EVALUATION OF IFSAR, SRTM, AND ASTER DIGITAL ELEVATION MODELS AT MT. APO GEOTHERMAL PRODUCTION FIELD THROUGH STATIC GPS OBSERVATIONS

S. Farley M. Meneses III

Energy Development Corporation
41st Floor, One Corporate Centre, J. Vargas cor. Meralco Ave., Ortigas Center,
Pasig City 1605 Philippines, meneses.sm@energy.com.ph

Abstract: Digital Elevation Models (DEM) have long been used as sources of information in various engineering and scientific applications in the Philippines. In fact, nationwide topographic maps were first created in the country as early as the 1940's. Sample applications are in flood modelling, base mapping, geographic information systems (GIS), environmental management, climate change studies, routing, navigation, and construction, among others.

Being a vertically-integrated energy company engaged in engineering and scientific activities in exploring and developing renewable energy sources, Energy Development Corporation (EDC) also utilizes DEMs in its various work processes. For example it has traditionally used national topographic maps in fieldwork planning, GIS mapping, structural delineation, geophysical and geologic modelling, and boundary demarcation. However, for the last years the world has seen a boom of new technologies that offer up-to-date and higher resolution DEMs. EDC was able to catch on early and has been acquiring and using these new DEMs in the last few years.

In order to evaluate available remotely-sensed DEMs, namely 30m resolution ASTER GDEM, 90m resolution SRTM DEM, 25m resolution SRTM DEM, and 5m resolution IFSAR DEM, at one of EDC's production field, Mt. Apo Geothermal Production Field or MAGPF, static GPS observations were compared to spot elevations derived from these DEMs at select control points scattered within the study area. When compared against GPS measurements, the best fitting DEM was the 25m resolution SRTM DEM with minimum difference of just 0.2m, maximum difference of 11m, and standard deviation of around 3.3m. The 5m IFSAR DEM had a 0.02m minimum difference, 14m maximum difference, and 3.7m standard deviation. The 90m SRTM DEM on the other hand had a 0.008m minimum difference, 19m maximum difference, and standard deviation of 6m. The least fitting DEM was the 30m ASTER DEM with 0.15m minimum difference, 26m maximum difference, and standard deviation of 7m.

The study was done in order to quantitatively appraise and analyze existing remotely-sensed DEMs of MAGPF. It is deemed that by comparing direct GPS measurements versus derived height values from the DEMs, EDC scientists and engineers will be able to give better characterization of the geomorphologic features of the study area. This in return will enable the company to derive better information from these datasets which will then ultimately lead to better solutions to research and business challenges involved in exploring and developing sustainable energy resources for the country.

Keywords: **IFSAR, SRTM, ASTER, DEM, GPS**