Geophysical studies to decipher the subsurface features in Joshimath, Uttarakhand, India

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Joshimath, a geologically fragile region in the Garhwal Himalayas, is experiencing land subsidence due to natural and anthropogenic factors. A multi-instrumental geophysical survey, including Electrical Resistivity Tomography (ERT), magnetic susceptibility analysis, and ground magnetic surveys, was conducted to assess subsurface conditions. ERT results reveal weak zones with water saturation and resistivity variations linked to fractured and compact gneissic formations. Magnetic susceptibility analysis highlights variations in mineral concentration, while ground magnetic surveys identify subsurface structures and lineaments associated with instability. These findings provide critical insights for hazard assessment and sustainable development in Joshimath and other vulnerable Himalayan regions.

Keywords: Electrical resistivity tomography, ground magnetic, Joshimath, lineaments, magnetic susceptibility.