

*WMO Strategy for Improving Severe Weather Forecasting in  
Developing Countries*

**Severe Weather Forecasting Demonstration  
Project (SWFDP)**  
**Lessons learnt, Opportunities for the future**

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*from: EC WG on Disaster Risk Reduction and Service Delivery Geneva, 24-26 February 2010*

# *Severe Weather Forecasting Demonstration Project (SWFDP)*

## **Overview**

- ❖ Vision – Strategy – Goals – Planning and execution cycle
- ❖ SWFDP « primer »
- ❖ Lessons learnt, and opportunities



# Numerical simulations of the atmosphere

*“In general, the public is not aware that our daily weather forecasts start out as initial value problems on the major national weather services supercomputers.*

*“Numerical weather prediction provides the basic guidance for weather forecasting beyond the first few hours.”*

- Eugenia Kalnay (2003)

- *From: “Atmospheric Modeling, Data Assimilation and predictability”  
Cambridge University Press, 2003, 5th printing 2009*

# Improving Severe Weather Forecasting in Developing Countries

## ***Vision***

*“NMHSs in developing countries are able to implement and maintain reliable and effective routine forecasting and severe weather warning programmes through enhanced use of NWP products and delivery of timely and authoritative forecasts and early warnings, thereby contributing to reducing the risk of disasters from natural hazards.”*

*(Cg-XV, 2007)*

# SWFDP – WMO Strategic Thrusts

## *Improved Service Quality and Service Delivery*

- ✓ Improved delivery and access to high quality weather, water, related environmental predictions, information, and services
- ✓ Reduced risks and potential impacts of hazards

## *Strengthening Capacity Building*

# SWFDP MAIN GOALS

*Weather Forecasting (GDPFS) and Service Delivery (PWS)  
Programmes*

- Improve severe weather forecasting
- Improve lead-time of warnings
- Improve interaction of NMHSs with media and disaster management and civil protection authorities
  
- Identify areas for improvement
- Improve the skill of products from GDPFS Centres through feedback

GDPFS – Global Data-Processing and Forecasting System  
PWS – Public Weather Services

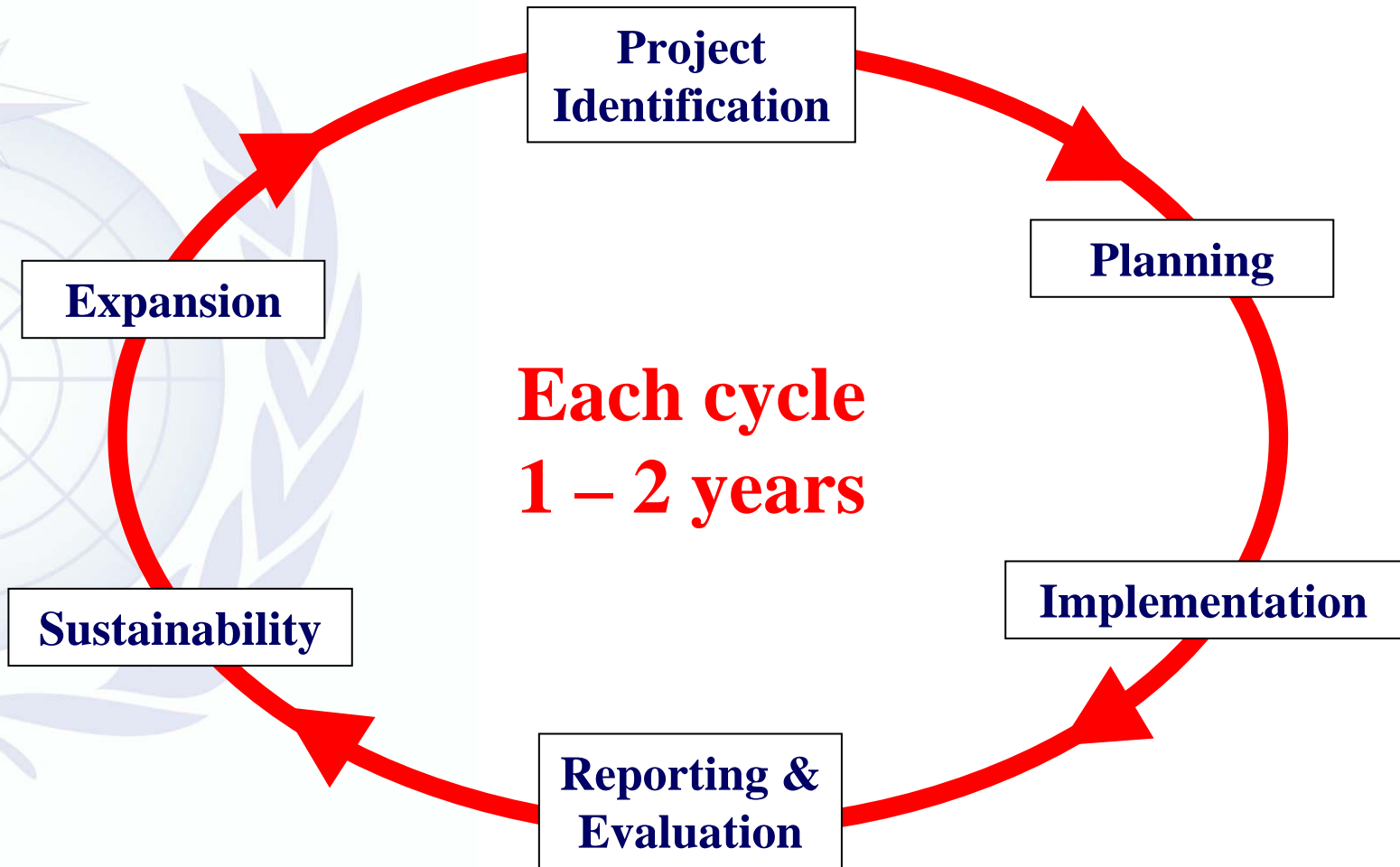
From CBS (2005, 2006, 2009)

# SWFDP

## *Planning and execution : 4-step cycle*

- 1. Establish regional partnership**
  - focus on severe weather forecasts and warnings in developing countries (heavy rain, strong winds)
- 2. Plan and develop prototype demonstration project**
  - develop an implementation plan
- 3. Implement demonstration project**
  - generally, 1 year duration
  - tracking, continuous evaluation, reporting
- 4. Broaden and sustain successful prototypes**  
(return to step 1)

# WMO DRR Programme Project Management Framework

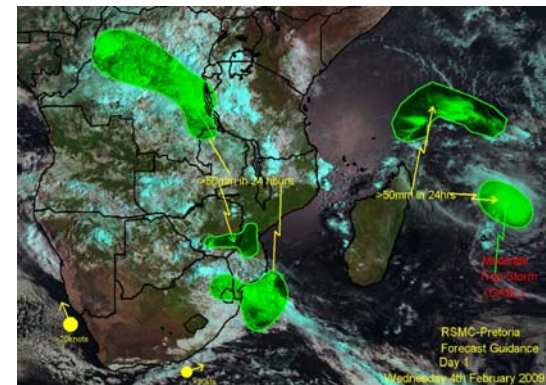
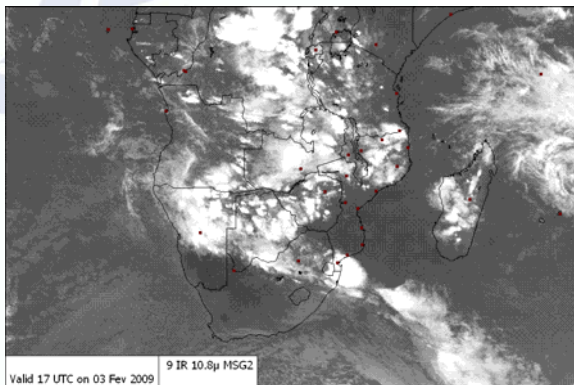




# SWFDP

## *Concept of Operations – Cascading Forecasting Process:*

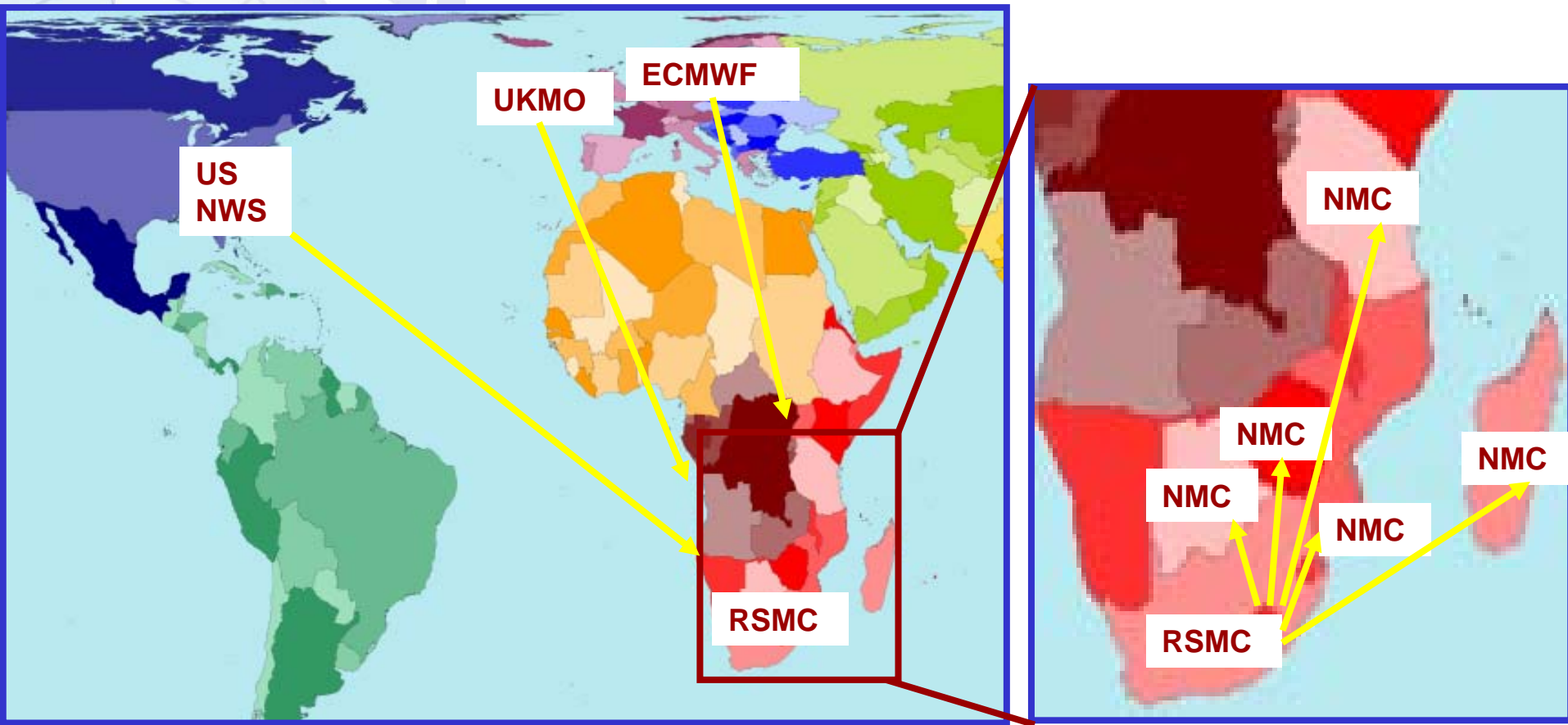
- > GLOBAL NWP => RSMC and NMCs (daily)
- > RSMC: hi-res limited-area NWP for project region; prepares, distributes severe weather forecasting guidance bulletin to NMHSs (daily, to day-5)
- > NMCs use guidance, forecast severe weather, issue warnings, and deliver services to public, media, and disaster management and civil authorities (24/7)



# SWFDP - South-eastern Africa (2006-2007)

## Cascading Forecasting Process

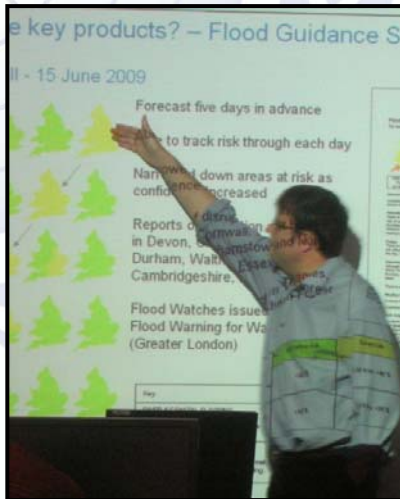
- Global products cut to project window frame
- RSMC guidance bulletin: short-range (d1-2), med.-range (d3-5) for NMCs
- NMCs use guidance, prepare and issue warnings to public, media, disaster management



# SWFDP

## *What's needed to participate?*

- > One RSMC to play central SWFDP regional role
- > Focused Training: NWP/EPS and dissemination and communication of warnings
- > Internet access to dedicated RSMC Web site and portal
- > Project accountability for all participating centres (commitment)



*Under the guidance of the  
CBS Steering Group on SWFDP*

# SWFDP Regional Subprojects

## **Southern Africa:**

- Southeastern Africa – 2006 to 2007 (5 countries)
- Southern Africa expansion – 2008 to 2011 (16 countries)
- RSMC Pretoria

## **South Pacific Islands:**

- Pilot – Nov. 2009 to Nov. 2010 (4 SIDS)
- Full demonstration – Nov. 2010 to 2011+ (9 SIDS)
- RSMC Wellington

## **Southeast Asia:**

- Project development in progress
- Cambodia, PDR Lao, Thailand, Viet Nam
- CMA, JMA, KMA, RSMC New Delhi, RSMC Tokyo, HKO
- Possible start-up May 2011

➤ LDCs involved (Aug. 2010):

Angola, Comoros, DR Congo, Lesotho, Madagascar, Malawi, Mozambique, Tanzania, Zambia; Samoa, Solomon Islands, Vanuatu;

➤ (tentatively): Kiribati, Tuvalu, Cambodia, and Lao PDR)

# Exploring new regional projects

## *Eastern Africa (6 countries)*

- Victoria Lakes region: Kenya, Tanzania, Uganda – 2010-2012 (World Bank)
- Burundi, Rwanda, Ethiopia
- Services to general public, disaster management, agriculture and fisheries
- RSMC Nairobi

## *Pacific Islands – “western window” (3 countries)*

- RSMC Darwin, TCWC Jakarta

## *Bay of Bengal (4 - 5 countries)*

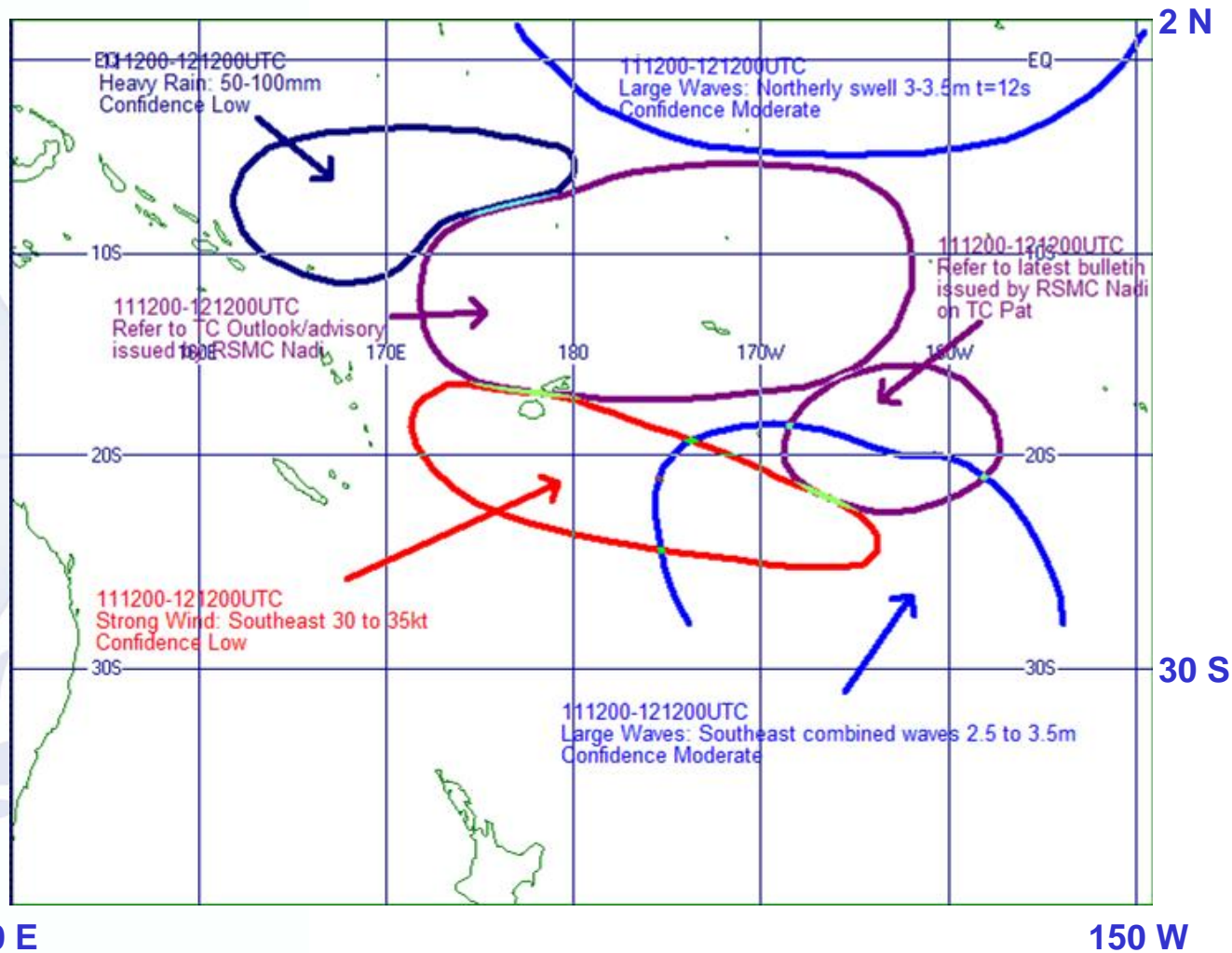
- Severe weather forecasting, coastal communities, storm surges

## *Central Asia (2 - 5 countries)*

- At the request of the World Bank

# SWFDP – South Pacific Islands

## RSMC Wellington « MetConnect Pacific »



Pilot: Fiji, Samoa, Solomon Islands, Vanuatu  
 + (full demo): Kiribati, Tuvalu, Tonga, Niue, Cook Islands

# SWFDP – evolution

## *Developmental sequence :*

- ✓ Strengthen the “forecasting engine” (GDPFS)
- ✓ Strengthen Warning Services (PWS)
- ✓ Account for country/regional DRR analyses
- ✓ Add “micro-projects” (e.g. verification, statistical post-processing, warnings exchange, public surveys, contingency planning and exercise)
- ✓ Add multi-hazard components

# SWFDP – resources

(FP 15)

## Regular Budget :

- ✓ GDPFS and PWS
- ✓ Education and Training
- ✓ WWRP

## Extra-budgetary from participating Members :

- ✓ Donated funds, in-kind
- ✓ RSMCs

## Surplus (from FP 14)



# Results from SWFDP, so far...

- Southern African countries highlighted:
  - Successful recipe - real benefits to developing countries
  - High impact, cost effective
  - Visible operational results in improved early warnings
  - Forecasters increased confidence in their warnings
  - Some NMHS feel improving relations with civil protection authorities
- South Pacific Islands:
  - early inclusion of “damaging waves”
  - Similar benefits being noted (re: southern Africa)



*SWFDP provides a practical and beneficial platform for preparation and dissemination of multi-hazard, early warnings*

# SWFDP - General Lessons

*Extracted from CBS-XIII (2009)*

- Accelerated technology transfer of NWP/EPS tools into developing countries
- **Continuous learning by forecasters**
- Tight cycle of demonstration, adapting to regional and national needs, evaluation, and implementation
- **Contributing to learning practical probabilistic forecasting methods**
- Increased visibility, credibility, and value of meteorological services
- **New role for WMO regional centres (RSMC) in severe weather forecasting for the region**

# SWFDP - General Lessons

## *Secretariat's perspective*

- Regional partnerships: collective needs, motivation, buy-on, ownership, champion(s)
- SWFDP “Cascading” process - an after-burner for technology transfer, creating and boosting results
- Introduction of probabilistic forecasting to extend the lead-time and usefulness of predictions, especially of severe and high impact weather phenomena
- Predicting severe weather needs technical tools in the very short-range (< 12 hours)
- Performance of NWP could be improved for region-specific needs, through feedback, verification, and documented case studies

# SWFDP – Opportunities

## *Project development :*

- ✓ more countries, new regions
- ✓ Improved tools for predicting tropical convection
- ✓ all weather hazards, and flooding (public and marine warnings)
- ✓ Prediction services in sector-specific hazards (e.g. frost, fires, health/air quality)
- ✓ Contingency planning and exercise
- ✓ Beyond day-5 (outlook)



# SWFDP – Opportunities

## *Strategic :*

- ✓ Multi-hazard, early-warnings
- ✓ Capacity building for LDCs (*managing the “gap”*)
- ✓ Introducing promising R&D outputs (e.g. TIGGE)
- ✓ Cross-programmes, Results focused
- ✓ Beyond meteorological hazards
  - ✓ Industrial disasters (Emergency Response)
- ✓ Adaptation to climate variability and change





**SWFDP:**

- Southern Africa
- South Pacific Islands
- Southeast Asia

*“ ... next decade will continue to bring improvements, especially in ... detailed short-range forecasts, using storm-scale models able to provide skillful predictions of severe weather;*

*...*

*“... improvement in the usefulness of medium-range forecasts, especially through use of ensemble forecasting;”*

*...*

*- Eugenia Kalnay (2009)*



釣勝於魚

*Tell us how to fish  
Show us how to fish  
Fish with us*

*Thank you!  
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