

Water cycle monitoring network of México

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México



México

1 960 189 Km²

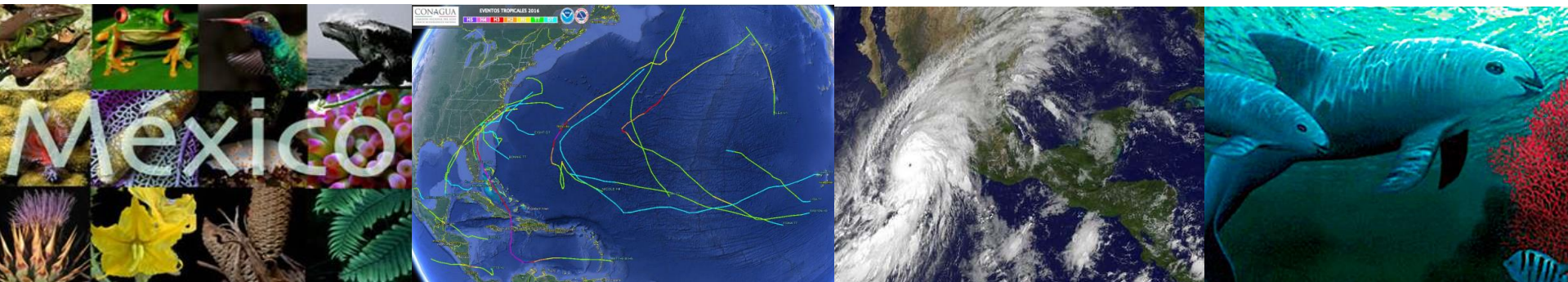
119,713,203 inhabitants

10% of the world animal and vegetation diversity

Climate (according to temperature) **warm and temperate** (according to humidity) **humid subhumid and very dry**.

From 2001 to 2016 **32 cold fronts on a yearly basis**.

From 2010 to 2017 in average, **38 tropical cyclones** in WMO region IV, **22** in the Nororiental Pacific Ocean and **16** in the Atlantic Ocean.



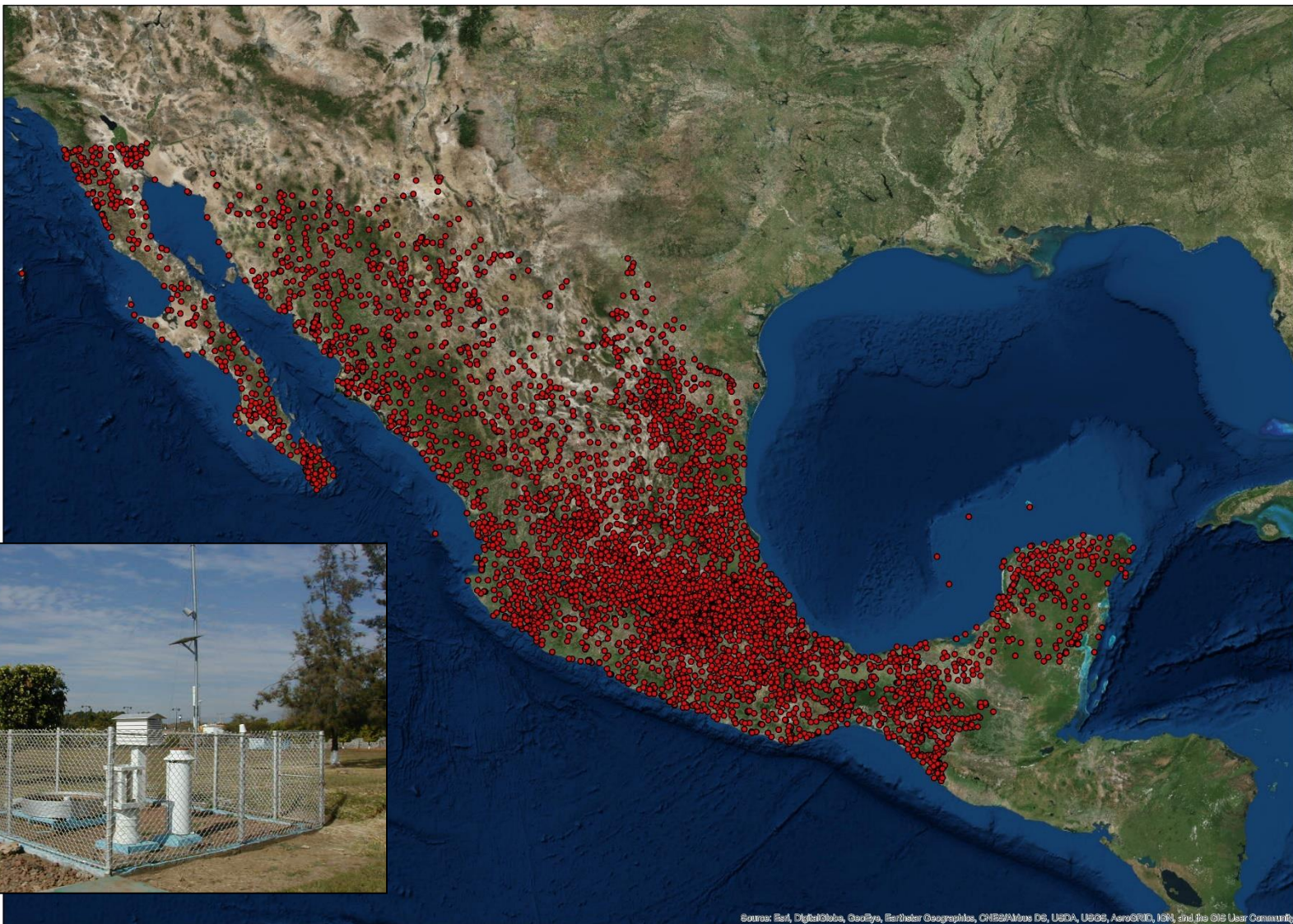
CLIMATOLOGICAL MONITORING NETWORK

Network is part of the National Meteorological Service of the National Water Commission and include

- Radiosonde stations
- Automatic stations (meteorological, hydrometeorological or ESIME)
- Surface synoptic observatories
- Reception of Satellite and Radar Images
- Meteorological Radars
- Conventional stations



CLIMATOLOGICAL NETWORK

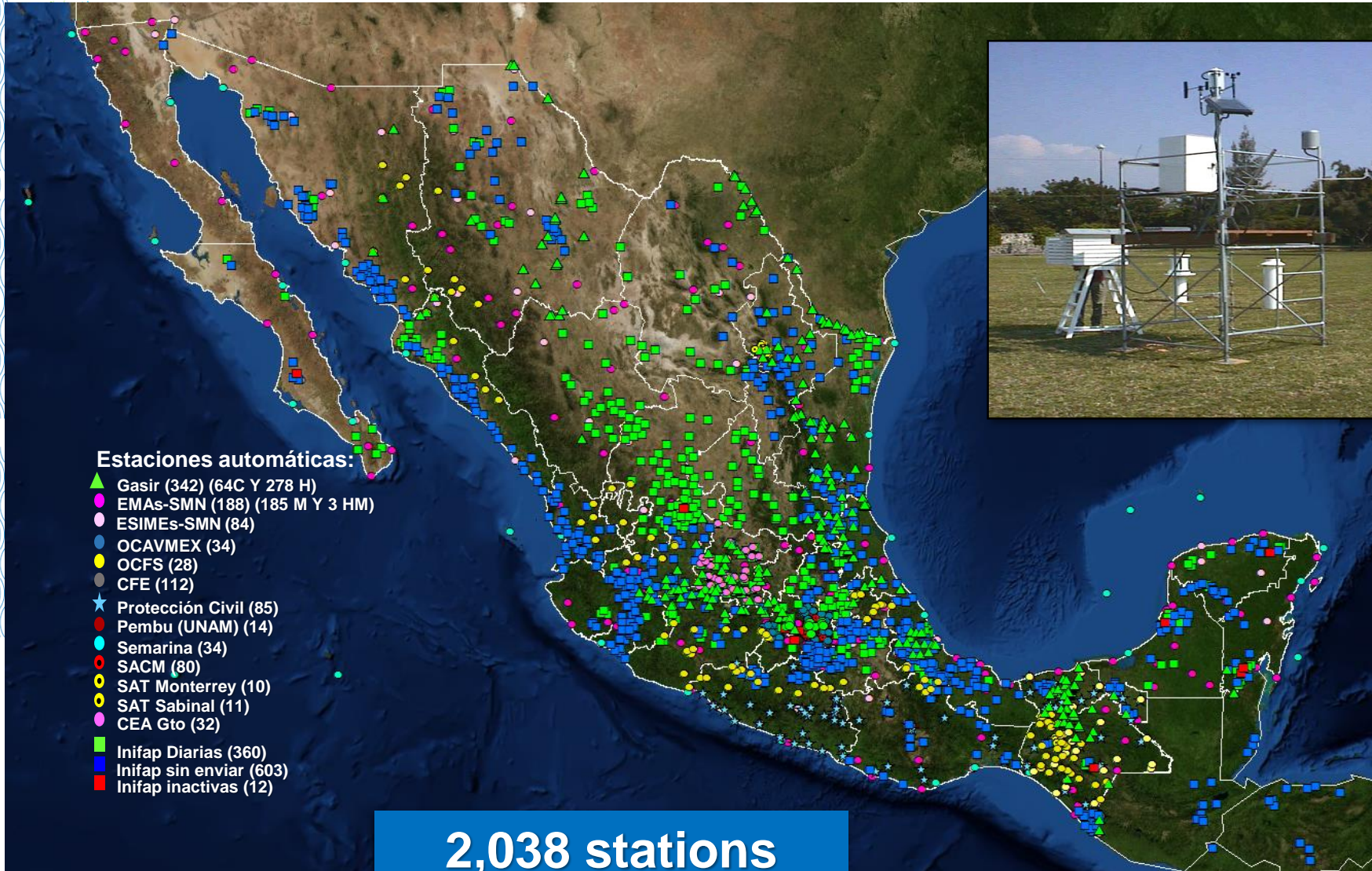


Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

MAIN METEOROLOGICAL EFFECTS OVER MEXICO

Sistema Meteorológico	Principales efectos
Tropical cyclones	Rainfall (floods, landslides), wind, sea waves, storm surge
Cold Fronts	Low temperatures, precipitation (floods, landslides), wind, sea waves.
East waves	Precipitation (floods, landslides)
Severe electrical storms	Precipitation (Floods), lightning, hail, wind.
Heat waves- High pressure systems – droughts	Forest fires, dehydration, digestive problems, atmospheric concentration of pollutants.

REAL TIME CLIMATOLOGIC NATIONAL NETWORK



AUTOMATIC METEOROLOGICAL STATION

(EMA)

It is a set of electrical and mechanical devices that perform measurements of meteorological variables automatically (especially in numerical form) (Reference WMO 182)

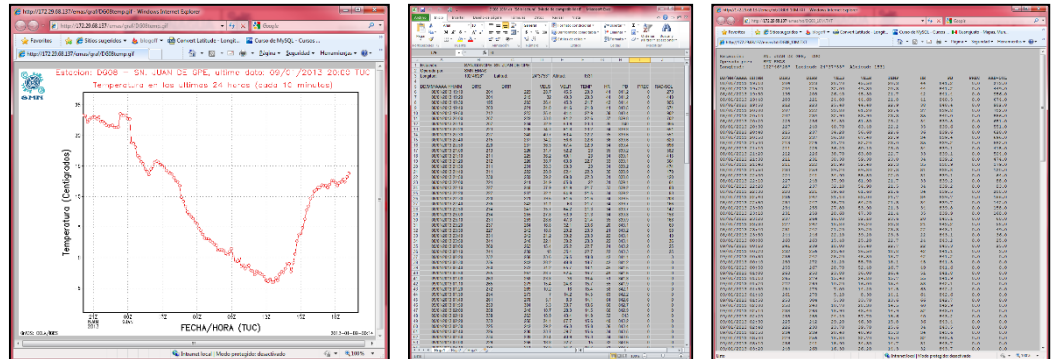
Sensors:

- Wind speed
- Direction of the wind
- Atmospheric pressure
- Temperature and relative humidity
- Solar radiation
- Precipitation

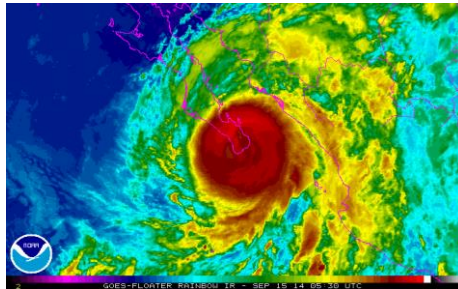
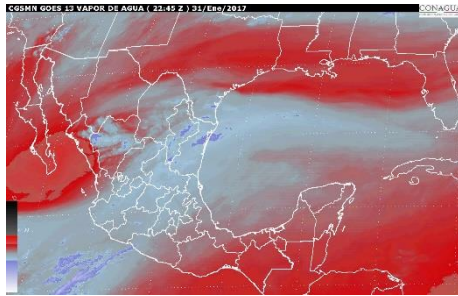


Estación de instalada en Tecamachalco , Puebla

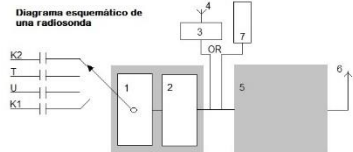
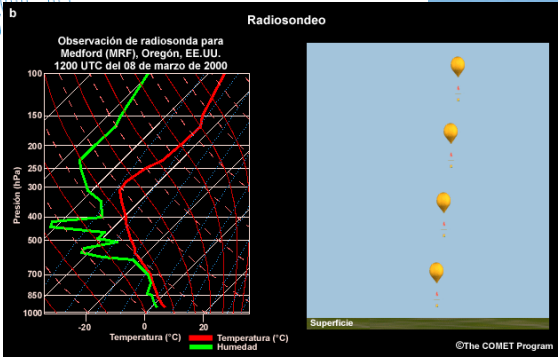
Primary products from EMAS



SATELLITE IMAGE RECEPTION STATIONS

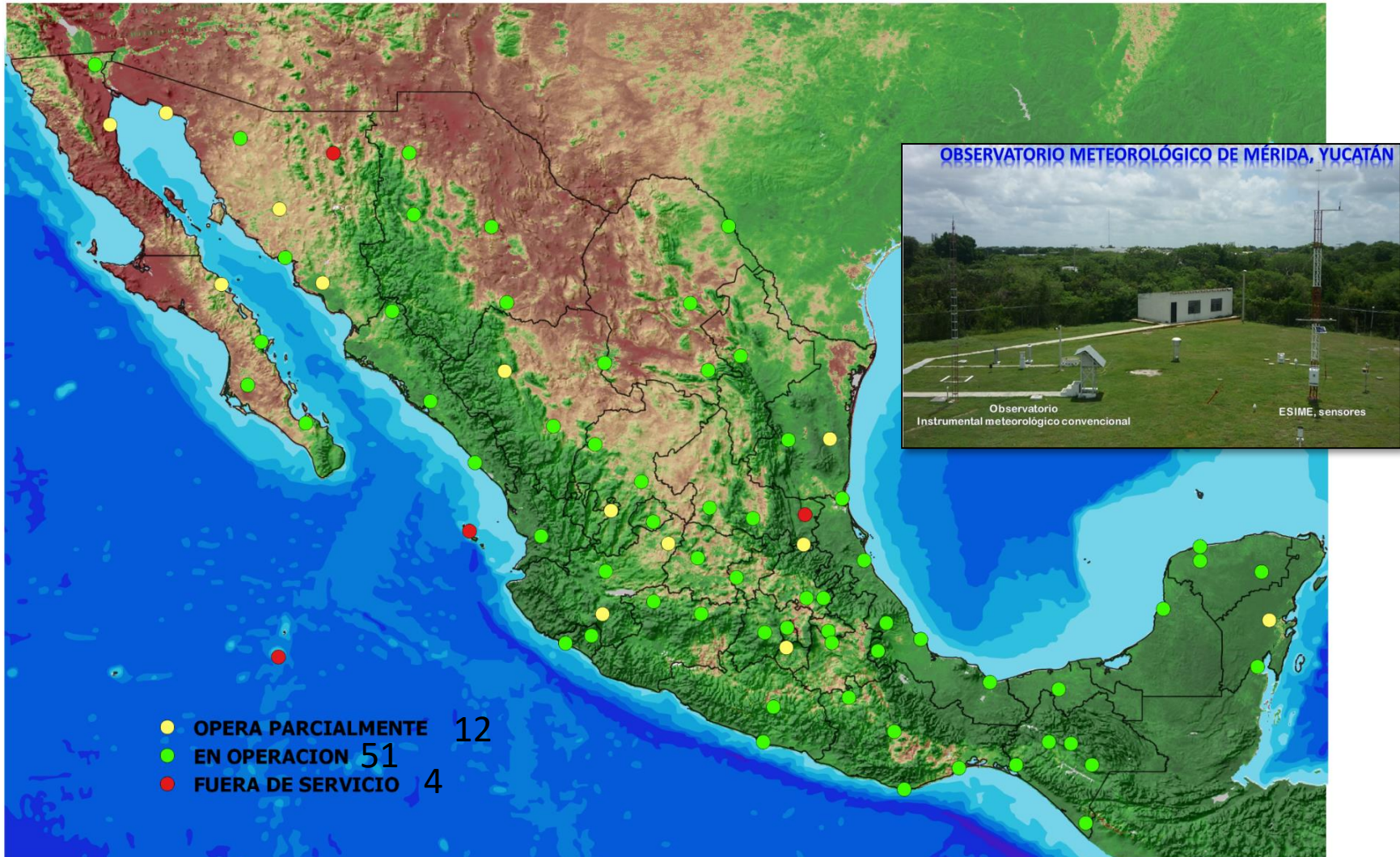


RADIOSONDE SITES



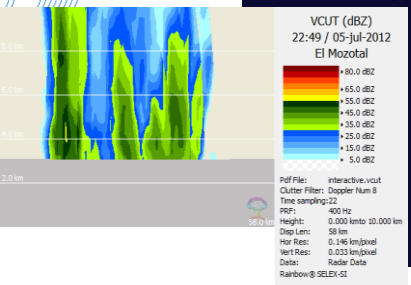
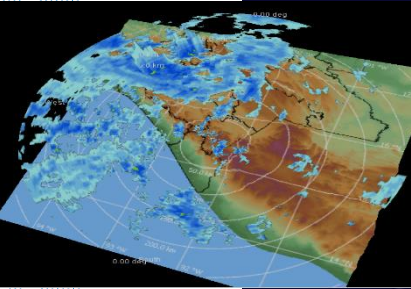
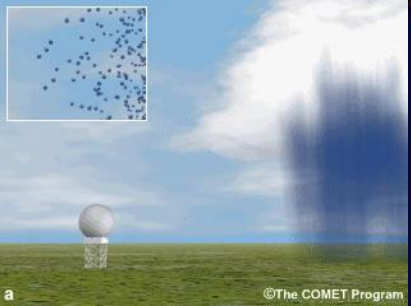
- 1. Conmutador electrónico
- 2. Oscilador
- 3. Receptor VLF
- 4. Antena VLF
- 5. Transmisor FM de 404 MHz
- 6. Antena de transmisión
- 7. Módulo GPS
- K2 capacitor 2
- T 1 sensor de temperatura
- U 1 sensor de humedad relativa
- K1 capacitor 1

METEOROLOGICAL OBSERVATORIES NETWORK



METEOROLOGICAL RADARS

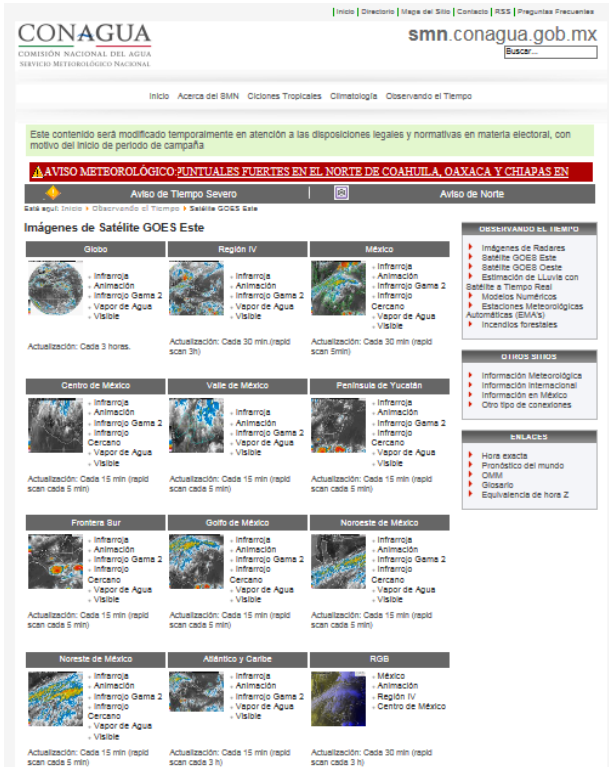
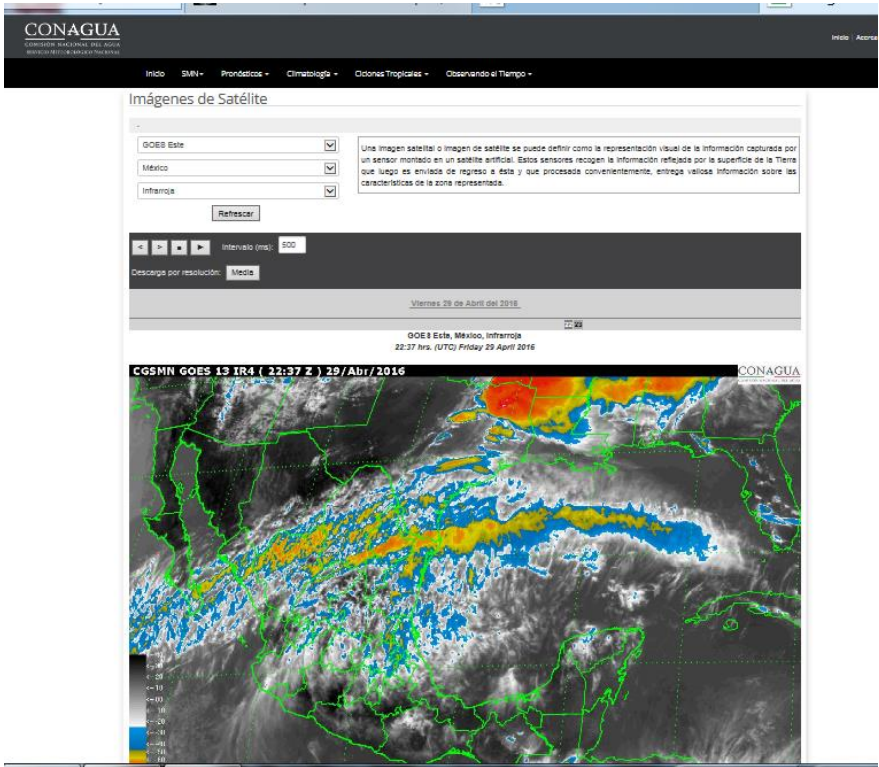
6 Radars partialy operating



NATIONAL MET SERVICE WEB SITE

PÁGINA WEB ACTUAL:
<http://smn.conagua.gob.mx/>

PÁGINA WEB ALTERNATIVA
<http://smn1.conagua.gob.mx/>



CONVENTIONAL MEASUREMENT STATIONS

5520 conventional stations with historical records of more than 10 years



A NIVEL HORARIO, EL OBSERVADOR EN TURNO:

Observa y registra:

- Visibilidad
- Cantidad, altura y tipo de nubes
- Tiempo presente y pasado

Mide y registra

- Dirección y velocidad del viento
- Temperaturas; humedad
- Presión atmosférica, Evaporación
- Radiación Solar; Precipitación

A NIVEL SINÓPTICO (CADA 3 HORAS)

CADA OBSERVATORIO GENERA Y TRANSMITE AL CENTRAL UN MENSAJE SINÓPTICO.

ZCZC
SMMX1 MXBA 311800
AAXX 31181 76628 31669 80707 10129 20101 38096
40252 50010 70222 85820
91750 333 10130 20094 31/// 56290 58007 85896
83498=
NNNN

CADA 10 DÍAS

CADA OBSERVATORIO GENERA Y TRANSMITE AL CENTRAL UN MENSAJE DECENAL.

ZCZC
CLIMEX – DECENAL MXBA 21113
76628 01133 10231 20205 30138 40043 50091 60000
70629 80109 91272 00450
12000 20000 30000 40000 50000 60000 70228 82306
91204 00000 10000 20000
NNNN

CADA MES

CADA OBSERVATORIO GENERA Y TRANSMITE AL CENTRAL UN MENSAJE CLIMAT

ZCZC
CSMX01 MXBA 121800
CLIMAT 12013 76628 111 18087 20215 30162106
402210109 5124 60000000 7208///
80000000 90000000 444 0021510 1004815 2025713
3004126 40000000 5106506 60000
NNNN

Nombre del Instrumento	Imágenes	Variable a Medir
Anemocinémógrafo Anemómetro Ultrasonico		Dirección y Velocidad del Viento
Termómetros Digitales o Convencionales		Temperatura
Higrómetro y/o Psicrómetro		Humedad Relativa
Barómetro Digital y/o Barómetro anerode		Presión Atmosférica
Pluviómetro y Pluviógrafo		Precipitación
Heliógrafo y Piranómetro		Radiación Solar
Evaporímetro		Evaporación

HYDROMETRIC NETWORK



- ✓ 800 hydrometric stations located in main rivers
- ✓ Several report the flow discharge daily at 8 am and store information for consultation in SIH platform
- ✓ The main instruments of measurement are velocimeters and water level scales
- ✓ During high floods the measurement is continuous
- ✓ There is a historical computerized data bank

PIEZOMETRIC NETWORK

Historical data from 258 aquifers

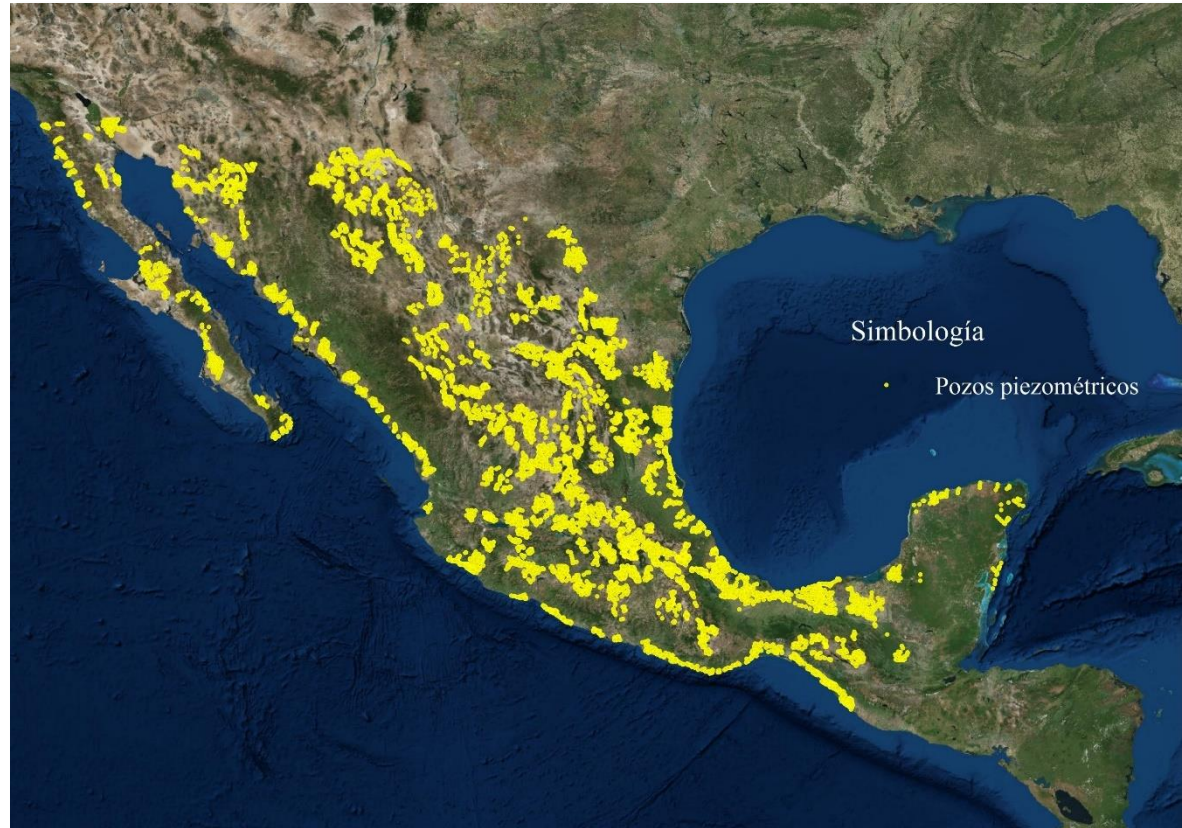
Density:

- Heterogeneous: 4 wells / 100 km²
- Homogeneous in great areas: 2 wells / 100km²

170 sites (6000 wells)

The main network cover 144 aquifers

- 102 overexploited
- 30 in fragile equilibrium
- 14 in equilibrium

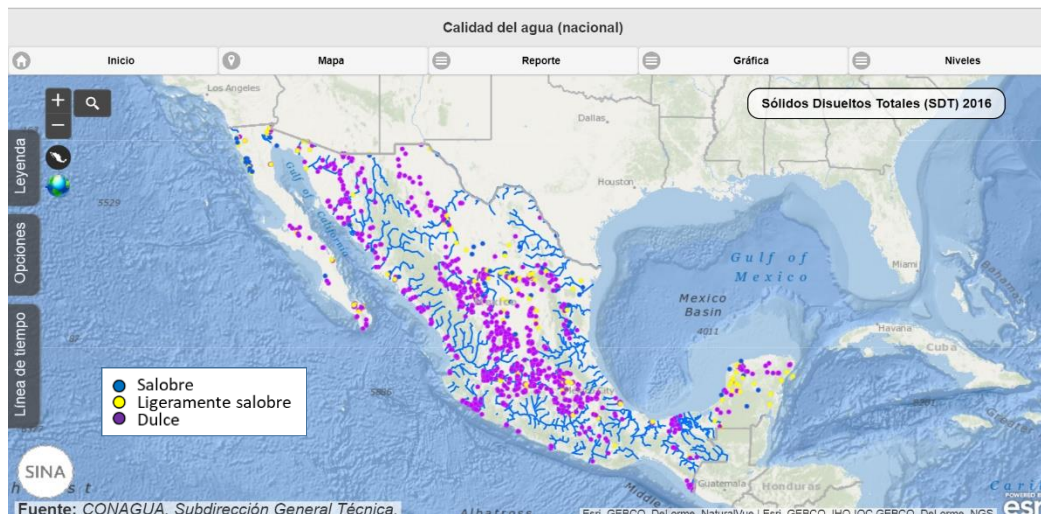
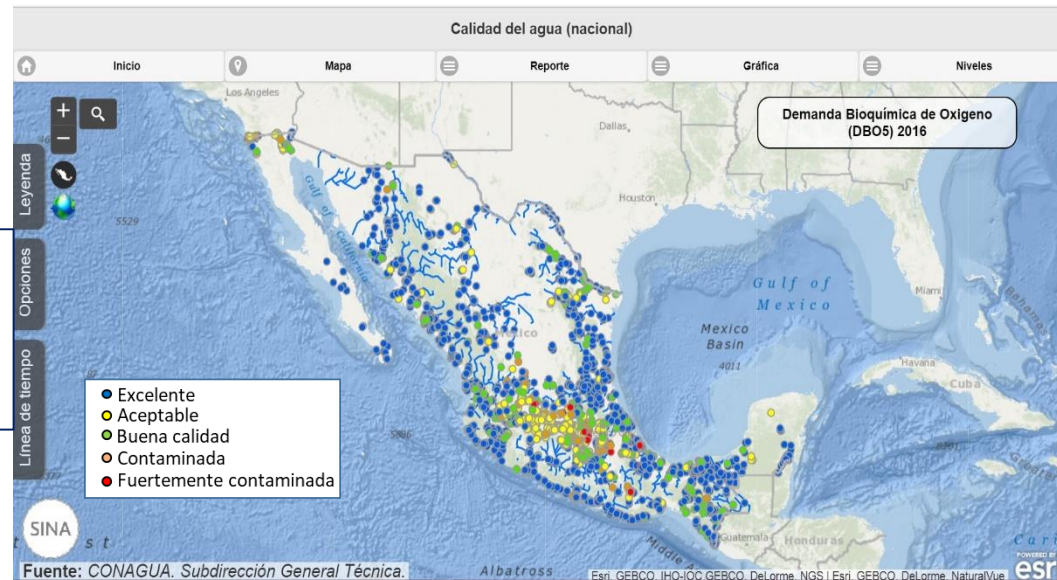


- When they are located in large extension areas.
- Manifest a rapid response to cyclonic rains or droughts.
- With high rates of abatement > 3.0 m / year, in irrigation districts, or of ecological interest.
- Transboundary aquifers (Mexico-USA).

WATER QUALITY NETWORK

5000 monitoring sites since 2011
650 monitoring sites since 1986

- Biochemical Oxygen Demand (DBO5)
- Chemical Oxygen Demand (DQO)
- Total Suspended Solids (SST)
- Total Disolved Solids Sólidos(SDT)



- Total Dissolved Solids Sólidos (SDT) 2016

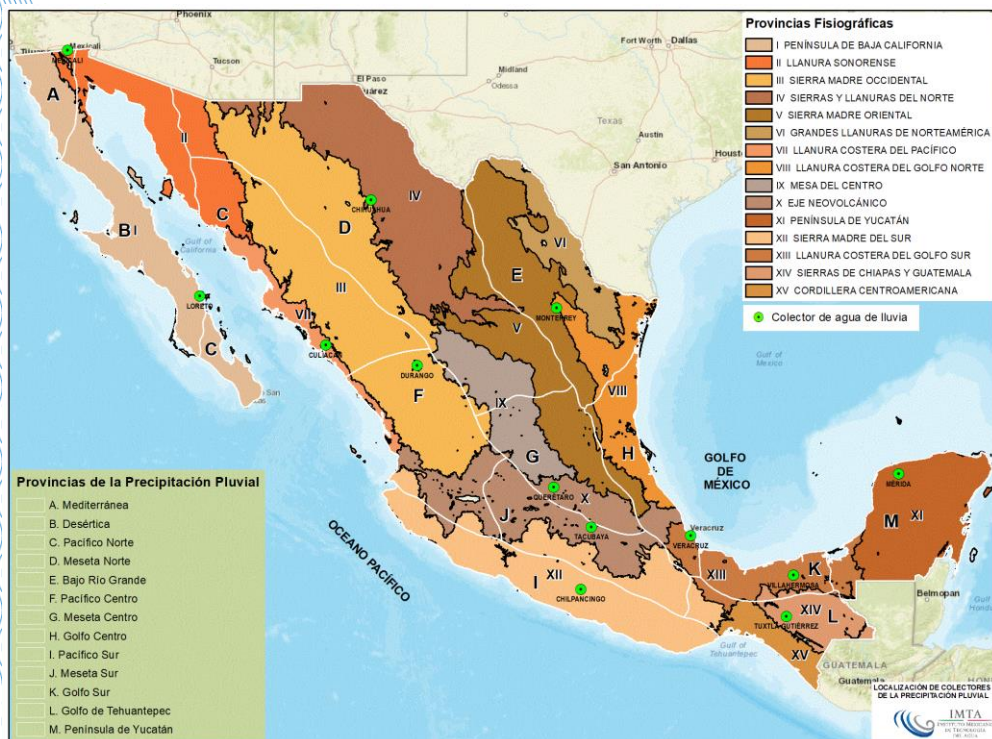
WATER QUALITY LAB NETWORK



17 Conagua Water Quality Labs

8th WORLD WATER FORUM | BRASÍLIA-BRASIL, MARCH 18-23, 2018

ISOTOPIC NETWORK



PROVINCIA DE LA PRECIPITACIÓN PLUVIAL		PROVINCIA FISIOGRAFICA		ESTACIÓN METEOROLÓGICA
A	MEDITERRÁNEA	II	LLANURA SONORENSE	MEXICALI
B	DESÉRTICA	I	PENÍNSULA DE BAJA CALIFORNIA	LORETO
C	PACÍFICO NORTE	VII	LLANURA COSTERA DEL PACÍFICO	CULIACÁN
D	MESETA NORTE	IV	SIERRAS Y LLANURAS DEL NORTE	CHIHUAHUA
E	BAJO RÍO GRANDE	VIII	LLANURA COSTERA DEL GOLFO NORTE	MONTERREY
F	PACÍFICO CENTRO	III	SIERRA MADRE OCCIDENTAL	DURANGO
G	MESETA CENTRO	X	EJE NEOVOLCÁNICO	QUERÉTARO
H	GOLFO CENTRO	XIII	LLANURA COSTERA DEL GOLFO SUR	VERACRUZ
I	PACÍFICO SUR	XII	SIERRA MADRE DEL SUR	CHILPANCINGO
J	MESETA SUR	X	EJE NEOVOLCÁNICO	TACUBAYA
K	GOLFO SUR	XIII	LLANURA COSTERA DEL GOLFO SUR	VILLAHERMOSA
L	GOLFO DE TEHUANTEPEC	XIV	SIERRAS DE CHIAPAS Y GUATEMALA	TUXTLA GUTIÉRREZ
M	PENÍNSULA DE YUCATÁN	XI	PENÍNSULA DE YUCATÁN	MÉRIDA

- ✓ 13 sampling sites (precipitation provinces)
- ✓ Started December 2017
- ✓ Parameters sampled:
 - Oxygen 18
 - Tritium
 - Deuterium
 - Carbon 14



CHILPANCINGO
MARCH 18-23, 2018



MÉRIDA



CHILPANCINGO



MONTERREY

Usefulness of the Mexican water cycle monitoring network

- Generate data to determine the variables that govern the functioning of the behavior of water in the hydrological cycle, under the climatic, orographic and environmental conditions of the national territory.
- Baseline and updates for water planning since 1975
- Foundations of the water management system (water allocation and Law enforcement among others) since 1994
- Cornerstone for the Civil Protection System since 1970

In other words, the main support to address the status and progress of water security of Mexico



Organization



MINISTRY OF THE ENVIRONMENT



Support



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www.worldwaterforum8.org | secretariat@worldwaterforum8.org