

R003-05

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14:45~15:00

2016年鳥取県中部の地震の余震と電磁場データに現れる特徴的な波形の関係

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Relationship between aftershocks of the 2016 Central Tottori earthquake and characteristic waveforms appearing in EM field data

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Characteristic variations in the electromagnetic field have been reported to be observed before and after earthquakes. Many of these variations occur simultaneously with ground motion (e.g., Honkura et al., 2002; Ujihara et al., 2004). Variations in the electromagnetic field observed for hours to days including the origin time of an earthquake have also frequently been discussed (e.g., Oike and Ogawa, 1986; Izutsu, 2007). On the other hand, there are only a few studies on a relationship with earthquakes regarding variations in the electromagnetic field for seconds to tens of seconds including the origin time (e.g., Iyemori et al., 1996; Okubo et al., 2011; Fujinawa and Noda, 2016).

In this study, we focus on the electromagnetic field data for tens of seconds including the origin time of aftershocks of the 2016 Central Tottori Prefecture earthquake (October 21, 2016; M_j 6.6) to clarify the relationship between occurrence of earthquakes and electromagnetic field variations. The electromagnetic field data were obtained by MT surveys conducted at two sites during the period from the day after the main shock to November 9, 2016. A continuous record with 15 Hz sampling is used for the study. Two components of the electric field were measured at both sites, whereas three components of the magnetic field were measured only at one site.

Examination of the time-series of the electromagnetic field variations revealed characteristic waveforms for seconds to tens of seconds before and after origin time. The waveforms can be classified into several types according to their shapes: some of which were observed even when no earthquake occurred, whereas others were observed only when earthquakes occurred. Variations in the electromagnetic field with the former waveforms are assumed to be caused by artificial noises or natural phenomena other than earthquakes including lightning, while variations with the latter waveforms are assumed to be related to earthquakes.

In this presentation, we will introduce characteristic waveforms that appear in the electromagnetic field data before and after earthquakes and discuss whether these waveforms are related to the occurrence of earthquakes or not.

地震の前後に特徴的な電磁場変動が観測された事例がこれまでに報告されている。その多くは地動と同時に生じる変動であり (例えば, Honkura et al., 2002; Ujihara et al., 2004)、また、発震時刻の前後数時間~数日間に見られるものについても議論されている (例えば, Oike and Ogawa, 1986; Izutsu, 2007)。一方、発震時刻の前後数秒~数十秒間の電磁場変動について地震との関係を示した研究は Iyemori et al. (1996) や Okubo et al. (2011)、Fujinawa and Noda (2016) などが挙げられるが、その例は少ない。

本研究では、「2016年鳥取県中部の地震 (2016年10月21日、 M_j 6.6)」の余震を対象として、発震時刻の前後数十秒間に観測された電磁場データに注目し、地震の発生と電磁場変動の関係を明らかにすることを試みる。電磁場データは、本震の翌日から11月9日までの期間に2地点において実施されたMT探査によって取得されたもので、そのうち連続記録である15Hzサンプリングのデータを用いる。電場2成分は両地点で、磁場3成分は1地点のみで測定されている。

電磁場変動の時系列記録を調べたところ、発震時刻の前後数秒~数十秒間に特徴的な波形が確認できた。波形は形状により数種類に分類でき、地震が起きていない時にも確認できるものと、地震が発生した時にのみ確認できるものがあった。前者の波形は人工ノイズや、落雷のような地震以外の自然現象によるものと推測されるが、後者の波形は地震との関連が示唆される。

今回の発表では、地震発生前後の電磁場データに現れる特徴的な波形を紹介し、それらの波形が地震発生と関係しているか否かを議論する。