بسم الله الرحمن الرحيم

Space Technologies Role in Disaster Management and Mitigation

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Mother Nature is Playing a Vital Role
in
Our Daily Lives and Activities.

Humans, Animals and Trees are
Facing Serious Threat and Great Challenges
from
Natural Disasters .

Natural Disasters are Everyone’s Enemy

.

Disasters by Their Nature are Unpreventable Natural Events expose:

- Life to the Risk of Injury or Death
- Private Property and Agricultural to be Damaged or Destroyed.

Government Agencies should have
Long and Short Term:
Predicting, Monitoring, Forecasting for Management,
Making Scenarios of Analysis , Strategies for Mitigation,
Preparation of Coordinated Risk Assessments for regions vulnerable.

Informing the Public at Real-Time Before, During and After the Crisis.

Before the Era of the Computer and Communication
and
Information Technologies.

Natural Disasters and Calamities
have Been Striking and leaving

Untold Suffering in Their Wake.

Natural Disaster is an Occurrence Inflicting Wide Speed Destruction and Distress to

Life and Properties.

Natural Disasters are The Result of:

Earthquakes, Floods, Tropical cyclones,
Volcanic Eruption,

Landslide, Drought, Desertification,
Sand and Snow Storms

Deforestation and Tidal Waves.

Also there are Man Induced Disasters

Pollution of The Atmosphere and The Water,

Deforestation, Arsenal Fires and Oil Spill.

Earthquake is a Violent Shaking of Earth's Surface and occurs

When Energy Stored in Rocky Layer Underneath Earth's Surface
is Released in Elastic Waves.

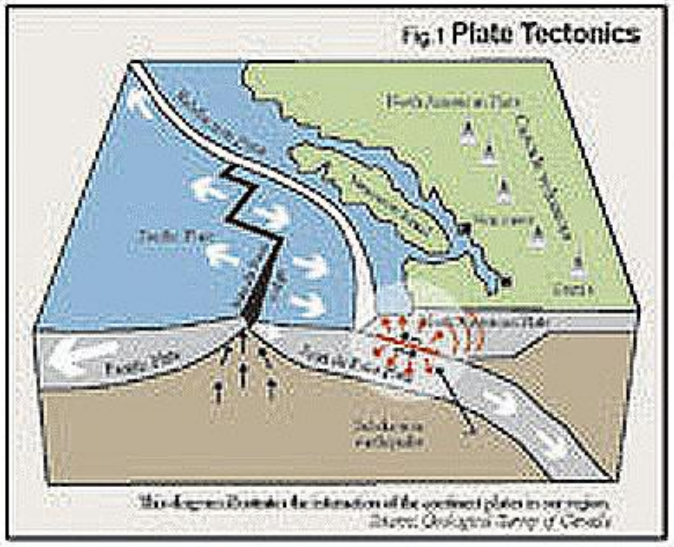
Most Earthquakes happen Near the Boundaries of Tectonic Plates,

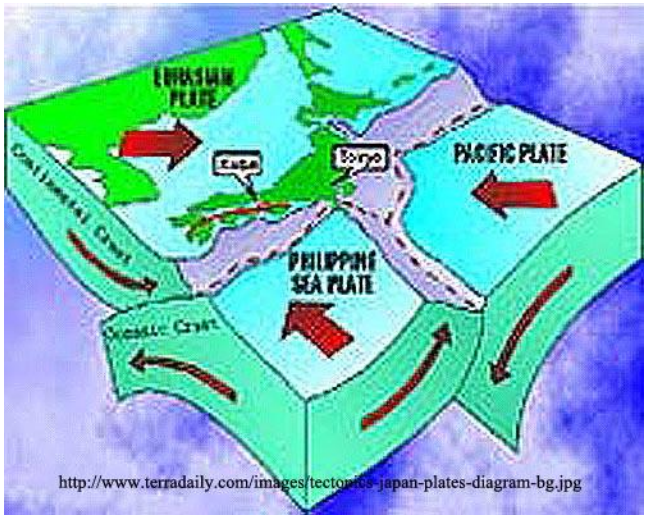
Either Plates were Spread Apart or where Crunch or Grind together.

Earthquake can completely Devastate a Region
within Seconds of Time causing
Huge Damage of Life, Change in the geological features
and Damage Man-made Structure.

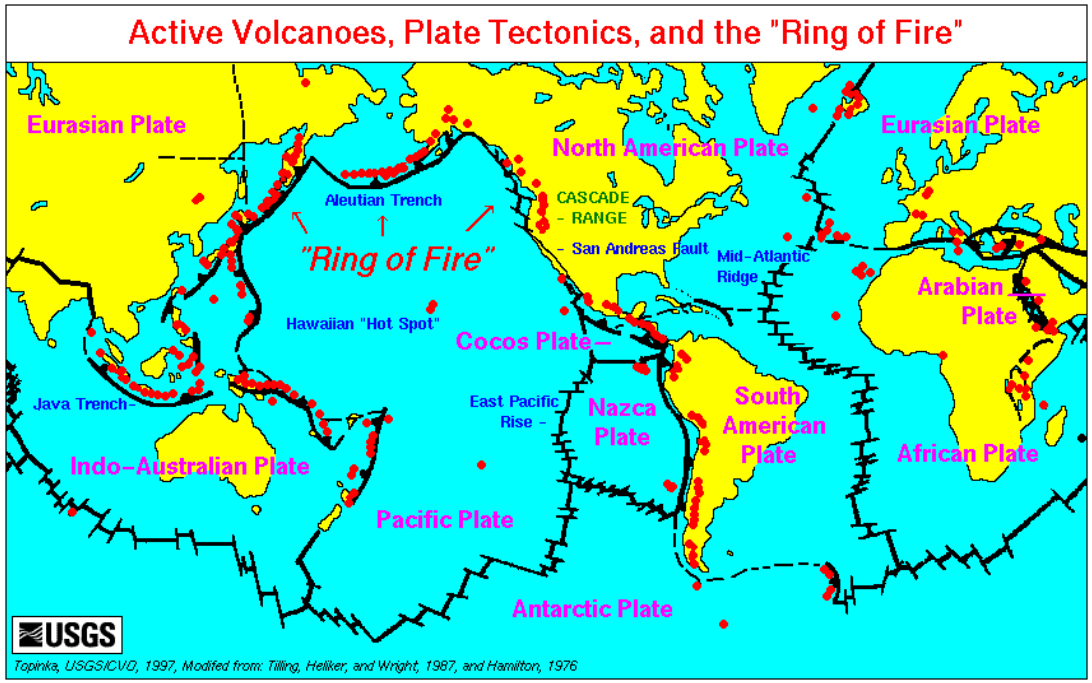
Earthquake have a Vital Impact
on
Human and animal life.

EARTHQUAKE SEVERE DAMAGE TO LIFE & PROPERTIES





TECTONIC PLATES MOVEMENT CAUSES EARTHQUAKE



Desertification is the Expansion and Shrinking of Desert due to :
Climatic Changes, and Human Influence or Both.

Result from Poor Farming Practices & Excessive Cultivation,

Human's Influence by Removing Vegetation, Harsh Grazing,

Collection of Firewood,

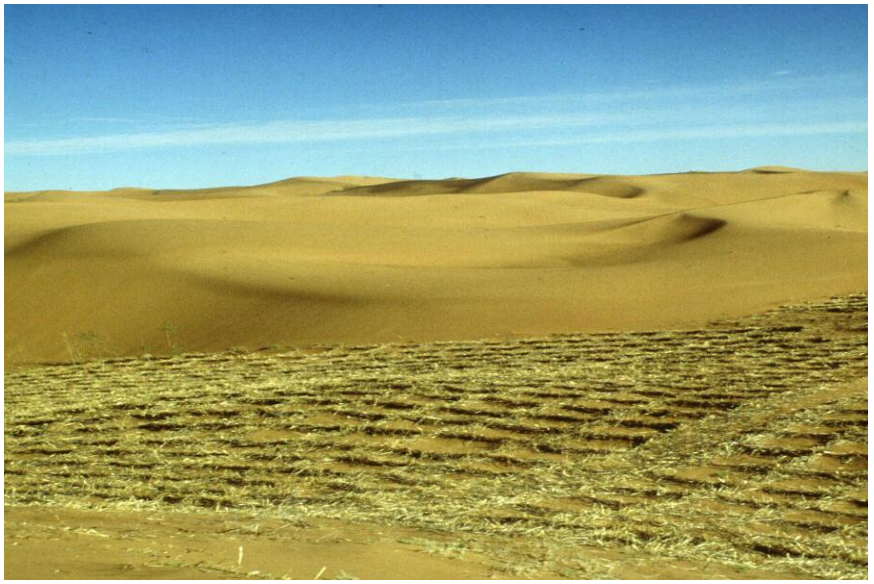
Excessive Use of Surface or Groundwater Supplies

Industry and Domestic Use, and

Stress on The Ecosystem Beyond Its Tolerance Limit.

Mass Starvation and Degradation of the Biological Environment

Desertification is Responsible for :
The Deaths of Humans and Animals and
Disruption of Other Lives,



DESERTIFICATION AFFECT ON THE ENVIRONMENT

Drought is the Lack or Insufficiency of Rain
for An Extended Period of Time
that Causes Considerable Hydrological Imbalance.

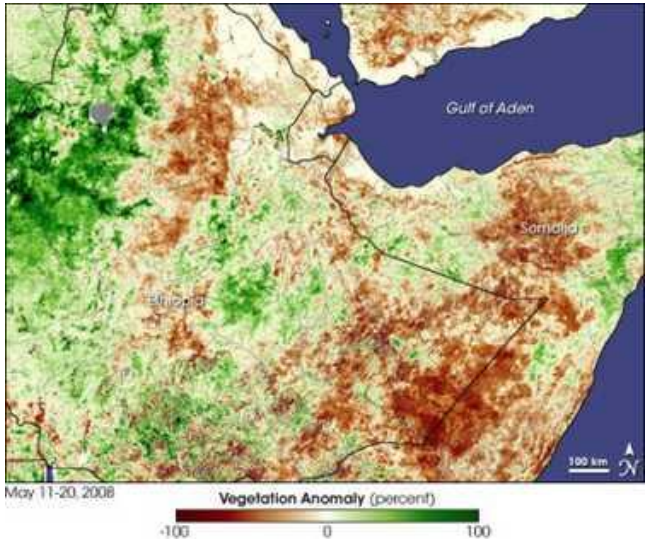
It occurs When Evaporation and Transpiration Exceed Precipitation
for a Considerable Period.

Drought is Divided Into Four Different Disciplines
Meteorological, Agricultural, Hydrological and Socio Economic .

Causing Hydrological Imbalance and Consequently Water Storages,
Crop Damage, Stream Reduction and Depletion of Ground Water
and Soil Moisture.

Drought is the most Serious Physical Disaster to Agriculture
in Nearly Every Part of The World.

By Coping with Desertification we can Cope with Drought



DROUGHT CUASES HYDROLOGICAL IMBALANSCE ENVIRONMENT

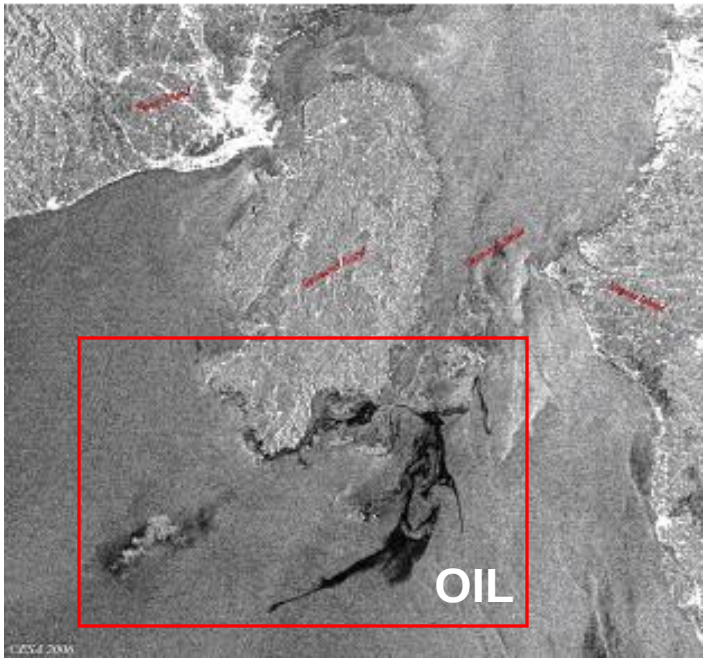
Oil Spill is The Leakage of Petroleum onto
The Surface of Large Body of Water
Or
Discharging Oil from Pipelines or Tankers.

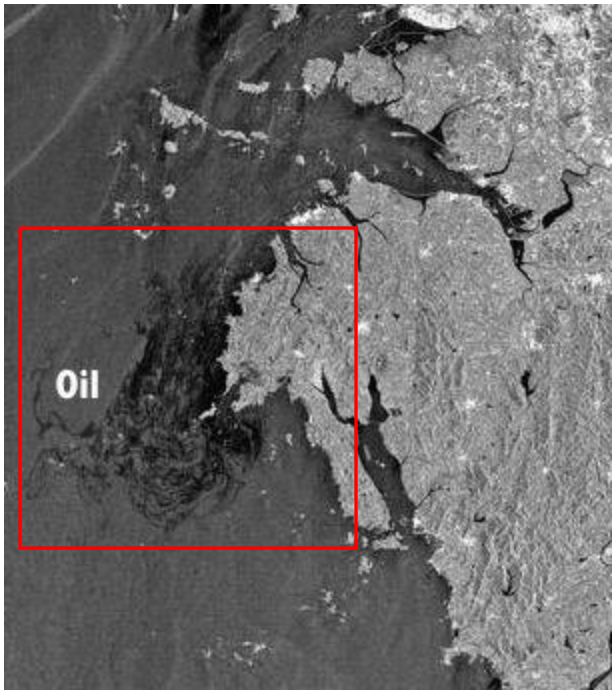
The Oceanic Oil Spills is A Major Environmental Problem.

The affect of Accidental Oil Spills is
Very Considerable in Both Economic and Ecological Terms.

Oil Spill is Very Hazardous for Marine Environment in Both Ways

Physically and Chemically





REDAR IMAGES SHOWING OIL SPILL

Flood is A High Flow of Water Stage in Which Water Overflows Its Natural or Artificial Banks onto Normally Dry Land such as River Inundating Its Floodplain.

Topography, Soil Conditions, and Ground Cover play A Major Role in The Cause of Uncontrollable Floods from Excessive Rainfall Over A Brief Period Of Time.

Flash Flood can Occur at Any Place on Earth Where There are Thunderstorms Repeatedly Moving Over The Same Area, or Heavy Rains from Hurricanes and Tropical storms.

Flash Flood is One of The Most Devastated Leading Causes

of Large Scale Fatalities all Over The World.

FLOODS AFFECT CITIES AGRECALURAL LANDS

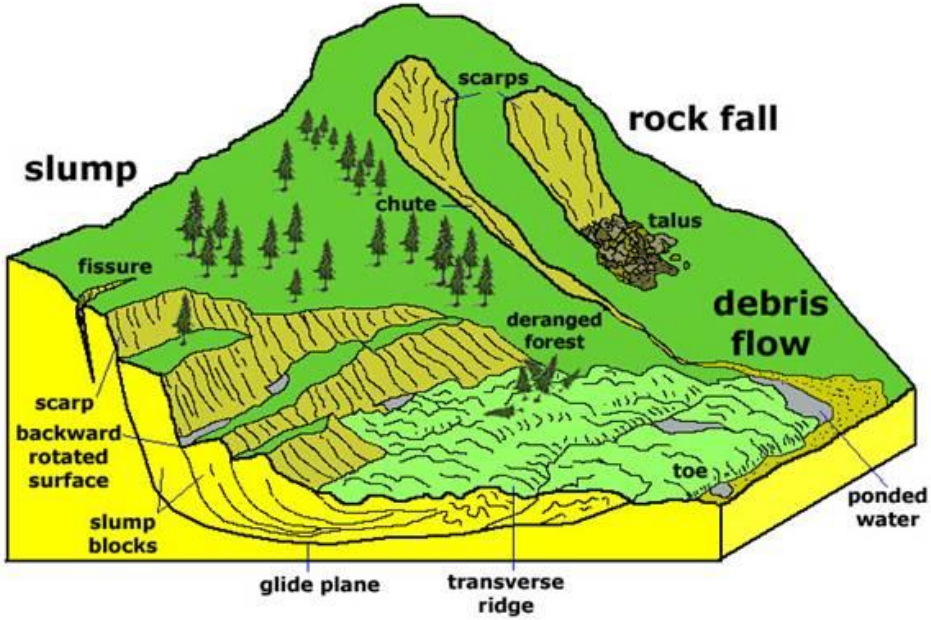
Landslide is The Movement of A Wide Range of Downward Mass of Earth or rock on unstable slopes .

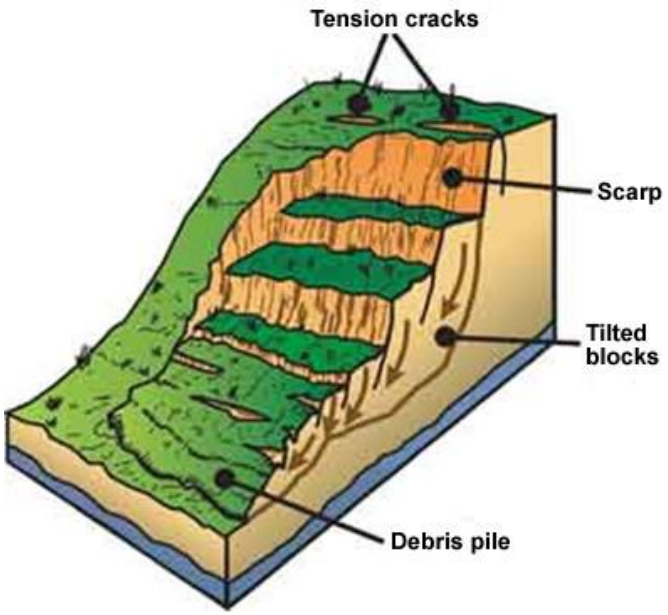
The Causes of This Downward Movement happens by:

A various number of Erosion From Rivers, Glaciers, Heavy Monsoon Rock and Soil Slopes are Weakened by Saturation from Snowmelt, Removal of Vegetation to Create Homes and Power lines &Skiing Slopes and Logging
and Natural or Manmade Wild Fire.

Landslides also could Occur in Conjunction of Major Earthquakes or Flash Floods .

It Causes Heavy Loss of Life and Properties Ever Year.





LANDSLIDE IN SCIENCE AND IN REALITY

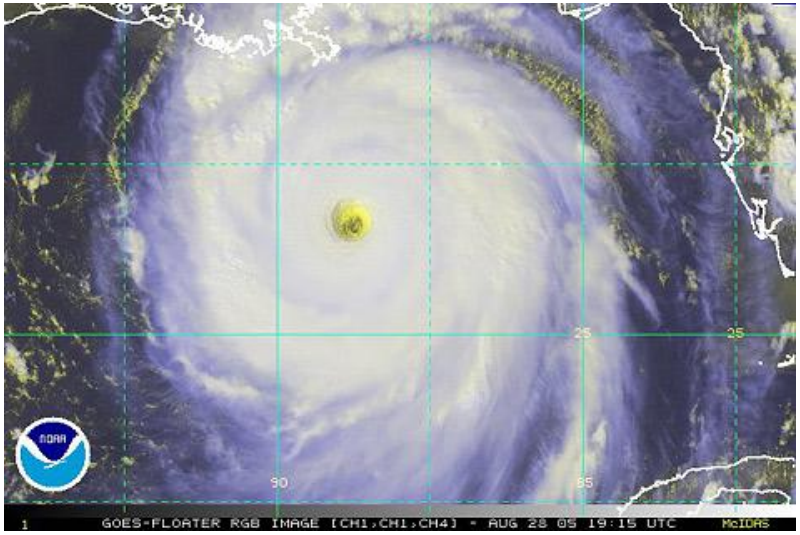
Tropical Cyclones are The General Term for
All Circulating Weather System.

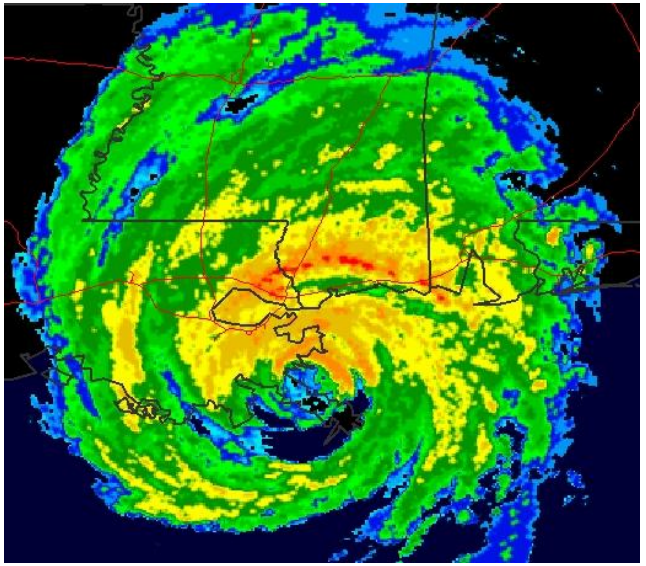
- Hurricane (The North Atlantic Ocean The Northeast Pacific Ocean)
- Typhoon (The North West Pacific Ocean)
- Cyclone (The Indian Ocean)

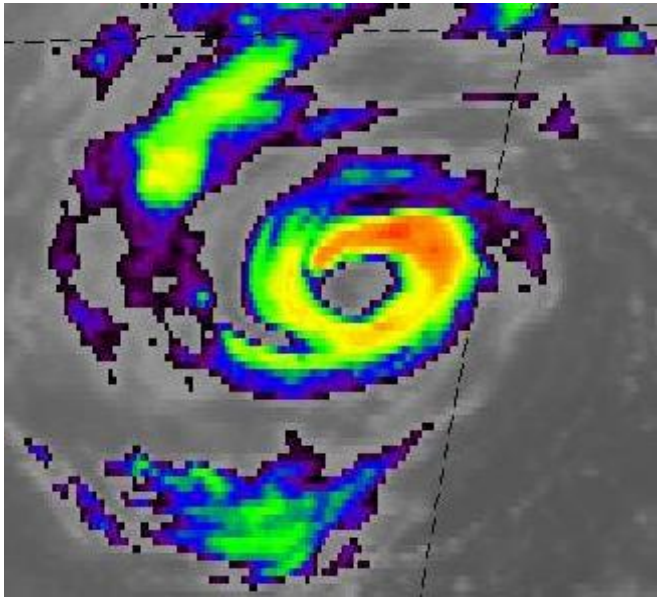
They are Usually Accompanied with Maximum Sustained Surface Winds and Very Sever Rainstorm.

They are One of The Most Destructive Weather Systems on The Earth.

**They Cause High Number of Death and
Damages to Environment Property in The World Every Year.**







MONETRING AND ANALYSIS OF TROPICAL CIYCLONSE

Deforestation is The Cutting Down of Trees
in A Large Area of The Forests
or from Fires (either Natural or Manmade) .

Deforestation Contributes to An Array of Environmental Damages besides Loss of Biodiversity.

CUTTING TREES

WOOD LOGGING

FOREST FIRES CAUSE GREAT DAMAGE TO LIFE AND PROPERTIES

SEVERE EFFECT ON THE ENVIRONMENT

Sand Storms are Caused by Strong Winds
Blowing Over Loose Soil or Sand
and Picking Up so Much of That Materials.

At Certain Time of The Year in Desert Regions,
Sand Storms Become More Frequent.
Due to The Strong Heating of The Air Over the Desert
Causes The Lower Atmosphere to Become Unstable.

This Instability Mixes Higher Winds in The Middle
Troposphere Dawn Word Producing Stronger Winds
At The Surface.

This is Causing Lack of Feasibility

RIYADH SAND STORM 10 / Mar /2009

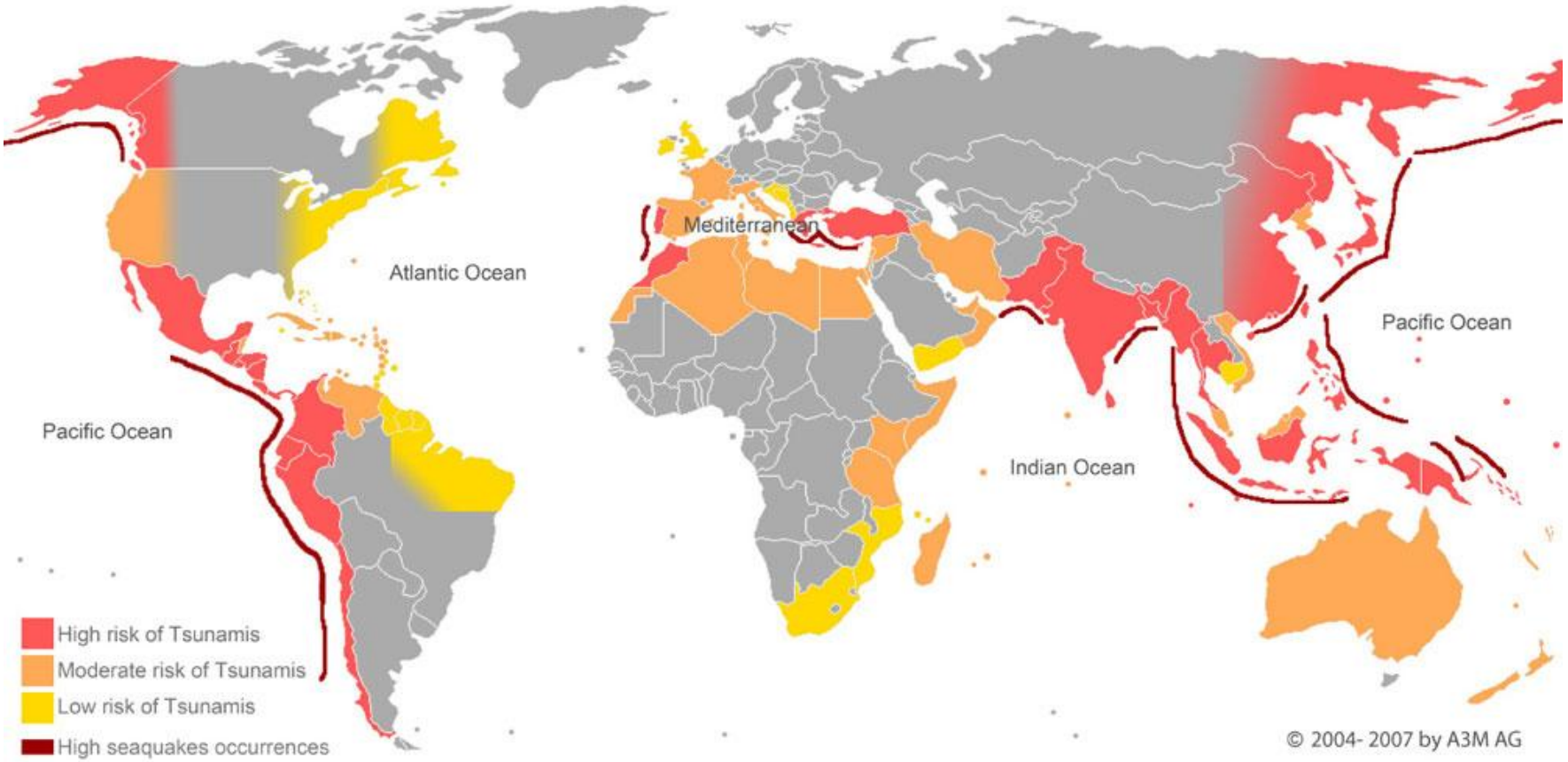
RED SEA SAND STORM

Tidal Wave is A Wave that Moves Fast (200mile/hour) and up to >300 meter high.

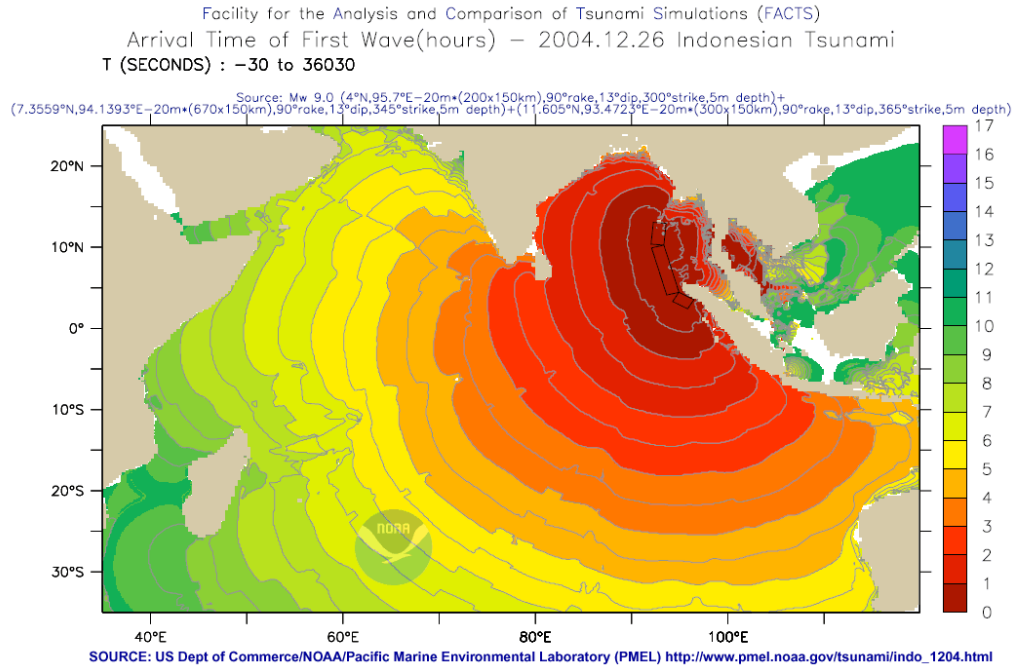
It Causes from Hurricanes, Underwater Earthquake and Astronomical Conditions.

Resulting Sever Flooding, Destruction of Coastline and Human life and Properties.

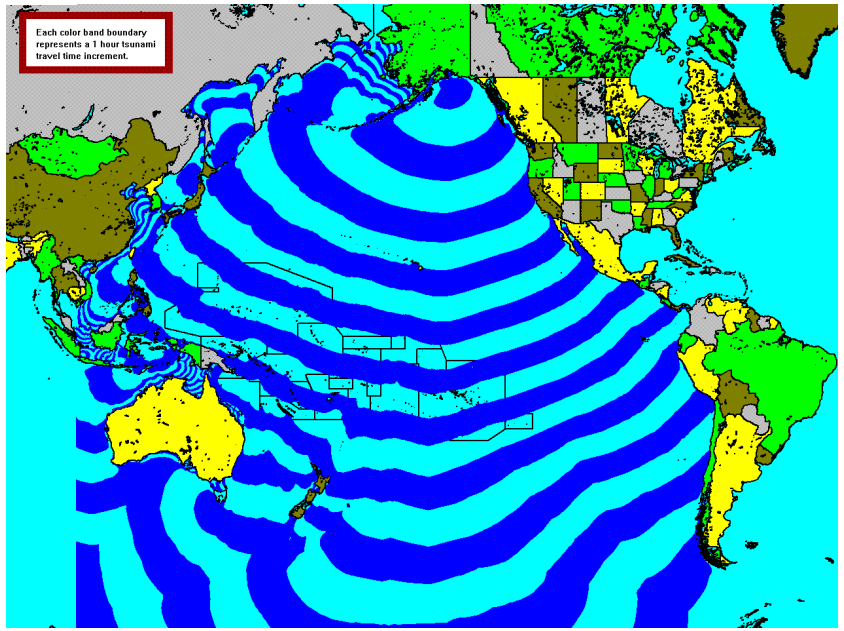
TIDAL WAVE CAUSING FLOODS &DAMAGE TO COASTALLINES



MAP SHOWING THE HIGH / LOW RISK OF TSUNAMIS



IMAGES SHOWING THE MOVEMENT OF TIDAL WAVE IN TWO DIRECTIONS FROM INDONESIAN TSUNAMI 2004



Can Space Technologies Play A Vital Role
in
Management and Mitigation of Natural Disaster?

For a Long Time Controlling and Eliminating
Natural Disaster
was Absolutely a Great Challenge,
But to Day with The Development of
Space and Observation Technologies
is It Going to be Far Better to Cope with Disasters
and Minimize the Losses of Life and Properties.

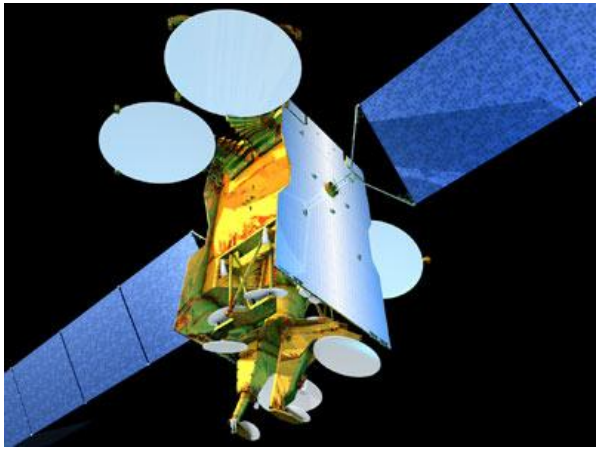
Almost All Satellites are Launched in Order to Provide Services to Fulfill the People's Need.

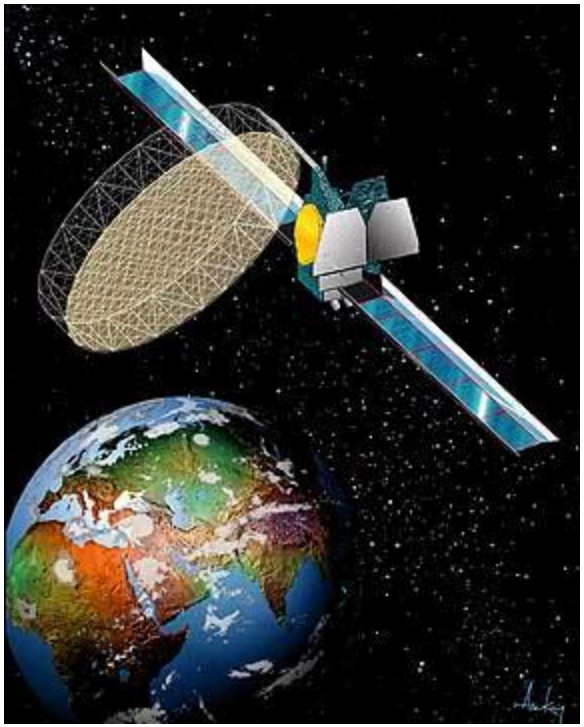
Communication Satellites (COMSAT)
have Potential Use as
Source of Information and Awareness.

It have Special Potential to be used in
The Poorer rular and Most Devastated Areas.

Modern COMSAT and DB Networks and Services have disseminate information in real time around the Earth.

This Contribution will Lead us to Prosperity and Saving Life and Properties.



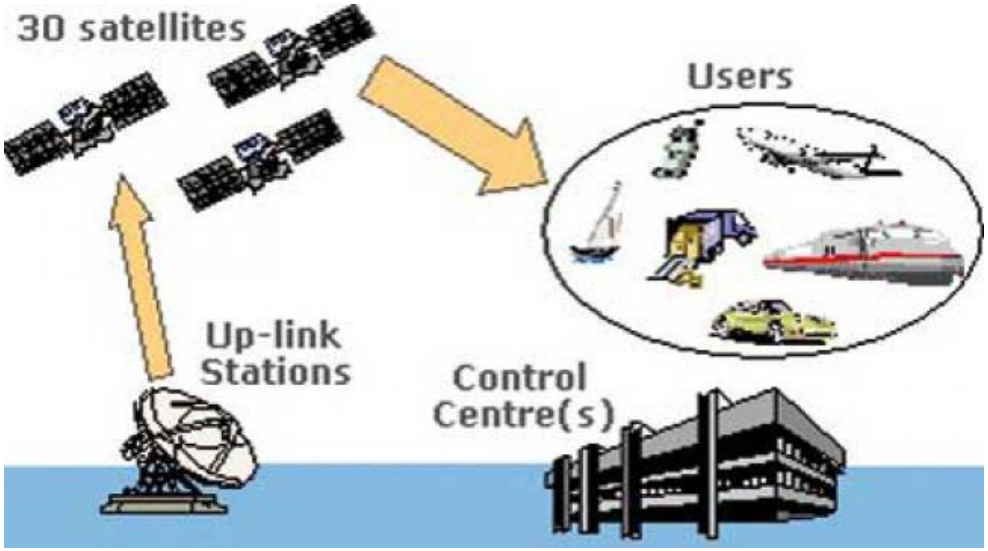


FIX / MOBILE COMSAT

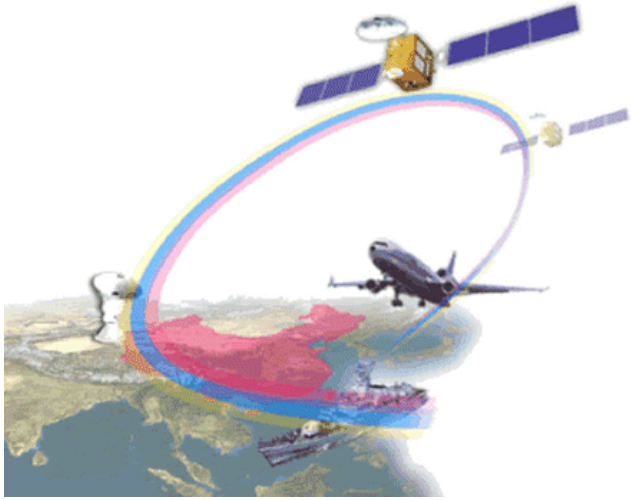
Global Navigation Satellite System (GNSS) are
A Constellation of Satellites in Different Orbital Planes
and Transmit Signals that can be Detected by Any One
with GPS Receiver to Locate his Position.

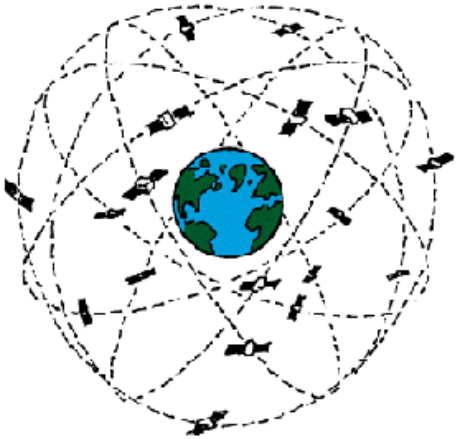
They are used to Track Fishing Vessels,
Vehicles Transporting Goods or Hazardous Materials
and for Navigation Almost Every Where in World.

They became A New Global Utility with Increasing Benefits to People's Daily Life.



GNSS POLAR ORBITS



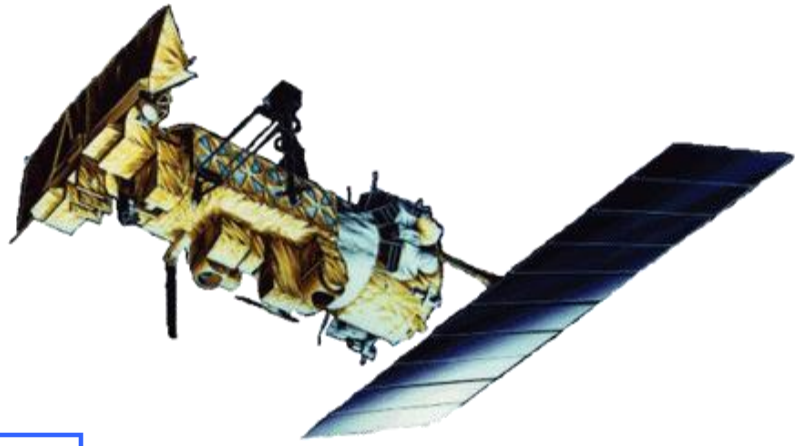


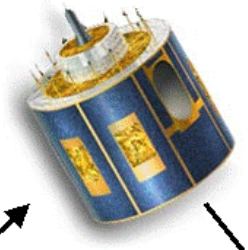
NAVIGATION SATELLITE

Meteorological Satellites are
Either Polar or Geostationary Orbiting.
They are Imaging The Earth to Measure Temperature, Moisture and Solar Radiation in The Atmosphere.

They Record Atmosphere and Ocean Temperature at Different Altitudes and Depths,
Gauge Rainfall for Forecasting Droughts. Spot Forest Fire and Map Ocean Currents
They Carry Search and Rescue Transmission Equipment **COSPAS/SARSAT.**
These Satellites Provide Before and At The Time of The Disaster Warning of Impending Storm, Assessing Their Intensity and Close Tracking and Monitoring Their Movement.

These Routinely Activates are Enabling The Decision Maker to Take the Appropriate Precautionary Measurements In Time.





DCP

LRUS/HRUS
EUMETCast

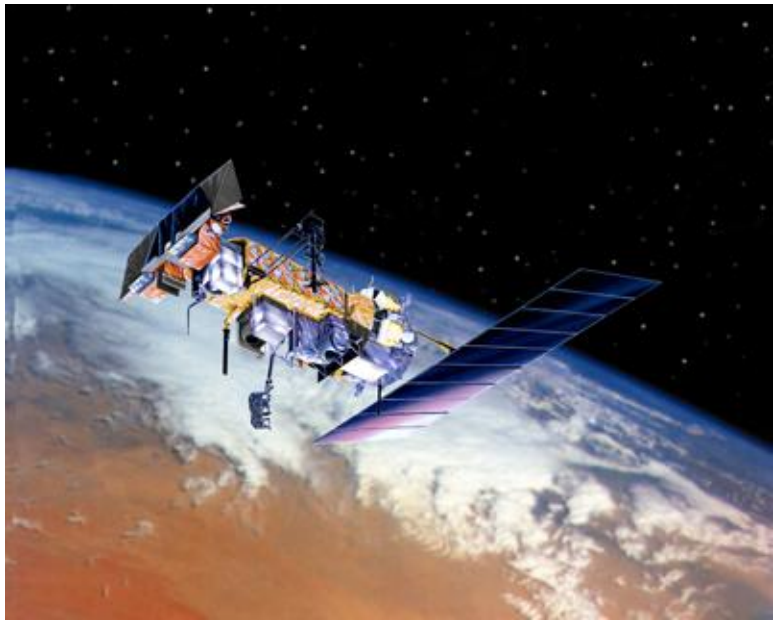
Primary
Ground
Station

PDUS

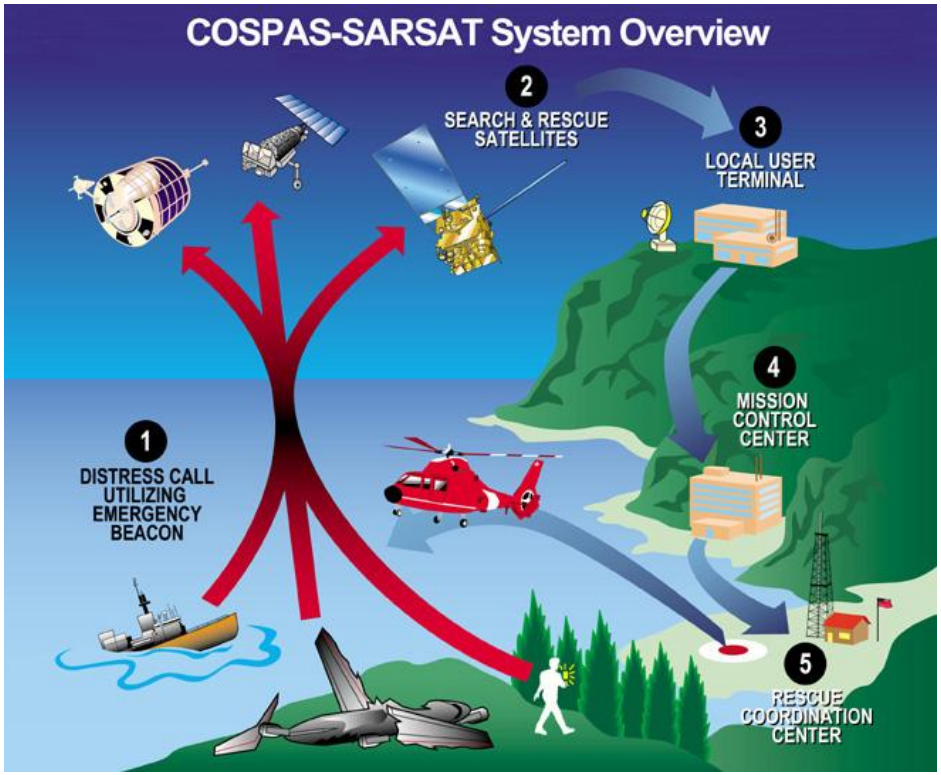
Datensammler
& Verteiler-
einrichtung

GTS/
RMTN

Internet

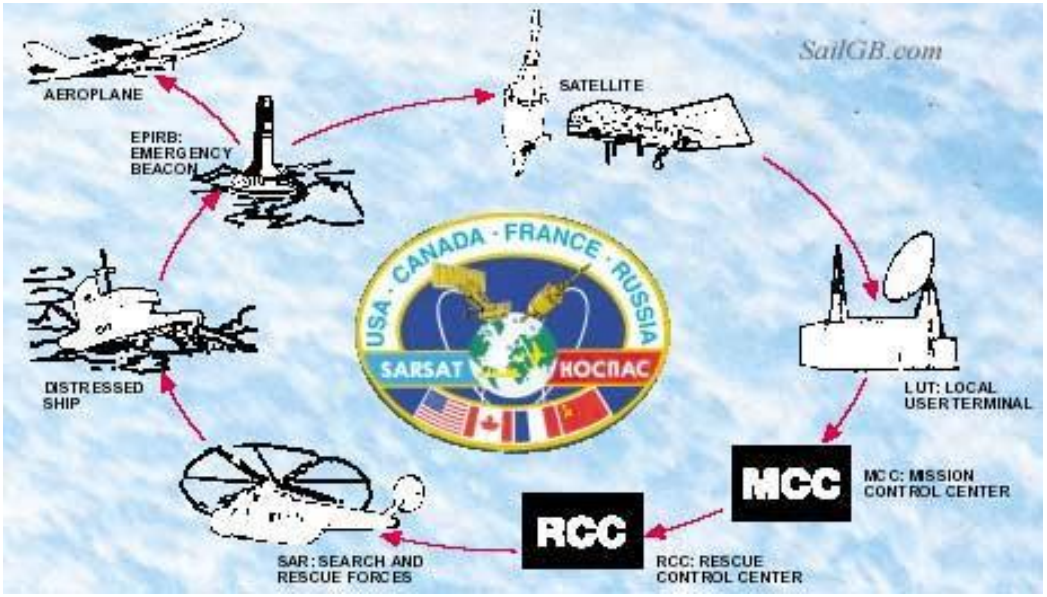


POLAR / GEOSTATIONARY METEOSAT



HAND HELD, SHIPS AIRCRAFT 604 MHz RECEIVERS

HAND HELD RECEIVER



Earth Observation Satellites (EOS) are An Eye Using Either Optical or Radar Sensors to Collect Information about Our Earth at Different Spectral, Spatial and Temporal Resolutions.

EOS Observe Land Surface, Oceans and Atmosphere from Space to
Predict Changes in The Environment Over Time.
They have Global Coverage with Essential Tool for Many Applications.

Future EOS (Optical and Radar) Constellations will make Observation of Any Part of The World almost in Real Time.
The Radar Satellites Provide Images Day and Night and Penetrate Cloud Cover.

EOS Images are Good Tool for Mitigation because
It Helps to do Studies of Areas Before and After the Disaster.

Their Images Provide Great Saving in Budgeting and Time.

EOS OPTICAL and RADAR (PASSIVE or ACTIVE)

Satellite	Origin	Status	Description
CBES1 & 2	Brazil/China	Operational	Brazil and China Joint Earth Observation Satellite Programme
			20m/5m Multispectral
			120 Km
			26 days
			Sun-synchronous near-polar orbit
CBES 2B	Brazil/China	Operational	Brazil and China Joint Earth Observation Satellite Programme
			20m Multispectral / 2.7m Pan
			133 Km
			26 days/133 days
			Sun-synchronous near-polar orbit
LANDSAT 7	USA	Operational	Enhanced Thematic Mapper(ETM) 8 Channels
			30m (visible,NIR&IR), 15m (PAN Band 8) and 60m (TIR Band 6)
			185 km swath width
			16 days revisit
			Sun-synchronous near-polar orbit
SPOT 1,2& 4	France	Operational	10m pan/20m multi-spectral
			60 km swath wicth
			1-2 day revisit depending on lattude
			Sun-synchronous near-polar orbit
SPOT 5	France	Operational	5m(PAN),2.5m(Supermoce),10m(visible$NIR),5m(Supermode)
			Swath 60km
			3-5 day revisit deperding on lattude
			Sun-synchronous near-polar orbit
IRS 1C/D	India	Operational	5.8m pan/23m multi-spectral
			70 km swath wicth
			5 day revisit with off-nadir viewing
			Sun-synchronous near-polar orbit
CartoSat 1/2	India	Operational	2.5m Pan /1m Pan
			30 km swath wicth/ 9.6Km swath width
			Sun-synchronous near-polar orbit
RADARSAT-1	Canada	Operational	8-100 m C-Band Synthetic Aperture Radar
			50-500 km swath width
			2-5 day revisit deperding on lattude / Mode
			Sun-synchronous near-polar orbit
			Less than 48 hr programming

			Less than 4 hr delivery
EROS-1A	Israel	Operational	2 m pan 12.5 km swath width 1.5- 5 day revisit depending on latitude Sun- synchronous near-polar orbit
IKONOS-2	USA	Operational	1m pan/ 4m multi-spectral 11 km swath width 1.5- 5 day revisit depending on latitude Sun- synchronous near-polar orbit
QUICKBIRD	USA	Operational	60 Cm pan/ 2.5 m multi-spectral 16.5 km swath width 1- 5 day revisit depending on latitude Medium- inclination non sun- synchronous orbit
NOAA-16	USA	Operational	1.1km 4 times/day Sun synchronous polar orbit
Feng Yun1&2	China	Operational	Two 5-channel scanning radiometers 1.1km (visible),4 km(IR) 3200km swath width
ENVISAT	European Space Agency	Operational	Sensor system- ASAR 30x30m,150x150m,1000x1000m 100/400 km swath width;35 days revisit --- Sensor System MERIS 300/1200m 1250km swath width; ~ 3 days revisit --- Sensor system AATSR 1000X1000 m 500 km swath width; ~ 6 days revisit --- Near polar Sun-synchronous

SCRS is THE ONLY RS CENTER RECEIVING & PROCESSING GeoEye HIGH RESULOTION DATA (50cm) in MIDDEL EAST

Even it is Extremely Difficult to Control and Extinguish Natural Disaster,
but all the above Described Satellite Systems Show they can have A Vital Role in Monitoring, Imaging, Collecting, Communicating and Forecasting various Information a bout the Causes of Natural Disaster.

These Satellite Applications play an Affective Role in Natural Disaster Assessment, Management and Mitigation in Very Short Possible Time.

SAVING OUR EARTH

In the Last Twenty Years many World Summit Meeting were Held for Climate Stability , Fight Hunger and Provide Good Prosperity of Life.

-- EARTH SUMMIT RIO DA GENERO BRAZIL1992
-- KYOTO PROTOCOL KYOTO JAPAN 1997
-- MILLENIUM SUMMIT NEW YORK USA 2000
-- SUSTAINABLE DEVOLOPMENT SUMMIT JOHANNESBURG SA 2002
-- INFORMATION SOCIETY TUNIS 2003
-- INFORMATION TECHNOLOGY GENEVA SWISS 2009
-- FOOD SECURITY ROMA ITALY 2009
-- CLIMATE CHANGE TREATY COPENHAGEN DENMARK 2009

All These Summit and Treaty's Agendas Call to Protect Earth's Environment .

So We are Encouraged to find Solutions for That.

THE SOLUTIONS ARE :

-- WORLD COOPERATION
-- USING SPACE TECHNOLOGIE
-- PUBLIC AWARENESS
-- RESEARCH and DEVELOPMENT

Therefore the Space Technologies can and will Play Vital Role in Management and Mitigation of Natural Disaster.

Space Capabilities
in
The Kingdom of Saudi Arabia
(KSA)

KSA is a Prominent Member of the Major International Organizations Dealing with Space activities and Space Related Matters

ITU, WMO, UNCOPUOS, UNDP, ARABSAT, most COMSAT, EOS METEOSAT Providers etc.

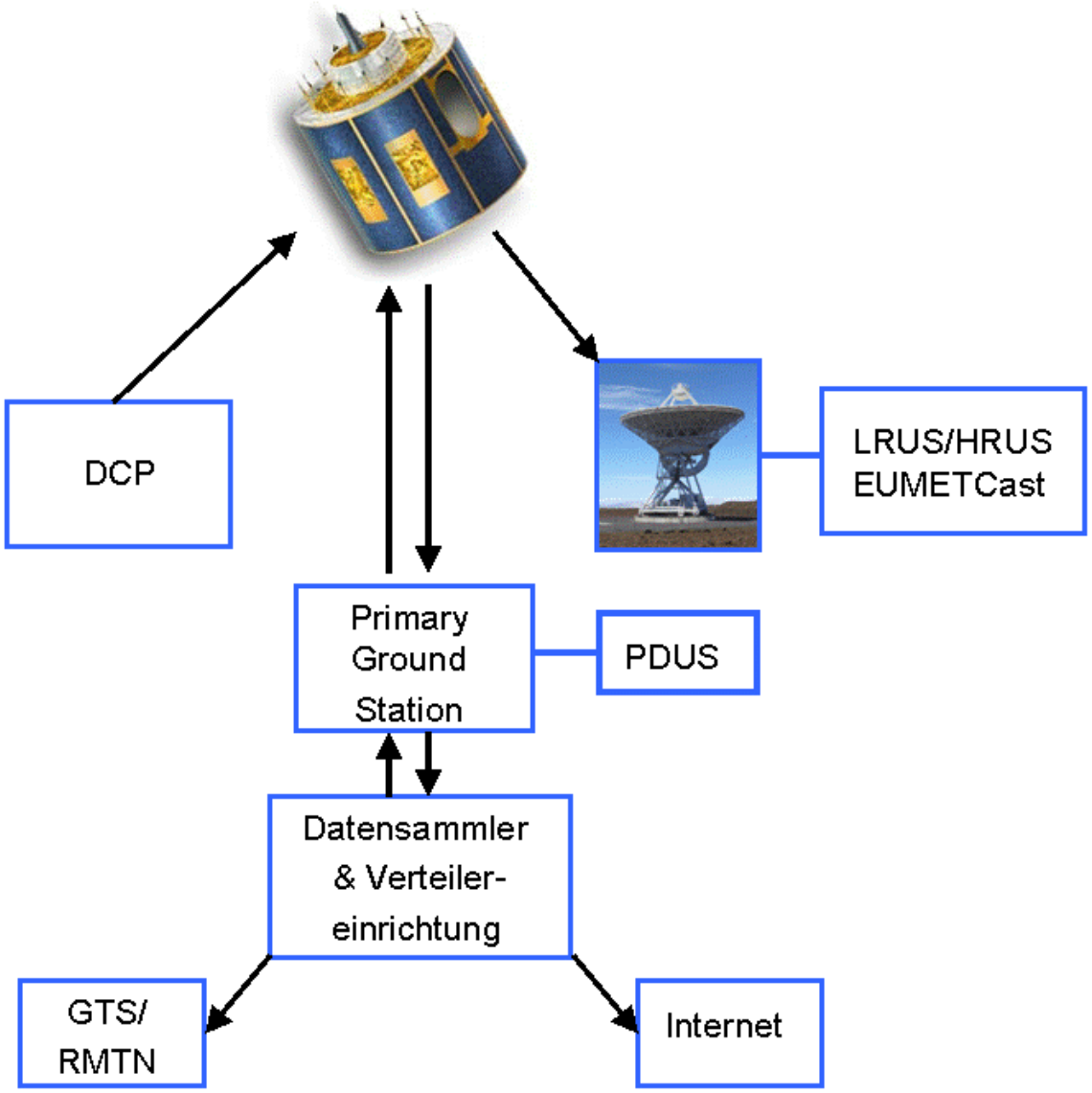
KSA has Two Major Teleport and Gateways for Mobile Satellites

The Presidency of Meteorology and Environment (PME) has a Major Receiving Station for Meteorological Satellites at Jeddah.

PME was Designated as the Central Agency Which is Responsible for Environmental Protection, Monitoring Pollution of All Kinds and Establishment of Different Environmental Standards.

PME has the Regional Environmental and Drought and Meteorological Center (REDMC) Responsible to give Seasonal Forecast and Monthly Predication in Early Warning, Temperature, Rain Fall, Vegetation Index and Special Reports.

PME task is the Improvement of Safety, Health and Human Welfare of the Citizens of KSA by the Provision of Services in Meteorology, Climatology and Environmental Protection.

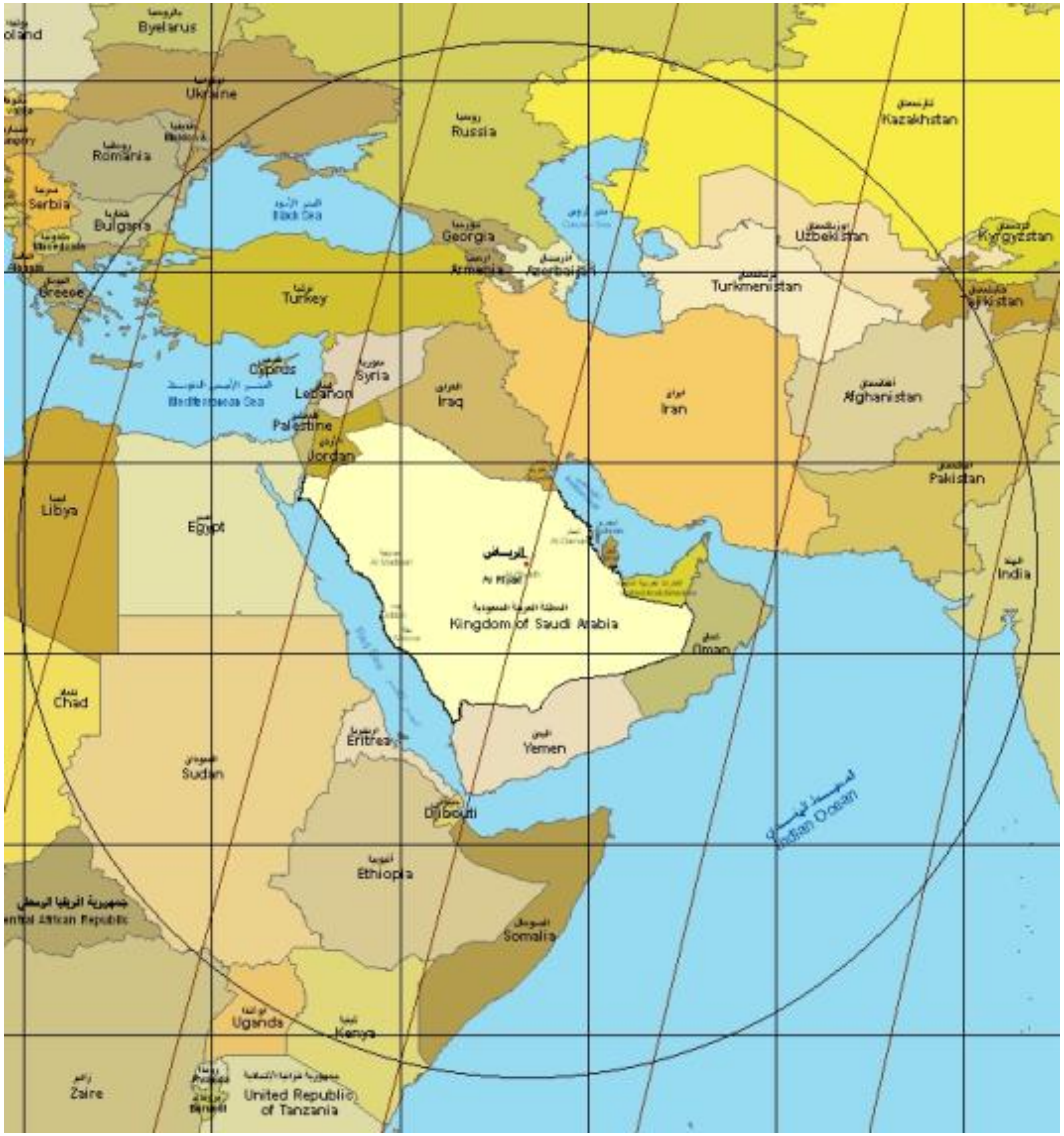

DCP
LRUS/HRUS
EUMETCast
Primary
Ground
Station
PDUS
Datensammler
& Verteiler-
einrichtung
GTS/
RMTN
Internet

After Royal Decree was Signed to Join
COSPAS/SARSAT
Lately in The Year 1996 KSA Built
Mission Control Center
for Search and Rescue Operation
in Jeddah
Under Presidency of Civil Aviation
to Receive Information from
COSPAS/SARSAT Systems.

The Space Research Institute (SRI) at
King Abdulaziz City for Science and Technology (KACST)
is The Responsible Organization in
The Fields of Space Technology at KSA.
The Royal Decree of 1983 at which Stated
KACST to Build Receiving Station for EOS.
KACST at 1986 established
The Saudi Center for Remote Sensing (SCRS).

SCRS is Considered to be One of The Most Well Known
Established Center in The World.
SCRS conduct Research, Pilot and Full Scale Projects
in The Applications of Remote Sensing in Different Areas
and held seminars and training sessions
to promote their use.

THE AREA COVERAGE of



RIYADH EOS GROUND RECEIVING STATION AT KACST

The Geographical Information Applications Center (GIAC)
was Established at SRI for
The Purpose of Adopting Advanced Technologies to
Develop Technical Capabilities to
Perform Application Researches in
The Field of Geographical Information Systems and to
Develop Models for Various Applications in GIS.

It is One of The Best in The Region and with
The State of art Equipments and Software Programs. GIAC
Beside his Performance in
Building, Analyzing and Planning for
The Use of GIS Technologies in
Updating Maps and Producing Digital Maps is Signing
Contracts with Many Ministries, and Public and Private Sectors.

THE GIS LABORATORY

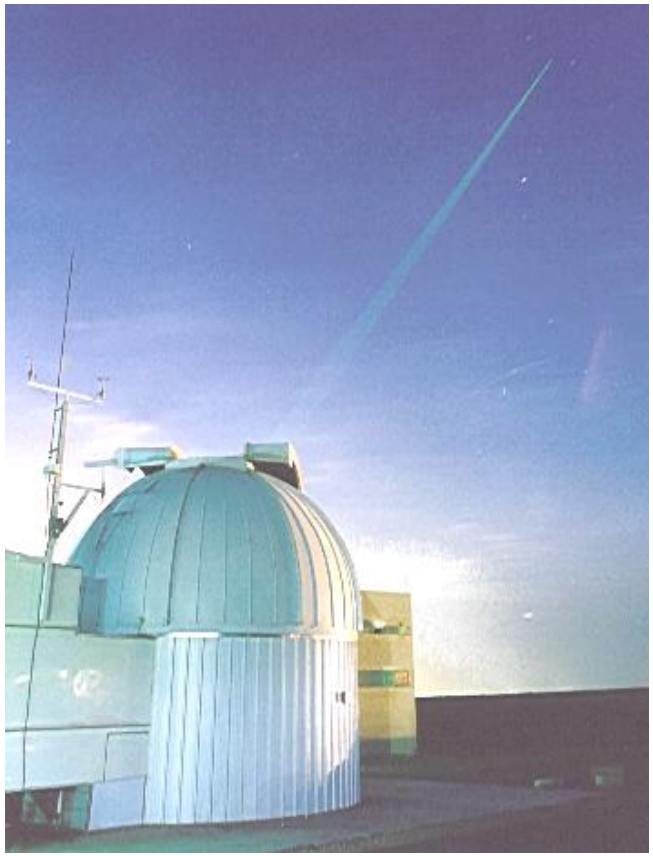
SRI has also Built Laser Ranging Facility.
The Saudi Arabian Laser Observatory (SALOR) was
Established in 1995.
The Data Collected from Laser Ranging have Many Applications.

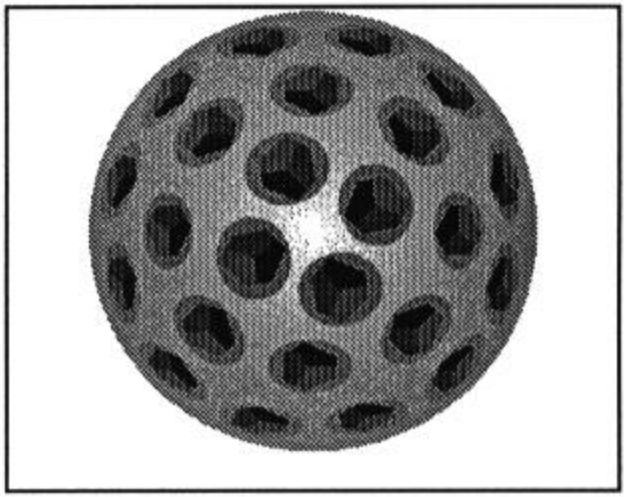
Detection and Monitoring of Tectonic Plate Motion, Crustal Deformation and Earth Rotation and Polar Motion.

Monitoring of The Millimeter-Level Variations in The Location of the Center for Mass of Total Earth System
(Solid Earth- atmosphere - Ocean)

LGS
GROUND
STATION

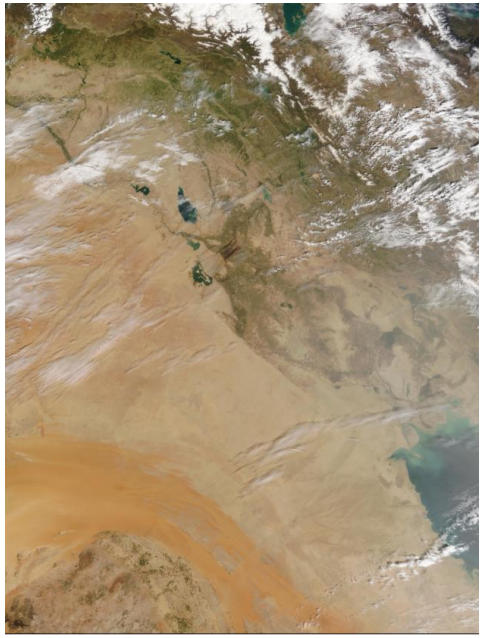
Saudi Arabia

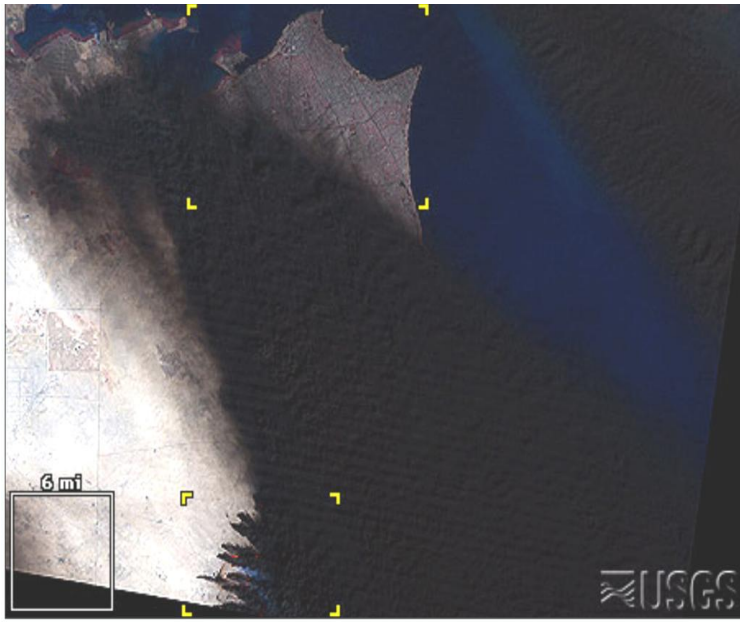


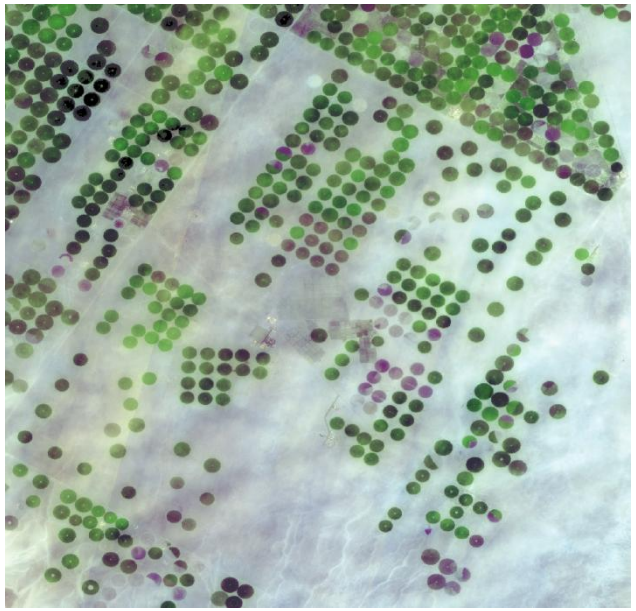


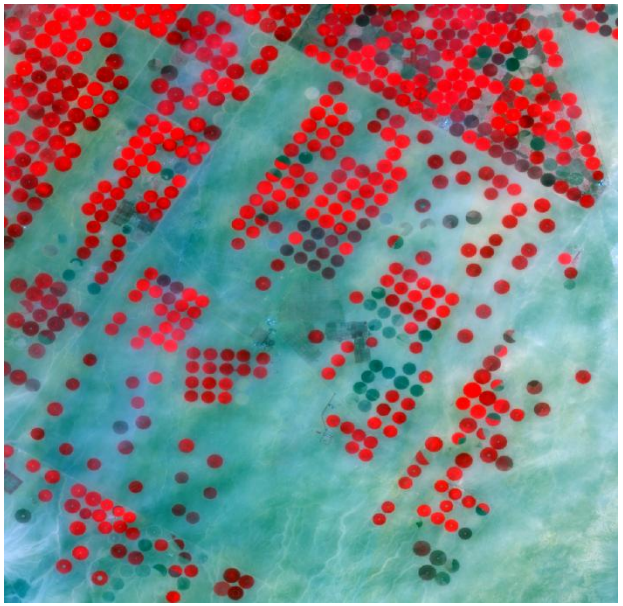
LASER GEODYNAMICS SATELLITE
LAGEOS 1 - 2

Ministries, Governmental and Private Agencies
in
The Kingdom of Saudi Arabia and The Region
have been Using these Latest Space Technologies
to Provide
Safety and Prosperity to Their People.




6 mi
USGS





RECOMMENDATION

-- **Governments** should Establish A National Center for DMM
-- **Government** should Encourage and Support Research in DMM
-- **Satellites Owners and Ground Receiving Stations** should
-- Acquire and Process Data and Information to Affected Area
-- Establish Early Warning Center to Disseminate Information
-- **UNCOPUOS, FAO and WMO** should
-- Establish Data Base of High and Low Resolution Data to
-- Fight Hanger and Fame, Help in DMM and Provide Expertise List
-- Develop Programs of Training in Various Fields DMM
-- **National, Regional and International Governments** should
-- Cooperate in Disaster Management and Mitigation (DMM)

CONCLUSION

Since Polar / Geostationary METEOSAT Provide
Data continuously By the Hour
about The Weather Conditions like (ALNina / ELNino) Affect and Enabling
Appropriate Precautionary Measures to be Taken in Time
.
Where Multimedia
COMSAT can Relay The Information to Alert Concerned Agencies and
The Public to Take Precautions to Avoid The Disaster.

Also The High Resolution Data from Optical / Radar EOS and GIS Provide
More Detailed Information about The Area Before / After The Disaster.

Beside Mobile COMSAT with GPS Provide Services in Rural and Non accessible
Areas

SPACE TECHNOLOGIES PLAY VITAL ROLE IN DMM

Thank You