

# **A User's Guide for Installation and Use of FY-3 MPT/HRPT Data Preprocessing Software Packages for Linux Users**

On 27 May 2008, the China Meteorological Administration (CMA) successfully launched the FY-3 polar orbiting meteorological satellite through its partners. While making the Earth observations, FY-3 continuously broadcasts within its coverage the raw MPT data (from MERSI instrument), which is packed in CCSDS format and raw HRPT data from all its payload instruments (with only exception of MERSI instrument) via both X and L transmission bands.

To extensively share the FY-3 data, the National Satellite Meteorological Center/CMA has released 2 software packages oriented to Linux users: (1) FY3L0pp 1.1 version and FY3L1pp 1.1 version. Currently, they are capable to process data from the four instruments on board the FY-3 satellite, i.e. MERSI, VIRR, MWTS and MWHS. (Due to the abnormal functioning of FY-3 instrument IRAS, no processing software has been released for IRAS so far).

## **1 Environment for operating FY3L0pp 1.1 and FY3L1pp 1.1 software packages**

- Both FY3L0pp and FY3L1pp software packages have been successfully decoded and run on the following platform:
  - Operating system: RedHat Fedora Linux 6.0/8.0
- Recommended hardware configurations are as follows:
  - RAM: >2.0GB
  - CPU: Intel Pentium Duo Core processor (>3.0Ghz)
  - Hard disk: >200GB

## **2 FY-3 MPT/HRPT Level-0 data generation software package (FY3L0pp)**

FY3L0pp package enables to unpack raw data broadcasted by FY-3 in both X and L bands for generating level-0 data from various instruments. Users need to apply directly to the National Satellite Meteorological Center/CMA, and sign a related agreement (see Appendix 1), in order to obtain a DVD containing the compressed package of execution codes ([FY3L0pp.1.1.0.tar.gz](#)) and relevant ancillary data. This package contains the following three execution scripts:

- 1) Fy3MersiL0db.csh, which unpacks raw MPT data from MERSI instrument obtained through X band to generate level-0 data;
- 2) Fy3VirrL0db.csh, which unpacks raw data from VIRR instrument obtained in L band to generate level-0 data;

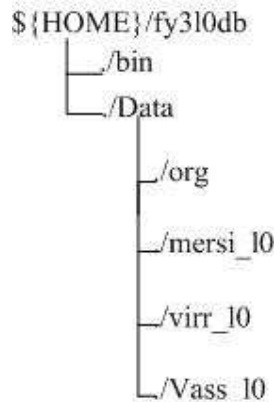
- 3) `Fy3VassL0db.csh`, which unpacks raw data from VSS unit (MWTS, MWHS and IRAS) obtained through L band to generate level-0 data from the corresponding instruments.

## 2.1 Installation of FY3L0pp software package

If a user has not yet created a `fy3user` account, please do so in your Linux system. The home directory is `fy3user` with Login Shell being set to `csh`. Using newly created `fy3user` account, a user can login the Linux system and open the `xterm` window. The decompression software can be installed by using the following commands:

```
> tar-zxvf FY3L0pp.1.1.0.tar.gz
or
> gunzip <FY3L0pp1.1.0.tar.gz | tar xf-
```

After successful installation, the system will automatically create the following directory structure under the user's directory:



The meanings of directory names are given in the following table.

Directory	Description
<code>fy3l0db</code>	Home directory of FY3L0pp software package
<code>Bin</code>	Repository directory of execution codes
<code>Data</code>	level-0 data repository directory of each instrument
<code>Org</code>	Repository directory of raw data acquired from X or L band
<code>mersi_10</code>	repository directory of unpacked level-0 data generated from MERSI
<code>virr_10</code>	repository directory of unpacked level-0 data generated from VIRR
<code>vass_10</code>	repository directory of unpacked level-0 data generated from VASS unit (MWTS, MWHS and IRAS)

## 2.2 Software execution

2.2.1 The software to generate level-0 data from MERSI is executed as follows:

```
>cd fy3l0db/bin
>Fy3MersiL0db.csh [FY3-X-BAND-raw-file] [FY3A|FY3B]
```

Where `[FY3-X-BAND-raw_file]` is the original file of raw MERSI data input, and

[FY3A|FY3B] is the satellite's name ,as shown in the following example:

```
>./Fy3MersiL0db.csh FY3A_X_2009_10_29_11_16_D.ORG FY3A
```

Or

```
>./Fy3MersiL0db.csh FY3B_X_2011_12_12_13_25_D.ORG FY3B
```

2.2.2 The software to generate level-0 VIRR data is executed as follows:

```
>cd fy3l0db/bin
```

```
>Fy3VirrL0db.csh [FY3-L-BAND-raw_file] [FY3A|FY3B]
```

Where [FY3-L-BAND-raw\_file] is the original file of VIRR data input, as shown in the following example:

```
>./Fy3VirrL0db.csh FY3A_L_2009_10_21_12_06_D.ORG FY3A
```

Or

```
>./Fy3VirrL0db.csh FY3B_L_2011_12_12_13_25_D.ORG FY3B
```

2.2.3 The software to generate level-0 data from VASS unit is executed as follows:

```
>cd fy3l0db/bin
```

```
>Fy3VassL0db.csh [FY3-L-BAND-raw_file] [FY3A|FY3B]
```

Where [FY3-L-BAND-raw\_file] is the original file of VIRR data input, and [FY3A|FY3B] is the satellite's name, as shown in the following example:

```
>./Fy3VassL0db.csh FY3A_L_2009_10_21_12_06_D.ORG FY3A
```

Or

```
>./Fy3VassL0db.csh FY3B_L_2011_12_12_13_25_D.ORG FY3B
```

### 3. Level-1 FY-3 MPT/HRPT data pre-processing software package (FY3L1pp)

FY3L1pp package processes level-0 data from five instruments MERSI, VIRR, MWTS, MWHT and IRAS on board the FY-3 satellites to generate corresponding level-1 data respectively. Users are requested to apply directly to the National Meteorological Satellite Center/CMA and sign a relevant agreement (Appendix 1) to obtain a DVD that contains the execution code compression package (FY3L1pp.1.1.0.tar.gz) and relevant ancillary data. This package contains following 5 execution scripts:

- 1) Fy3MersiL1db.csh: MERSI data processing routine;
- 2) Fy3VirrL1db.csh: VIRR data processing routine;

- 3) Fy3MwtsL1db.csh: MWTS data processing routine;
- 4) Fy3MwhsL1db.csh: MWHS data processing routine;
- 5) Fy3IrasL1db.csh: IRAS data processing routine.

### 3.1 Installation of FY3L1pp software package

First of all, if the fy3user account has not been created, please do so in your Linux system. The home directory is fy3user with the Login Shell being set to csh.

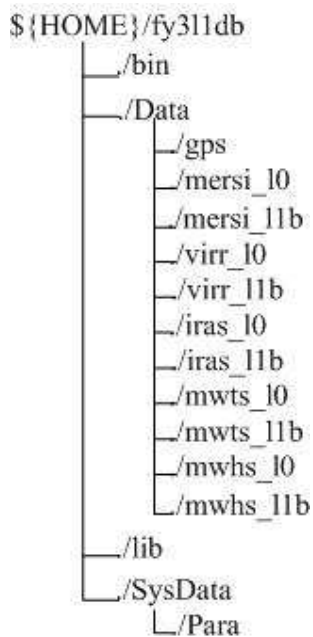
With the newly created fy3user account, you can log in the Linux system and open the xterm window. The decompression software can be installed by using the following commands:

```
>tar -zxvf FY3L1pp.1.1.0.tar.gz
```

or

```
> gunzip <FY3L1pp.1.1.0.tar.gz | tar xf-
```

After the successful installation, the system will automatically create the following directory structure under the user directory.



Directory descriptions are given in the following table:

Directory	Description
fy3l1db	Home directory of the FY3L1pp software package
bin	Repository directory the executable code of the pretreated software package
data	Repository directory for level-0 and level-1 data from various payload instruments
gps	Repository directory for GPS data disseminated by FY-3
mersi_10	Repository directory for unpacked level-0 data from MERSI
mersi_11	Repository directory for preprocessed level-1 data from MERSI
virr_10	Repository directory unpacked level-0 data from VIRR
virr_11	Repository directory for preprocessed level-1 data from VIRR

iras_l0	Repository directory for unpacked level-0 data from IRAS
iras_l1	Repository directory for preprocessed level-1 data from IRAS
mwts_l0	Repository directory for unpacked level-0 data from MWTS
mwts_l1	Repository directory for preprocessed level-1 data from MWTS
mwhs_l0	Repository directory for unpacked level-0 data from MWHS
mwhs_l1	Repository directory for preprocessed level-1 data from MWHS
lib	Repository directory for the library files attached to FY3L1pp preprocessing software package
SysData	Repository directory for static data files necessary for FY3L1pp package, e.g. Land Mask file, Land Cover file, DEM, fy31line data, leapsec.dat and utcpole.dat.
Para	Repository directory for calibration coefficients of MERSI

### 3.2 Installation of ancillary parameters

While running FY3L1pp package, some static data files are required. Some files need to be downloaded and updated via Internet on a regular basis:

- fy3a1line.dat (<ftp://fy3aonline.fy3a@nsmc-ftp.cma.gov.cn/fy3a1line.dat>) is downloaded and saved in the (./fy31db/SysData/) directory on a daily basis
- fy3b1line.dat (<ftp://fy3aonline.fy3a@nsmc-ftp.cma.gov.cn/fy3b1line.dat>) is downloaded and saved in the (./fy31db/SysData/) directory on a daily basis
- utcpole.dat (<ftp://oceans.gsfc.nasa.gov/COMMON/utcpole.dat>) is downloaded and saved in the (./fy31db/SysData/) directory on a weekly basis
- leapsec.dat (<ftp://oceans.gsfc.nasa.gov/COMMON/leapsec.dat>) is downloaded and saved in the (./fy31db/SysData/) directory on a weekly basis

### 3.3 Configuration

Switch to root user by executing the following commands:

```
>su root
>echo "/home/fy3user/fy31db/lib" >> /etc/ld.so.conf
>/sbin/ldconfig
>exit
>chcon -t textrel_shlib_t /home/fy3user/fy31db/lib/*.so
```

### 3.4 Operation

FY3L1pp package contains 5 scripts for 5 different instruments respectively. The specific description is made as follows:

#### 3.4.1 FY-3/MERSI data preprocessing

```
>cd fy31db/bin
>Fy3MersiL1db.csh [FY3-Mersi_L0_file] [FY3A|FY3B]
```

**Fy3MersiL1db.csh** script needs 2 input parameter: **FY3-Mersi\_L0\_file** and **satellite's name**.

An example:

```
>./Fy3MersiL1db.csh FY3A_X_2009_10_29_11_16_D_MERSI.DAT FY3A  
Or  
>./Fy3MersiL1db.csh FY3B_X_2011_12_12_13_25_D_MERSI.DAT FY3B
```

#### 3.4.2 FY-3/VIRR data preprocessing

```
>cd fy3l1db/bin  
>Fy3VirrL1db.csh [GPS_file] [FY3-Virr_L0_file] [FY3A|FY3B]
```

**Fy3VirrL1db.csh** script needs 3 input parameters: **GPS\_file** and **FY3-Virr\_L0\_file** and **satellite's name**.

An example:

```
>./Fy3VirrL1db.csh FY3A_L_2009_10_21_12_06_D_GPSXX.DAT FY3A_L_2009_  
10_21_12_06_D_VIRRX.DAT FY3A
```

Or

```
>./Fy3VirrL1db.csh FY3B_L_2011_12_12_13_25_D_GPSXX.DAT FY3B_L_2011_  
12_12_13_25_D_VIRRX.DAT FY3B
```

#### 3.4.3 FY-3/MWTS data preprocessing

```
>cd fy3l1db/bin  
>Fy3MwtsL1db.csh [GPS_file] [FY3-Mwts_L0_file] [FY3A|FY3B]
```

**Fy3MwtsL1db.csh** script needs 3 input parameters: **GPS\_file** and **FY3-Mwts\_L0\_file** and **satellite's name**.

For example:

```
>./FyMwtsL1db.csh FY3A_L_2009_10_21_12_06_D_GPSXX.DAT FY3A_L_2009_  
10_21_12_06_D_MWTSX.DAT FY3A
```

Or

```
>./FyMwtsL1db.csh FY3B_L_2011_12_12_13_25_D_GPSXX.DAT FY3B_L_2011_  
12_12_13_25_D_MWTSX.DAT FY3B
```

#### 3.4.4 FY-3/MWHS data preprocessing

```
>cd fy3l1db/bin  
>Fy3MwhsL1db.csh [FY3-Mwhs_L0_file] [FY3A|FY3B]
```

**Fy3MwhsL1db.csh** script needs only 2 input parameter: **FY3-Mwhs\_L0\_file** and **satellite's name**

For example:

```
>./Fy3MwhsL1db.csh FY3A_L_2009_10_21_12_06_D_MWHSX.DAT FY3A
```

Or

```
>./Fy3MwhsL1db.csh FY3B_L_2011_12_12_13_25_D_MWHSX.DAT FY3B
```

#### 3.4.5 FY-3/IRAS data preprocessing

```
>cd fy3l1db/bin
```

```
>Fy3IrasL1db.csh [GPS_file] [FY3-Iras_L0_file] [FY3A|FY3B]
```

**Fy3IrasL1db.csh** script needs 3 input parameters:**GPS\_file** and **FY3-Iras\_L0\_file** and **satellite's name**

For example:

```
>./Fy3IrasL1db.csh FY3A_L_2009_10_21_12_06_D_GPSXX.DAT FY3A_L_2009_10_21_12_06_D_IRASX.DAT FY3A
```

Or

```
>./Fy3IrasL1db.csh FY3B_L_2011_12_12_13_25_D_GPSXX.DAT FY3B_L_2011_12_12_13_25_D_IRASX.DAT FY3B
```

#### 3.5 Remark on installation of HDF5 (version 1.6.7)

Data preprocessing software package (FY3L1pp) contains HDF5 execution code (Version 1.6.7). The installation of FY3L1pp package includes installation of HDF5, therefore users do not need to take the following installation steps.

If users have previously installed HDF5 packages (non-version 1.6.7), or preprocessing package cannot operate normally due to different HDF5 version, you should install this new HDF5 package by yourself. This shared package code is available from the following website. Please follow the software package installation instructions for taking specific decoding, installation and configuration steps:

- The code execution of this shared HDF5 software (hdf5-1.6.7.tar.gz) can be downloaded from Internet (<http://www.hdfgroup.org/ftp/HDF5/prev-releases/>). After decompression, please take decoding, installation and configuration in accordance with its instructions.

### **3.6 Science and Technique Support**

The operational versions of the FY-3 MPT/HRPT Pre-processing software were developed at CMA/NSMC by FY-3A/B DPPS Science Team. The team includes Dr. Yang Zhongdong (principal investigator, [yangzd@cma.gov.cn](mailto:yangzd@cma.gov.cn)); Dr. Guan Min (geolocation algorithm for all instruments); Dr. Gu Songyan (calibration for WMHS); Dr. Wu Xuebao and Dr. You Ran (calibration for WMTS); Dr. Qi Chengli (calibration for IRAS); Dr. Hu Xiuqing (calibration for MERSI); and Dr. Zhang Liyang (calibration for VIRR).

A Software Development Team of Beijing Huayun ShineTek Satellite Application System Engineering Co., Ltd was in charge of converting the FY-3 MPT/HRPT Pre-processing software operational versions of NSMC into Linux version for FY-3 DB user. This software development team includes Mr. Qu Jianhua (program management); Mr. Qing Ping, Mr. Sha Li, Mr. Huangjian, Mr. Guo Tao, and so on. Mr. Sha Li ([shallyjl@gmail.com](mailto:shallyjl@gmail.com)) is responsible for supporting and maintaining the FY3L0pp 1.1 and FY3L1pp 1.1 software packages on Linux system.



## **A Letter of Undertaking for Use of Data Preprocessing Software Packages Dedicated to Four FY-3 Payload Instruments**

To extensively share FY-3 satellite data, the National Satellite Meteorological Center (NSMC) of the China Meteorological Administration has released to Linux users the data pre-processing software packages (trial version) for some remote sensing instruments onboard the FY-3: FY3L0pp (version 1.1) and FY3L1pp (version 1.1). These packages are designed to process level-0 data from 5 payload instruments (MERSI, VIRR, MWTS, MWHS and IRAS) of the FY-3 satellite, and to generate level-1 data. For more information on their use, see the user guide.

In view of the copy and patent rights, users shall commit that the software packages are used for public good, but not for commercial purpose, and that they shall not be transferred and copied to a third party.

IN WITNESS WHEREOF, this Letter of Undertaking shall be written in duplicate, one for each party.

Party A: National Satellite Meteorological  
Center/CMA

Party B:

Approved by:

Person in charge:

Focal point:

Focal point:

Tel:

Tel:

E-mail:

E-mail:

Date:

Date: