Early Warning center in Sultanate of Oman

Presented by

Abdullah Alkhadouri

Director General of Oman Meteorology

Presentation outline

- Lessons learned from the catastrophic tropical cyclone “ Gonu” 2007
- What were the 3 main pillars that helped Oman to create an effective early warning center After “ Gonu ”
- Do we successed?
- What is Next?

Sultanate of Oman

Capital: Muscat

Population: 4.5 m (2021)

Climate:

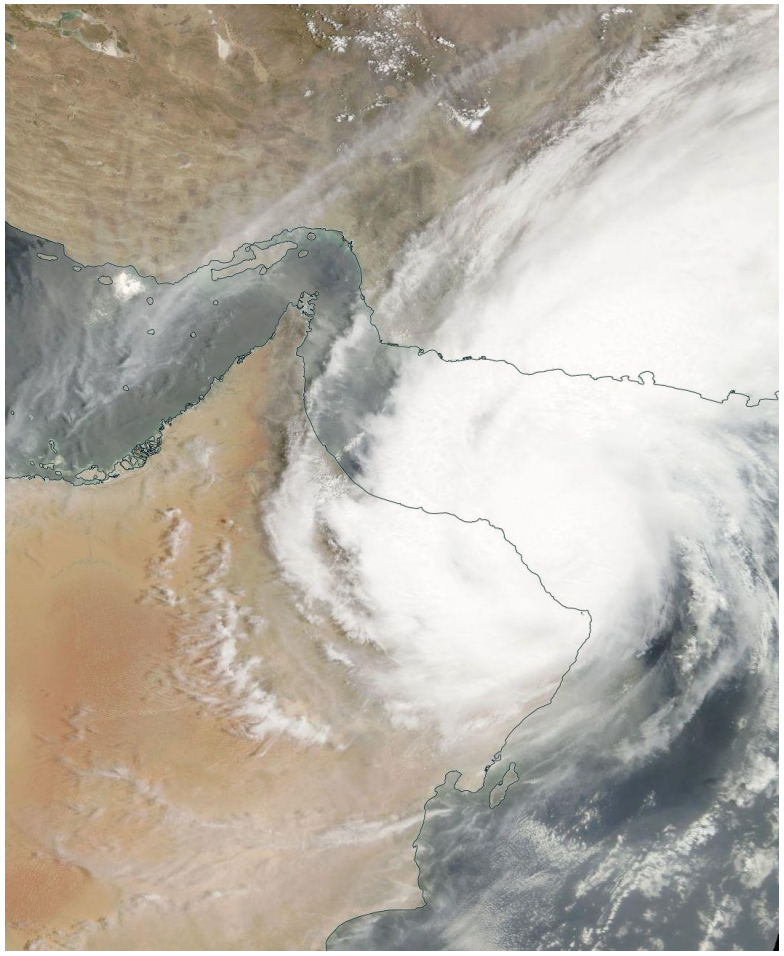
Hot during summer

Cool and mild during winter

100 ml Anuual average rainfall

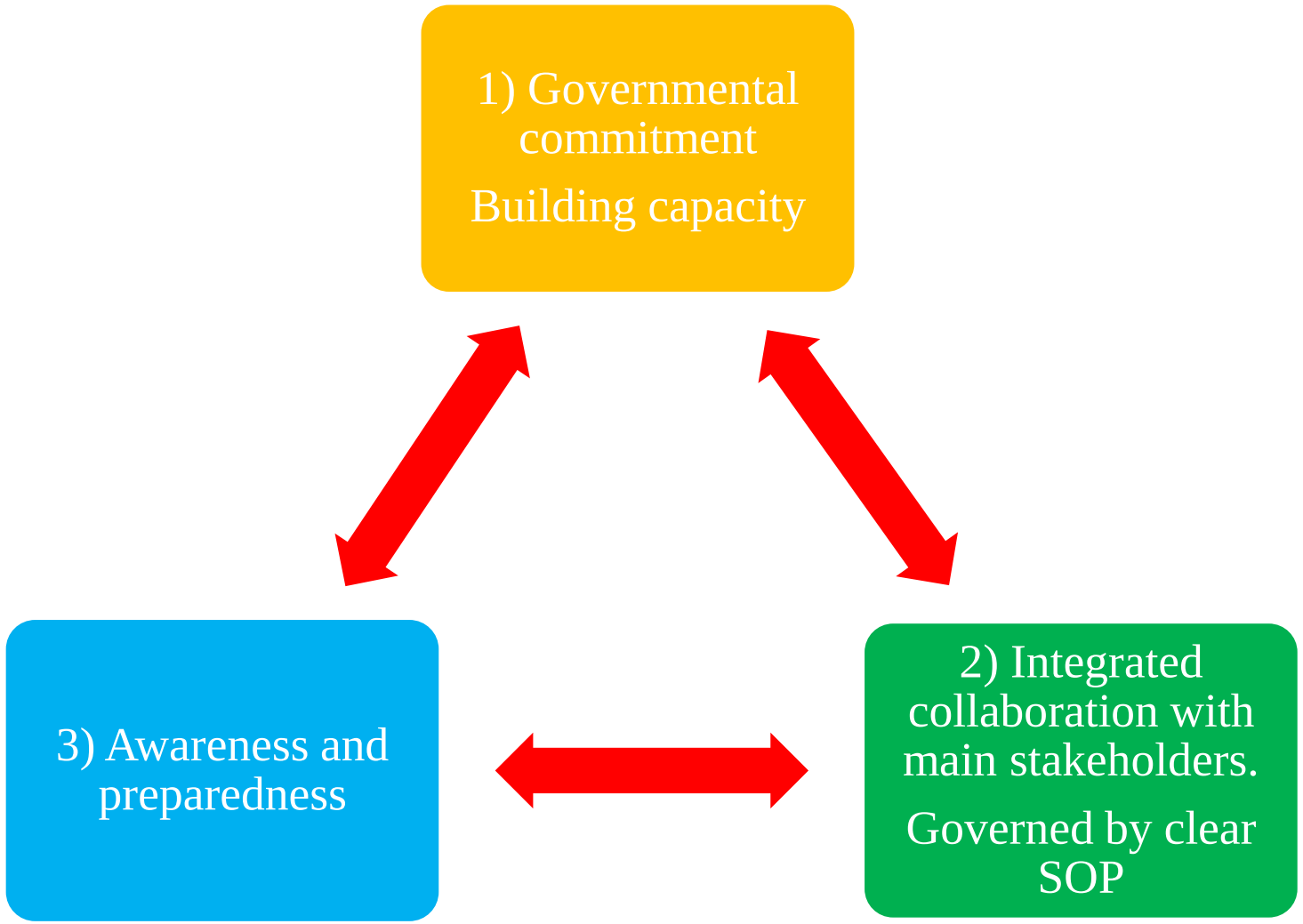
Lessons learned from the catastrophic tropical cyclone “ Gonu” 2007

Tropical Cyclone Gonu (6-7 June 2007)

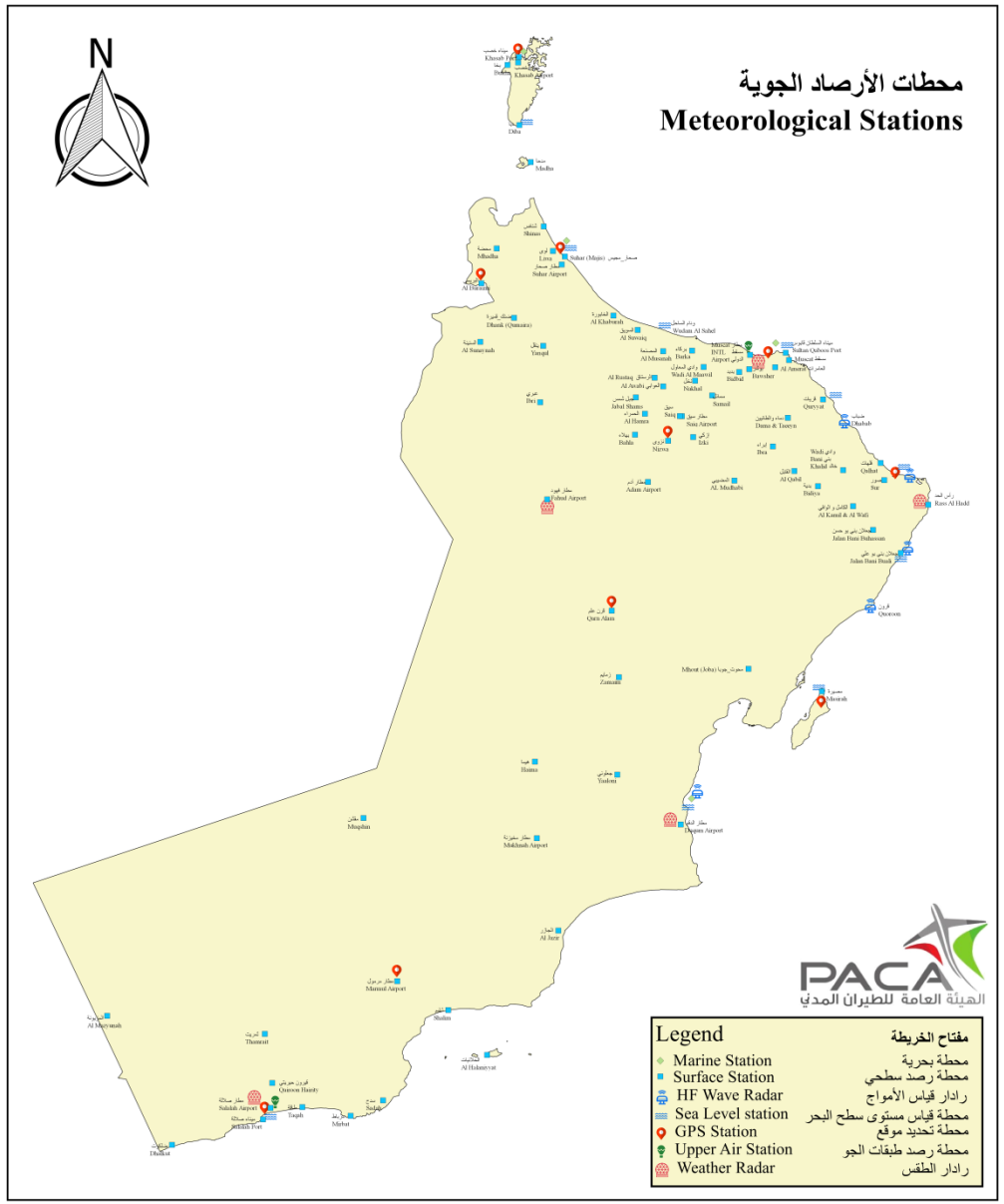


	Gonu	Mekunu
Casualties	50	7
Damage	4200 Million (2007 USD $)	400 million (2018 USD $)

3 Main Pillars to create An effective Early warning center



1. Building capacity

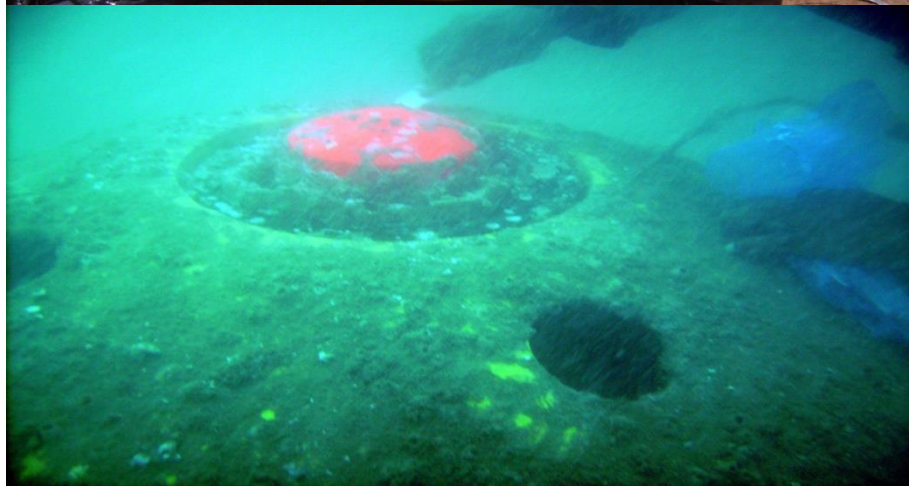


Network of Met Stations

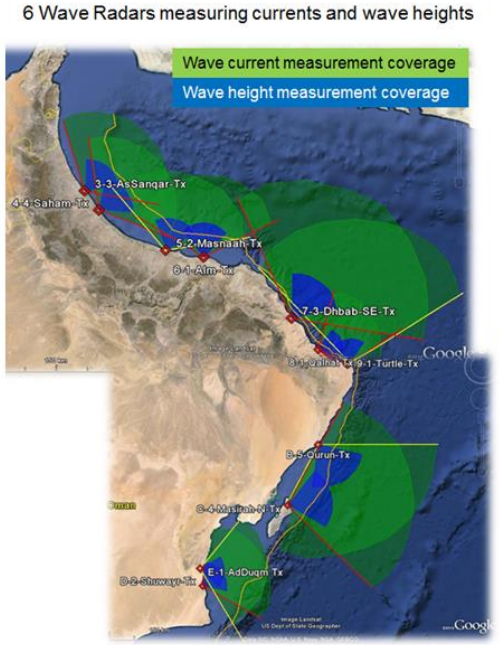
Legend	مفتاح الخريطة	العدد
Marine Station	محطة بحرية	4
Surface Station	محطة رصد سطحي	75
HF Wave Radar	رادار قياس الأمواج	6
Sea Level station	محطة قياس مستوى سطح البحر	10
GPS Station	محطة تحديد موقع	10
Upper Air Station	محطة رصد طبقات الجو	2
Weather Radar	رادار الطقس	5

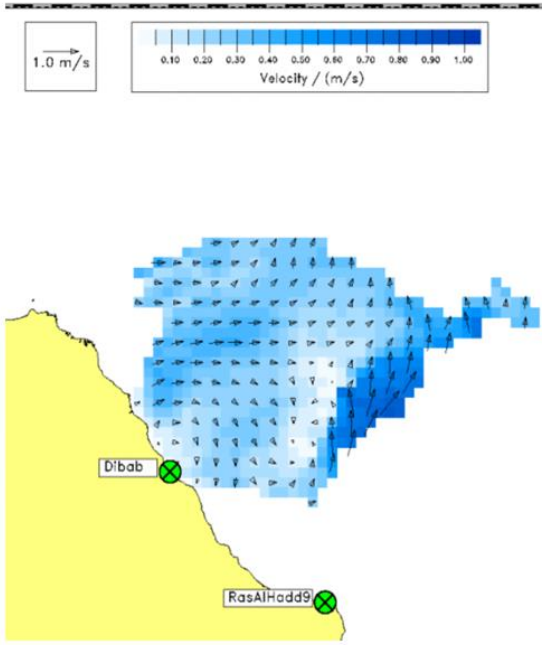
1-Observation Network
Marine Stations

4 Marine Stations



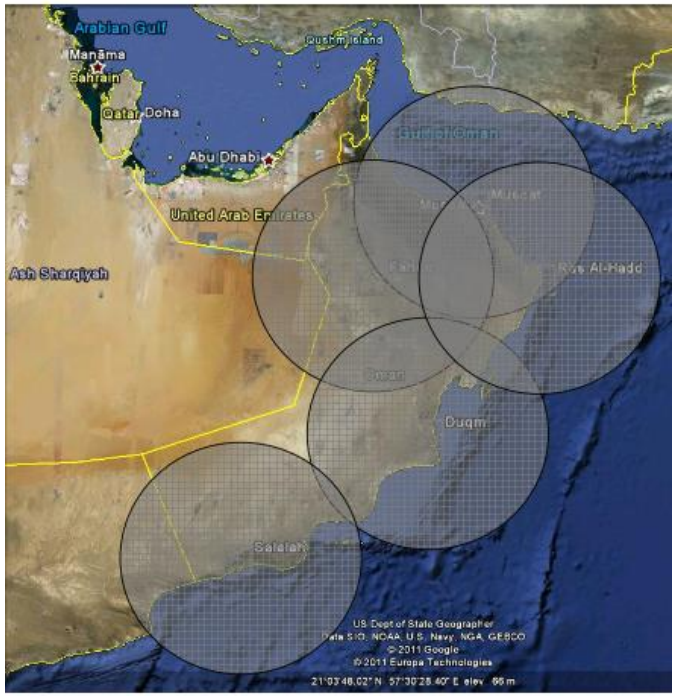
6 Wave Radars

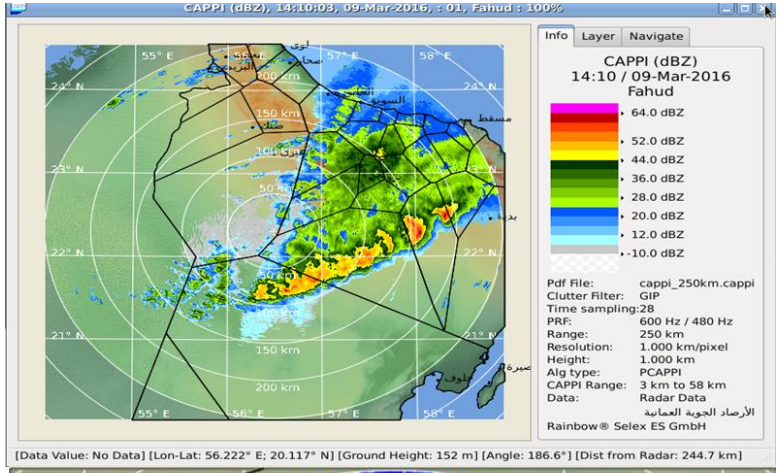


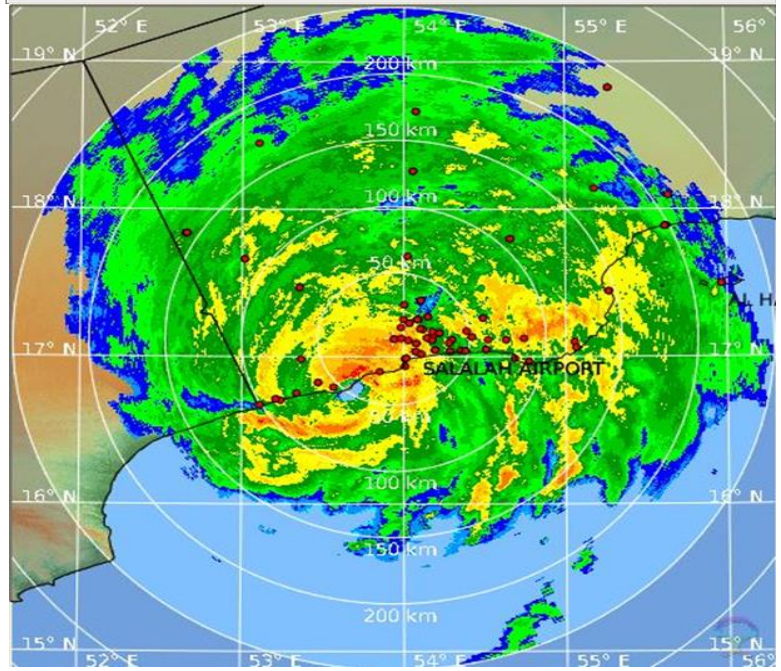


1-Observation Network
Remote Sensing - Radars

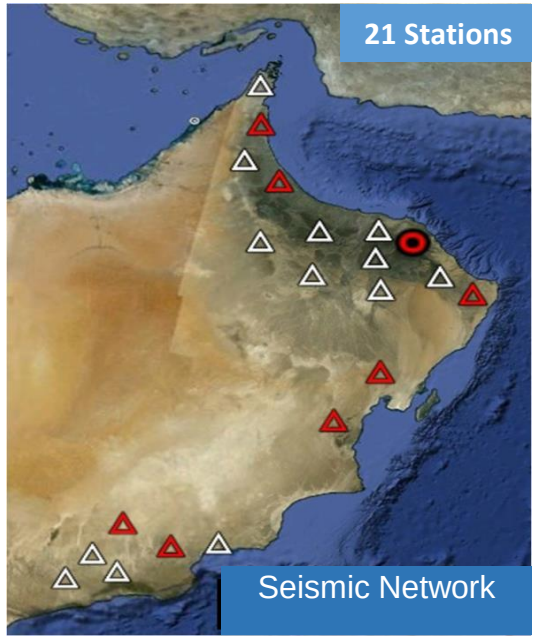
5 Weather Radars

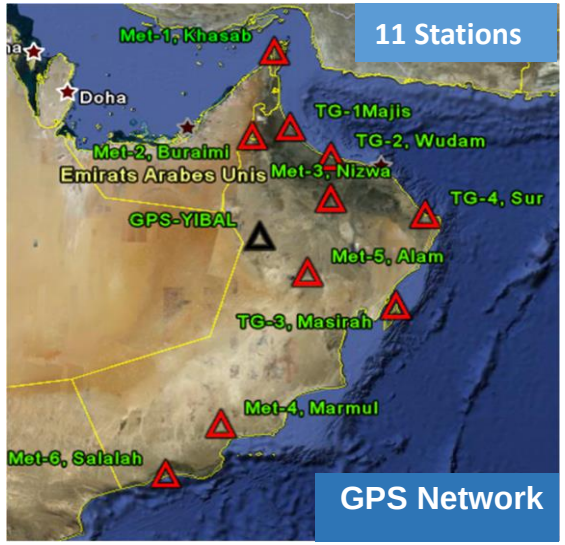


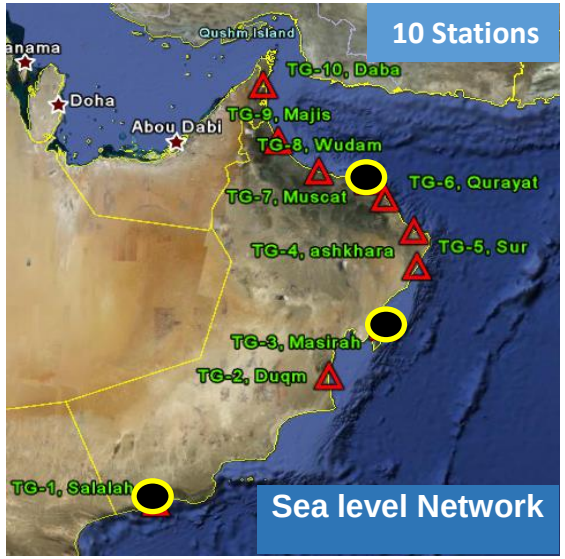


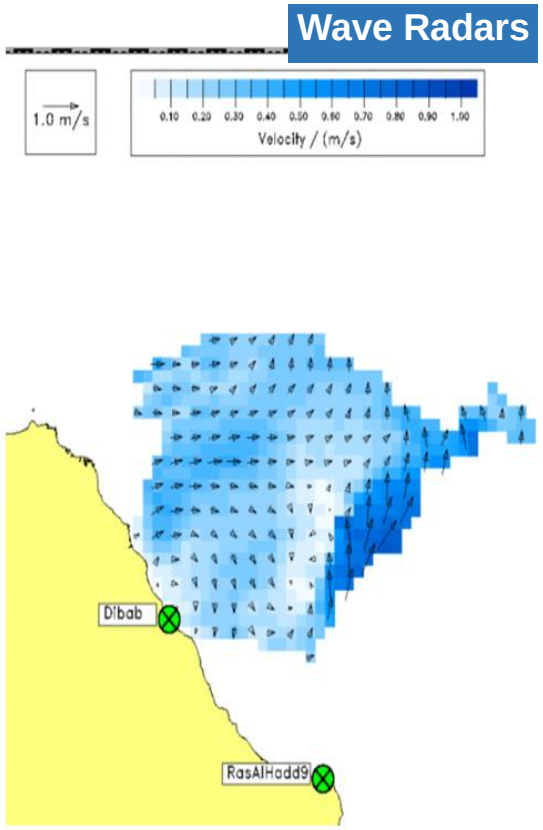


1-Observation Network
Tsunamis





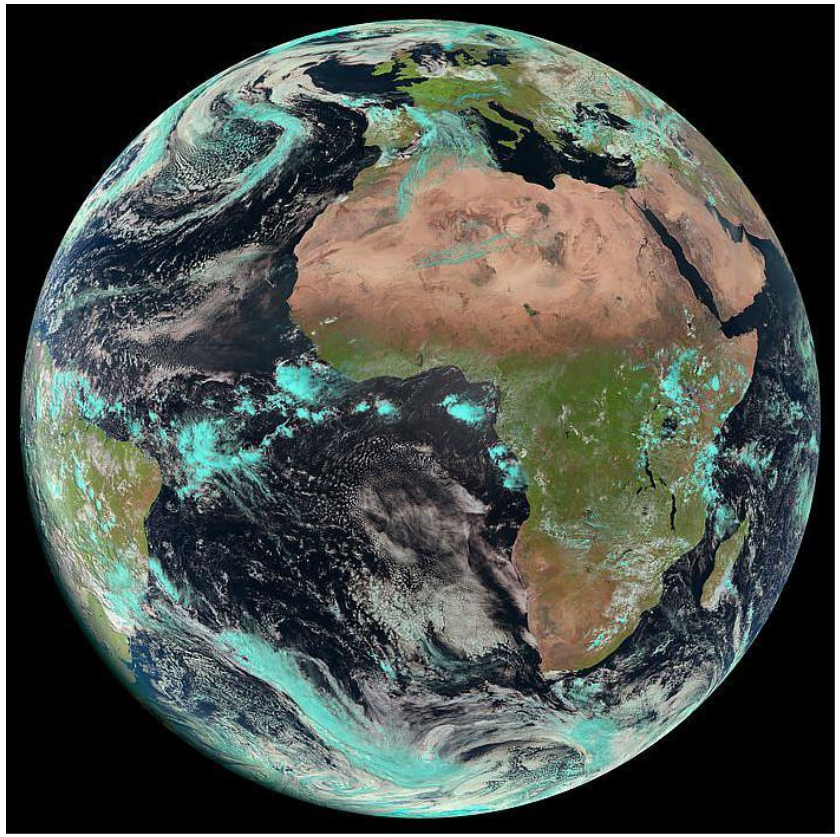




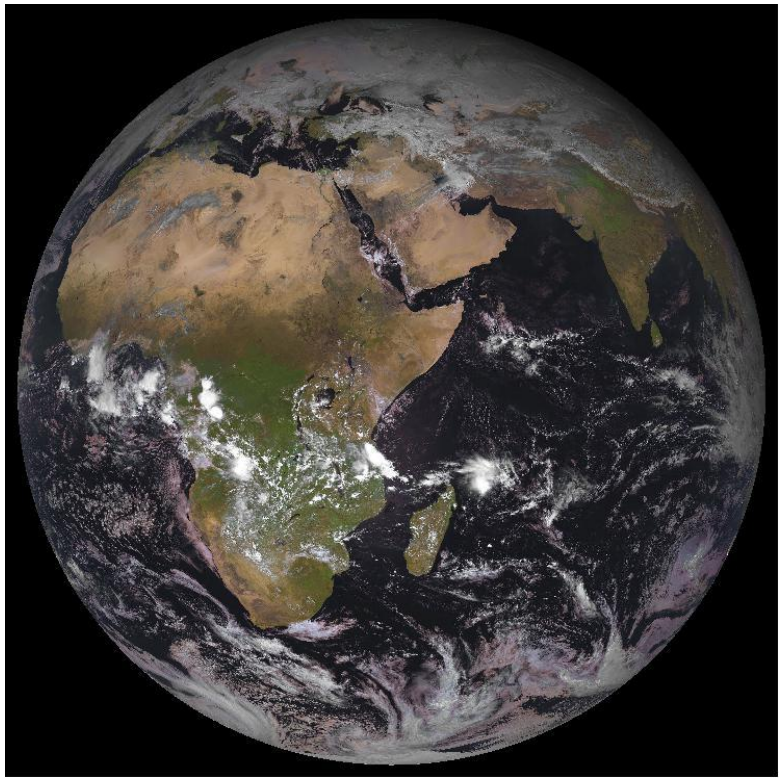
1-Observation Network

Remote Sensing - Satellites

Meteosat-11 at 00



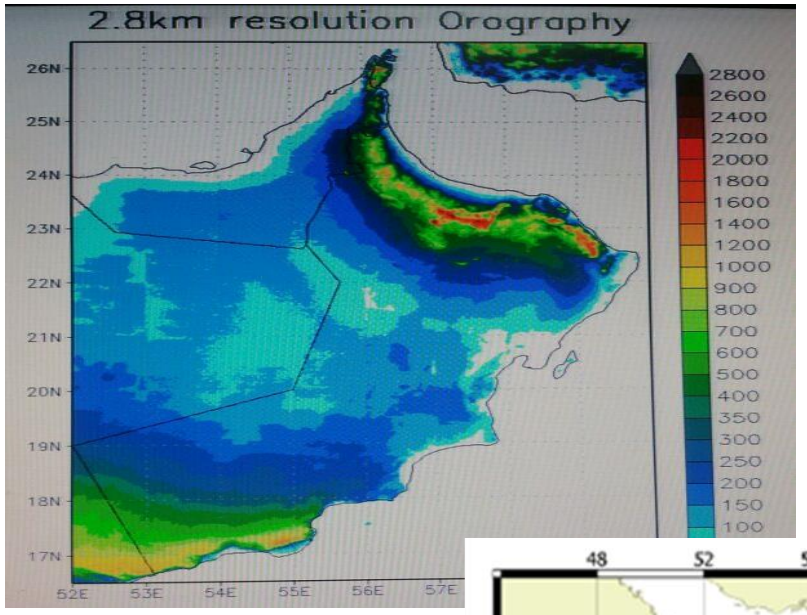
Meteosat-8 at 41.50 East



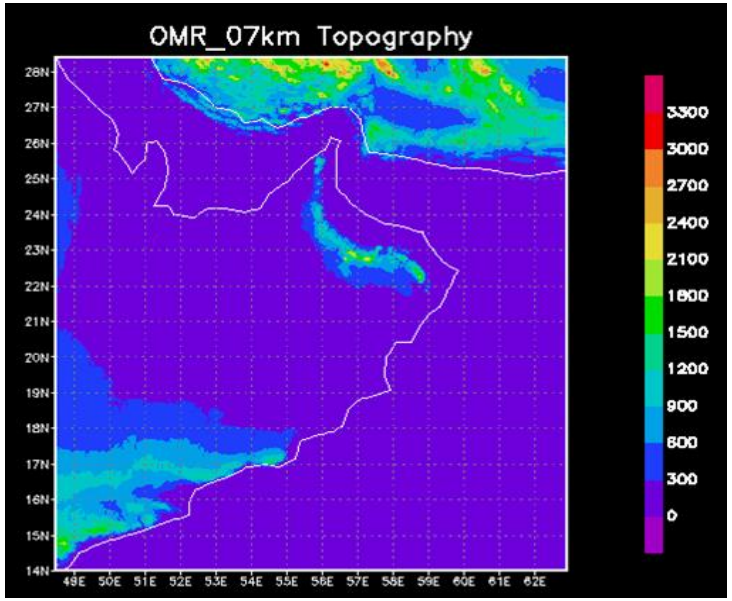
2- Modeling and Assessing the Hazards
Numerical Modeling

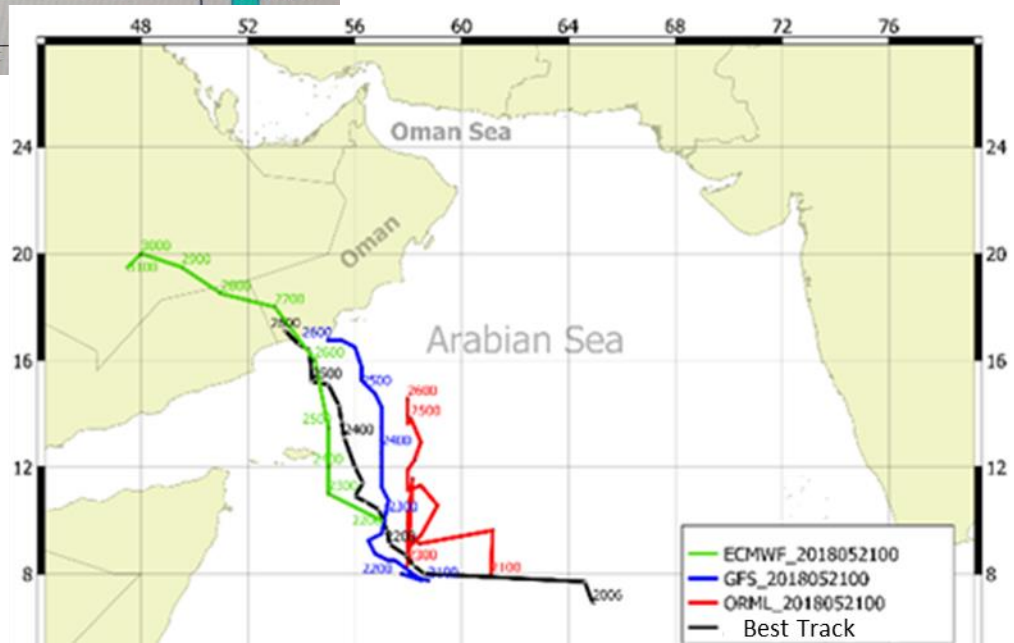
	Model المجسم	الجودة Resolution	Global Data المعطيات الخارجية	Type نوع المجسم	Run time (Min) الوقت المطلوب لإنهاء العمليات الحسابية (دقيقة)
Atmospheric	COSMO	7 km	ICON	Atmospheric للغلاف الجوي	50
		2.8 km			45
Tropical Cyclones	HWRF	27 km	GFS	TC + static للأعاصير	130
		9 km			
		3 km			
Wave Models	WAM	14 km	ICON	Wave لأمواج البحر	15
		3.5 km			45

2- Modeling and Assessing the Hazards
Numerical Modeling



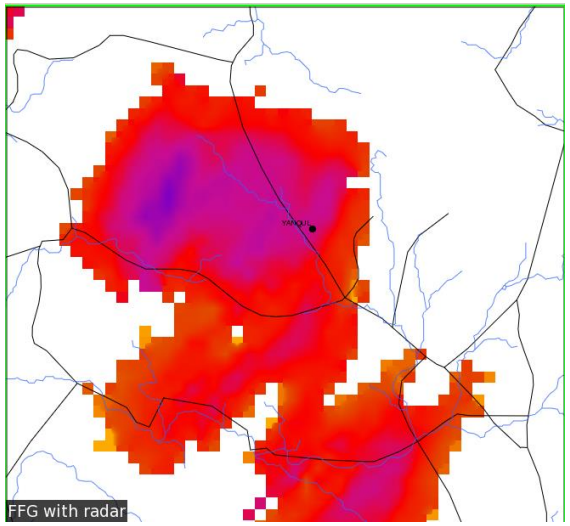
Two regional models

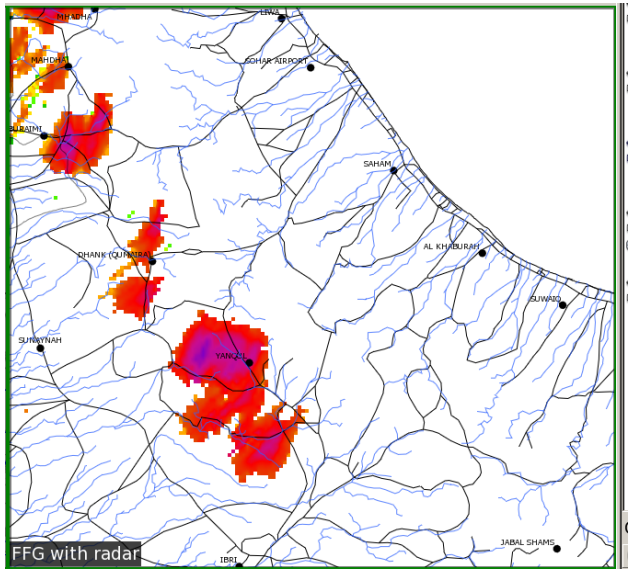




2- Modeling and Assessing the Hazards
Numerical Modeling

Flash Flood Guidance System





Input

Network of rainfall Observations Weather Radars observed rainfall estimates

Satellites observed rainfall estimates

NWP rainfall forecasts

Output

Flash Flood Guidance products (1-6h lead time)

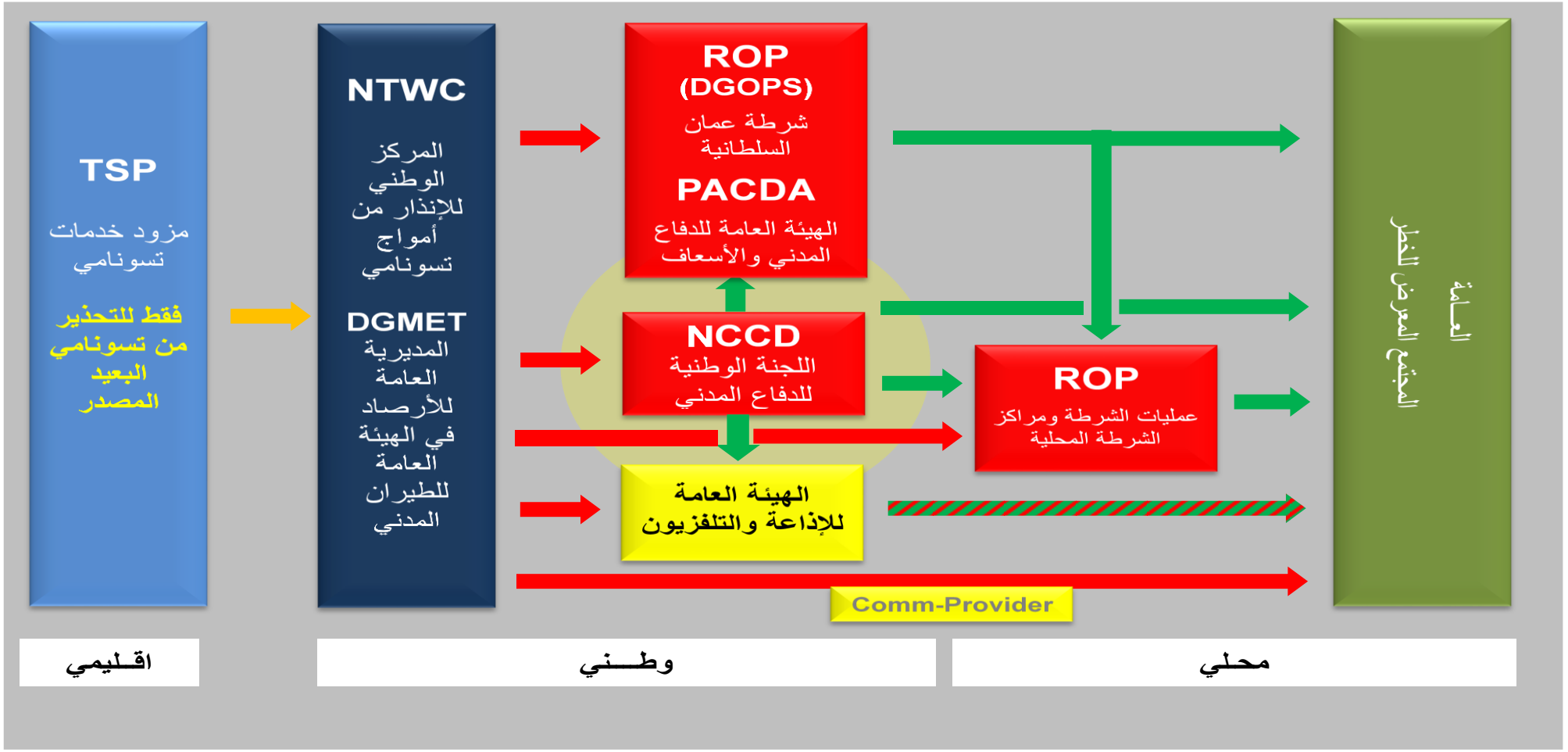
Warnings are transmitted to public & main stake holders (NCCD, Police Ops & Water Resources)

Future Development

Cooperate with Water Resources to used their high density of rainfall measurements

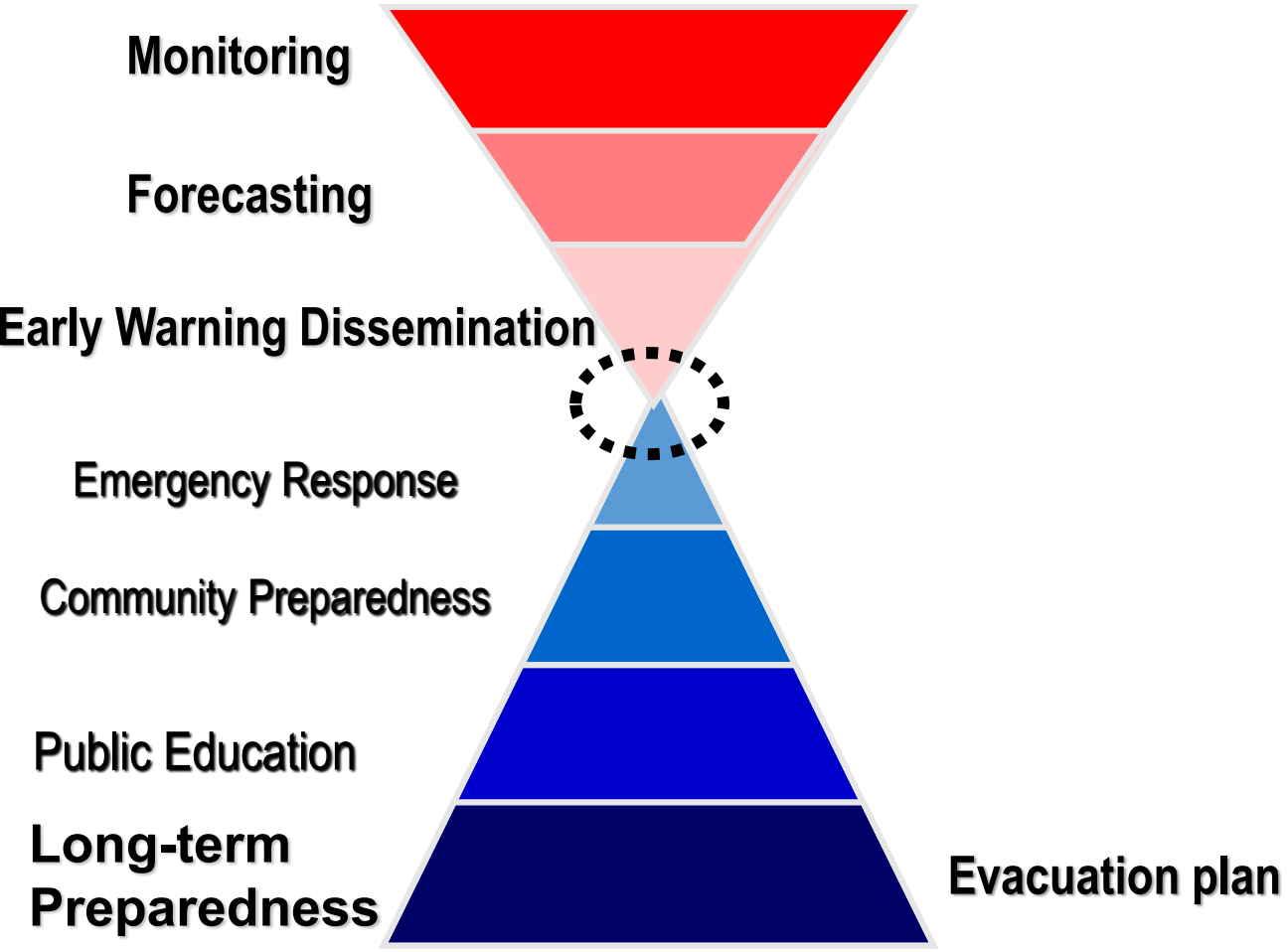
2) Integrated collaboration with main stakeholders Governed by clear SOP

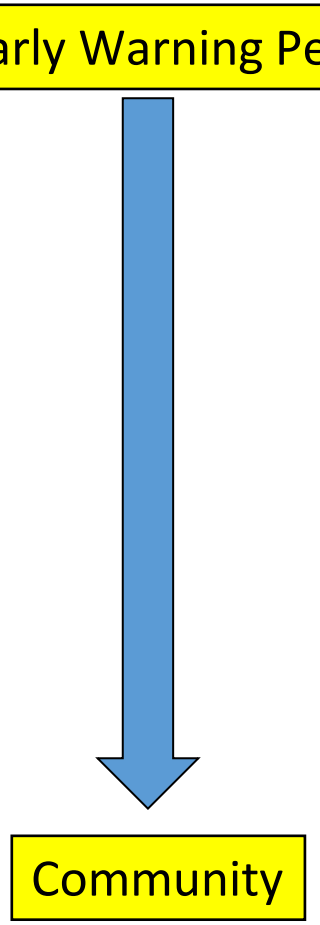
Building bridges with the stakeholders



Building bridges with the stakeholders

Everybody has a role in every part: **End to End Early Warning System**





Standard Operating Procedures

الهيئة العامة للطيران المدني

المديرية العامة للارصاد الجوية

دليل الاجراءات التشغيلية الموحدة

للمركز الوطني للإنذار المبكر من المخاطر المتعددة

المديرية العامة للارصاد الجوية

الهيئة العامة للطيران المدني

مارس -2017م

New detailed and updated SOP.
Mar. 2017

3) Awareness and preparedness

Awareness and Preparedness

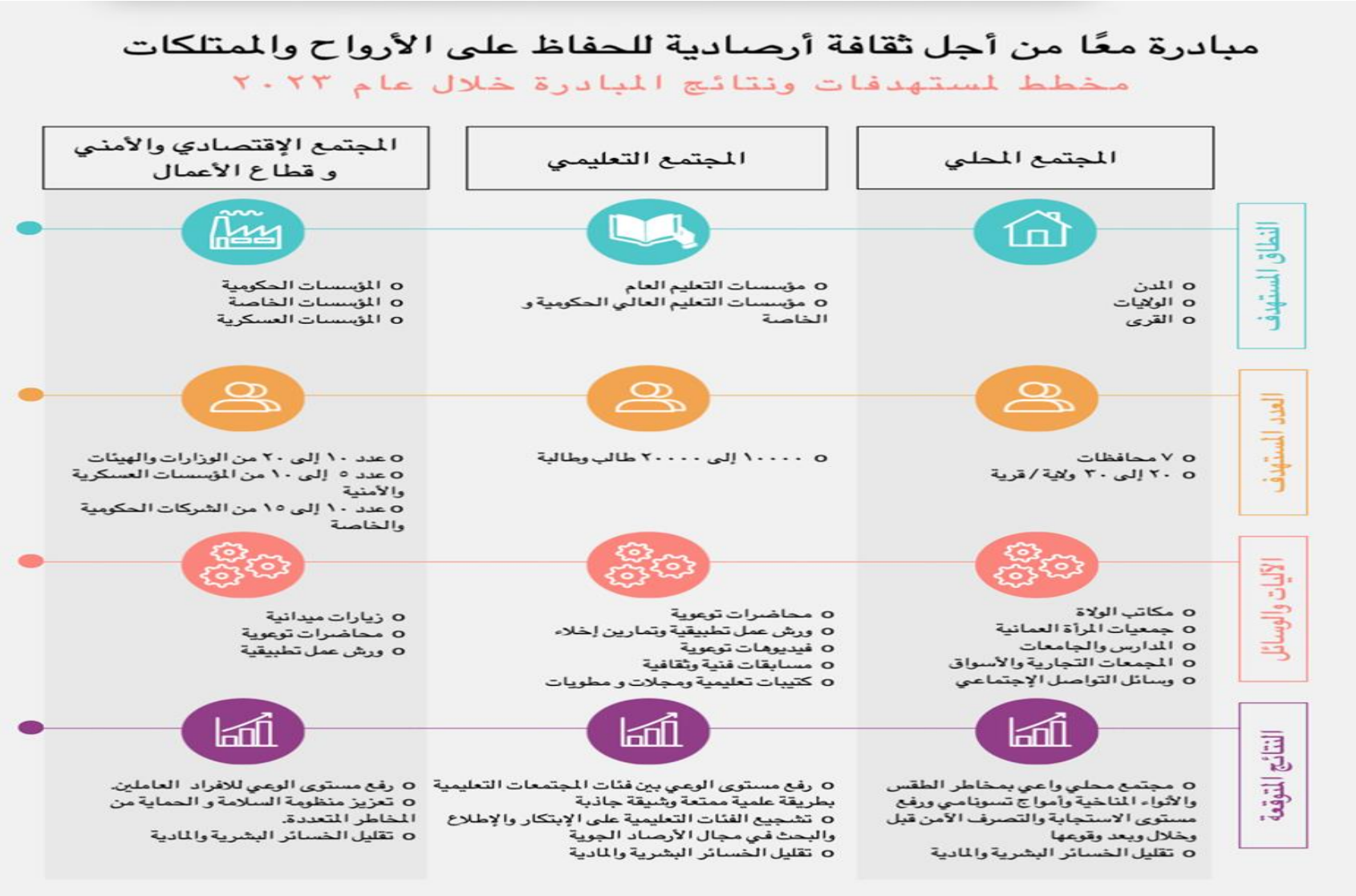
IOWave18

Real Evacuation Drill

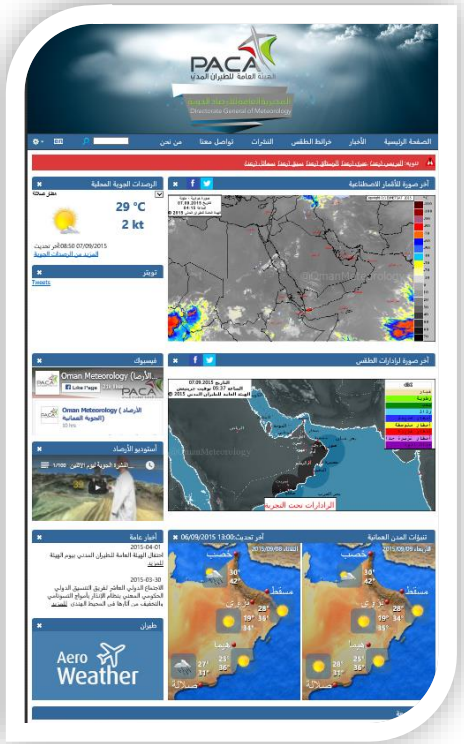
Drills

IOWave14
IOWave16

Awareness and Preparedness



Awareness and Preparedness



Following

الأرصاد العمانية

@OmanMeteorology

الحساب الرسمي للأرصاد الجوّية العُمانيّة - الهيئة العامّة للطّيران المدني The official account for Oman Meteorology-PACA-Sultanate of Oman

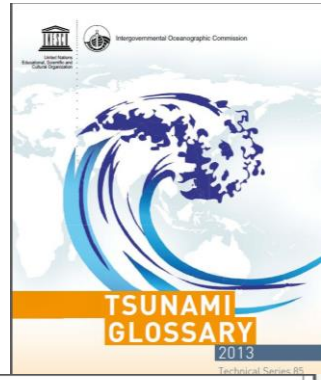
1 M Followers

01-01-2023

Awareness and Preparedness

Prepare and implement Awareness & education programmes

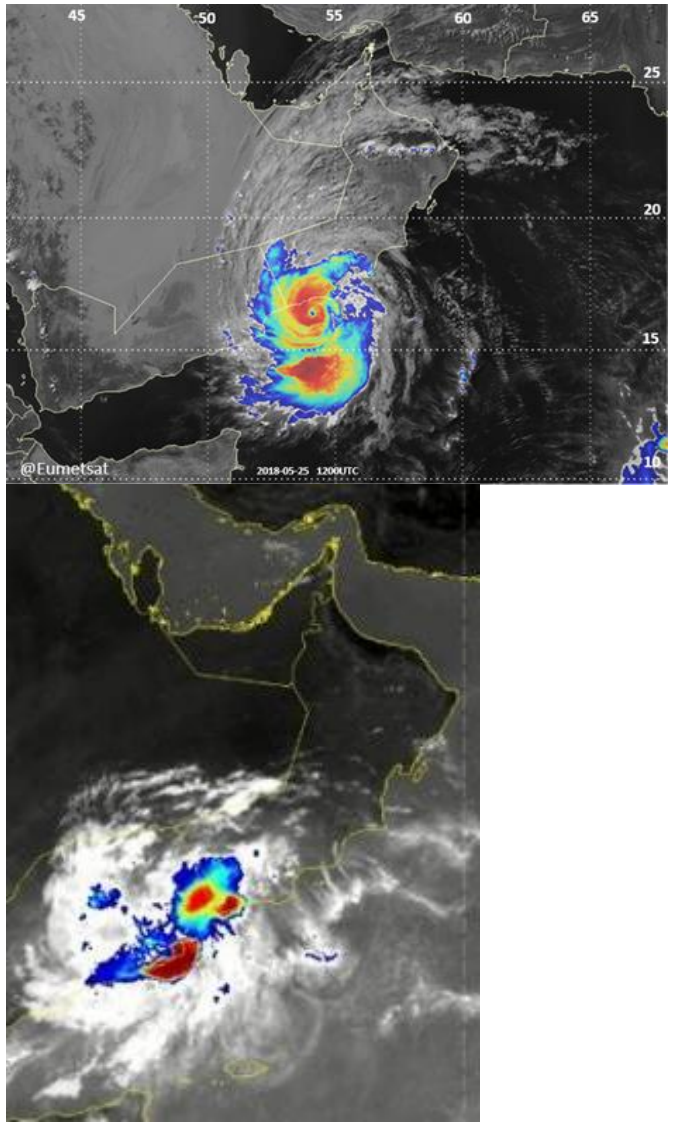
- **Lectures for colleges & schools**
- **Arrange students visits to the NMHEWC**
- **Joint committee for schools curriculum with the Ministry of Education**



Do we successed?

22–27 May 2018 Tropical Cyclone Mekunu considered a very Successful crisis management case

27-30 May 2021 Deep Depression showed how it is necessary to continually review the Planned Disaster Management System and Communicating with other Stakeholders



WMO OMM

World Meteorological Organization
Organisation météorologique mondiale
Organización Meteorológica Mundial
Всемирная метеорологическая организация
المنظمة العالمية للأرصاد الجوية
世界气象组织

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Ref.: 17240/2018-1.12 WDS/TCP

Our ref.: 17240/2018/WDS/TCP/Mekunu

Dr Juma bin Said bin Ahmed Al-Maskari
Permanent Representative of Oman
with WMO
Public Authority for Civil Aviation,
Department of Meteorology
P.O. Box 1, Seeb International Airport
111 MUSCAT
Oman

19 June 2018

Subject: Extreme Severe Tropical Cyclone "Mekunu"

Dear Dr Al-Maskari,

I wish to refer to the recent extreme severe tropical cyclone "Mekunu" that made landfall in the west of Salalah around midnight on 25 May 2018.

First of all, I would like to acknowledge with appreciation the excellent services provided by your staff to the people of Oman before and during the landfall of "Mekunu", historically the strongest tropical cyclone in Oman. It is unimaginable the loss of lives and damage to infrastructure and property which could have been worse without these services.

The performance of your Service could also be attributed to the well-established early warning system in the Department of Meteorology of Oman and the well-coordinated national disaster response system (National Civil Defense Committee), as well as to the established procedures on flood control and protection on dams.

Moreover, it is also equally important to highlight the innovative and effective way that your Service broadcast the warnings on "Mekunu" in seven languages to ensure that these warnings are well understood by the public and stakeholders.

Your experience in the national disaster response system will remain one of the best examples in dealing with natural disasters like "Mekunu". It is indeed a great example for many countries experiencing tropical cyclones. I hope that a report of this event, good practices and lessons learnt could be made available to the Members through me.

I look forward to your continued effective and efficient response to meteorological disasters and support to the WMO Programme and activities.

Yours sincerely,

(P.Taalas)
Secretary-General

What is next?

البرنامج الاستراتيجي

مزن

- برنامج استراتيجي يعنى بتطوير منظومة الأرصاد الجوية والإنذار المبكر
- تم إطلاقه بتوجيهات من سعادة المهندس رئيس الهيئة بتاريخ 28 ديسمبر 2022
- مدة البرنامج 4 سنوات 2023-2026
- رؤية البرنامج

كفاءة بشرية ونظام إنذار مبكر متطور ومتكامل

- البرنامج يتضمن عدة مشاريع ويستهدف تحقيق عدد من المؤشرات الاستراتيجية والتي من خلالها سنرتقي بقطاع الأرصاد الجوية والإنذار المبكر