**First observations of daytime** **range spread F** **at middle latitude during the afternoon hours**

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Tables S1

The file of 20161223.zip includes ionograms (\*.amp) at ZHY station.

The file of VTEC\_ZY07\_20161223000000.txt is associated with GNSS-TEC at ZHY station.

The file of ZY0720161223\_1d.ism is associated with GNSS intensity scintillation index at ZHY station.

**Introduction**

This supporting information provides the ionograms and GNSS data used in this study. I

The file of VTEC\_ZY07\_20161223000000.txt is associated with GNSS-TEC at ZHY station.

The file of ZY0720161223\_1d.ism is associated with GNSS intensity scintillation index at ZHY station.

The format of the files mentioned above is text. Thus, readers can directly get the information of the data from these files.

The files of \*.amp in 20161223.zip are corresponding to ionograms data. It is noted that the recorded time of the data is Beijing Time (UT+8h), the local time is UT+7h.

The file format of \*.amp was shown in Table S1, readers could read them instructed by Tables S1.

Table S1.File format of \*.amp recorded by ionosonde

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Bytes | Description | Unit | Range | Type |
| 1-4 | Start frequency | MHz | 0-20 | float |
| 5-8 | Step frequency | KHz | 0-1000 | float |
| 9-12 | Stop frequency | MHz | 0-20 | float |
| 13-16 | Sounding times of each frequency | time | 1-128 | float |
| 17-20 | Total Range number of echoes | one | 1-700 | float |
| 21-24 | Range resolution | km | 3.84, 3.84\*n,n=1,2.. | float |
| 25-28 | Number of frequency | one | 1-1000 | float |
| 29-32 | Echo starting position | one | 1-20 | float |
| 33-36 | Type of sounding code | - | 1:complementary code; otherwise: m sequence | float |
| 37-40 | Code order | one | 1-20 | float |
| 41-44 | Pulse width | one | 1-20 | float |
| 45-48 | Pulse repetition period | second | 1-1000 | float |
| 49-52 | Start year | year | 0-2999 | float |
| 53-56 | Start month | month | 1-12 | float |
| 57-60 | Start day | day | 1-31 | float |
| 61-64 | Start hour | hour | 0-24 | float |
| 65-68 | Start minute | minute | 0-59 | float |
| 69-72 | Start second | second | 0-59 | float |
| 73-76 | Stop year | year | 0-2999 | float |
| 77-80 | Stop month | month | 1-12 | float |
| 81-84 | Stop day | day | 1-31 | float |
| 85-88 | Stop hour | hour | 0-24 | float |
| 89-92 | Stop minute | minute | 0-59 | float |
| 93-96 | Stop second | second | 0-59 | float |
| 97-100 | Latitude of station | degree | 0-90 | float |
| 101-104 | Latitude of station | minute | 0-59 | float |
| 105-108 | Latitude of station | second | 0-59 | float |
| 109-112 | North and south latitude | - | 0:north; 1:south | float |
| 113-116 | Longitude of station | degree | 0-180 | float |
| 117-120 | Longitude of station | minute | 0-59 | float |
| 121-124 | Longitude of station | second | 0-59 | float |
| 125-128 | East and west longitude | - | 0: east; 1: west. | float |
| 129-132 | Code width | one | 1-100 | float |
| 133-136 | Mode of sounding | - | 0: sweep frequency sounding; 1: fixed frequency sounding; 2: hop frequency sounding. | float |
| 137-140 | Display Range number of echoes | one | 1-700, indicates number of echoes to be displayed on ionogram. | float |
| 141-144 | Type of sounding | - | 0: vertical sounding; 1: backscatter sounding; 2: oblique sounding. | float |
| 145-500\*4 | Reserved | - | - | - |
| 500\*4+1-end | data | - | - | float |