

عنوان مقاله:

Detection of southern faults of Sabalan volcano on the resistivity section inferred from the magnetotelluric data inversion

محل انتشار:

مجله فیزیک زمین و فضا، دوره 40، شماره 4 (سال: 1393)

تعداد صفحات اصل مقاله: 13

نویسندگان:

M. Takalu - کارشناس ارشد ژئوفیزیک، گروه فیزیک زمین، موسسه ژئوفیزیک دانشگاه تهران، ایران

B. Oskooi - دانشیار، گروه فیزیک زمین، موسسه ژئوفیزیک دانشگاه تهران، ایران

B. Habibian - استادیار، گروه فیزیک زمین، موسسه ژئوفیزیک دانشگاه تهران، ایران

خلاصه مقاله:

The magnetotelluric method is a frequency domain electromagnetic (EM) tool which utilizes natural variations in the Earth's magnetic and electrical field as a source. Variations in the Earth's natural fields supply information, providing the ability to study the electric substructure of the Earth in great depths. The large frequency range of the EM signals eradicates the problematic presence of conductive overburden or sampling frequencies, thereby allowing a deep penetration. Natural magnetotelluric (MT) signals arise from a variety of natural currents, including thunderstorms and solar winds. Total frequency range of the MT data can be from 40 kHz to less than 1 - 4 Hz. Data is acquired in a passive mode using a combination of electric sensors and induction coil magnetometers, and can detect changes of resistivity in great depths (Simpson and Bahr, 2005). Cagniard (1953) and Tikhonov (1950) developed a theory underlying the magnetotelluric method independent of each other in the 1950's. They both observed that the electric and magnetic fields associated with telluric currents that flow in the Earth as a result of variations in the Earth's natural electromagnetic field, should relate to each other in a certain way depending on the electrical characteristics of the Earth. The ratio of the horizontal electric field to the orthogonal horizontal magnetic field gives the electromagnetic impedance. The major advantage of the MT method is that it simultaneously measures the electric and magnetic fields in two perpendicular directions. The electric sensors are used to determine the electric field, which is derived from measurements of the voltage difference between electrode pairs of E_x and E_y . Induction coils are used to measure the magnetic field components in 3 orthogonal directions. The ratio of the recorded electric and magnetic fields gives an estimate of the apparent resistivity of the Earth at any given depth. The elements of the 2×2 impedance (Z) tensor are derived from complex ratios of the orthogonal components of the horizontal electric and magnetic fields in the frequency domain. As all the measurement stations are located over a line in our case, the data only permit the application of a two-dimensional interpretation process that requires the identification of the TE and the TM modes corresponding to electric and magnetic fields parallel to the geologic strike, respectively. As the geological strikes are not known in advance, the components of electromagnetic fields are measured in geomagnetic (or arbitrary) directions ... and the impedance tensor is

کلمات کلیدی:

سبلان، گسل، مگنتوتلوریک، نیم رخ مقاومت ویژه، وارون سازی

