

## Simultaneous observation of field-aligned current with QZS and MAGDAS observatories - using FA coordinate

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FAC (Field-Aligned Current) is a current connecting the magnetosphere and the ionosphere. It is important to research FACs to understand the structure and dynamics of the magnetosphere and substorms. There are many reports about FAC observations. They used data from, e.g., geostationary orbit satellites, polar-orbit satellites and ground magnetometers. However, there are only small number of reports about a FAC simultaneously observed for a long time by a satellite and a ground observatory is. Thus, we analyze magnetic data from QZS (Quasi-Zenith Satellite) operated by JAXA and MAGDAS (MAGnetic Data Acquisition System) operated by International Center for Space Weather Science and Education (ICSWSE), Kyushu University. QZS has a tilted geostationary orbit and stays near the meridian plane of Japan. Thus, the footpoint of the magnetic field line running through QZS exists near Siberian MAGDAS stations, and we can observe a phenomenon along a magnetic field line for a long time. Furthermore, since QZS stays at high latitudes in space, we can expect to clearly identify FACs. In this study, we use the QZS magnetic field data expressed in FA (Field-Aligned) coordinates and the magnetic field data from Siberian MAGDAS stations, identify simultaneously-observed FAC events, and study them on a statistical basis. An example event took place on April 9th, 2011. Disturbances of the magnetic field were observed at 17:20~17:35UT. The observation can be interpreted as follows: A current circuit which was caused by a substorm moved westward in the morning-side region.

FAC (Field-Aligned Current; 沿磁力線電流) は磁気圏と電離圏を繋ぐ電流で、磁気圏の構造やサブストームなどの現象において非常に重要である。FACについてはこれまでに静止軌道衛星や極軌道衛星、地上観測など様々な観測が行われてきた。しかし、同一のFACを衛星と地上観測で長時間同時に観測した報告例は少ない。そこで本研究では、JAXAの運用する衛星QZS (Quasi-Zenith Satellite; 準天頂衛星) と九州大学国際宇宙天気科学・教育センターが中心となり運用する地磁気観測ネットワークMAGDAS (MAGnetic Data Acquisition System) の同時観測磁場データを用いて解析を行う。QZSは静止軌道に傾斜角を持っており、日本の子午面近くに滞在する。そのため、これを通過する磁力線のfootpointがMAGDASシベリア観測点の付近にあり続けるので同一の磁力線上を伝わる現象を長時間同時観測できる。また、QZSは磁気圏内高緯度領域に長時間滞在するため、FACを明瞭に観測することができると考えられる。本研究では、FA (Field-Aligned) 座標系で表現したQZS磁場と、シベリアMAGDAS磁場から、FAC同時観測例を同定し統計的に解析する。一例として、2011/04/09の17:20~17:35UTにイベントが観測された。このイベントは朝側領域において、サブストームに伴って形成された電流回路が西向きに流されたものと解釈できる。