The study of surface deformation parameter and its application to volcano monitoring has evolved from procedures based on geometric or geodetic processes up observations from satellites. The GNSS-GPS system is the most widely used geodetic technique due to the obtained precision, sampling rate and speed in obtaining results, large storage capacity and low power consumption of equipments.

These features have enabled the installation of permanent GNSS stations to ensure the continuous monitoring of the satellites, increasing the benefits of using this technique for the evaluation of surface deformation parameter in active tectonic or volcanic areas.

This work presents a new methodology for volcano monitoring by determination of surface deformation on Deception Island (Antarctica) from the establishment of a number of permanent GNSS stations. The reference station is placed in the lower geodynamic activity zone. This station is the origin of topocentric system. The variation of slope distance between stations and the reference one, and the temporal variation of the magnitude and direction of the normal vector of the plane, defined by the reference station and any two stations, provide the spatial deformation in the volcanic area considered.

Then the variation of the magnitude provides information on compression or expansion (spatial dilatometer); while the changes of direction information on uplift or subsidence (spatial inclinometer).

Additionally, this work shows IESID-W system developed for transmitting and receiving GNSS-GPS observations in the control center. Detail the software developed for real-time the variation in the direct distance between the reference station and other stations.