

TIGGE Real-Time Tropical Cyclone Data for Regional Applications

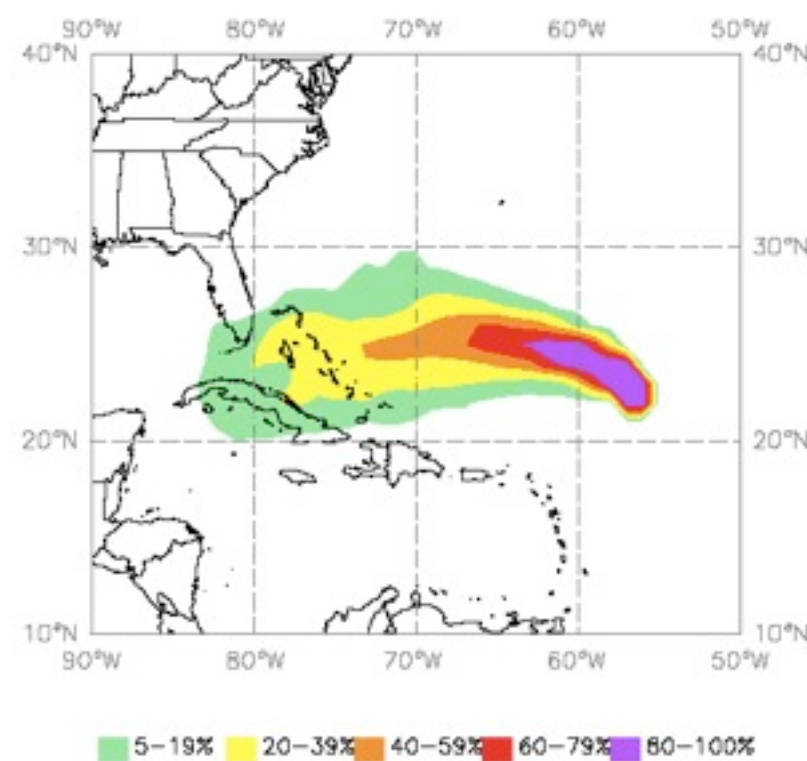
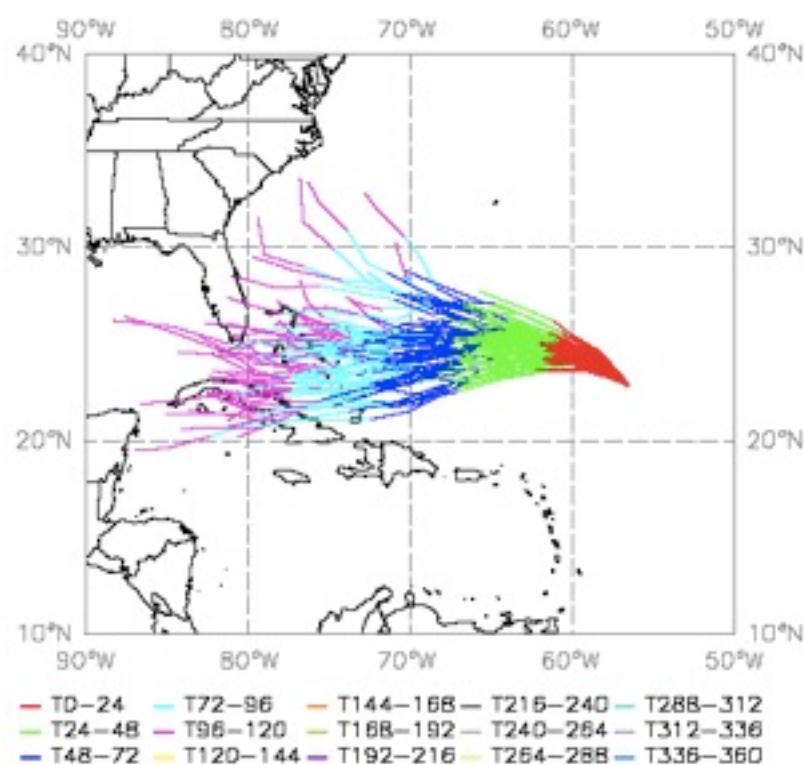
North Western Pacific Tropical Cyclone Track Ensemble Forecast Research Project

a WWRP-RDP

Tetsuo NAKAZAWA, David PARSONS, David BURRIDGE

Towards the Global Interactive Forecast System (GIFS)


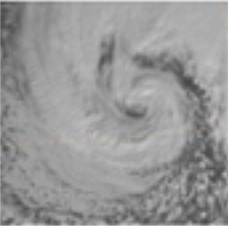
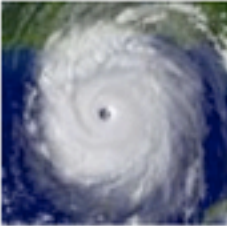
- The objective of the GIFS is to realise the benefits of THORPEX research by improving the delivery of improved forecasts of high-impact weather.
- As a first step, the GIFS-TIGGE working group set up a pilot project for the exchange of real-time tropical cyclone predictions using “Cyclone XML” format.
- Forecast and research demonstration projects are being developed by the GIFS-TIGGE WG and regional centres to predict tropical cyclone tracks and heavy rainfall



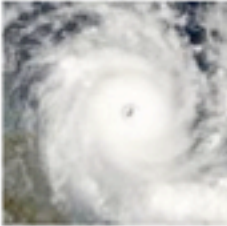
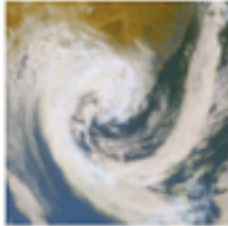

A First Step: NW Pacific Tropical Cyclone Ensemble Forecast Research Experiment

- A five-year regional project with both a research and operational component that will feed into national efforts such as for the Shanghai MHEWS Project
- Intent is to make **GIFS-TIGGE typhoon track data available to ESCAP/WMO Typhoon Committee members including RSMCs in near-real time beginning May 2010** via a password protected web site
- **“Ensemble Track Information” at the beginning, then expansion to include other variables; precipitation, maximum wind, etc.**
- Training for operational forecasters and evaluation of the utility of such data sets in a forecast environment
- Research efforts will attempt to develop and extract useful information from TIGGE ensemble data (or a subset of this data since many ensembles are not well designed for the tropics) and develop products where appropriate
- **Product development to feed into the operational SWFDP in Africa and then in the S. Pacific** (already a request from the SWFDP to feed into RSMCs in Africa for such data)
- **Close Collaboration/Coordination with GIFS-RDP through TIGGE WG, ARC, WWRP/TCP, JWGFVR, RSMCs, and TCWCs**

Cyclone XML (CXML) Homepage

Cyclone Exchange

Introduction

The [Sixth WMO International Workshop on Tropical Cyclones](#) recommended that all tropical cyclone-related Numerical Weather Prediction (NWP) products, including full set of ensemble forecasts, be made available to all operational and research users in real-time. Meanwhile, the [THORPEX GIFS-TIGGE Working Group](#) is developing plans for the Global Interactive Forecast System (GIFS) for the real time dissemination of ensemble data and products in support of high impact weather prediction, including prediction of tropical cyclones. A pilot project has been established by the TIGGE Working Group to test the real-time exchange of ensemble TC track forecasts; the format for TC data exchange will be [Cyclone XML \(CXML\)](#). This exchange of real-time TC forecasts will further the immediate goals of the [THORPEX Pacific-Asian Regional Campaign \(T-PARC\)](#) (August 2008-March 2009), designed to study the lifecycle of tropical and extratropical cyclones over the northern Pacific. Ongoing exchange of TC tracks in real time is expected to lead to improved tropical cyclone prediction, benefiting society in general.

Data

The table below lists FTP sites from which it is possible to download real-time ensemble tropical cyclone track forecasts. A more sophisticated web interface will be developed in due course.

| Producing center | Center code | FTP site | More information about ensemble system and/or track forecasts |
|--|-------------|---|--|
| Canadian Meteorological Centre (CMC) | cwao | ftp://ftp.emc.ncep.noaa.gov/gc_wmb/mcharles/tigge/beta/cxml/ (via NCEP) | http://www.weatheroffice.gc.ca/ensemble/index_e.html |
| China Meteorological Administration (CMA) | babj | ftp://tgftpusr:tigge@tigge-cma-ncar.cma.gov.cn/ | http://www.typhoon.gov.cn/en/other/about.php |
| European Centre for Medium Range Weather Forecasts (ECMWF) | ecmf | ftp://tigge:tigge@tigge-ldm.ecmwf.int/cxml/ | http://www.ecmwf.int/products/forecasts/d/charts/medium/tropcyclones/Forecast/ |
| Japan Meteorological Agency (JMA) | rjtd | http://tparc.mri-jma.go.jp - request login from thorpex@mri-jma.go.jp | http://www.jma.go.jp/en/typh/ |
| Korea Meteorological Administration (KMA) | rksl | ftp://cxml:cxml@210.107.255.35 | http://web.kma.go.kr/eng/abo/abo_05_02.jsp |
| United Kingdom Met Office (UKMO) | egrr | ftp://metoffice.gov.uk - request login from piers.buchanan@metoffice.gov.uk | http://www.metoffice.gov.uk/research/nwp/ensemble/prob-examples.html |
| US National Centers for Environmental Prediction (NCEP) | kwbc | ftp://ftp.emc.ncep.noaa.gov/gc_wmb/mcharles/tigge/beta/cxml/ | http://www.emc.ncep.noaa.gov/gmb/tpm/emchurr/tcgen/ http://www.emc.ncep.noaa.gov/gmb/ens/index.html |

<http://www.bom.gov.au/bmrc/projects/THORPEX/TC/>

Example of TC CXML in ECMWF Data

t=0

```

<data origin='ecmf' type='forecast'>
  <disturbance ID='2008021012_208S_865E'>
    <cycloneName>Hondo</cycloneName> <!-- 10S -->
    <cycloneNumber>10</cycloneNumber>
    <basin>Southwest Pacific</basin>
    <fix hour='0' source='model'>
      <validtime>2008-02-10T12:00:00Z</validtime>
      <latitude units='deg S' precision='0.1'>20.7</latitude>
      <longitude units='deg E' precision='0.1'>86.2</longitude>
      <cycloneData>

```

Time

Lat

Lon

```

      <minimumPressure source='model'>
        <pressure units='hPa' precision='0.01'>982.5</pressure>
      </minimumPressure>

```

Pressure

```

      <maximumWind source='model'>
        <speed units='m/s' precision='0.1'>23.8</speed>
        <latitude units='deg S' precision='0.1'>21.5</latitude>
        <longitude units='deg E' precision='0.1'>86</longitude>
      </maximumWind>
    </cycloneData>
  </fix>

```

Speed

t=6

```

  <fix hour='6' source='model'>
    <validtime>2008-02-10T18:00:00Z</validtime>
    <latitude units='deg S' precision='0.1'>21.3</latitude>
    <longitude units='deg E' precision='0.1'>86.1</longitude>
    <cycloneData>
      <minimumPressure source='model'>
        <pressure units='hPa' precision='0.01'>985.6</pressure>
      </minimumPressure>
      <maximumWind source='model'>
        <speed units='m/s' precision='0.1'>30.7</speed>
        <latitude units='deg S' precision='0.1'>21.5</latitude>
        <longitude units='deg E' precision='0.1'>85</longitude>
      </maximumWind>
    </cycloneData>
  </fix>

```

t=12

```

  <fix hour='12' source='model'>
    <validtime>2008-02-11T00:00:00Z</validtime>
    <latitude units='deg S' precision='0.1'>22</latitude>

```


Products to Deliver

CMA

KMA

RSMC
Tokyo

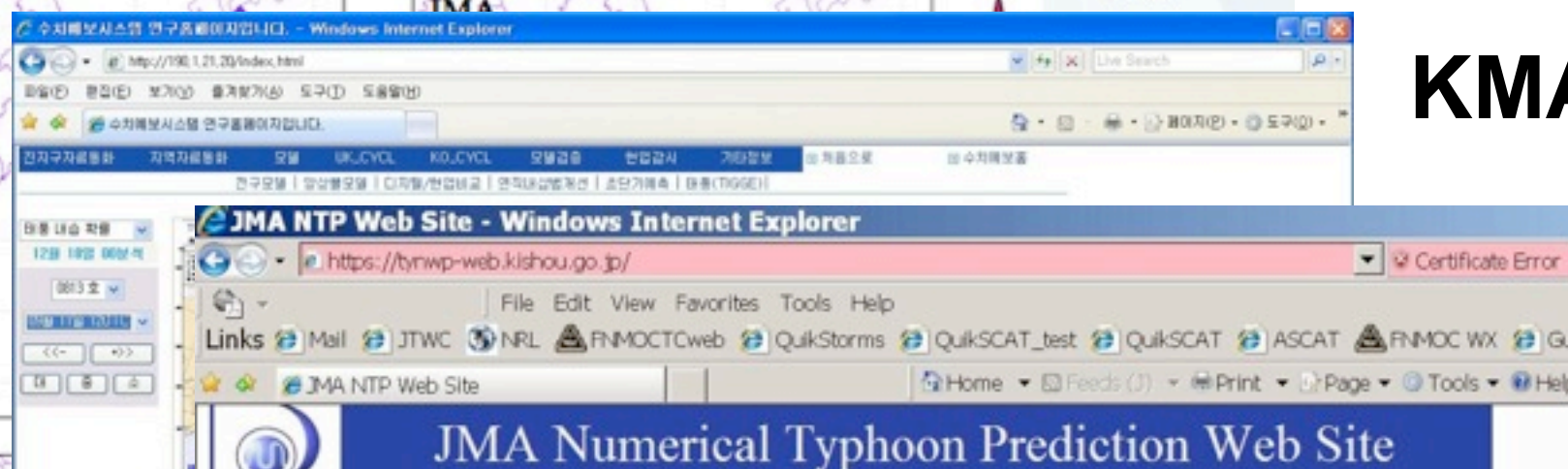
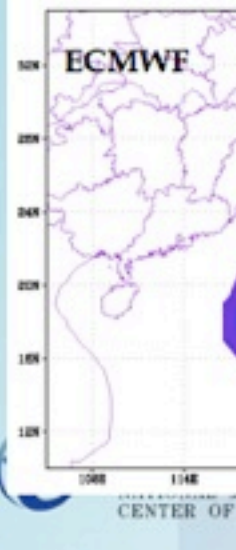
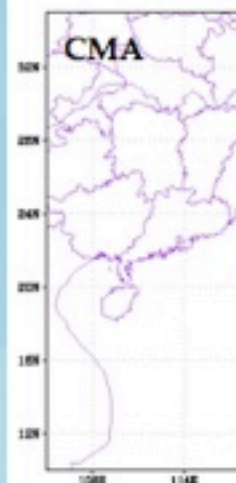
JMA

Parma (0917) will pass within 120Km radius cone within 120

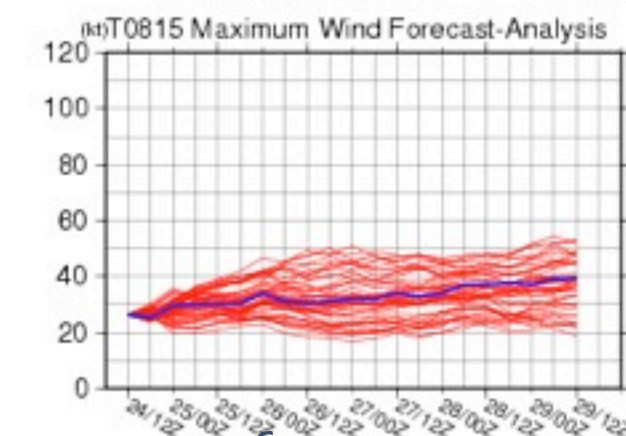
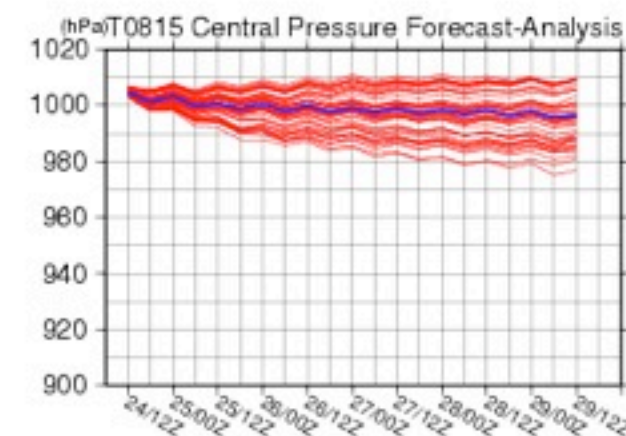
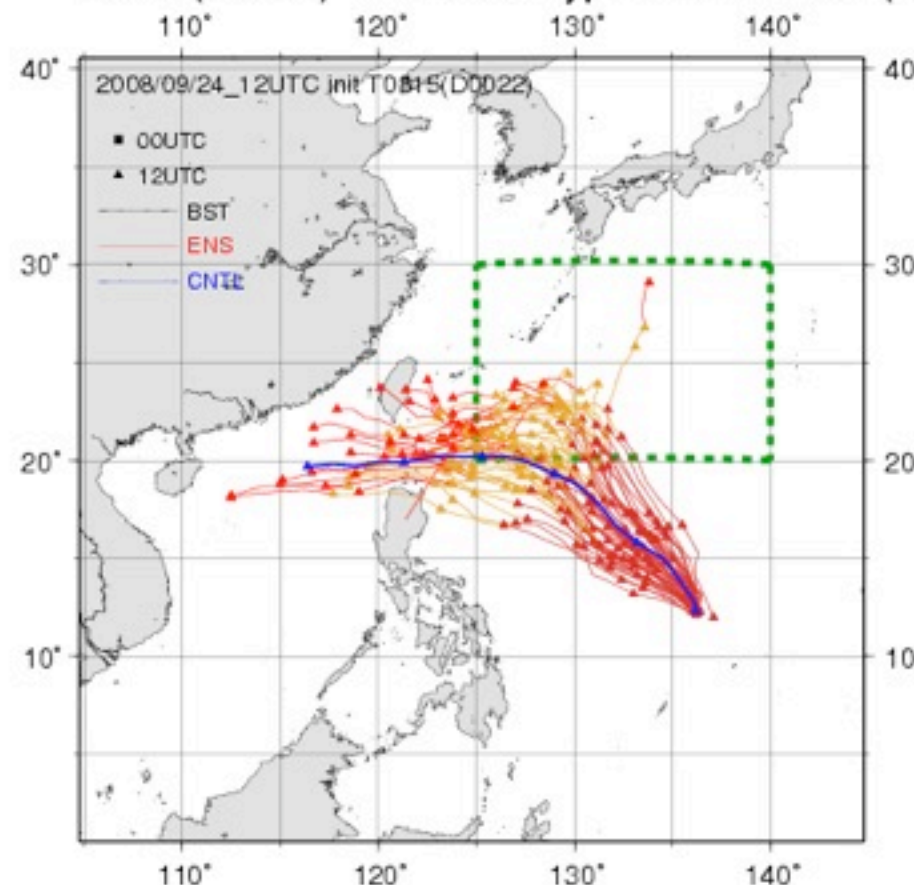
Probability that TC(0917) will pass within 120km radius
During 120h integration based on 2009100300 UTC

hour Probability that TC(0917) will pass within 120km radius
During 120h integration based on 2009100300 UTC

Single Model
EPS



T0815(D0022) Ensemble Typhoon Forecast (Track and Intensity)



Providing information extracted from EPS and creating /updating related potential threat guidance

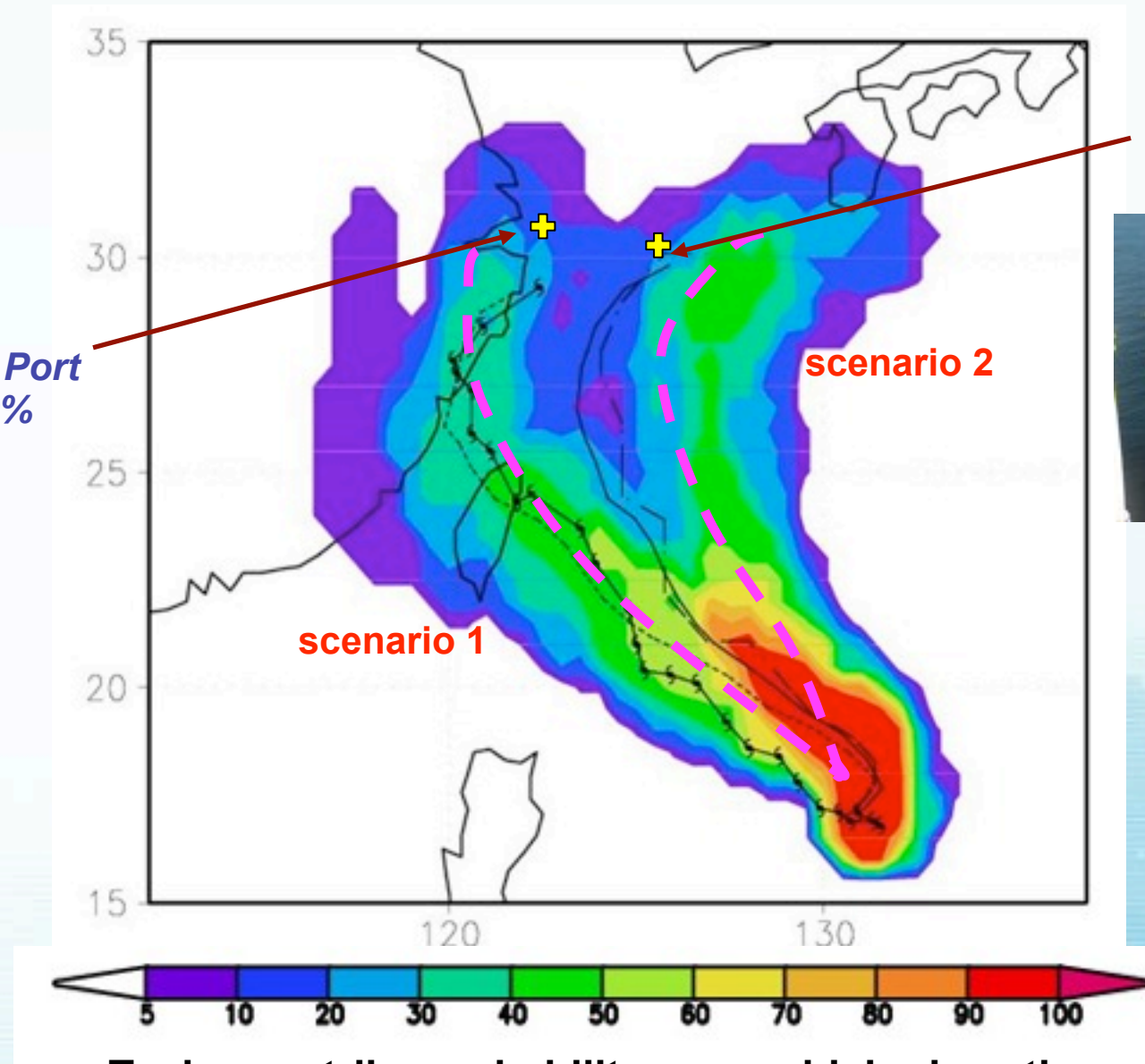
---- Super TY 0716 Krosa

**NMC/CHINA
EP System**

Global EP Background
+ Vortex
1+14 members

Twice a day
(00,12UTC)
Forecast : T+ 5 Days

Yangshan Port
20%~30%



Oil Platform
30%~40%



Typhoon strike probability map, which gives the
probability of typhoon striking over the next 5
days.

Provide Probability of Gale Prediction for the Sensitive Users
(eg. Oil Platform) 5 days in advance.

Courtesy of Dr. Tang XU

Vietnam Flood from Databases

Vietnam : Flood : November 2008

Torrential rainfall in early November in northern and central Vietnam caused severe flooding, at least 44 people dead, damaged infrastructure and vegetable crops. Many people were affected.

United Nations Office for Humanitarian Affairs

<http://ochaonline.org/News/NewsDetail.aspx?tabid/4837/lan>

| Dates | |
|------------|------------|
| Start | End |
| 25/12/2008 | 05/01/2009 |
| 27/10/2008 | 04/11/2008 |
| 19/10/2008 | 20/10/2008 |

| | | | | | | | |
|------------|------------|----------|---------------------------------|-------|---------------|----|-----|
| 26/08/2008 | 28/08/2008 | Viet Nam | Ha Giang province | Flood | General Flood | 16 | |
| 11/05/2008 | 12/05/2008 | Viet Nam | Dac Ngo (Dak Nong province) ... | Flood | Flash Flood | 4 | 500 |

IRIN

<http://www.irinnews.org/Report.aspx?ReportId=81253>

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VIETNAM: Dozens killed by flooding



Photo: Tung X. Ngo/IRIN

A woman caught in flooding in Hanoi. The Vietnamese capital has been inundated with some 20 inches of rain over a three-day period leaving 19 dead. In northern Vietnam, at least 44 people are dead and 100,000 homes underwater.

HANOI, 3 November 2008 (IRIN) - Days of heavy rains have paralysed parts of northern Vietnam, leaving at least 44 people dead and 100,000 homes under water. In Hanoi, 19 people died after lakes overflowed and streets turned into rivers.

"This heavy rain is the worst in Hanoi since 1984," said Duong Lien Chau, deputy director of the Central Hydro-Meteorological Forecast Center. "In some areas, this is the heaviest rainfall in more than 100 years."

With no typhoons in the region, the storm caught the capital by surprise. More than 500mm of rain fell in just three days.

"I did forecast the rain," said Chau, "but we did not expect it would be this heavy."

Most deaths were caused by drowning when the waters rose without warning. Streets quickly flooded, forcing people to navigate through water up to 1m high.

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EM-DAT

<http://www.emdat.be/database>

Nest Step: Severe Weather Forecast and Disaster Risk Reduction Demonstration Project in South Pacific

- SWFDP in southern Pacific has recently requested **TIGGE tropical cyclone CXML data in real time**
- S. Project will commence its pilot phase in November 2009
- Focus on forecasting and warning services in relation to heavy rain, strong winds and damaging waves for four island countries: Fiji, Samoa, Solomon Islands and Vanuatu
- Operational global-scale numerical weather prediction guidance products will be provided by the Met Office (UK), NCEP (USA), ECMWF, and JMA (Japan).
- Strong interest in **TIGGE tropical cyclone CXML data**

Nest Step: Severe Weather Forecast and Disaster Risk Reduction Demonstration Project in South Pacific

TC Animated

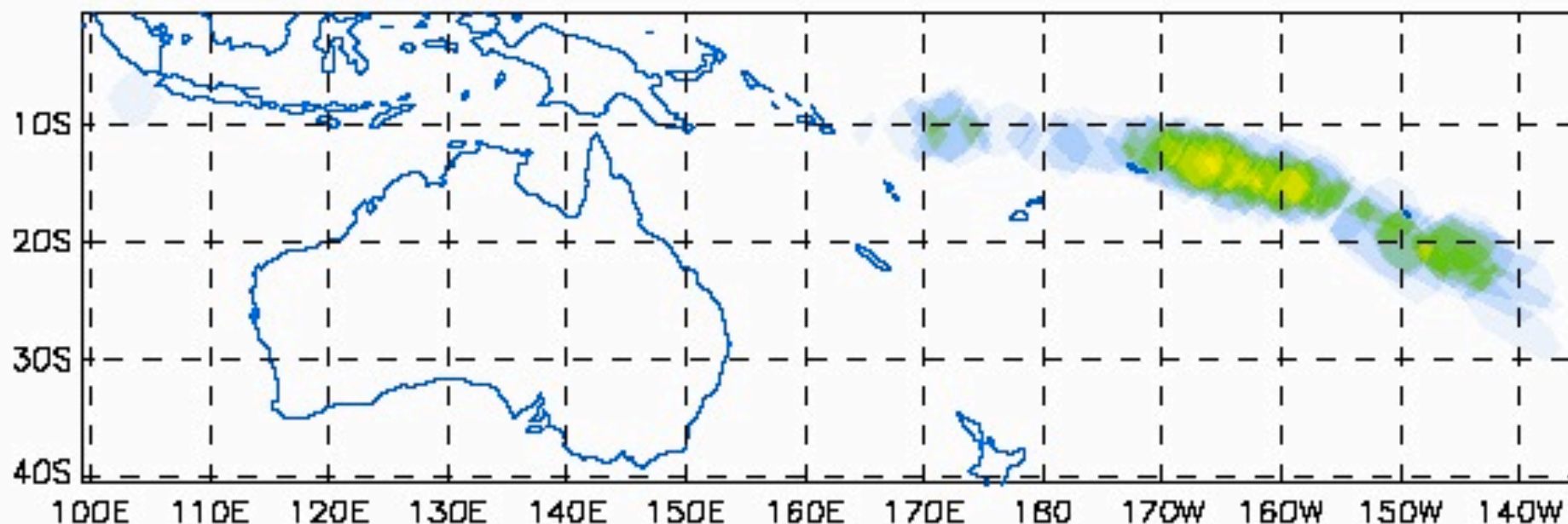


Tropical cyclone products from the experimental MOGREPS 15-day ensemble

© British Crown Copyright

Data time 2009111912

Tropical cyclone strike probability for 24hrs centred on T+120
(shows probability of a tropical cyclone passing within c.300km)



Courtesy of N. Gordon

Nest Step: Focused TIGGE project for South America: La Plata Basin –LPB-

Area:
3.100.000 km²

Inhabitants:
101.656.965

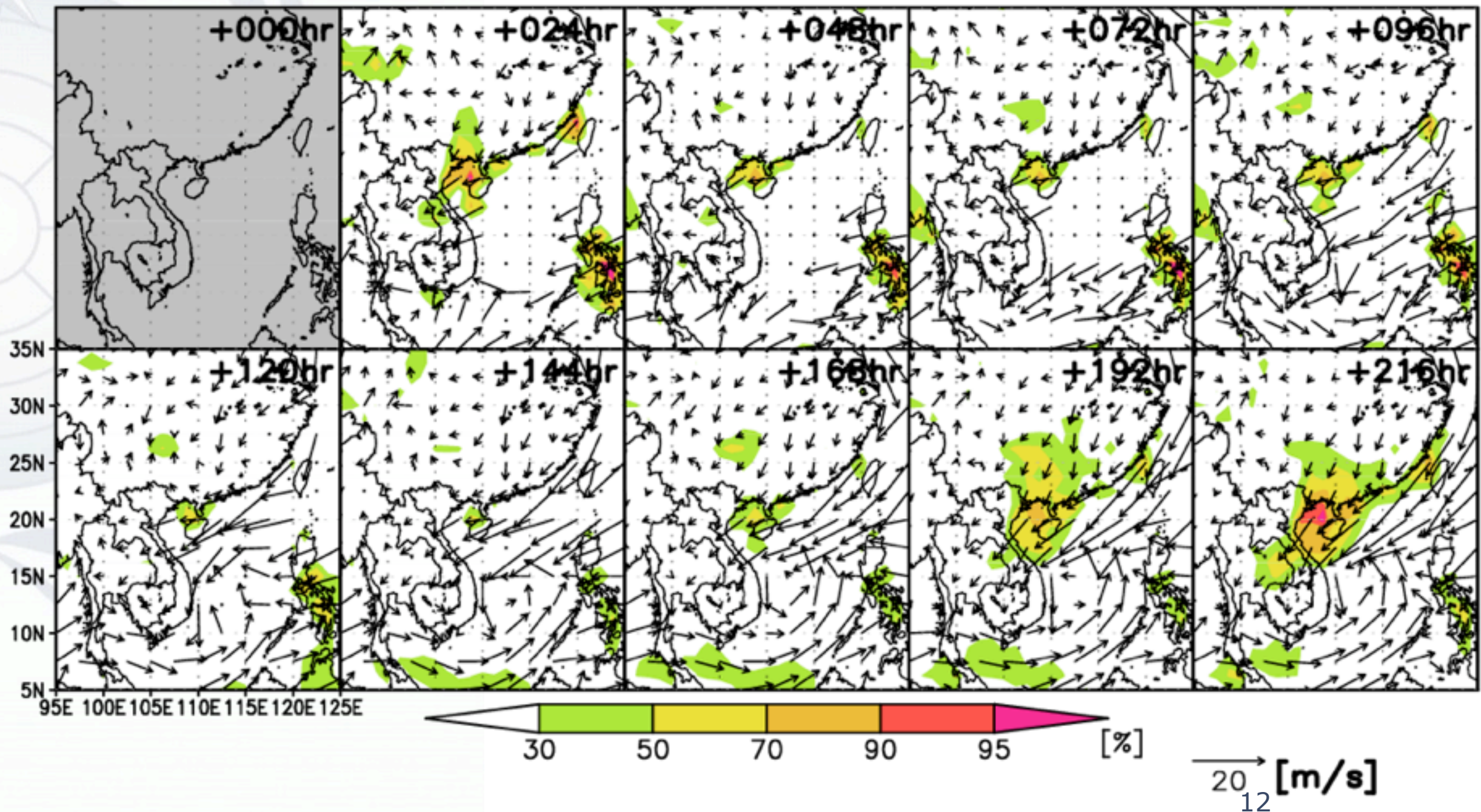
A recently proposed project is **precipitation** prediction for the La Plata Basin, which is formed by the discharge of waters from five countries - Argentina, Brazil, Uruguay, Bolivia and Paraguay in very early planning stages, and will include ensemble and TIGGE training

Mega-cities:
Sao Paulo-Buenos Aires
Other large cities: *Asunción-Sucre-Montevideo*



Genesis Potential using TIGGE EPSs for Vietnam Flood in Oct. 2008

Probability of surface wind speed over 90 percentile (MCGE)
Initial: 2008102312UTC



Annual Plan

■ 1st Year (2009)

➤ Establishment/Initial Phase of the Project

- Ask all TIGGE CXML Providers to allow “real-time” use of the data
- Ask ESCAP/WMO Typhoon Committee members to be interested in receiving “real-time” information the Project delivers
- Implement the details of the variables and web-design/interface

■ 2nd Year (2010)

➤ Execution during Shanghai EXPO

- Hold a training workshop on “Extract information from ensemble TC track forecast data”
- Ask ESCAP/WMO Typhoon Committee members to evaluate the value of the information the Project delivered during Shanghai EXPO

■ 3rd Year (2011)

➤ Evaluation of the TC CXML Database in Shanghai EXPO 2010

■ 4th Year (2012)

➤ Improvement/Enhancement of the Utilization of the TC CXML Database

■ 5th Year (2013)

➤ Final Assessment and Recommendation of the TC CXML Database