
子午工程感应式磁力仪设备 数据文件格式说明

子午工程数据中心

1 数据文件交换接口

1.1 数据文件定义

每一类数据文件描述如下表：

序号	数据文件名称	数据文件描述	数据级别	文件格式	文件类型编码	存储时间分割类型	数据文件文件名	设备→节点站				节点站→子午工程数据中心			
								是否打包传输	压缩包文件名称	传输时频模式	通讯确认	是否打包传输	压缩包文件名称	传输时频模式	通讯确认
01	感应式磁力仪观测数据文件	地磁感应场 2 个水平分量 X、Y 和 1 个垂直分量 Z	一级科学数据	二进制	D	01H	XXX_SCM01_DMD_L11_01H_20071120000000.le m	否	/	24 小时	Yes	是	/	24 小时	Yes
02	感应式磁力仪运行日志文件	感应式磁力仪设备运行状态	日志文件	TXT	LOG	01D	XXX_SCM01_LOG_01D_20070101.txt	否	/	24 小时	Yes	是	/	24 小时	Yes

注：XXX 为：MHT（黑龙江漠河站）、SSL（北京十三陵站）、SYS（海南三亚站）、ZSZ（南极中山站）、JFT（武汉九峰站）、MZL（内蒙古满洲里站）、NAT（长春农安站）、HZZ（浙江杭州站）、MLS（山东马陵山站）、SYT（湖南邵阳站）、ZQT（广州肇庆站）、QZT（海南琼中站）、PXT（成都郫县站）、LAT（西藏拉萨站）。

1.2 数据文件—01 格式描述

1 数据文件名称

感应式磁力仪数据文件

2 数据文件描述

地磁变化场 X' 、 Y' 和 Z'

3 数据级别

一级科学数据

4 文件格式

txt

5 数据文件存储时间分割

1 小时

6 文件格式样例

见附件。

7 文件格式描述

见附件。

Appendix C. Binary data file description

General notes

Each separate data file contains only one day (or one hour) data. Data are stored in binary format, except file header, which is stored as XML-text. Therefore, the datafile is divided in two parts: XML-header and data itself. In its turn, data part consists of one-second records. Each one-second record consists of a one-second header (where all data of time, GPS, gain and calibration status are stored) and one-second data block. The length of all one-second records in the datafile is constant. In case of errors, missing data, etc. necessary parts are filled with NAN (Not-a-Number) code to keep one-second record size constant.

The size of one-second record equals to:

One-second size in bytes = 4 bytes for one-second header + sampling rate *
number of channels * 4 bytes per sample

For example, if sampling rate is 64 samples per second, second size in bytes is equal to:

one-second size in bytes = 4 + 64 * 3 * 4 = 772 bytes

And the one day datafile size equals to:

file size in bytes = size of XML-header in bytes + second size * 86400 seconds per day

Skipped data

Skipped data are replaced by NAN code (7F FF FF FF hex). It helps to keep the datafile size always constant.

File names

The datafile name has the following template:

YYYYMMDDHHMMSS.lem

Where:

YYYYMMDD - date and HHMMSS - time when recording started.

YYYY - year, - 2001, 2002, ...

MM - month, - 01 ... 12

DD - day, - 01... 31

HH - hour, 0...23

		multiply each sample stored in file by this coefficient. $\text{bit_to_nT} = \text{sensitivity} / \text{gain} / \text{averaging}$
channels	3	number of channels. Always 3, which corresponds to X, Y and Z
bytes_per_sample	4	number of bytes per one sample (always 4)
one_second_record_size_in_bytes		number of bytes per one second data (<u>see above</u>)
GPS		GPS coordinates:
longitude		longitude
latitude		latitude
altitude		altitude
remarks		remarks (maximum length 1024 symbols)

XML header is finished by closing `</lemi_header>` tag and carriage return (0x0D, 0x0A).

Typical xml-header:

```
<? version="1.0" encoding="windows-1251"?>
<lemi_header version="lemi30i2">
  <year>2005</year>
  <month>09</month>
  <day>28</day>
  <base_sampling_rate>256</base_sampling_rate>
  <averaging>4</averaging>
  <samplingrate>64</samplingrate>
  <sensitivity> 2.440000000000000E-0005</sensitivity>
  <gain>10</gain>
  <bit_to_nT> 6.100000000000000E-0007</bit_to_nT>
  <channels>3</channels>
  <bytes_per_sample>4</bytes_per_sample>
  <one_second_record_size_in_bytes>772</one_second_record_size_in_bytes>
  <GPS>
    <longitude></longitude>
```



```

        <latitude></latitude>
        <altitude></altitude>
    </GPS>
    <remarks></remarks>
</lemi_header>

```

One-second header and data

status byte	1 byte	char	Second header
hour	1 byte	char	
minute	1 byte	char	
second	1 byte	char	
X channel sample	4 bytes	integer	Total number of samples equals to number of channels (3) * sampling rate
Y channel sample	4 bytes	integer	
Z channel sample	4 bytes	integer	
....			
X channel sample	4 bytes	integer	
Y channel sample	4 bytes	integer	
Z channel sample	4 bytes	integer	
....			

Status byte

bit	7	6	5	4	3	2	1	0	
meaning	not used				GPS status	calibration	bit1	bit0	gain
					0 - not available	1 - off	0	0	1
					1 - GPS OK	0 - on	0	1	10
							1	0	1000
							1	1	1000