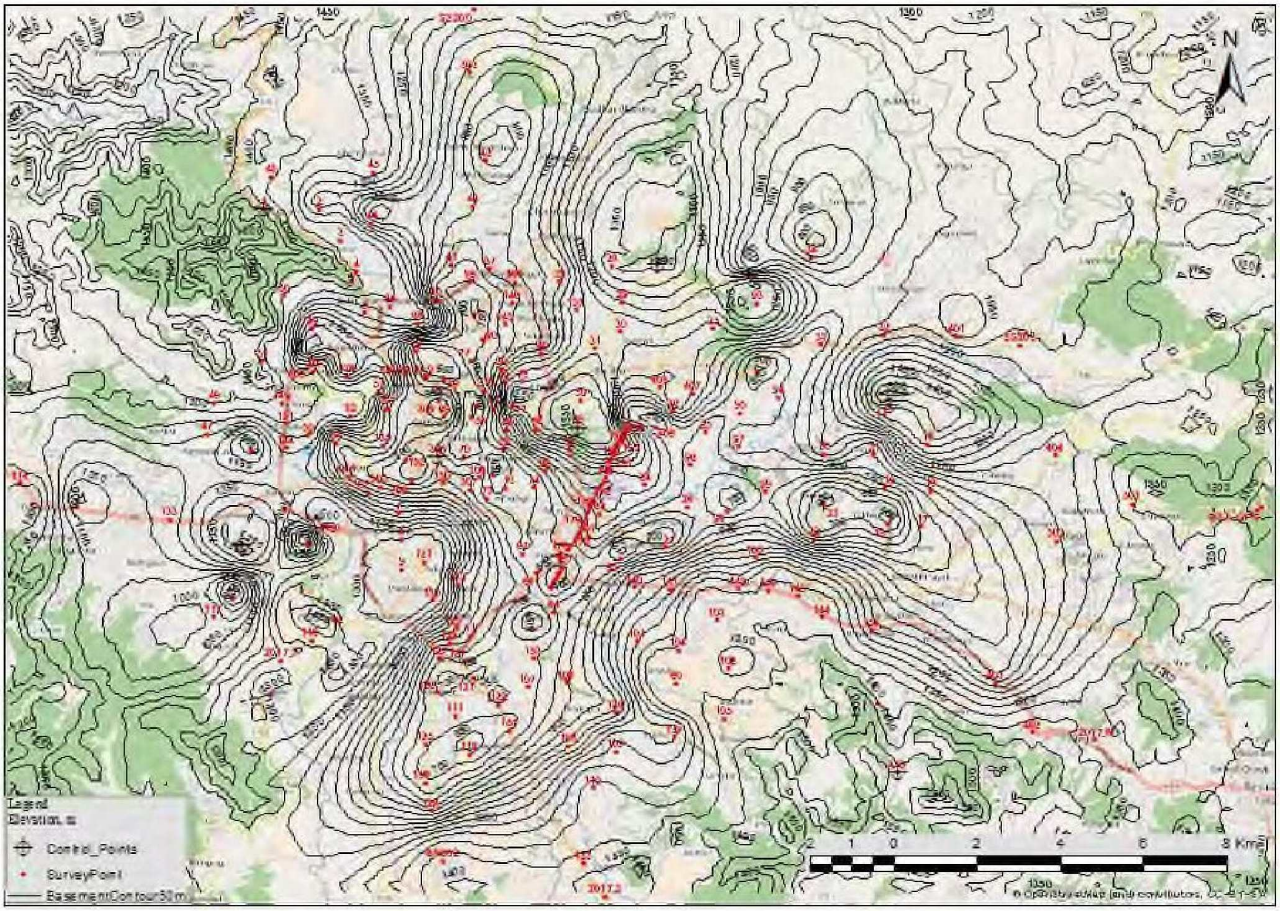

Fig.1 Gravity basement contour map (50 m interval) in elevation (preliminary result). For the basement estimation, Bouguer reduction density and density difference of the two layered model are assumed to be 2.67 g/cm^3 and 0.37 g/cm^3, respectively. Red solid circles indicate the gravity station established in the present study. (Base map: Open street map)

