

Coordinated use of targeted observations during TCS-08/T-PARC

**Sharan Majumdar
(RSMAS/U. Miami)**

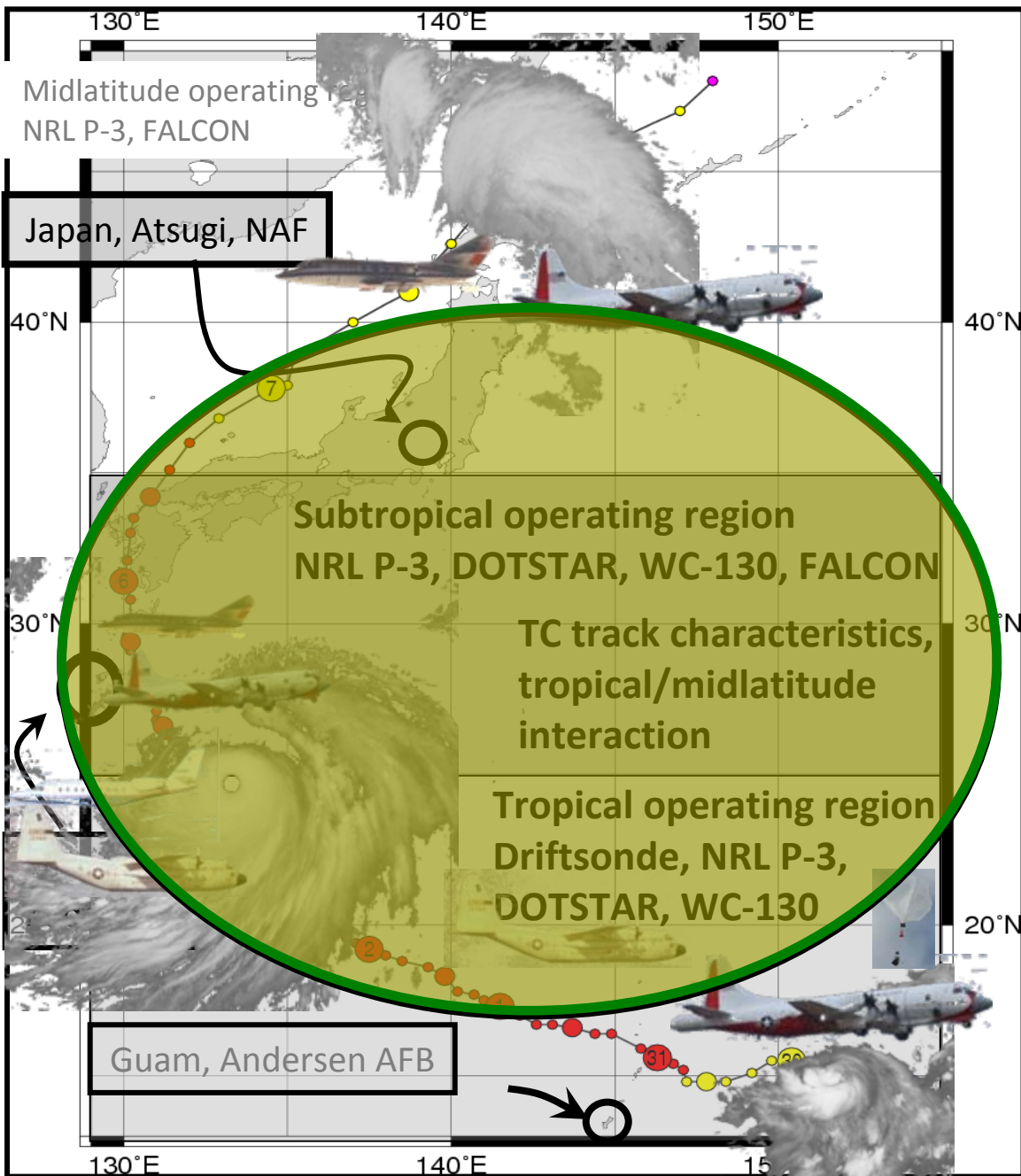
and multiple collaborators

**TCS-08/T-PARC Data Management
Workshop, Monterey, CA. 5/4/09**



TC Targeting Groups

Center	Presenters	Date and Time	Targeting Method	Evaluation model
JMA	Bessho, Komori, Nakazawa, Yamashita	2 talks Mon 2 posters Mon	SVs / all drops	JMA
DLR	Weissmann, Harnisch	Talk Mon Poster Mon	all drops	ECMWF
ECMWF	(contact: Richardson)		SVs	
UKMO	(contact: Swinbank)		ETKF (MOGREPS)	
U Miami/NCEP	Majumdar, Song		ETKF (NCEP + ECMWF + CMC)	
NRL	Reynolds, Langland	Poster Mon	SVs	NOGAPS
NRL	Doyle		COAMPS Moist Adjoint	
U Yonsei	Kim, Jung	Talk Mon Poster Mon	SVs	MM5
U Washington	Hakim	Talk Mon	Ensemble sensitivity	WRF
NTU	Wu	Talk Wed	(all drops)	NCEP GFS
NOAA	Aberson (hurricanes)	Poster Mon	(all drops)	NCEP GFS



First systematic targeting operation in the WPAC

- Multiple aircraft (up to 2 for targeting + 2 for structure missions)
- Comparison of several targeting methods from a variety of operational and research organizations
- ECMWF/UKMO Data Targeting System

Summary of Missions

TC	Date	Aircraft
Non-typhoon	2008082600-2008090900	6 Falcon missions
TY Nuri	2008082012	DOTSTAR
TY Sinlaku	2008091000	DOTSTAR
TY Sinlaku	2008091100 - 2008091112	DOTSTAR and Falcon
TY Sinlaku	2008091400	Falcon
TS Sinlaku	2008091600	DOTSTAR and Falcon
TY Hagupit	2008092200	DOTSTAR
STY Jangmi	2008092700	DOTSTAR
TY Jangmi	2008092800 - 2008092812	DOTSTAR and Falcon
TS Jangmi	2008092906-2008100100	3 Falcon missions

JMA activated rapid-scan mode on MTSAT2 satellite between 2008091012-2008091306 and 2008092712-2008092812. Extra rawinsonde observations.

Data Targeting System



- Interactive web-based system
- Developed by ECMWF in partnership with UK Met Office
- Funded by EU and EUCOS as part of Eurorisk PREVIEW

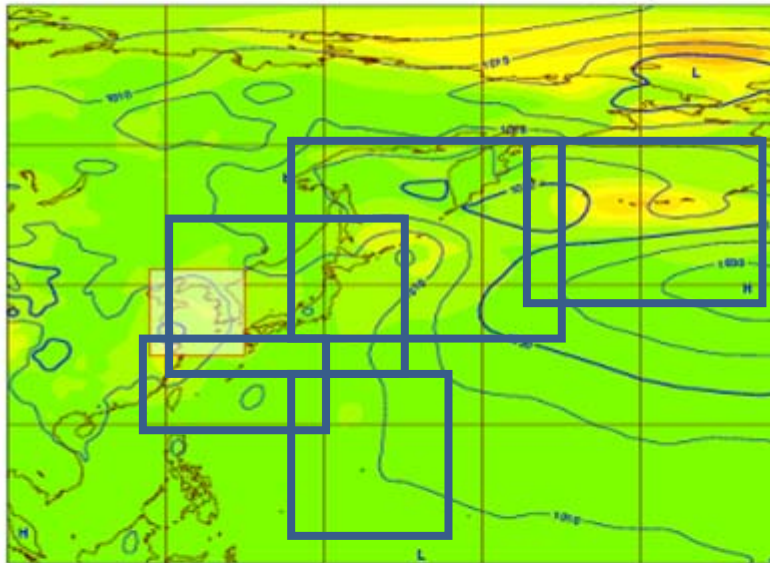
Case Proposal (T-PARC)

Case Proposal Deadline: 17/07/2008 at 09:00 UTC

Forecast Charts (EPS Mean/Spread):

2008071812 2008071900 2008071912 2008072000 2008072012 2008072100 2008072112 2008072200

Thursday 17 July 2008 00UTC ◉ECMWF Ensemble Forecast t+060 VT: Saturday 19 July 2008 12UTC
Surface: Mean sea level pressure: Ensemble mean (contours, hPa) / Ensemble spread (shaded, hPa)



Sensitive Area Predictions (SAPs)

- Automatic submission of 5 fixed areas
- Up to 5 additional areas chosen interactively
- Flexible choice of targeting time (t + 18 to 102 h) and verification time (t + 36 to 120 h)

Proposed by: tparc_lead (17/07/2008 at 08:35 UTC)

Lat1: 42.2

Lon1: 117.9

Verification Time:

2008071912

Lat2: 30.3

Lon2: 129.6

Target Time:

2008071800

Case Description:

Region around forecast track of Kalmaegi

Customised for T-PARC by Cristina Prates, David Richardson, Cihan Sahin

Data Targeting System

- SAPs from up to 6 different centres displayed in common format
- Icons toggle between calculations from different centres and overlays
- > 500 individual cases during Aug.- Sept. 2008



< SEP 2008 >

S	M	T	W	T	F	S
1	2	3	4	5	6	
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

Accepted Cases

[A.649.2008093000](#)
[A.650.2008093000](#)
[A.651.2008093000](#)
[A.652.2008093000](#)
[A.654.2008093000](#)
[A.655.2008100100](#)
[A.656.2008093000](#)
[A.657.2008092900](#)
[A.658.2008100100](#)
[A.659.2008100100](#)

Proposed Extra Observations

Links

[Show Cases](#)
[News \(0\)](#)

Only Lead user can propose extra observations!

JMA			SAC Results			NTU		
msl	z500	vo850	msl	z500	vo850	msl	z500	vo850
UWash	msl	z500	vo850	NOAA HRD	msl	z500	vo850	ECMWF
UMiami/NCEP	msl	z500	vo850	UKMO	msl	z500	vo850	UYonsei

ECMWF-SAP based on TE-SVs (moist TL95) and MSL

Valid time: 20080928, 00 UT (Targeting Time)

Shading: areas of 8, 4, 2, 1 x 10⁶ km²

trajectory initialized from fc 20080926, 00 UT +48 h

Targ. time: 20080928, 00 UT / Verif. time: 20080930, 00 UT (opt: 48h)

ECMWF SVs

JMA SVs

NRL SVs

U. Yonsei SVs

UKMO ETKF

U. Miami/NCEP ETKF

Super Typhoon Jangmi: Targeting Time 28 Sept. 2008

Data Targeting System

User

Lead User

Case Proposal

Propose a case

View & Comment on a case

Case Evaluation

SAPs from
ECMWF
NCEP /
U. Miami
NRL
JMA
UKMO
U. Yonsei

Request for calculations

Extra Observation Proposal

Propose observations

View & Comment on proposed observations

Observation Evaluation

Notification to Providers

Request for observations

0010

0900

0915

1100

1200

1300

1305

UTC

Forecast Products

Availability of Data

- Fields from external providers are on the ECMWF FTP site (next slide)
- We do not currently have access to the ECMWF and UKMO GRIB2 fields.
- Sarah is in touch with ECMWF on providing availability.

ftp <ftp.ecmwf.int>

User: tparc

Password: available upon request

Details of cases available in “cases” directory

case_id=455

coordinates=45,120,25,150

inittime=2008090800

leadtime=48

opttime=48

Targeting guidance fields available in GRIB2 format

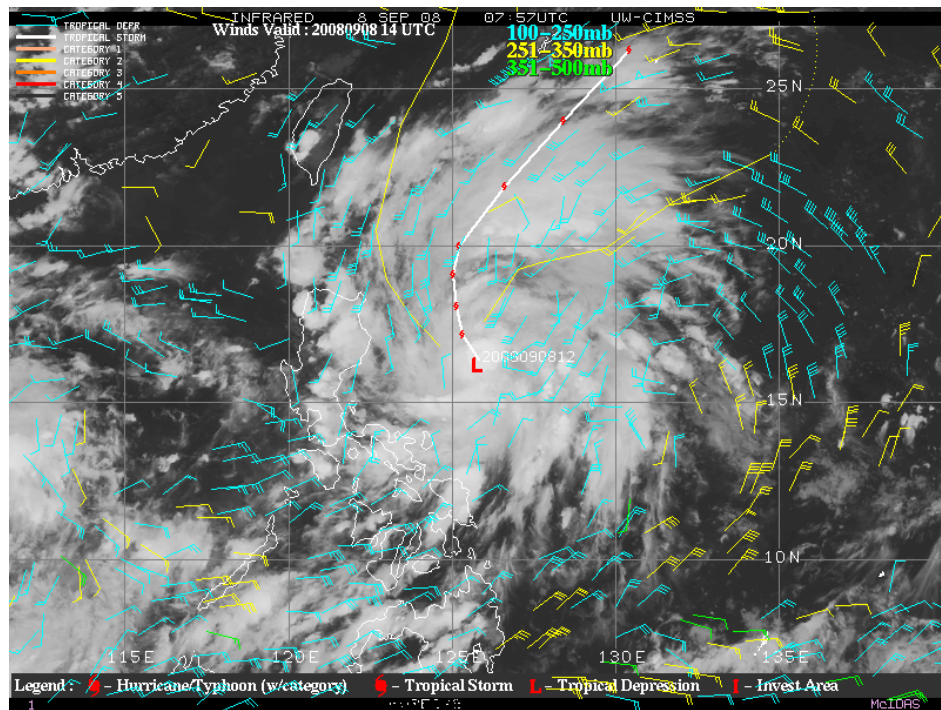
Z500, t850, MSLP also available from several centers

```
220----- Welcome to Pure-FTPd [TLS] -----
220-You are user number 3 of 50 allowed.
220-<<
220-*****
220-
220-                You are connected to the FTP service of the
220-
220-                European Centre for Medium-range Weather Forecasts (ECMWF)
220-
220-                All connections and transfers are logged.
220-*****
220->>
220-Local time is now 19:30. Server port: 21.
220-IPv6 connections are also welcome on this server.
220-You will be disconnected after 15 minutes of inactivity.
Name (ftp.ecmwf.int:majumdar): tparc
331 User tparc OK. Password required
Password:
230-User tparc has group access to: 500
230-OK. Current directory is /
230-=====
230-You are using 665M disk space in directory /vol/ftp-usb/ftp3/users/tparc.
230 =====
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> dir
200 PORT command successful
150 Connecting to port 48746
-rw-r--r-- 1 tparc 500 953856 Jul 26 2008 DTS_for_TPARC_ops_plan.doc
-rw-r--r-- 1 tparc 500 810977 Jul 26 2008 DTS_for_TPARC_ops_plan.pdf
drwxr-xr-x 2 tparc 500 12288 Mar 9 16:15 cases
-rw-r--r-- 1 tparc 500 2999806 Sep 9 2008 ecmwf_200809090_tparc.tar.gz
-rw-r--r-- 1 tparc 500 2687006 Sep 10 2008 ecmwf_200809100_tparc.tar.gz
-rw-r--r-- 1 tparc 500 3005815 Sep 11 2008 ecmwf_200809110_tparc.tar.gz
-rw-r--r-- 1 tparc 500 2995289 Sep 12 2008 ecmwf_200809120_tparc.tar.gz
drwxr-xr-x 2 tparc 500 4096 Jul 31 2008 fields_UWash
drwxr-xr-x 2 tparc 500 20480 Oct 4 2008 fields_UYonsei
drwxr-xr-x 2 tparc 500 16384 Oct 5 2008 fields_jma
drwxr-xr-x 2 tparc 500 139264 Mar 1 16:24 fields_ncep
drwxr-xr-x 2 tparc 500 4096 Jul 16 2008 fields_noaa_hrd
drwxr-xr-x 2 tparc 500 110592 Mar 9 16:31 fields_nrl
drwxr-xr-x 2 tparc 500 4096 Feb 28 00:37 fields_ntu
drwxr-xr-x 2 tparc 500 4096 Jul 31 2008 sac_UWash
drwxr-xr-x 2 tparc 500 4096 Oct 4 2008 sac_UYonsei
drwxr-xr-x 2 tparc 500 4096 Oct 5 2008 sac_jma
drwxr-xr-x 2 tparc 500 49152 Mar 9 16:33 sac_metoffice
drwxr-xr-x 2 tparc 500 45056 Mar 1 16:24 sac_ncep
drwxr-xr-x 2 tparc 500 131072 Oct 14 2008 sac_noaa_hrd
drwxr-xr-x 2 tparc 500 28672 Mar 9 16:31 sac_nrl
drwxr-xr-x 2 tparc 500 4096 Feb 28 00:37 sac_ntu
226-Options: -l
226 22 matches total
ftp> 
```

Targeting Example: Sinlaku

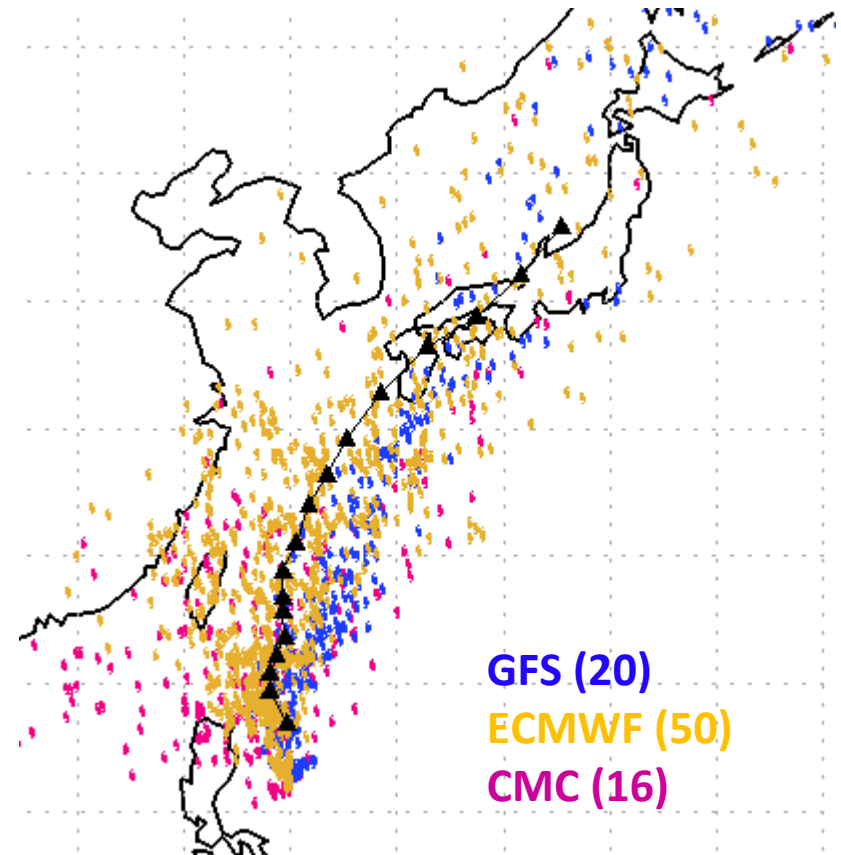
Sinlaku. Concept for Targeting Operations. 21 UTC, 20080908

Potential threat of TC to land



Courtesy CIMSS/U.Wisconsin

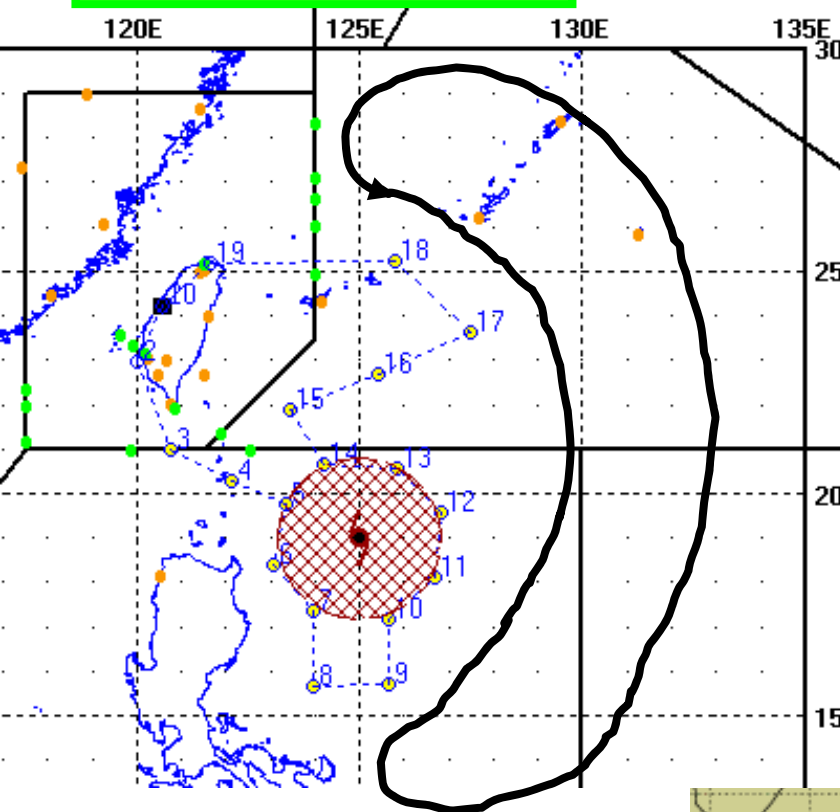
Uncertainty in ensemble track forecasts



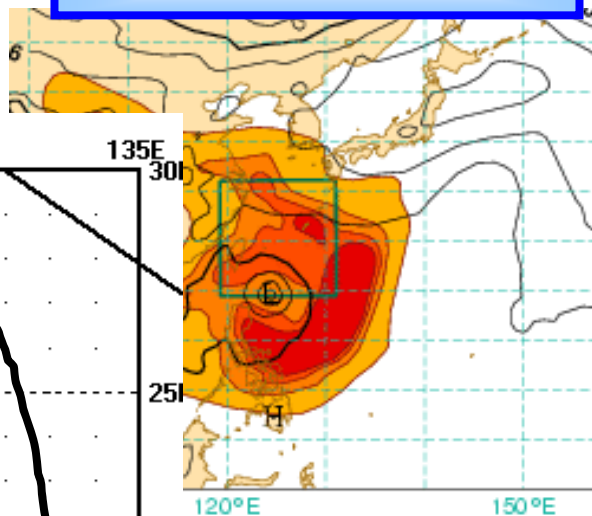
Uncertainty about strength of steering flow, and landfall location (if any)

Proposed Flight Mission: 00 UTC Sept 10th 2008

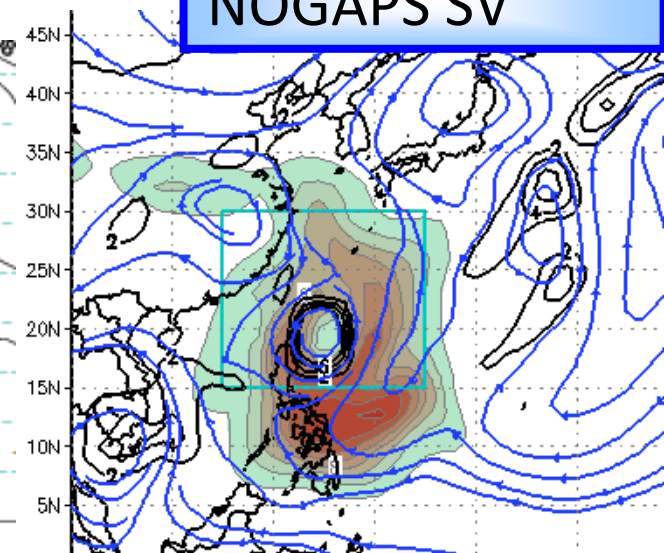
DOTSTAR Flight Plan



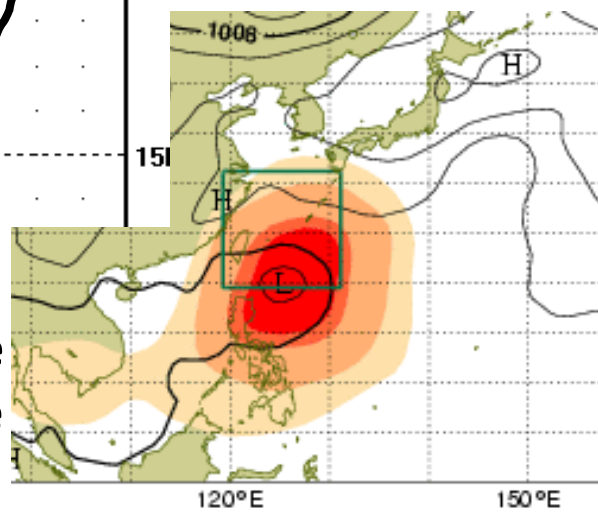
ECMWF SV



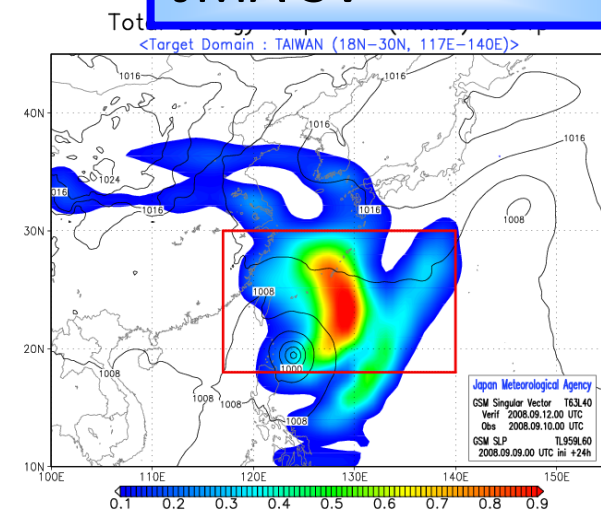
NOGAPS SV



ETKF



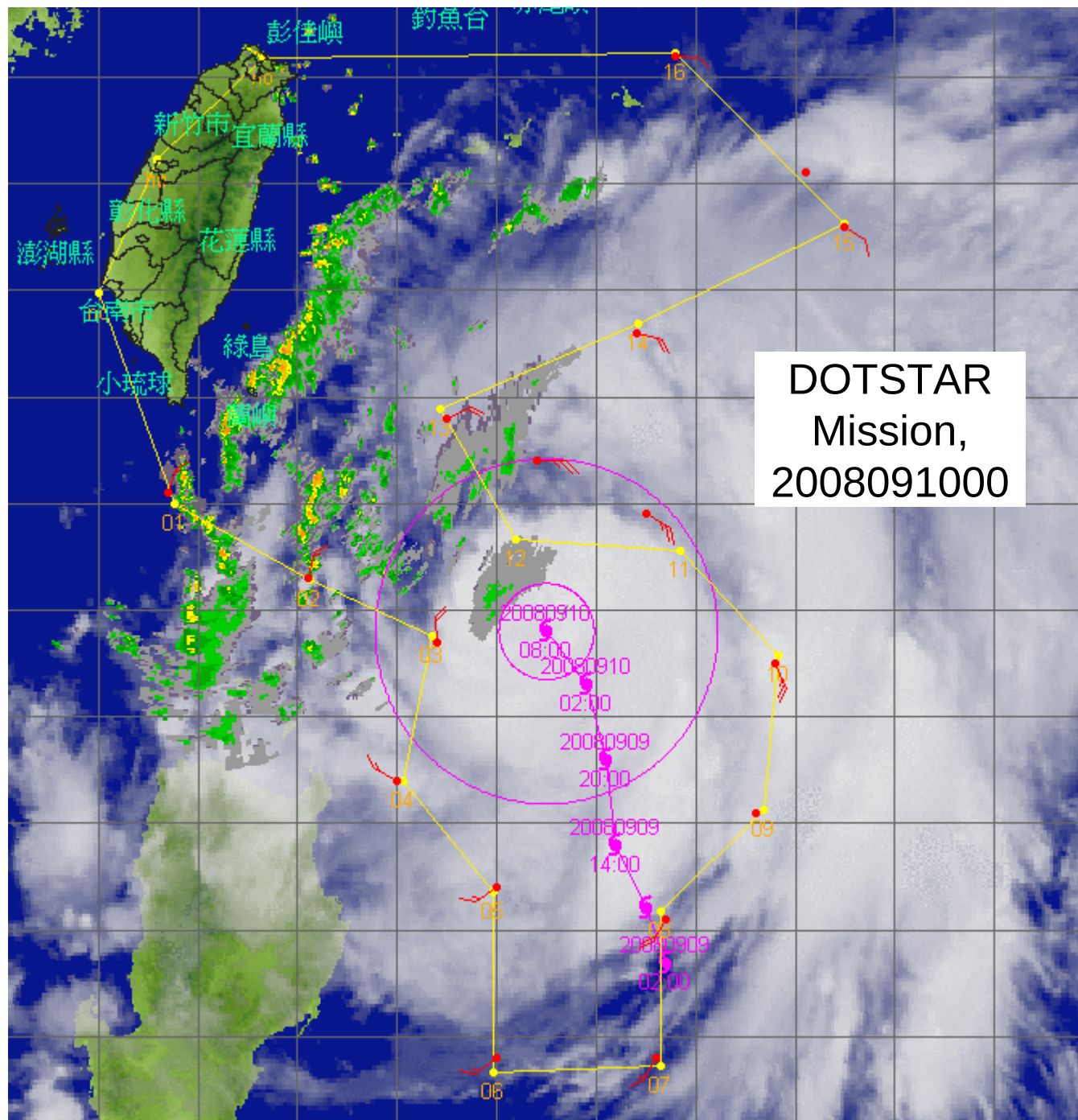
JMA SV



Obs. Points cover sensitive regions proposed by guidance
Area surrounded by black line is also sensitive

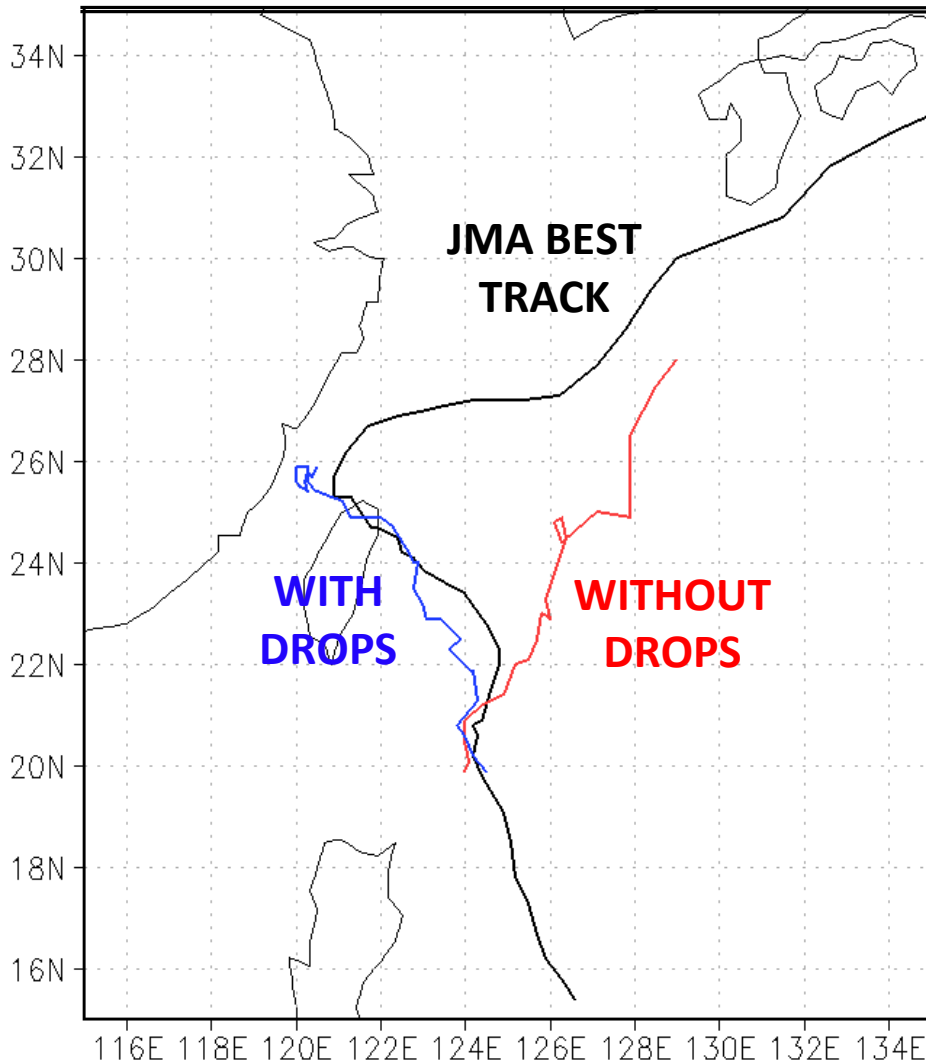
Tentative Plan: next 3 days

- 00 UTC 10th
 - DOTSTAR targeting mission
 - C-130 structure / sat val mission
- 00 UTC 11th
 - DOTSTAR targeting mission
 - FALCON targeting mission
 - C-130 and P-3 structure missions
- 00 UTC 12th
 - DOTSTAR + other missions? Need a rest?
- 12 UTC 10th – ?
 - MTSAT Rapid-Scan Activation; extra Japanese rawinsonde launches (3-hourly; ships)

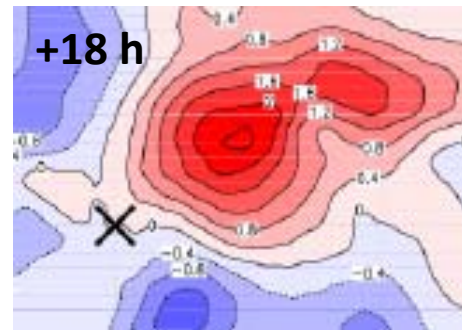
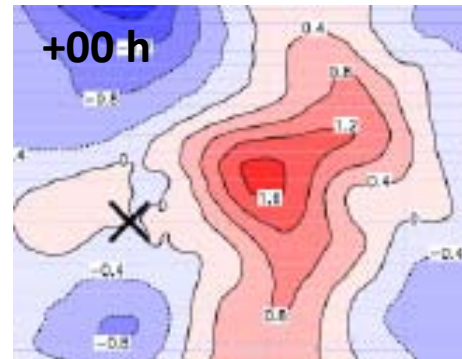


Preliminary Result: Sinlaku.

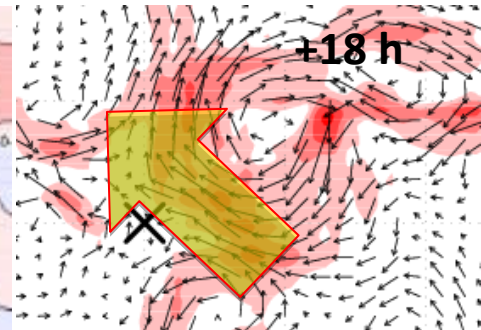
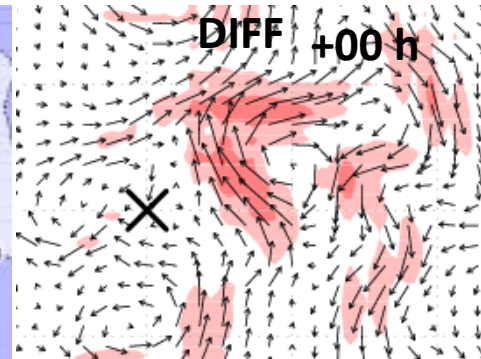
NCEP GFS initialized 00 UTC 10th Sept



**500 hPa ASYMMETRIC
STREAMF'N DIFF**



**500 hPa
ASYMMETRIC WIND
DIFF +00 h**

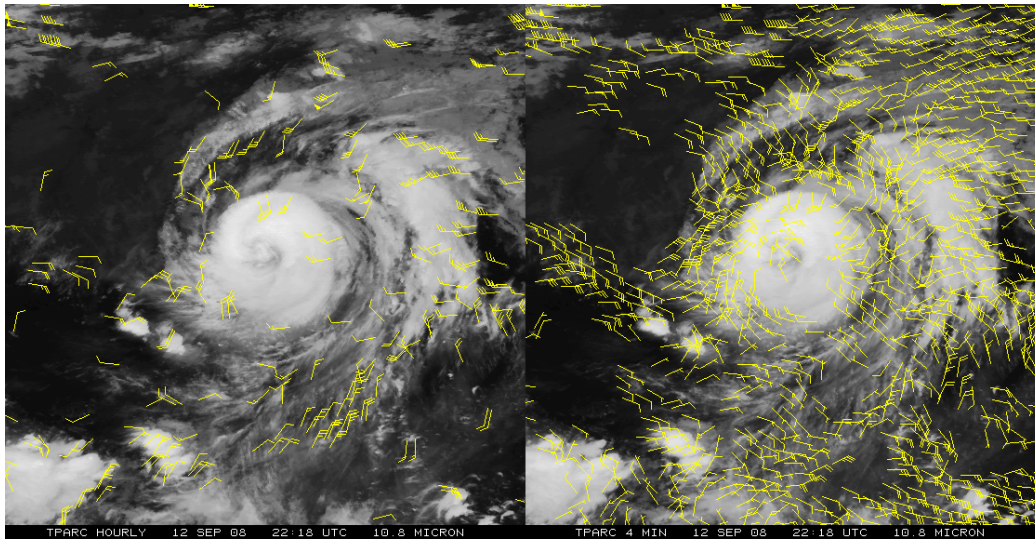


Effect of drops:

Strengthened vortex, decreased RMW
Strengthened subtropical ridge, inducing
northwestward flow

Future Plans

- Evaluate impact of assimilating **hourly** and **rapid-scan** satellite-derived atmospheric motion vectors



(Chris Velden,
CIMSS/U.Wisconsin
)

- Evaluate impact of observations in **different target areas** (following Yamaguchi et al. MWR 2009)
- Understand **differences in results between models**

Long-term goals

- Demonstrate utility of targeted observations
- Observation types: manned and unmanned aircraft, adaptive targeting/thinning of satellite winds and radiances, off-time rawinsondes, WISDOM, others...
- **Develop centralized, coordinated data targeting system for TCs, Winter Storms, others...?**
- Multi-agency, multi-national.
- Saves time and human error; allows for archiving and evaluation.
- Extend to 3-7 day track forecasts; intensity prediction