

Community SWIRLS Nowcasting System (Com-SWIRLS)

Wai-kin Wong, Vincent Tsz-lo Cheng and Wang-chun Woo

WMO WWRP 4th International Symposium on Nowcasting and Very-short-range Forecast 2016 (WSN16)

Session F3, 29 July 2016

Motivation of Com-SWIRLS

- capacity building of rainfall nowcasting in NMHSs, promote knowledge exchange and collaboration on research development of rainfall nowcasting techniques
- Com-SWIRLS is developed based on the operational version of SWIRLS, featuring:
 - Quantitative precipitation estimate (QPE), quantitative precipitation forecast (QPF) and graphics utilities to generate rainfall / reflectivity nowcast products
 - Portable code running on common Linux distributions
 - Configurable codes for implementation in different forecast domains
 - Modular design for easier code changes, and integrate new modules from community users

WMO VCP Workshop on Rainfall Nowcasting 7-11 December 2015

The Observatory organized the World Meteorological Organization Workshop on Rainfall Nowcasting

Tuesday, 22nd December 2015

[Mobile Version]



The Hong Kong Observatory organized an international workshop on "Rainfall Nowcasting" under the Voluntary Cooperation Programme (VCP) of the World Meteorological Organization (WMO) during 7 – 11 December 2015.

"Rainfall Nowcasting" generally refers to forecasts of rainfall and the associated severe weather such as thunderstorm, hail and wind gusts, for up to 6 hours ahead. It is the pillar for rainstorm warning system and public rainfall nowcast service, both critical to disaster prevention and reduction. The Observatory also took this opportunity to launch the community version of the SWIRLS nowcasting system ("Com-SWIRLS") for use by interested meteorological services around the world.

Experts in rainfall nowcasting were invited as lecturers of the workshop. Dr Jenny Juanzhen Sun of the National Center for Atmospheric Research (NCAR) presented the latest development of rainfall nowcasting based on radar and convection-permitting numerical weather prediction model. Mr Hidehiko Murata of Japan Meteorological Agency introduced the newly available Himawari-8 satellite products and their applications in nowcasting. In addition, Mr Wong Wai-kin, Mr Woo Wang-chun and Mr Cheng Tsz-lo of the Observatory presented their work on quantitative precipitation estimation (QPE) using the Com-SWIRLS.

The workshop was attended by 22 trainees from Fiji, Kazakhstan, Kuwait, Madagascar, Malawi, Africa, Tajikistan, Thailand, Uganda, Uzbekistan and Vietnam. The time at the VCP workshop to enable representatives from Beijing, China.

The participants highly appreciated the Com-SWIRLS in their meteorological services. They were most impressed with the learning of QPE and the way to disseminate information of rainfall nowcasting. They had benefited a lot from the workshop and will make more effective use of the radar nowcasting system in their respective countries.



AvRDP Workshop 20-22 July 2016



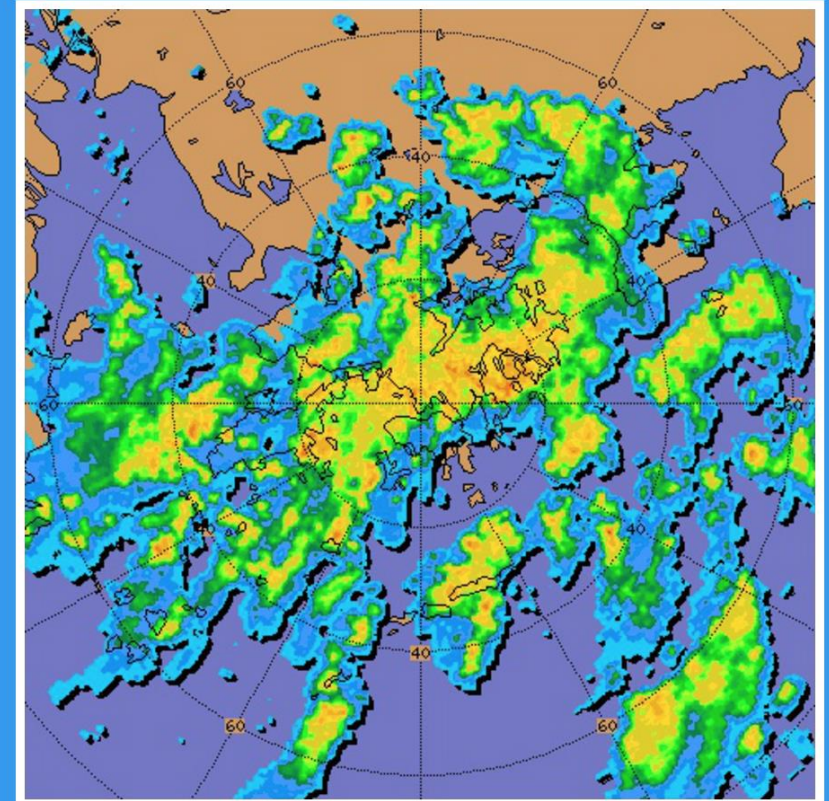
Com-SWIRLS Website

swirls.hko.gov.hk



Home Features Documentations **Downloads** User Forum

SWIRLS



...s in Localized
...stem of Hong
...chniques are
...f precipitation
...ours. SWIRLS
...RLS was also
...participated in
...research and
...s developed to
...development of
...available from
...d Hydrological
...enquiry, please



Home Features Documentations Downloads User Forum

Downloads

Before download, make sure your environment fulfils system minimum requirement. Also, please install all required packages and dependencies before configure SWIRLS. For more detail, please refer to installation guide.

By downloading SWIRLS, users are required to note that the SWIRLS software is provided for supporting the development of nowcasting techniques and/or operational application under the following terms and conditions and disclaimer:

Terms and Conditions:

1. The SWIRLS software (or "Software") shall not be partially or totally transferred to a third party;
2. The Software or its derived products shall not be used for commercial purpose; and
3. Due acknowledgement to the HKO shall be given in papers and reports containing results made or derived from the application or use of the Software.

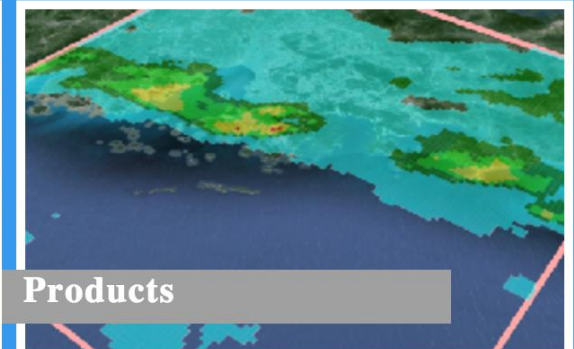
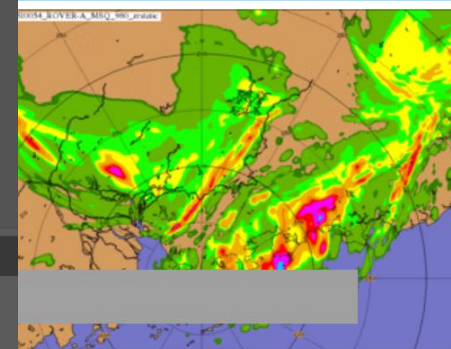
Disclaimer:

Hong Kong Observatory (HKO) and the Government of the Hong Kong Special Administrative Region (HKSARG) (including its servants and agents), make no warranty, statement or representation, express or implied, with respect to the accuracy, availability, completeness or usefulness of the information, contained herein, and in so far as permitted by law, shall not have any legal liability or responsibility (including liability for negligence) for any loss, damage, or injury (including death) which may result, whether directly or indirectly, from the supply or use of the Software.

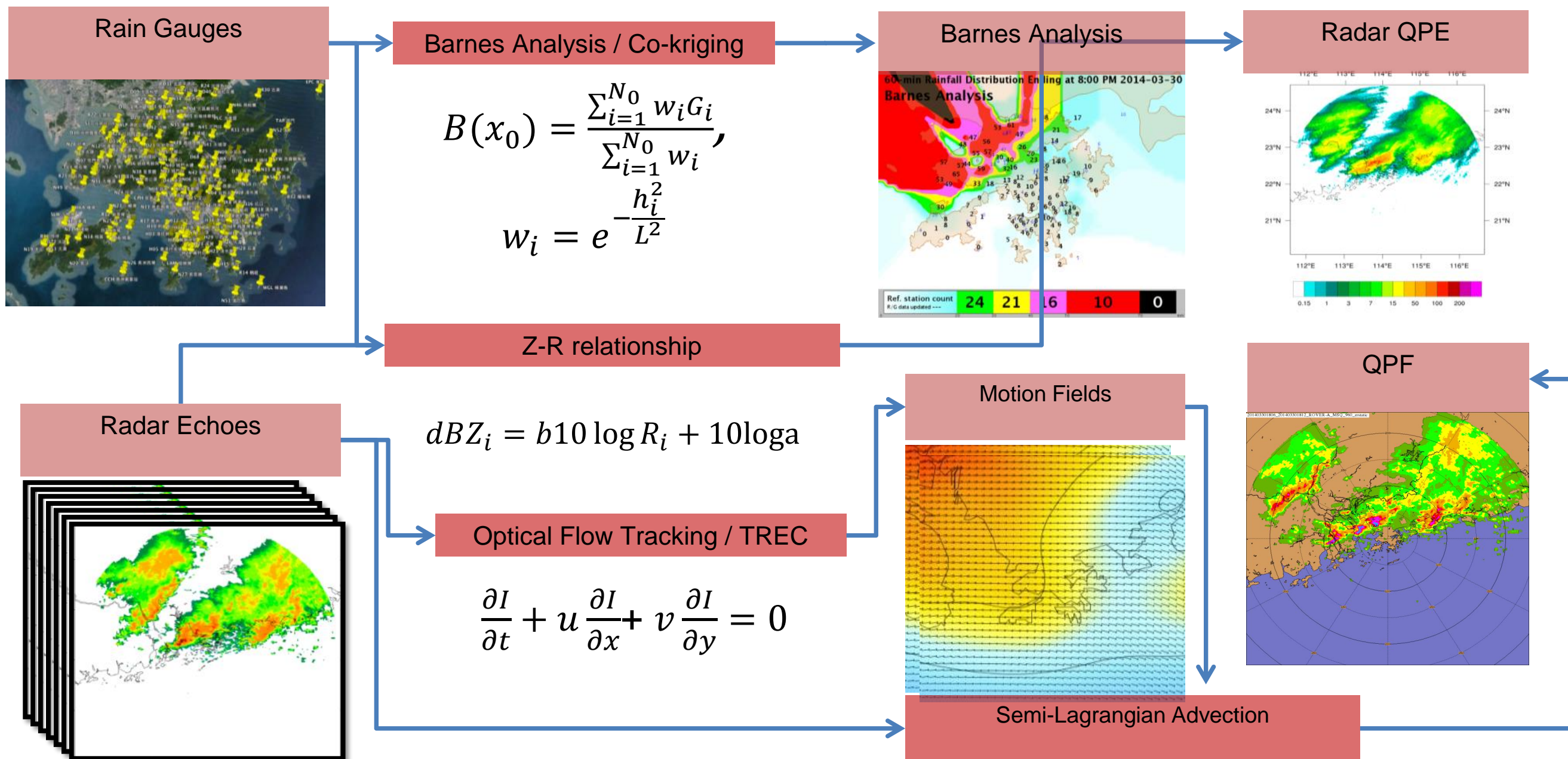
I accept the above terms and conditions.

Download

Products

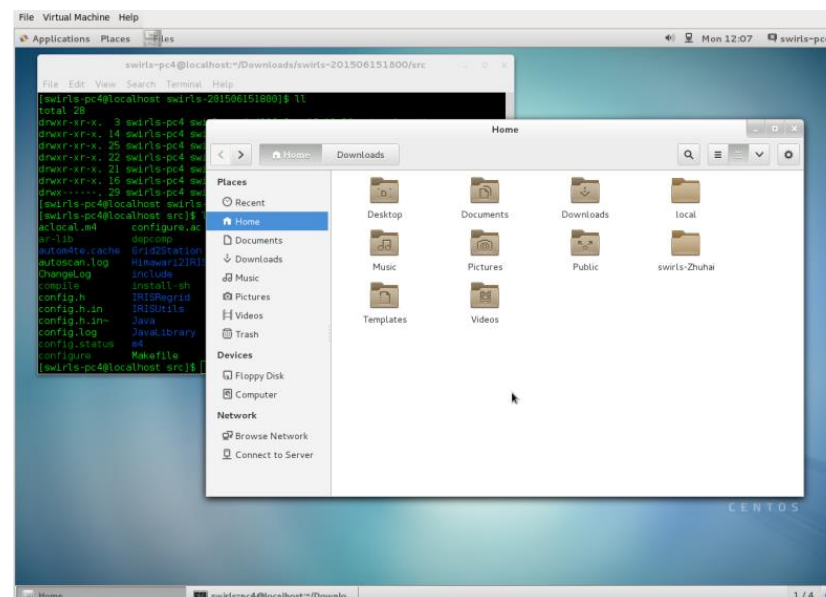


QPE and QPF in Com-SWIRLS



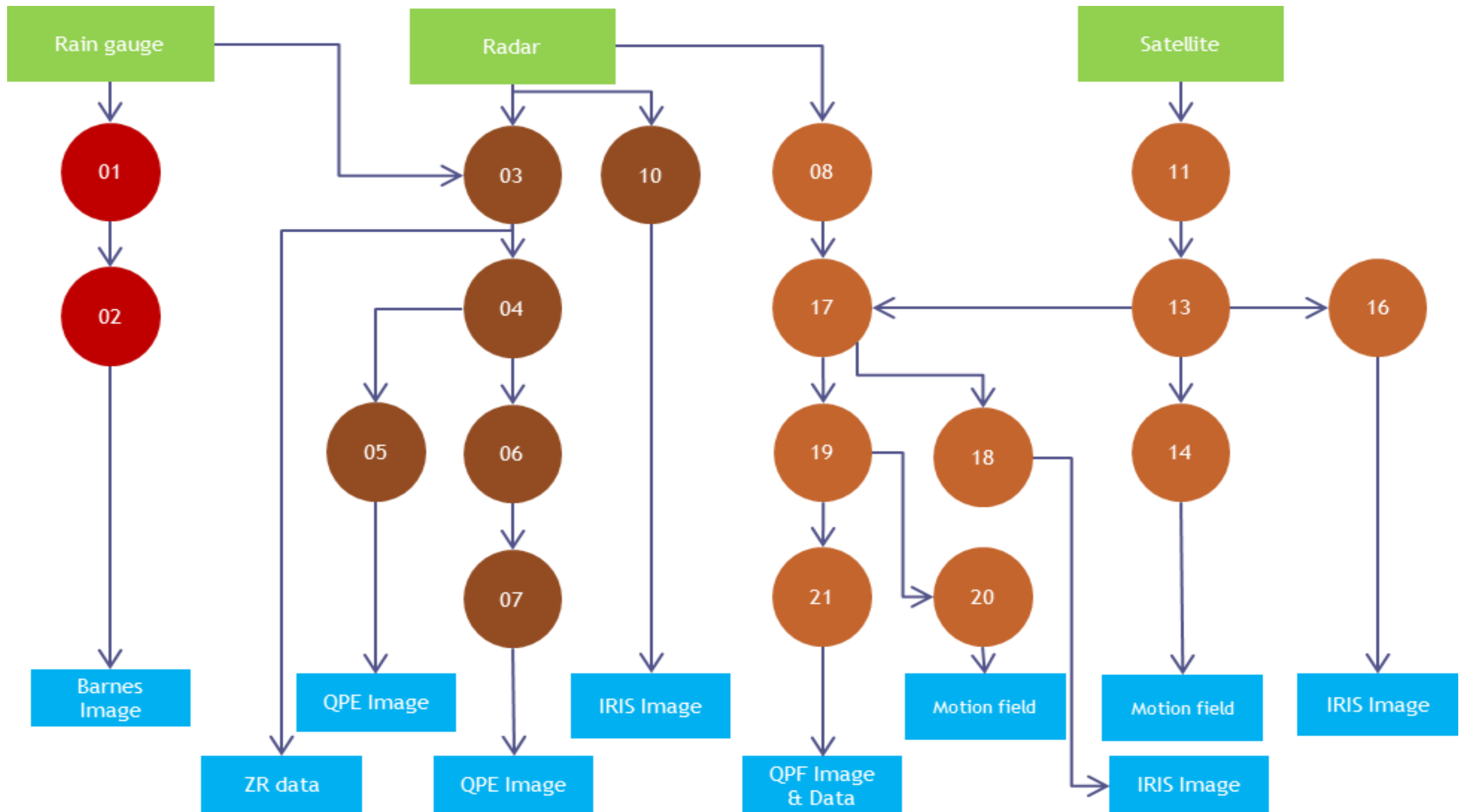
For beginners and experienced IT developers

- Virtual machine with pre-installed com-SWIRLS QPE and QPF executables, scripts, graphics utilities and case data
 - Virtual machine player (Windows, Mac or Linux)
- Full version of source codes to localize whole Com-SWIRLS
 - C, Java, Bash and Korn shell programming
 - Program automation via cron
- Supported domains: Hong Kong, Zhuhai, Guangdong SWAN composite, Philippines, South Africa ...

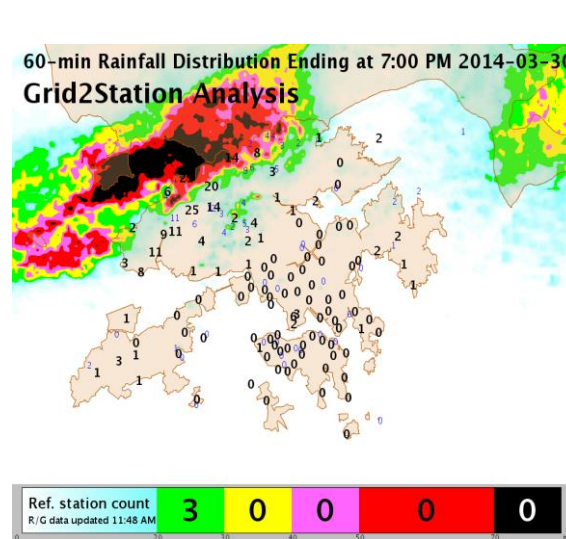
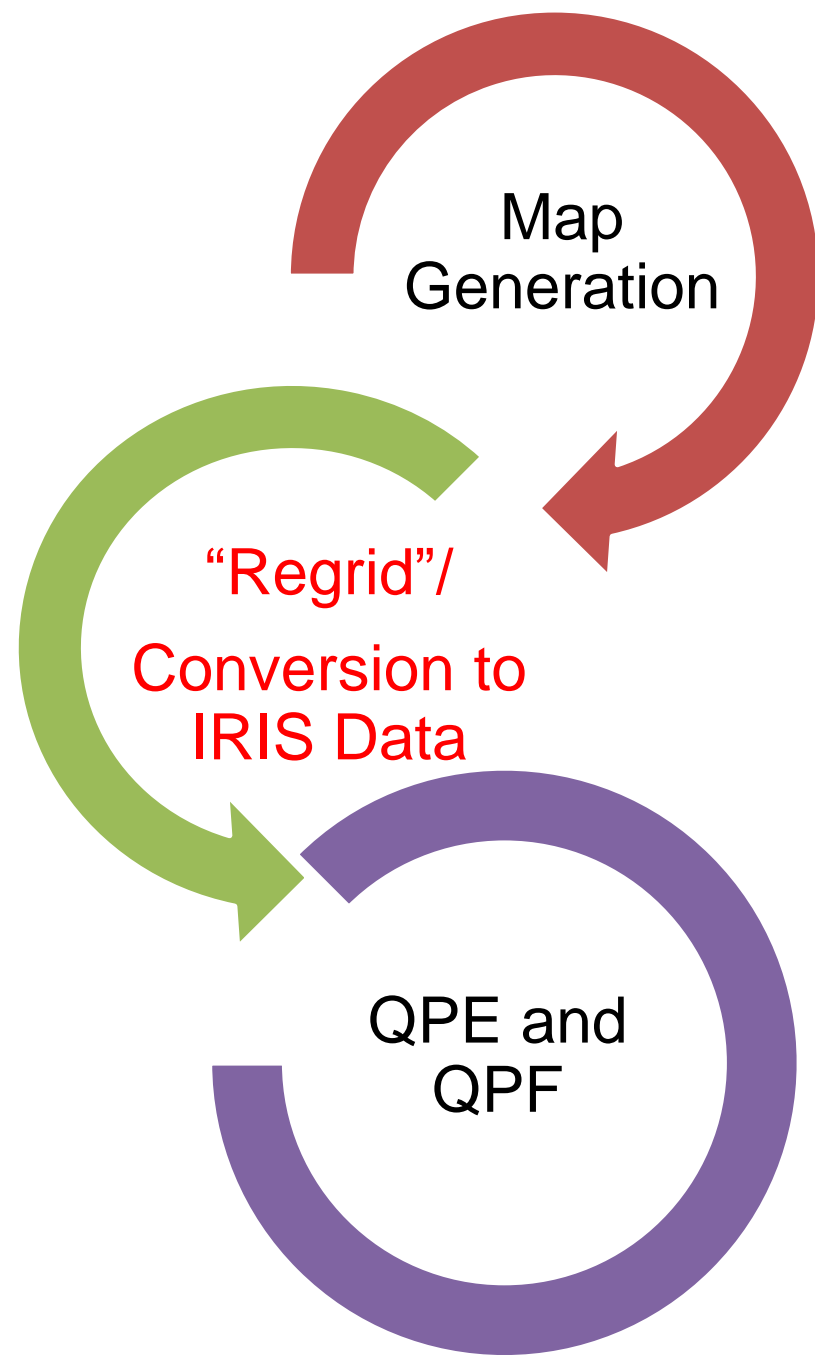


```
drwxr-xr-x. 3 swirls users 4096 Jun 16 10:39 scheduler-hko
drwxr-xr-x. 14 swirls users 4096 Jun 19 09:47 spt-himawari-8
drwxr-xr-x. 25 swirls users 4096 Jun 15 16:36 spt-HKO
drwxr-xr-x. 22 swirls users 4096 Jun 15 16:38 spt-PAGASA
drwxr-xr-x. 21 swirls users 4096 Jun 15 16:35 spt-TMS
drwxr-xr-x. 12 swirls users 4096 Jun 18 17:35 spt-TMS-QPE
drwxr-xr-x. 13 swirls users 4096 Jun 18 18:24 spt-TMS-QPF
drwxr-xr-x. 16 swirls users 4096 Jun 15 16:39 spt-Zhuhai
drwxr-xr-x. 16 swirls users 4096 Jun 18 18:19 spt-Zhuhai_SWAN
drwx-----. 29 swirls users 4096 Jun 19 15:36 src
[swirls@swirls-train1 swirls-201506191100]$ ls src/
acLocal.m4          include          PlotReflectivity
ar-lib             install-sh      Projection
autom4te.cache     IRISRegrid     Satellite_Advection_v1
autoscan.log       IRISUtils      Satellite_v4
ChangeLog          Java            scripts
compile            JavaLibrary    SEMI-LGG_960_9Hr
config.h           m4             setupenv.sh
config.h.in        Makefile       share
config.h.in-      Makefile.am    stamp-h1
config.log         Makefile.in    swirlsconfig
config.status      MakeImage      system
configure          make_PRD_qpe_image TMS_regrid
configure.ac       MapGenerator   TMS_SWAN_SAT
depcomp           missing        VarFlow
Grid2Station       MSQ_Tracking_Blending
Himawari2IRIS     PAGASA2IRIS
[swirls@swirls-train1 swirls-201506191100]$
```

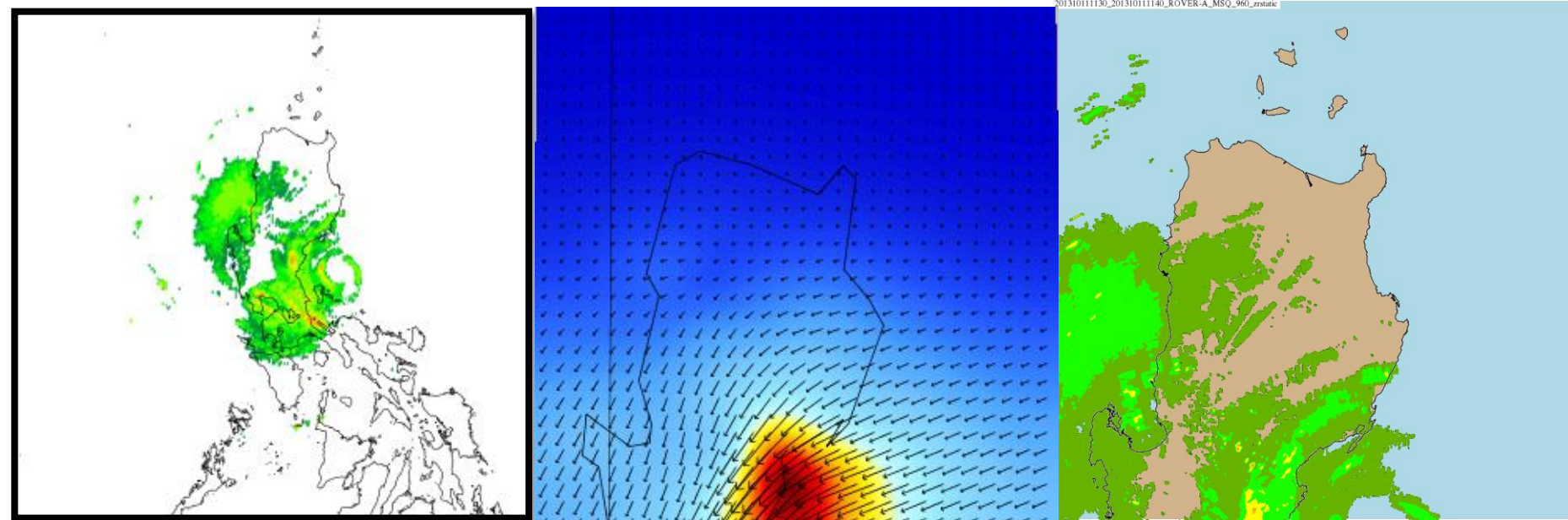
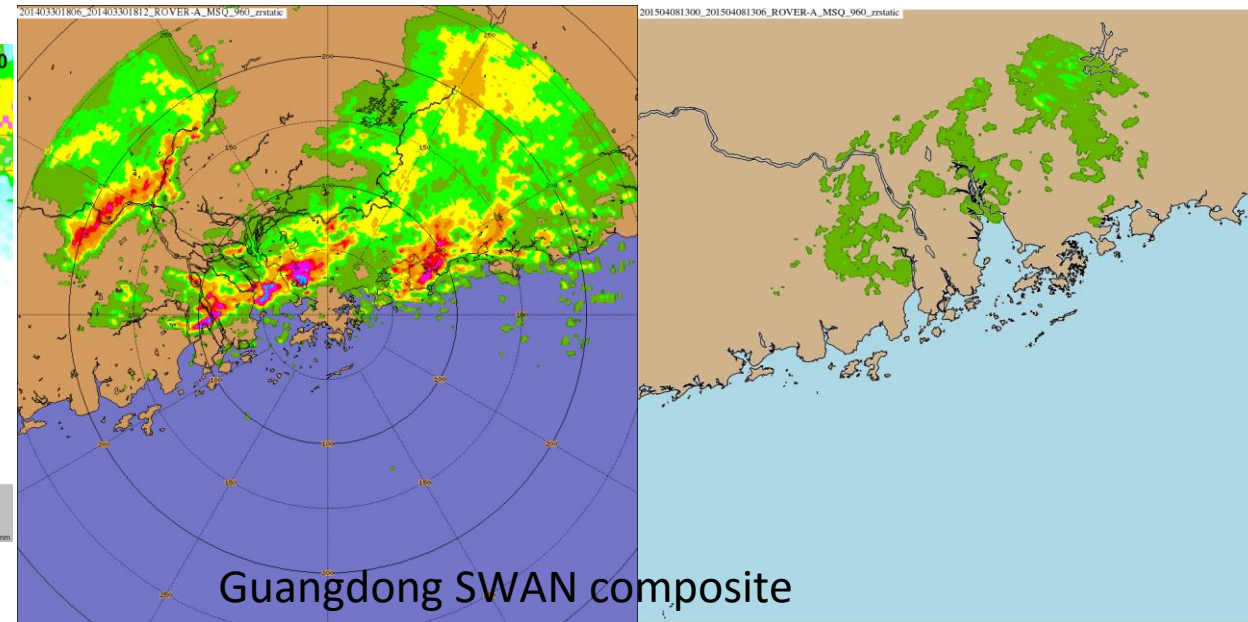
- Program blocks and data flow in Com-SWIRLS



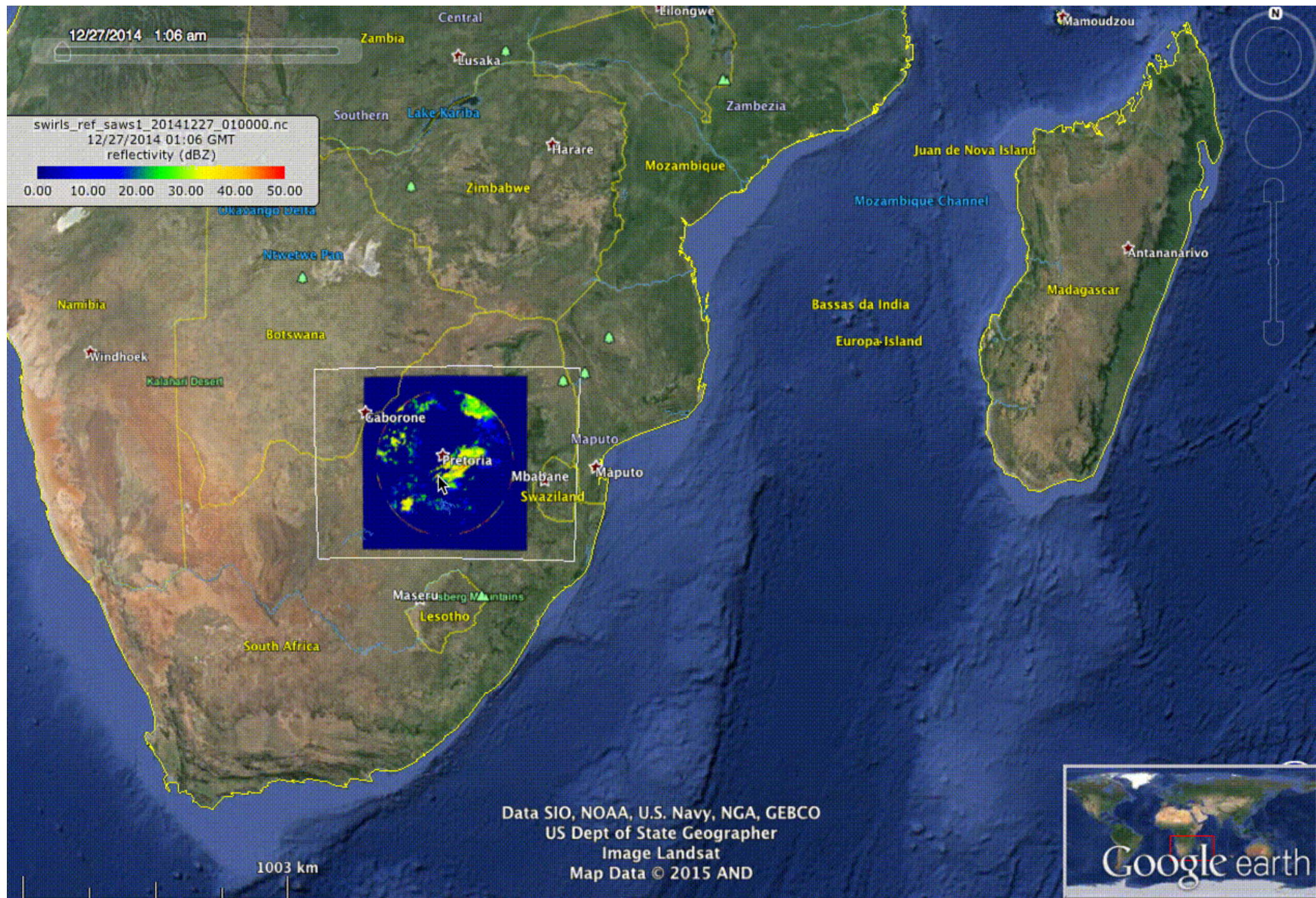
Examples of Com-SWIRLS



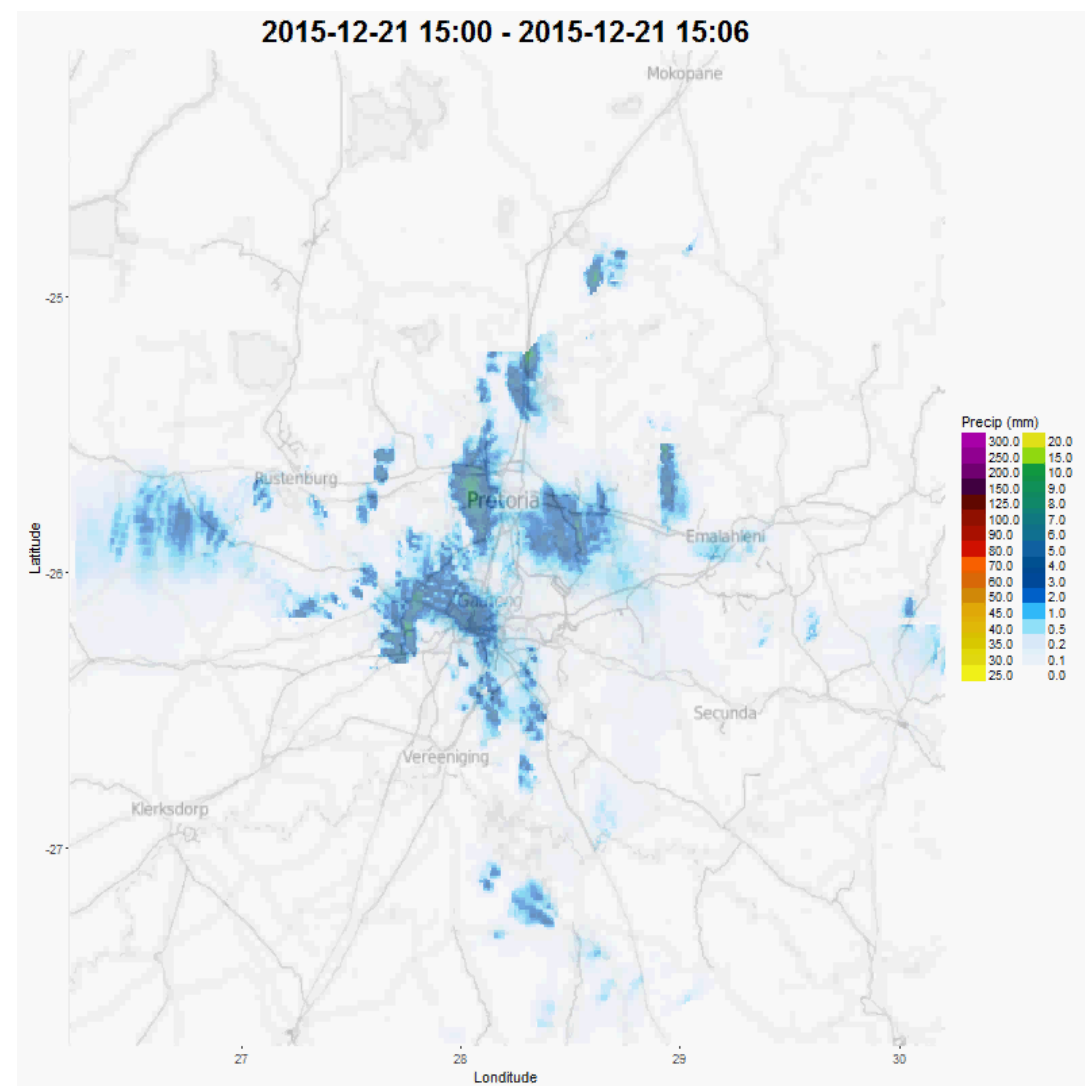
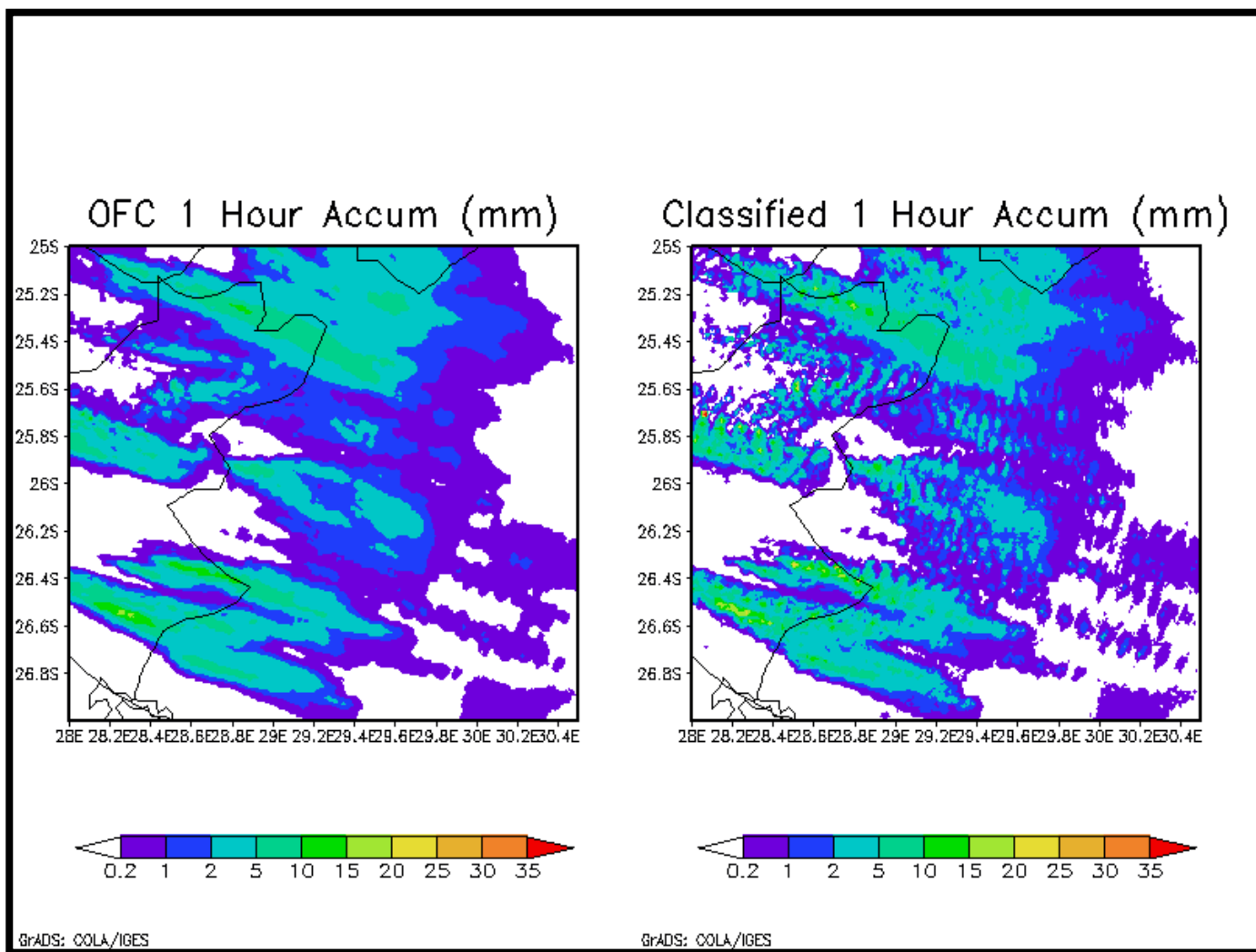
Hong Kong



Com-SWIRLS with SAWS radar data



Com-SWIRLS in SAWS



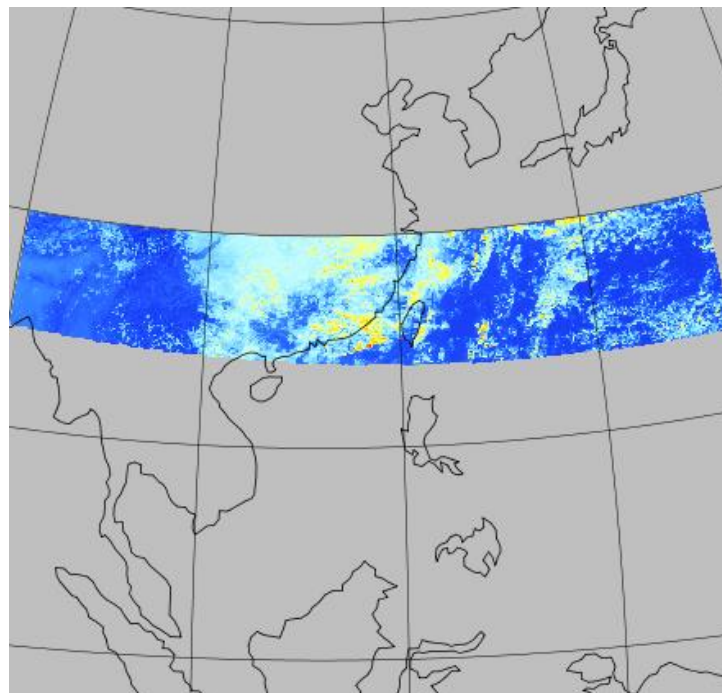
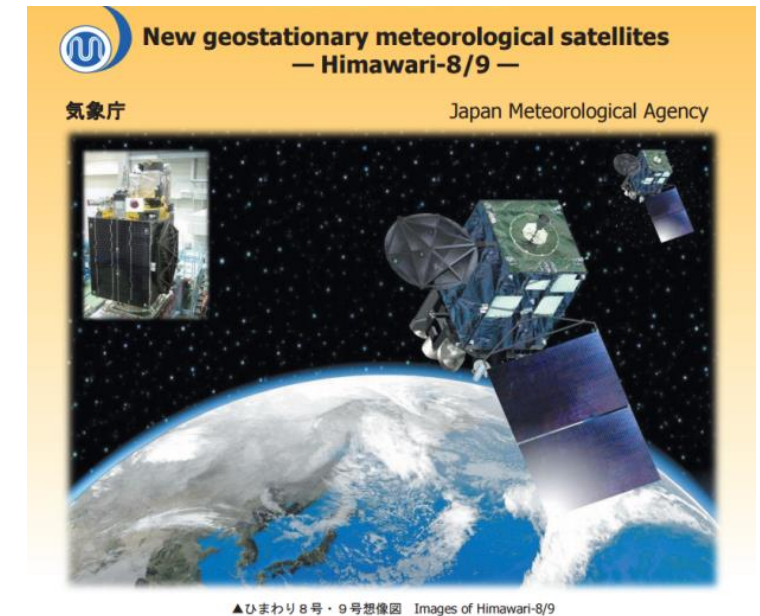
Credit: Erik Becker

Development Plan

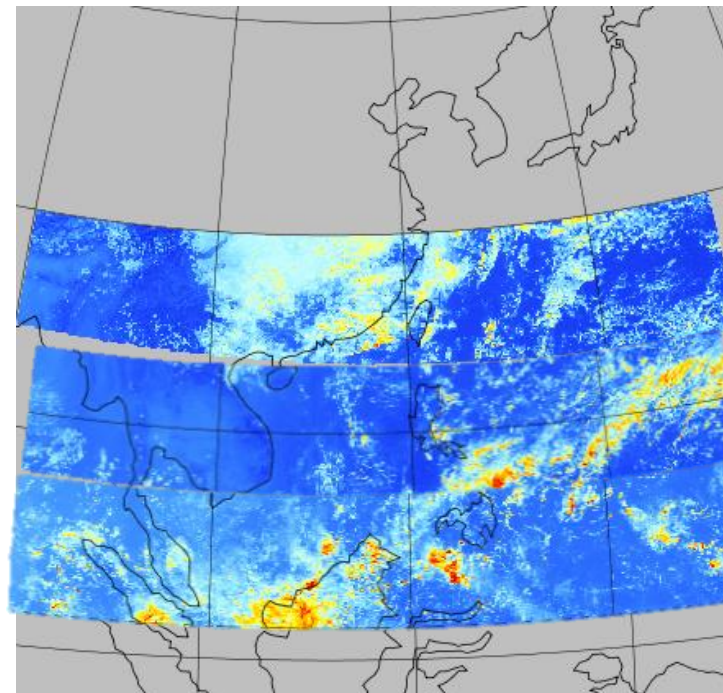
- Customization of code to enhance localization of Com-SWIRLS to different areas, bug fixes and further streamline of code structure /controlling scripts
- Satellite QPE using Himawari-8 (and other satellite data sources)
- Blending with NWP models
 - Rainfall or reflectivity ?
 - Standardized data format ?
- Training and support
 - Interaction with WWRP RDP (AvRDP, UPDRAFT)

Some preliminary attempts on Himawari-8

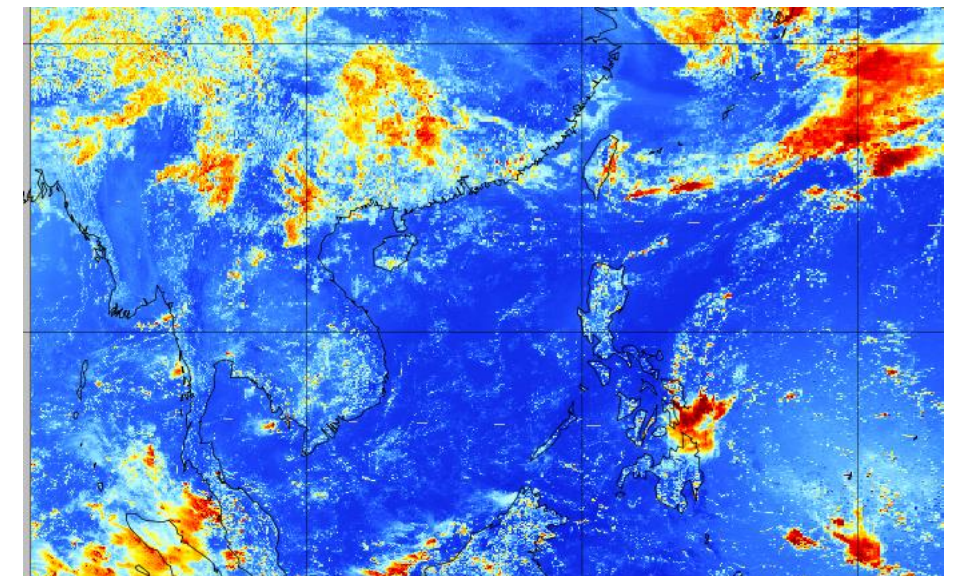
| | | バンド Band | 中心波長 Central wavelength (μm) |
|------------------|------------|-------------|---------------------------------|
| 1 2 3 | 可視 VIS | 1 | 0.46 |
| | | 2 | 0.51 |
| | | 3 | 0.64 |
| 4 5 6 7 | 近赤外 NIR | 4 | 0.86 |
| | | 5 | 1.6 |
| | | 6 | 2.3 |
| | | 7 | 3.9 |



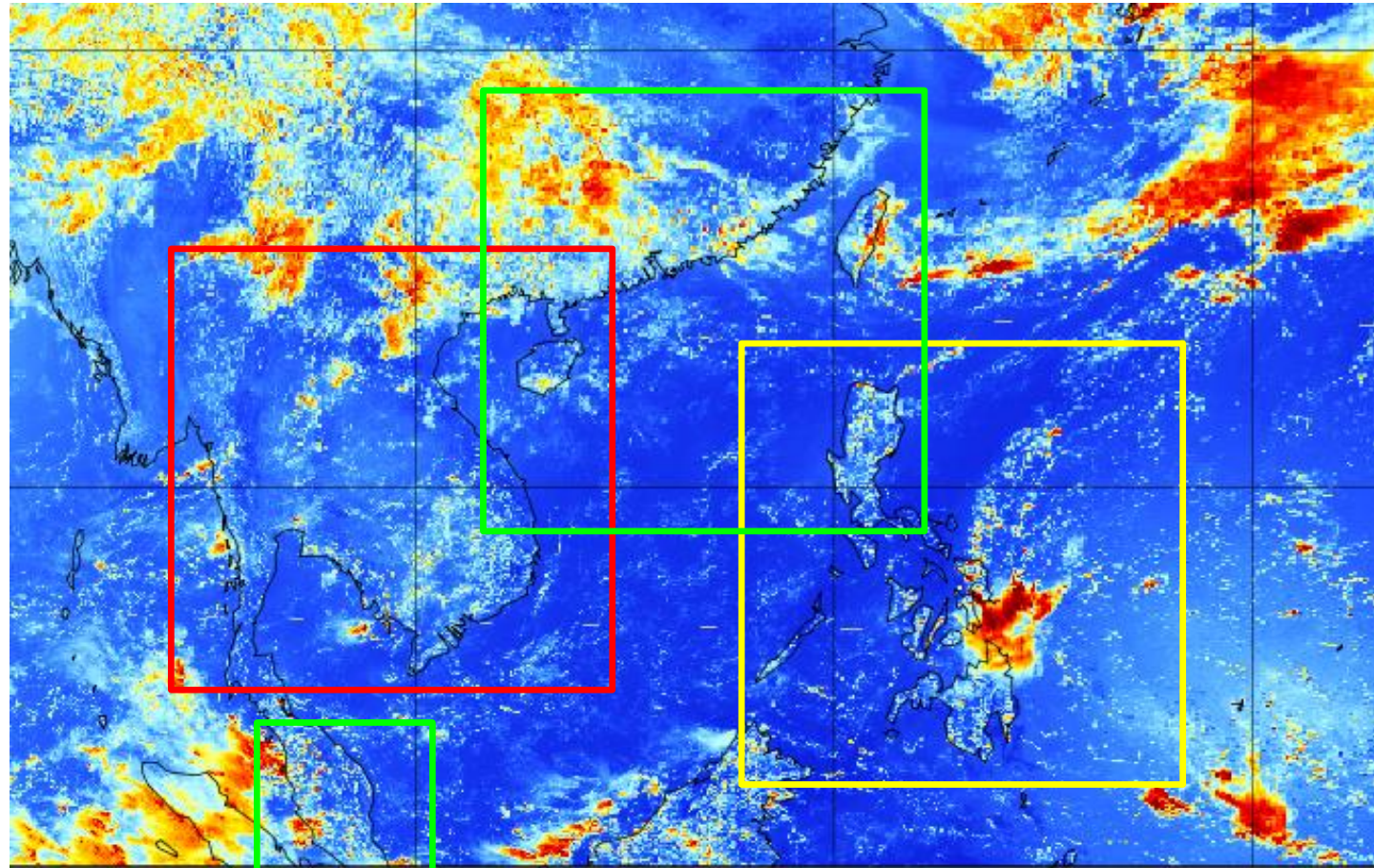
Convert H-8 segments to netCDF



Merge segments



Resultant netCDF



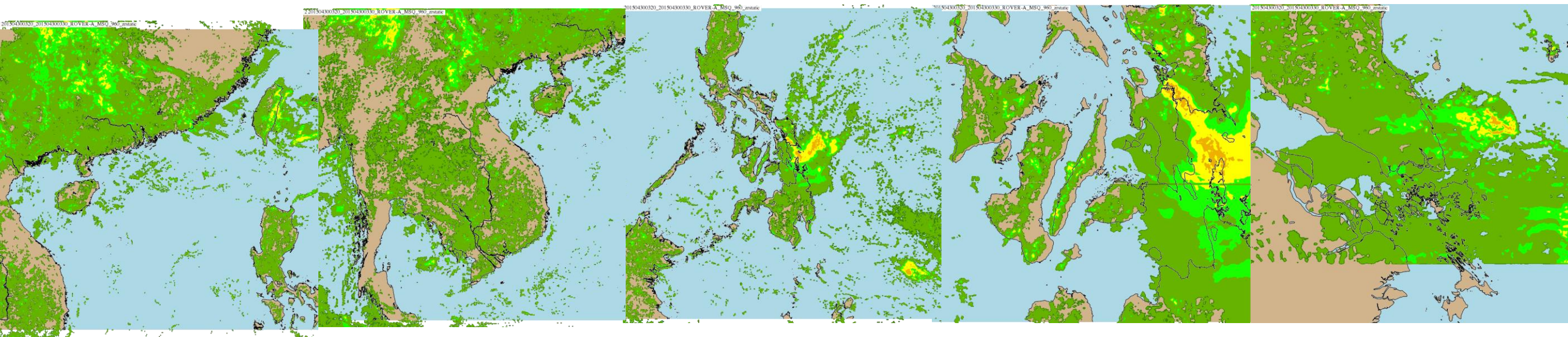
Southern China

Vietnam

Philippines

Lungsod

Singapore



Thank you very much



Dr. Tin
HKO's Mascot

