

Geomatics and biodiversity



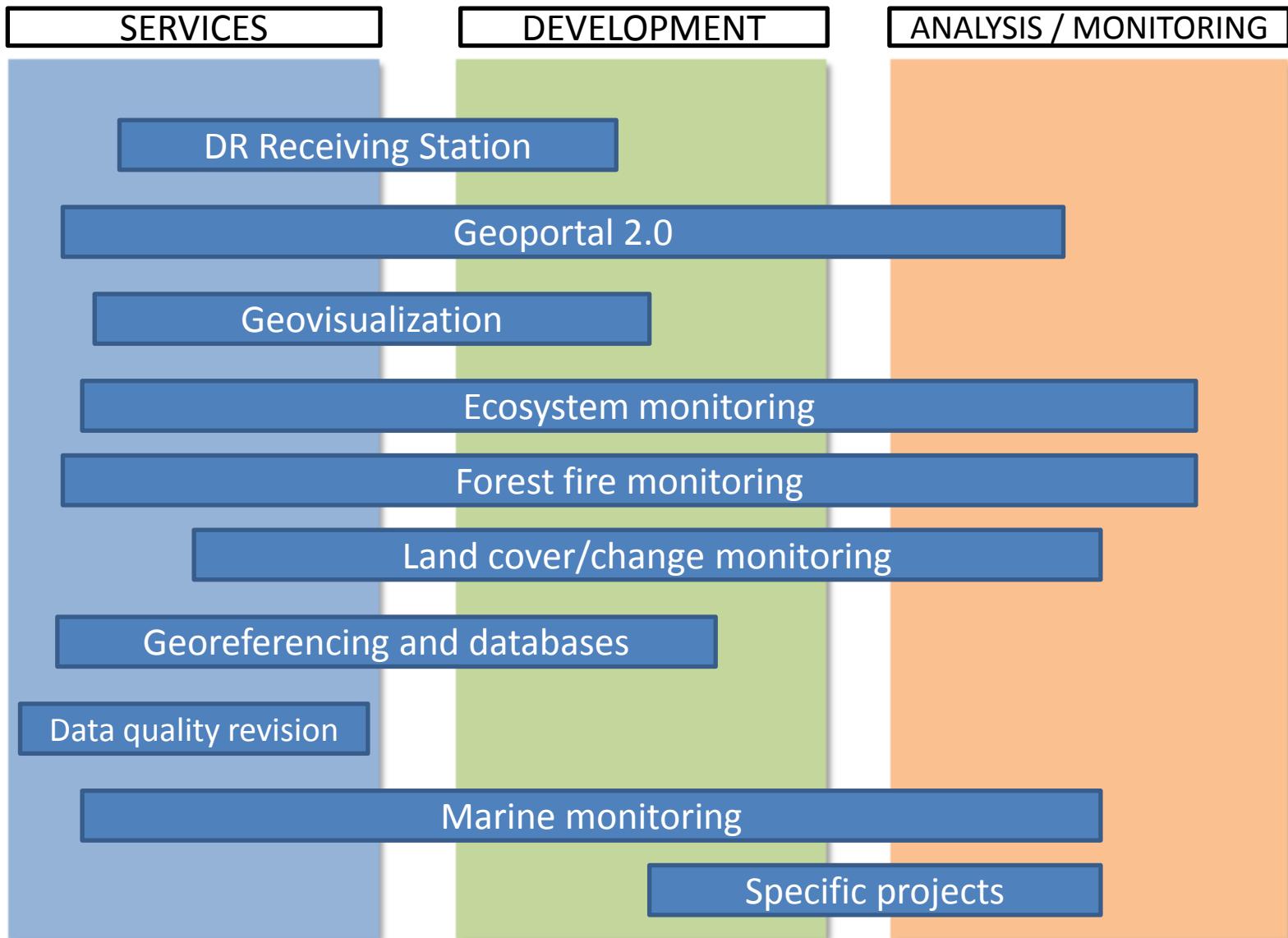
CONABIO

COMISIÓN NACIONAL PARA EL
CONOCIMIENTO Y USO DE LA BIODIVERSIDAD

Rainer Ressl
Director General de Geomática



GEOMATICS in CONABIO





Information retrieval: Georeferencing of species point data



Objective

- Assign geographical coordinates on basis of locality descriptions of scientific specimen collections



More than
800,000

localities being georeferenced
(SNIB 2015)

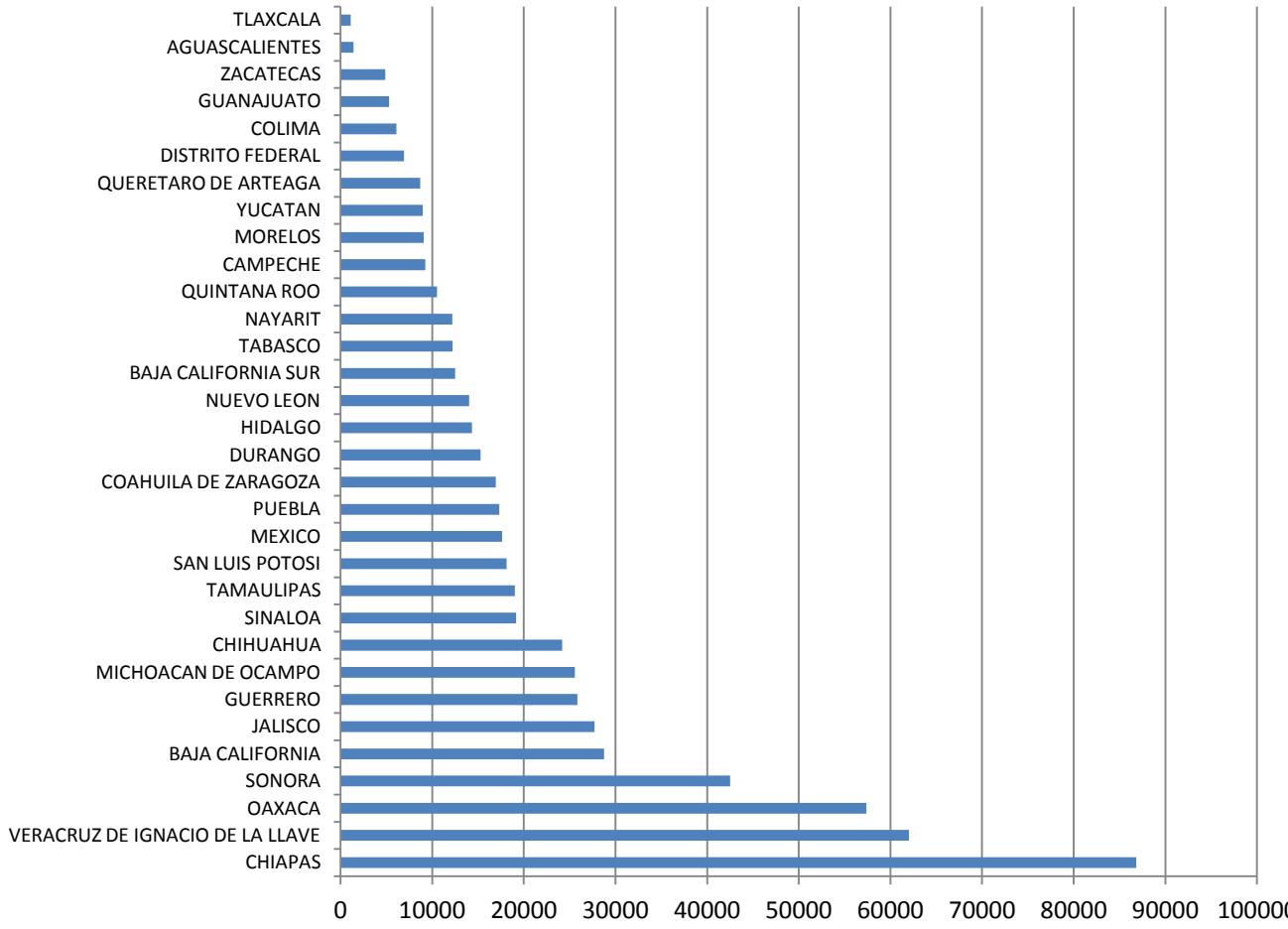




Information retrieval: Georeferencing of species point data

Localities without coordinates

■ localidades



Approx. 500,000 collection sites

Estimated time to
georeference:
+/- 14 years
(5 analysts full time)

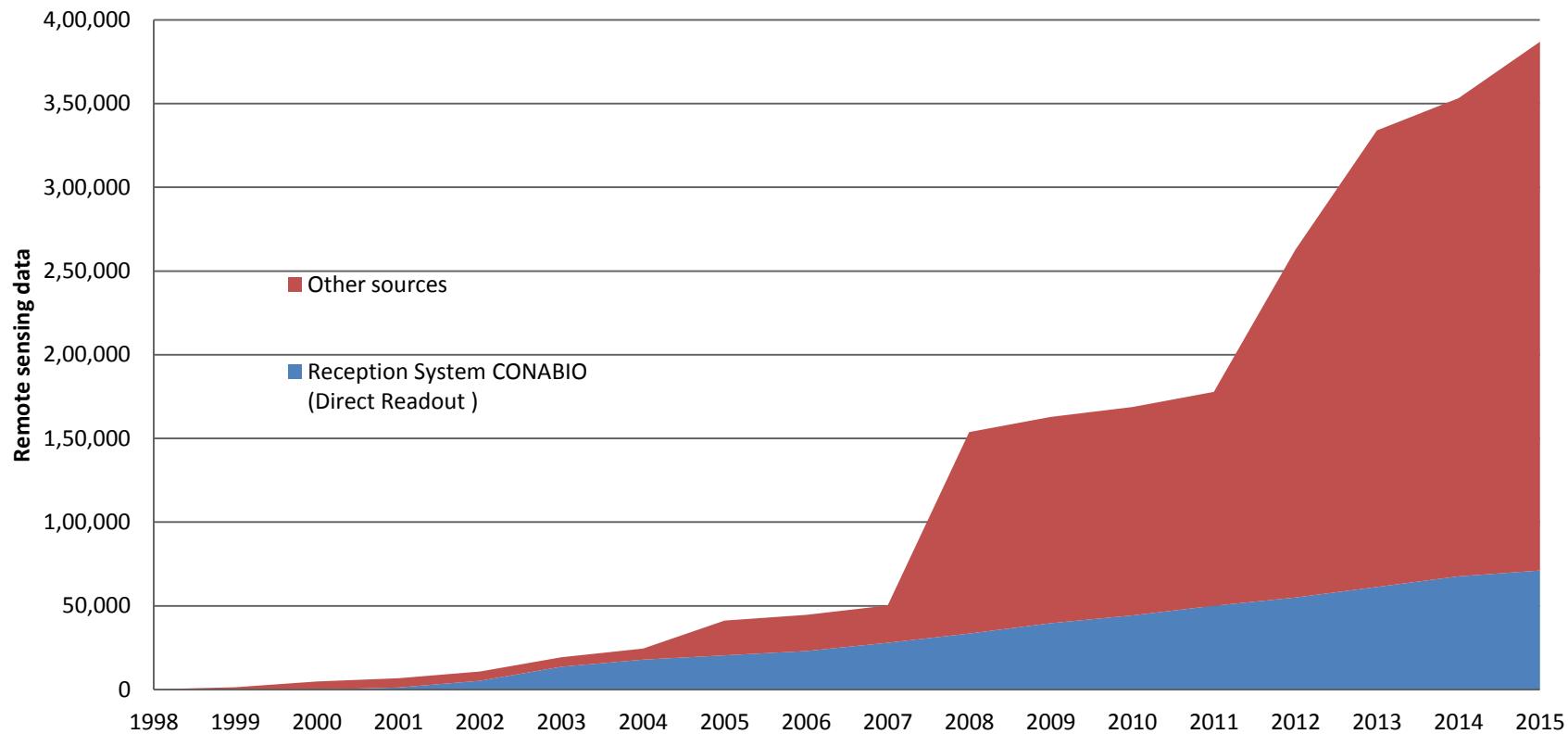


Cooperation with
universities:

- Univ. de Toluca
- Univ. de Veracruz
- Univ. de Queretaro
- Univ. Auton. Chiapas
- Tec. de Mont. (GDL)



Growth of CONABIO's remote sensing database



Data type

- Optical images
- Analog Aerial Photography
- Digital Aerial Photography
- Orthophotos
- Hemispheric Photography
- RADAR images
- LIDAR data

Satellite receiving station of CONABIO

Optical images:

AVHRR
MODIS
VIIRS



Data warehouse in CONABIO: Remote sensing data, products and online cartography

Remote sensing data archive	Total of images
Historical photo archive (1940-1996)	6564
Aerial photos - mangrove (2008 / 2015)	170247
Orthophotos - INEGI (2005)	13996
Landsat MSS (1975-1985)	439
Landsat TM y ETM+ (1990-2014)	58110
Radar (2010)	276
Quikbird *** (2008)	118
WorldView-2 (2010-2013,2015)	461
SPOT INEGI+ERMEXS (2004-2015)	9018
DMSP (1998-2001)	2482
RapidEye* (2011,2012,2013,2014,2015)	27901
IRS_AWIFS (2010 / 2011)	286
IRS_LIS-III (2010 / 2011)	279
MODIS (Terra/Aqua) 2000-2015	34714
AVHRR (2000-2013)	37501
VIIRS (2012,2013, 2014,2015)	2460
LIDAR	5110
Hemispherical photos (2012,2013)	13913
TRMM	3624
Total	387499

Geoportal / Cartography	Total
Biodiversity	3802
Climatology	32
Political division	22
Edafology	14
Geology	2
Hydrology	48
Infrastructure	17
Socio-demographic	83
Regionalization	84
Topography	23
Vegetation and land cover	44
Satellite products	228
Total	4464

First NPP-VIIRS satellite data
received and processed in CONABIO
29/03/2012

Internal/restricted access:
1816 maps



Operational land cover/change monitoring

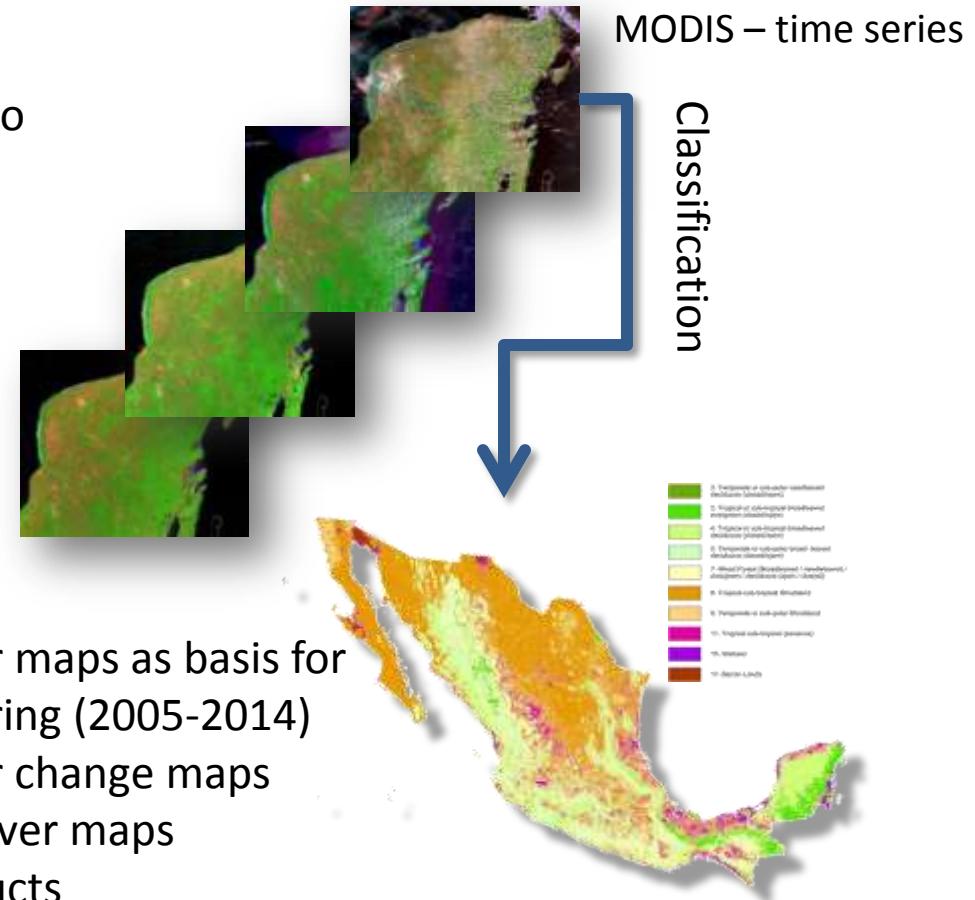
Objective

Development of an operational system to monitor land cover and land cover change at national scale using satellite remote sensing data and GIS



Products

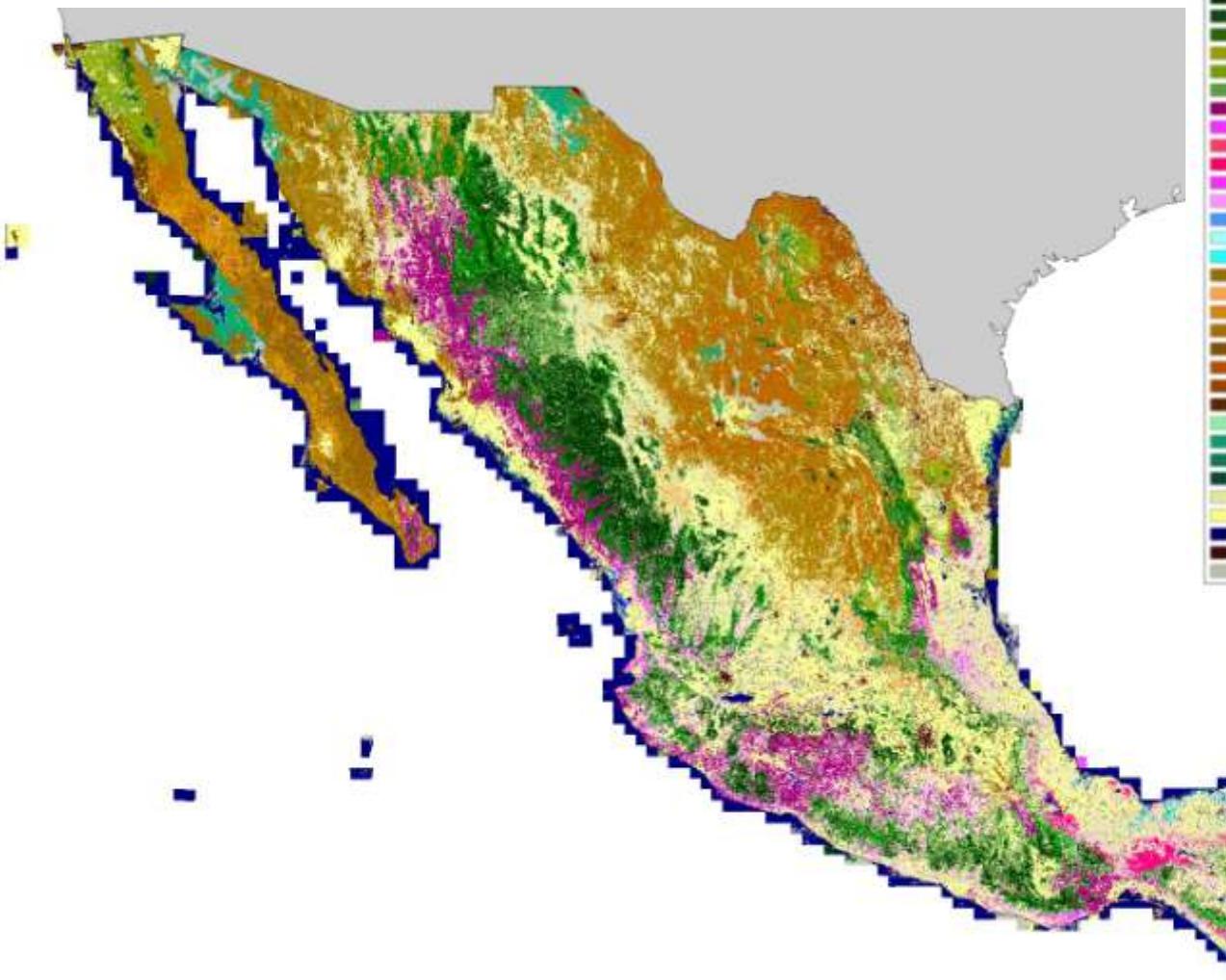
- Annual land cover maps as basis for continuous monitoring (2005-2014)
- Annual land cover change maps
- Fractional land cover maps
- Continental products





REDD+ MRV-AD system of México (MAD-Mex)

México land cover 1:20,000



Land cover legend

Bosque Huasteca de Montaña, Selva Baja Fenórrula
Bosque Ecuatorial Freijo, Matorral Subtropical
Bosque de Auyaní, Cacto
Bosque de Pino (Ecuatorial, Áltos, Quemado, Túneles, Matorral de Coníferas)
Bosque de Pinos Ecuatorial, Matorral de Coníferas
Bosque Húmedo, Cultivo de Caña de Azúcar
Matorral Subtropical, Bosque Tropical, Bosque Mixto
Chaparral
Bosque secundario
Selva Baja (Baja/Codorniz), Espino (Cacto/Arbol), Palmera Indígena
Selva Baja y Mixta (Espino) Subperennifolia, Selva de Guadua, Palmera Natural
Selva Alta Subperennifolia
Selva Alta y Media Páramo
Selva Media (Baja) Codorniz
Selva secundaria
Manglar, Vegetación de Playa
Salar
Papel
Bosque de Mosquitero, Matorral Desértico Monófita, Matorral Desértico, Vegetación de Galerón
Matorral Chacoense
Matorral Seco-Chacoense
Matorral Seco-Chacoense de Achira
Matorral Seco
Matorral Desértico Rosado
Matorral Espinozoso Térrea/Apriori
Matorral Rosado Cacto
Vegetación de Dunas Costeras
Vegetación de Desiertos Arenosos
Vegetación Herbácea Húmeda
Vegetación Galerón Herbácea Seca
Pantano y Sabana
Agricultura
Arido
Urbano
Otro y Descripción de Vegetación

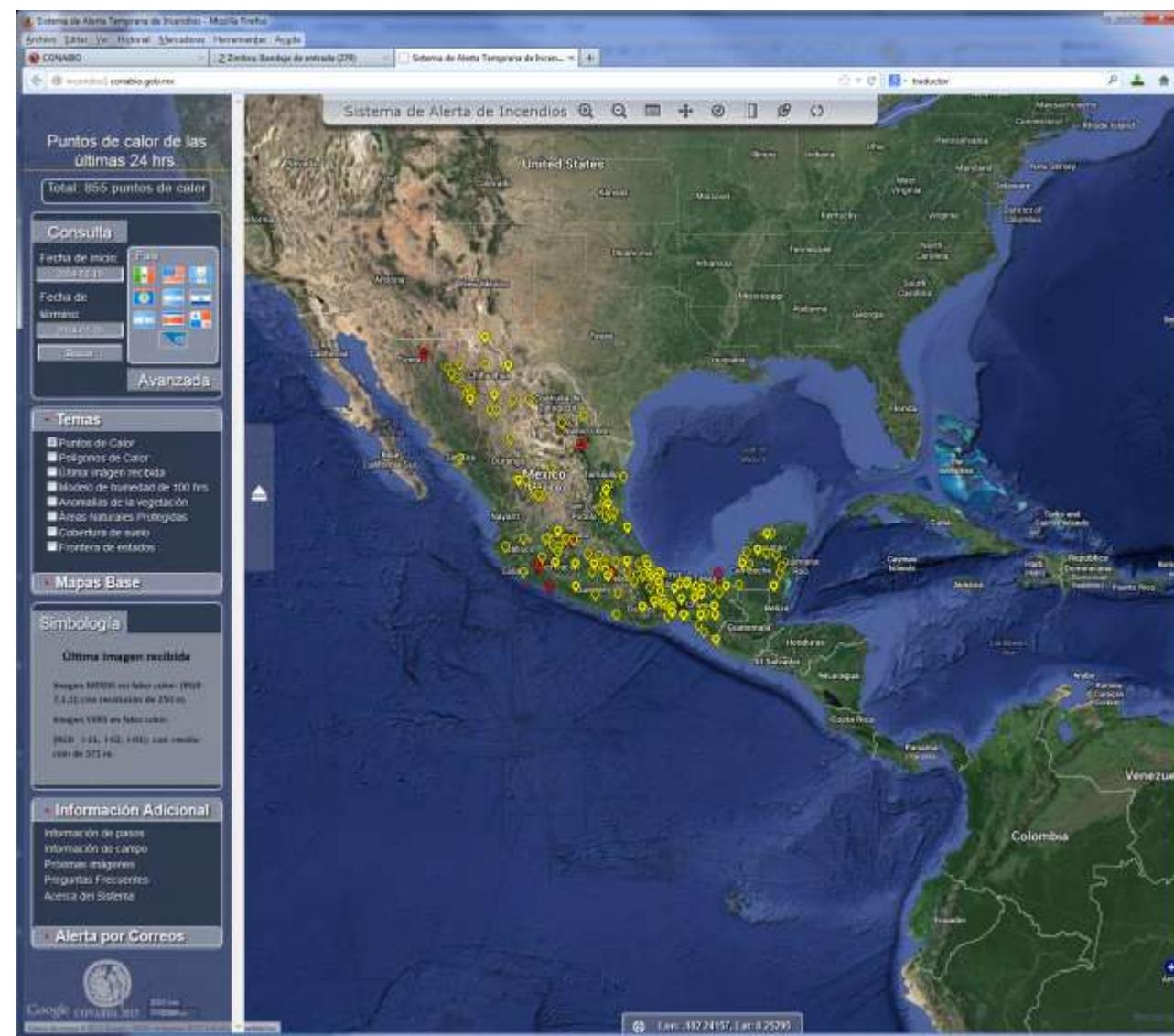
8000 Rapideye satellite images of the year 2014 used for classification



Early alert system for forest fires

The operational system generates forest fire related information in near-realtime. Main data source is satellite data provided by CONABIO's Direct Readout station.

- ✓ “Hot spot” detection using MODIS and VIIRS satellite images
- ✓ Initial view shows “Hot spots” of last 24 hours
- ✓ Allows query of historical fires back to the year 2000
- ✓ Provides complementing cartographic information for fire characterization and fire propagation risk.
- ✓ Forest fire detection also for Central America countries



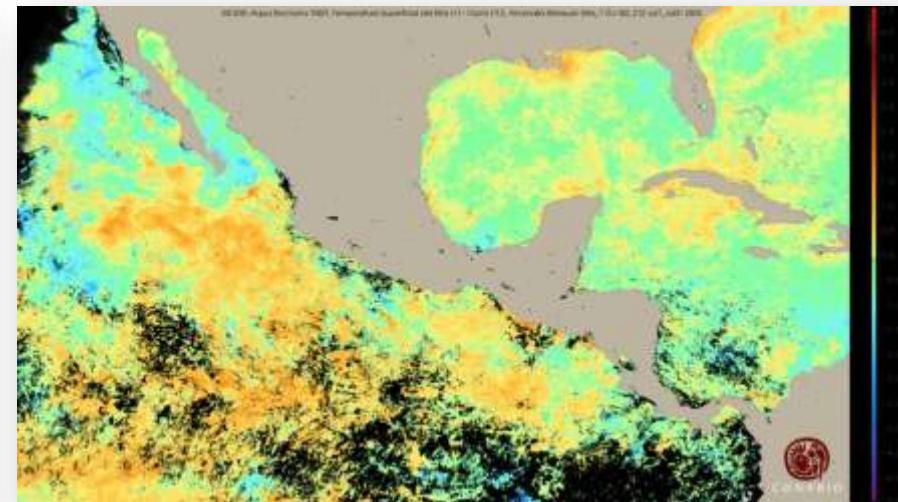
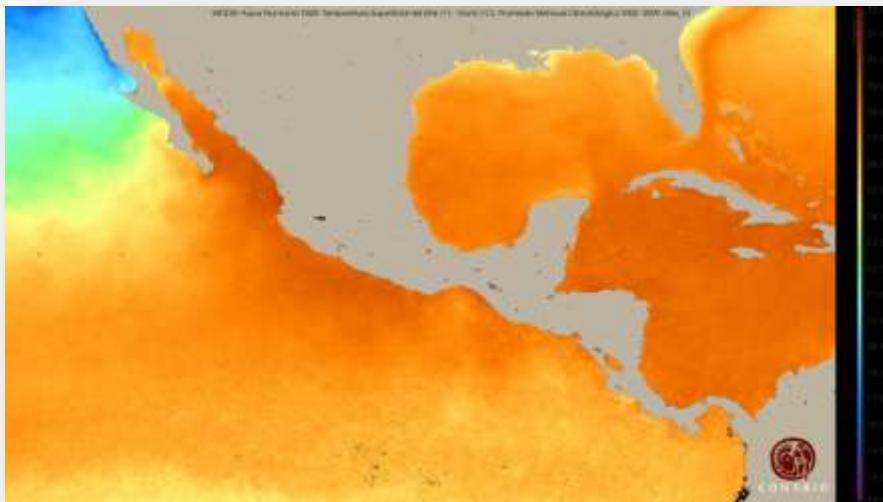
<http://incendios1.conabio.gob.mx/>



Satellite System for Ocean Monitoring (SATMO)

Satellite systems for ocean monitoring and early alert: Thermal stress (coral) and algae blooms

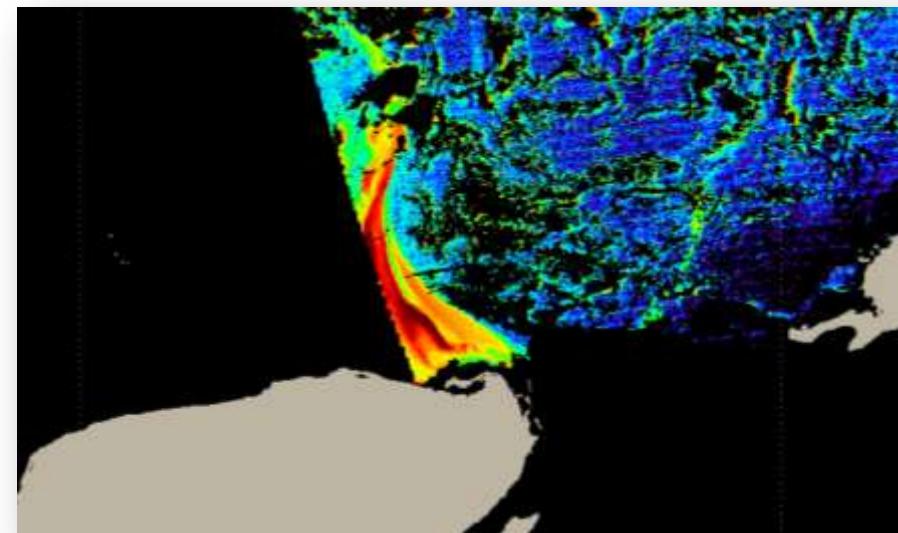
Satellite System for Ocean Moniting (SATMO)



Satellite Early Alert System for coral bleaching (SATcoral)



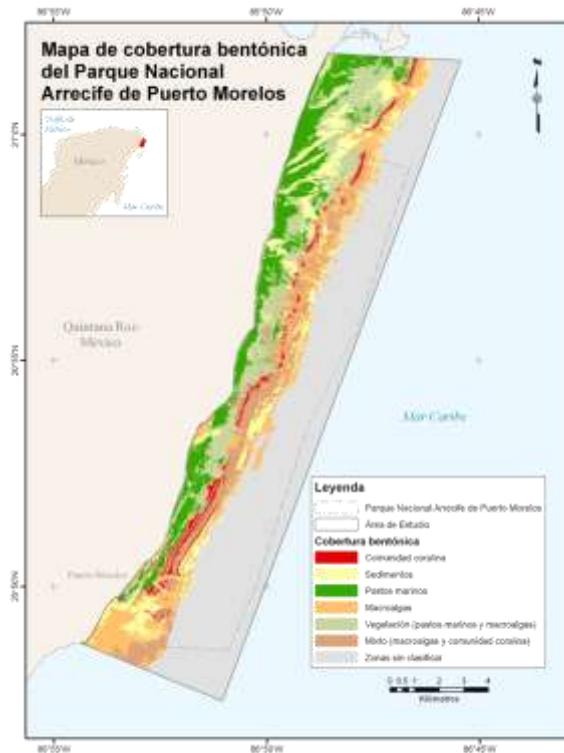
Satellite Early Alert System for algae blooms (SATFA)



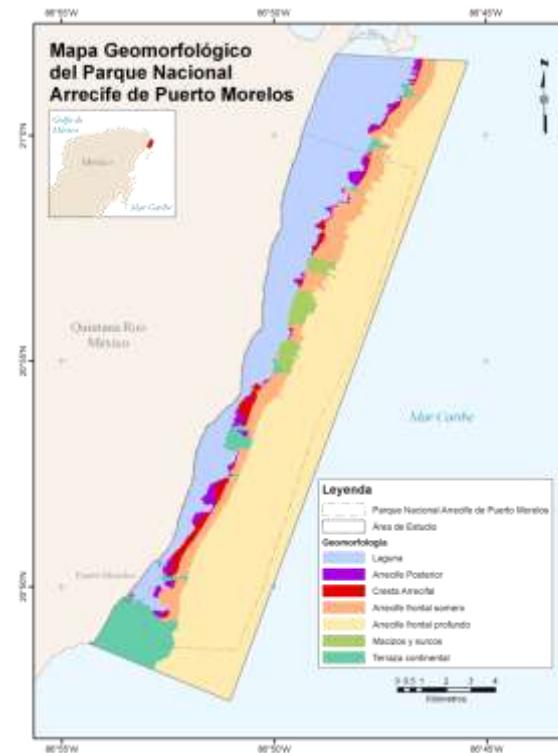
Benthic habitat mapping using high resolution satellite data

National coral reef park of Puerto Morelos (Sistema Arrecifal Mesoamericano (SAM))

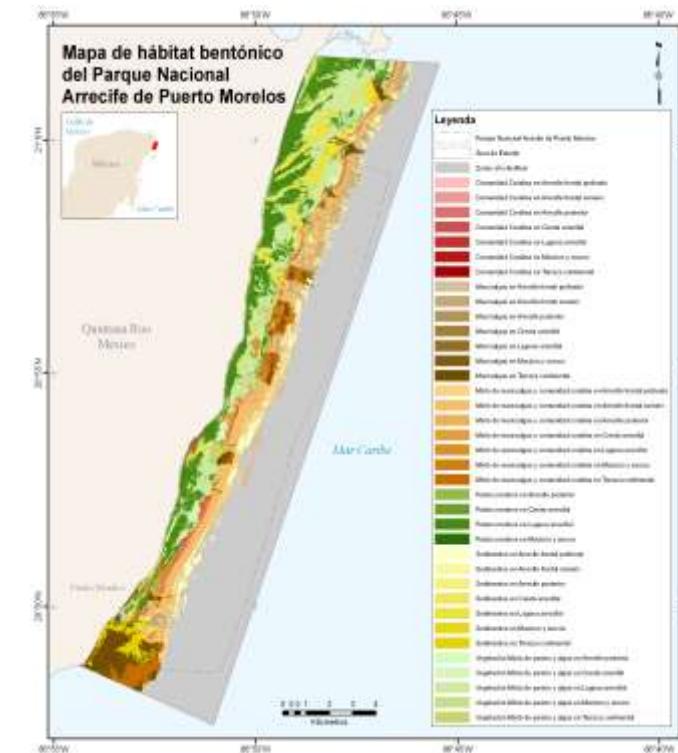
Map of benthic classes



Geomorphology map



Benthic habitat map



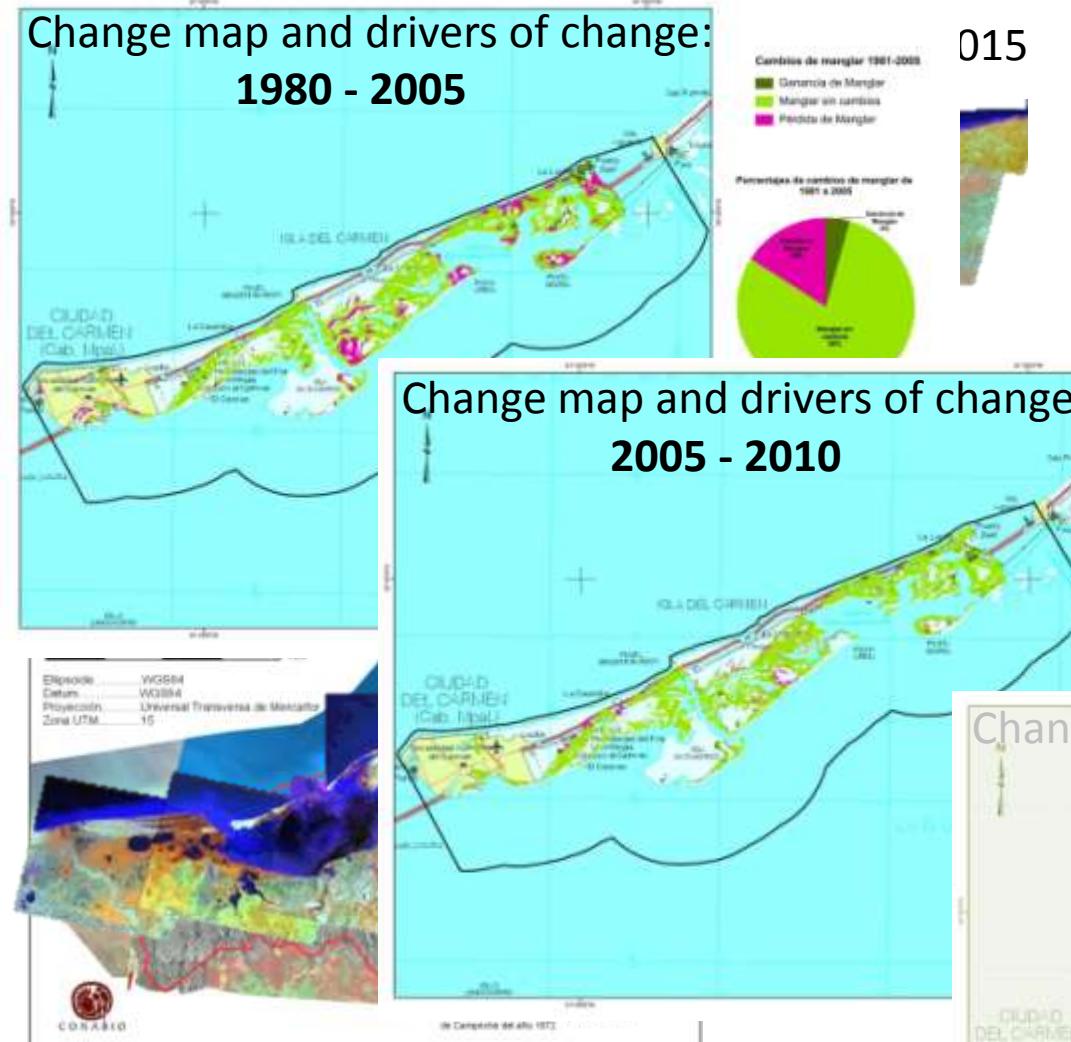
... using WorldView-2 multispectral data (4 m) and field data



National Mangrove Monitoring System

Data sources

Change map and drivers of change:
1980 - 2005



Change map and drivers of change:
2005 - 2010

Results

National mangrove maps (1:50,000) for:
1970/80 – 2005 – 2010 - 2015



Coming soon:

Change map and drivers of change:
2010 - 2015





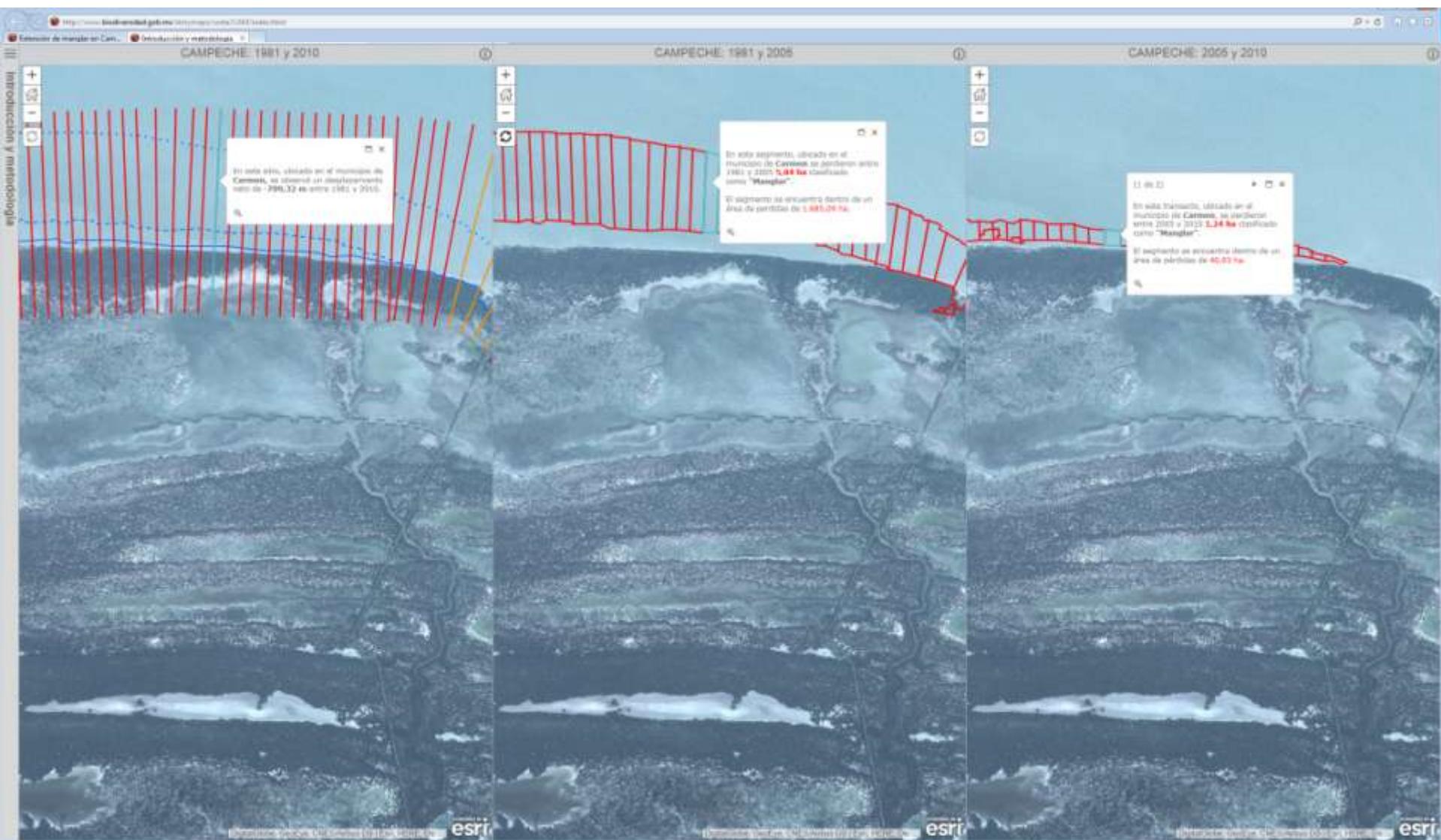
More than 100,000 aerial photos 369,183 vertical views



Tampico Alto – Veracruz de Ignacio de la Llave



Change monitoring: Geovisualization for Biodiversity



Se manda a los alcaldes del municipio de Benito Juárez | MiPolygons level 19.81098005005 MicroPolygons level 12.005520010



Geovisualización – Mapas con historia

www.biodiversidad.gob.mx/mymaps/carcasa/index.html

biodiversidad.gob.mx/mymaps/carcasa/index.html

SIGER ONLINE - Haci... QADIA - Form Trámites... Geonatal WWW les.org. REGIONES TERRISTRAE... Google DeclarSAT en línea http://www.facebook... Mis visitas Últimas visitas Comenzar a usar Firefox Catalogo de Informaci... Catalogo de Informaci...

Mapas con historia

Dimension social de la biodiversidad - caracterización geoespacial

- PD Población y demografía
- PI Población indígena
- AS Alimentación, salud y educación
- IA Información ambiental
- EP Economía y producción
- P Pobreza

México visto desde el espacio

Dimensión social de la biodiversidad

Manglares

Línea de costa

Cobertura de suelo



Information dissemination: Geoportal 2.0

One Geoportal

More than 4600 maps

100,000 aerial photos

Soon more than 7.2 Mio registries
of Mexican's flora and fauna

New functions of: visualization, data consulting,
advanced filtering, download and printing

CONABIO - Comisión Nacional para el Conocimiento y Uso de la Biodiversidad

Google



Geovisualization: México cloudfree

- **lat**: 10°N - 30°N
- **lon**: 100°W - 100°E
- **Cloud cover**: 0.0% to 100%
- **Satellite**: Sentinel-2 of 25m resolution
- **and low orbit satellite**
- **Final selection**: 100% of 4338 images
- **Processing: Using PCI GXL Geotools**
- **Rendering of actual lower resolution**

What is missing?

- **Final polishing: Cutline editing, radiometric adjustment**
- **Final full resolution (5m) rendering**
- **Post-mosaic editing**
- **Adding Digital Elevation Model (15m), bathymetry, coastal dynamic with Landsat data**

~14) being processed

least cloud, best radiometry



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First completely cloudfree, seamless 5m ground resolution satellite mosaic of México

Prototype: http://www.biodiversidad.gob.mx/storymaps/mosaico/CONABIO_MosMex_092015_leaflet.html



Geovisualization: México cloudfree

The final mosaic will/can be used for:

- Basemap for any kind of web-mapping application (as CONABIO's geoportal)
- Texture for 3D and 4D animations with biodiversity related content
- Baseline satellite information for environmental studies for the academic sector
- Educational purposes (e.g. Secretaría de Educación Pública SEP)
- General cartography
- Cadastral applications
- Esthetic applications (videos, posters, large scale printouts)



Public version available early 2016

Thank you