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National Focal Point AfriGEOSS - Madagascar

GEO plenary side event
DSWG and DMP TF
12 November 2014
– 14h00 – 17h30



PLAN

- **AfriGEOSS in General (Background, Vision, Goals, Objectifs and Perspectives)**
- **AfriGEOSS perspectives in Indian Ocean**
- **AfriGEOSS Perspectives in Madagascar**

HISTORY OF AfriGEOSS

RIO+20 AND THE



- The outcome of the Rio+20 Conference, building on action from the Millennium Development Goals,
- reaffirmed Sustainable Development as the primary objective of the Global Agenda post-2015.
- Sustainable development must be pursued through an integrated approach addressing each of its three components – **Economic**, **Social** and **Environmental**.

RIO +20 AND



- The Conference confirmed the importance of **Earth observation data and information for policymaking, and recognized the relevance and ongoing efforts in developing global environmental observing systems, and the need to support developing countries in their efforts to collect and use environmental data was also reinforced.**

ABOUT



- The Afri GEOSS is GEO in Africa;
- The AfriGEOSS, initiative in GEO IX plenary session in Brazil – Foz d'Igassu, developed within the GEO framework, will strengthen the link between the current GEO activities with existing capabilities and initiatives in Africa and will provide the necessary framework for countries and organizations to access and leverage on-going bilateral and multilateral EO-based initiatives across Africa, thereby creating synergies and minimizing duplication for the benefit of the entire continent.

- This coordination initiative has been recognized essential to enhance Africa's capacity for producing, managing and using Earth observations, thus also enabling the Region's participation in, and contribution to, the Global Earth Observation System of Systems (GEOSS)

VISION OF THE

- The AfrigeOSS vision is a continent where decisions on policy and implementation programs, involving the production, management and use of Earth observation, are taken with the involvement of all stakeholders, through a coordination framework enabling the linkage country-region-continent that AfrigeOSS wants to build.
- This is expected to be realized, in the medium-long term, by strengthening and enlarging the role of the existing national, regional and continental institutions

GOALS OF AfriGEOSS

- AfriGEOSS aims to provide the necessary framework for African countries and organizations as well as international partners to access and leverage on-going local and international bilateral and multilateral EO-based initiatives across Africa, thereby creating synergies and minimizing duplication for the benefit of the continent.

8 OBJECTIVES OF

- To achieve the above, a set of overall objectives has been defined for AfrigeOSS:
- Coordinate and bring together relevant stakeholders, institutions and agencies across Africa that are involved in GEO and other Earth observation activities;
- Provide a platform for countries to participate in GEO and to contribute to GEOSS;
- Assist in knowledge sharing and global collaboration;

- Identify challenges, gaps and opportunities for African contributions to GEO and GEOSS;
- Leverage existing capacities and planned assets and resources; and
- Develop an appropriate strategy and participatory model for achieving the above goals.
- Develop a strategy of Communication of the Earth Observation data in Africa

OFFICIAL LAUNCH OF

- During the AfricaGIS 2013/GSDI14, held in Addis Abeba, AfriGEOSS was launched on 5 November 2013.
- AfriGEOSS is an initiative by the intergovernmental Group on Earth Observations ([GEO](#)) aimed at building infrastructural capacities in Africa to benefit from geospatial [data](#) for sustainable development.
- GEO states: "The intergovernmental Group on Earth Observations (GEO) is playing a key role by supporting the Environmental component of the Sustainable Development agenda at the global level, and also at the regional level through a dedicated initiative, focused on Africa – AfriGEOSS.
- AfriGEOSS is designed to support the continent's efforts to bridge the [digital](#) divide and build a knowledge-based economy, by enhancing Africa's capabilities for producing, managing and using [Earth Observation](#) data and information.

SPEECH ABOUT THE OFFICIAL LAUNCH OF AFRIGE OSS



**PROMOTION OF THE
GEO X PLENARY SESSION AND
MINISTER SUMMIT OF GEO
IN GENEVA 15-16 JANUARY 2014**



AfriGEOSS

GEO GROUP ON EARTH OBSERVATIONS

AfriGEOSS

A vehicle for Africa to contribute to and benefit from GEOSS through the investment in and pooling of resources



- Sustained operational infrastructure



- A stream of data, metadata and products for

AfriGEOSS



GEO GROUP ON EARTH OBSERVATIONS

BLACKBRIDGE

RAPIDEYE REDD+

5

AfriGEOSS

The Global Earth Observation System of Systems



GEO GROUP ON EARTH OBSERVATIONS

CIMA RES FOUNDAT

COUNTRIES MEMBERS OF AfrigEOSS



Algeria	Guinea-Bissau
Burkina Faso	Guinea,
Cameroon	Republic of
Central African	Madagascar
Republic	Mali
Congo	Mauritius
Cote d'Ivoire	Morocco
Egypt	Niger
Ethiopia	Nigeria
Gabon	Senegal
Ghana	South Africa
	Sudan
	Tunisia
	Uganda



Source: <http://www.earthobservations.org/members.php>

ORGANIZATIONS MEMBERS OF



- African Association of Remote Sensing of the Environment (AARSE),
- African Center of Meteorological Application for Development (ACMAD),
- Environmental Information System (EIS-Africa),
- UN Economic Commission for Africa (UNECA),



PERSPECTIVES

**Implementation of the 5 Activities Areas
in the country member of AfriGEOSS**

1. User Needs and Applications:

- **Agriculture:** GEO Global Agricultural Monitoring (GEOGLAM) in Africa
- **Biodiversity:** GlobWetland Africa
- **Climate :** Global Framework for Climate Services in Africa
- **Ecosystems:** Global Forest Observations Initiative in Africa
Working Group on Land Cover for Africa
- **Disasters :** Disasters Initiatives in Africa
- **Meteo:** The Monitoring for Environment and Security in Africa
- **Energy:** Towards a Bioenergy Atlas for Africa (BAFA)
- **Water:** The TIGER initiative
GEOSS African water Cycle Coordination Initiative (AfWCCI)

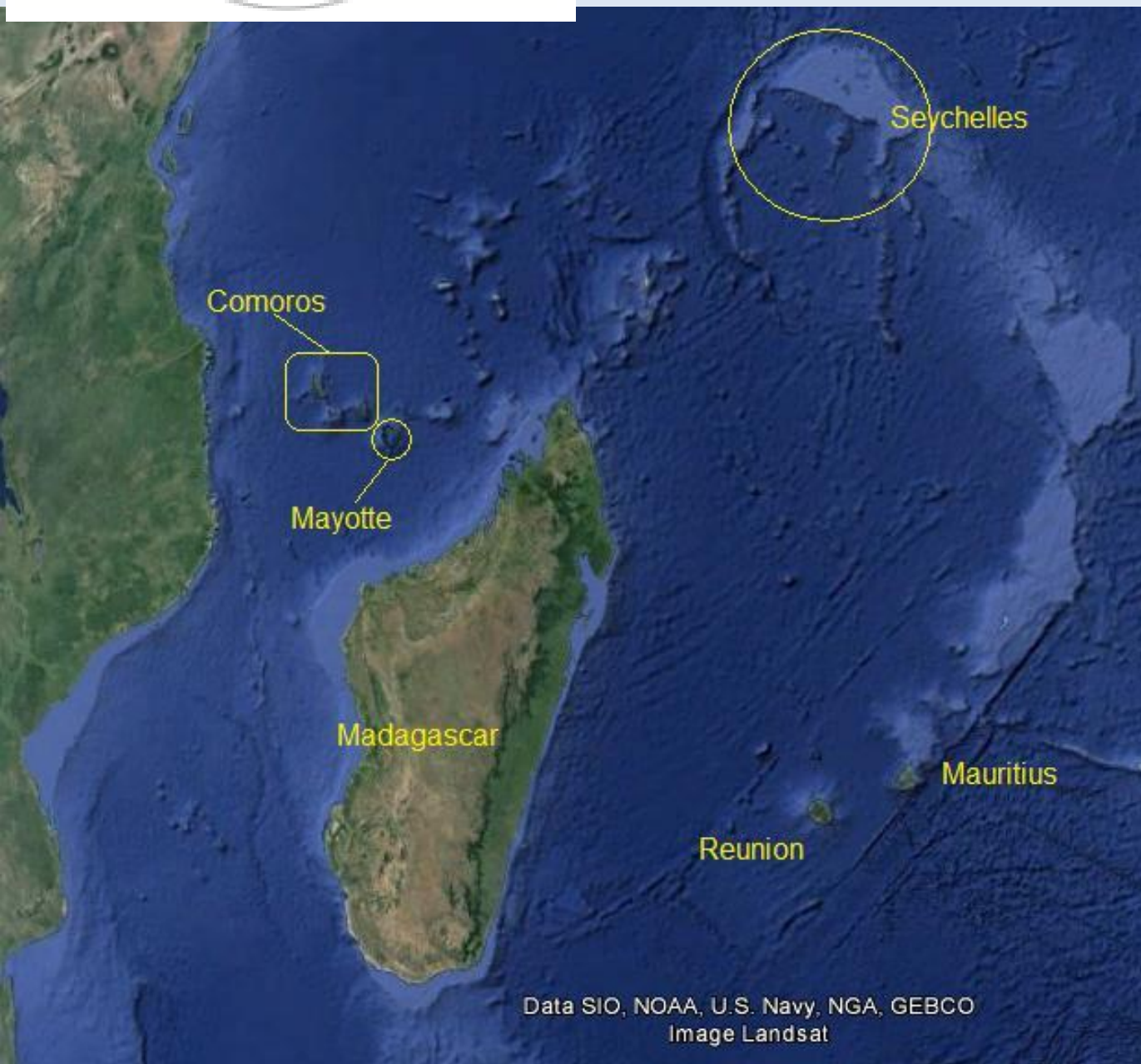
2. Data and Infrastructure

- GEOSS Portal
- Afronaison Africa Broker
- AGEOS Catalogue
- RCMRD Data Portal
- SANSA
- SERVIR /Africa Geodata Portal
- UNECA GEO Info
- GEOCAB Portal

- 3. Human Capital Development**
- 4. Ressource Contributors Coordination**
- 5. Communication and Outreach**



**PERSPECTIVES IN
IOC**



The IOC aims to achieve political and economic co-operation, sustainable development in a global context, co-operation in the field of agriculture, maritime fishing, and the conservation of resources and ecosystems, and strengthening of the regional cultural identity, through cooperation in cultural, scientific, technical, educational and judicial fields

SEAS-OI Station (*Survey of Environment Assisted by Satellite in the Indian Ocean*)



Satellite Images Receiving Station



- **COVERAGE** : Indian Ocean Region, part of East Africa ;
- **Received data** : SPOT5, RADARSAT ;
- **SENTINEL ??**

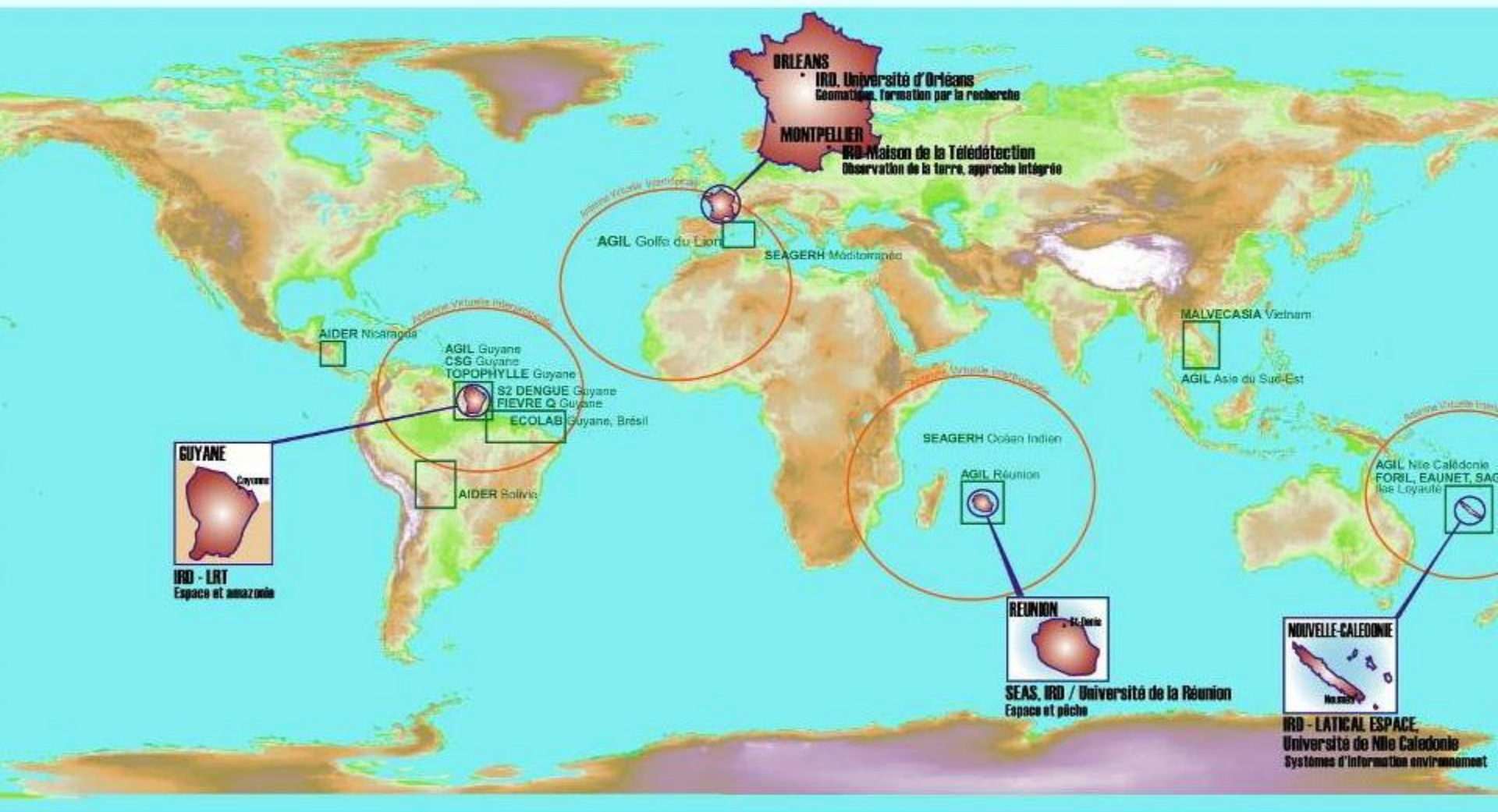
Up to now, data from SEAS-OI are freely available for public institutions.

PROJECT SEAS-OI

Survey Environment Applied by Satelite in Ocean indian

- In Madagascar, a network of spatial data endusers ensures good transmission of scientific and technical informations. AMESD receiving stations are implemented in Toliara (South West) and in Antananarivo. A receiving station implemented in Reunion island can provide free optical and radar data for all national institutions in the IOC Region and east africa coast

Pôles de compétences et chantiers géographiques



GUYANE
 Guyane
 IRD - LRT
 Espace et amazonie

REUNION
 Réunion
 SEAS, IRD / Université de la Réunion
 Espace et pêche

NOUVELLE-CALÉDONIE
 Nouvelle-Calédonie
 IRD - L'ATICAL ESPACE,
 Université de Nlle Calédonie
 Systèmes d'information environnement





Satelite Antenna offered by **AMESD**

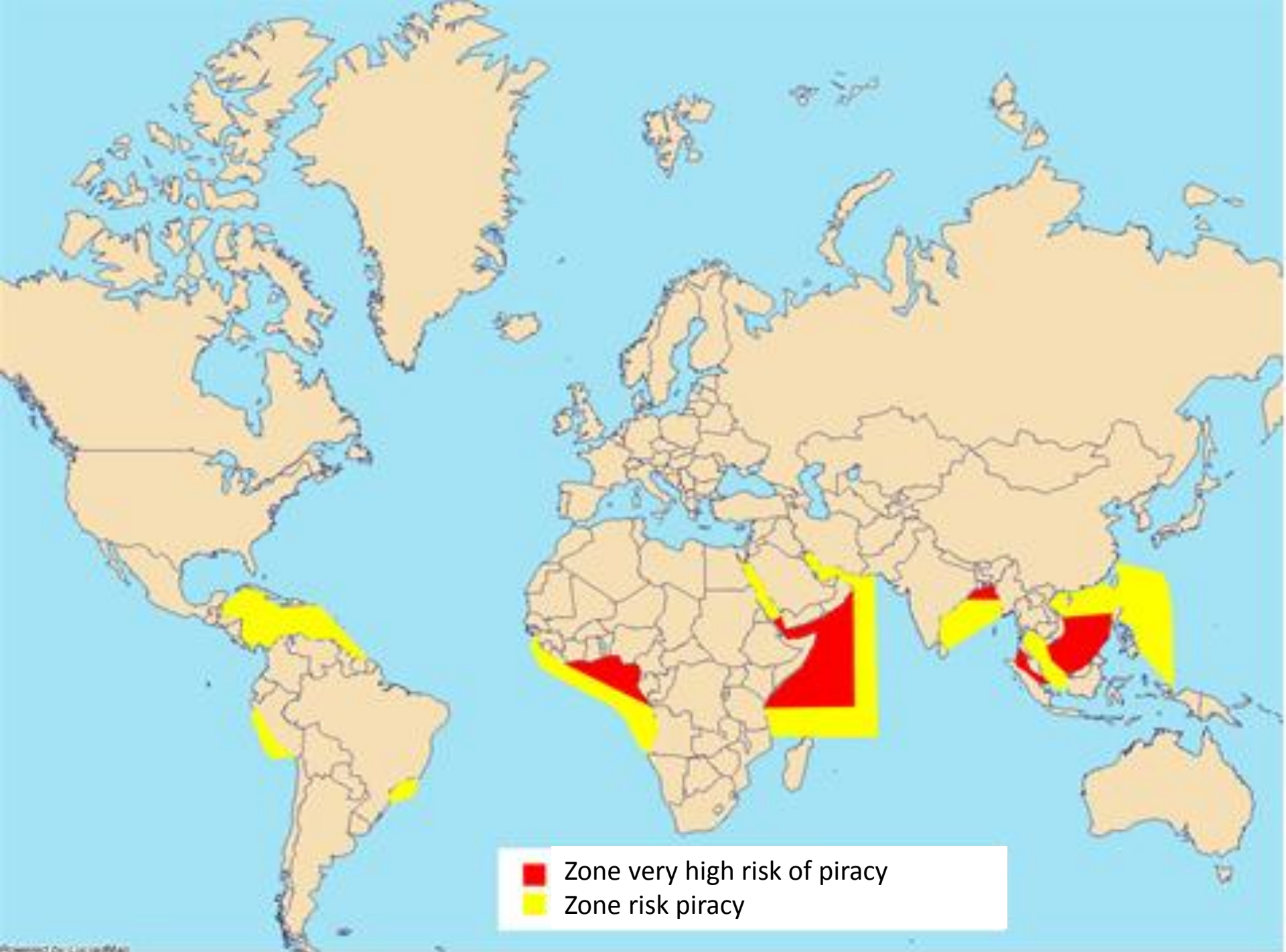
Following

- the temperature ,
- the sea level
- Fisher Boat in the IOC
- Concentrations of
chororophylles

Identifying the Potential
Fishing Zone

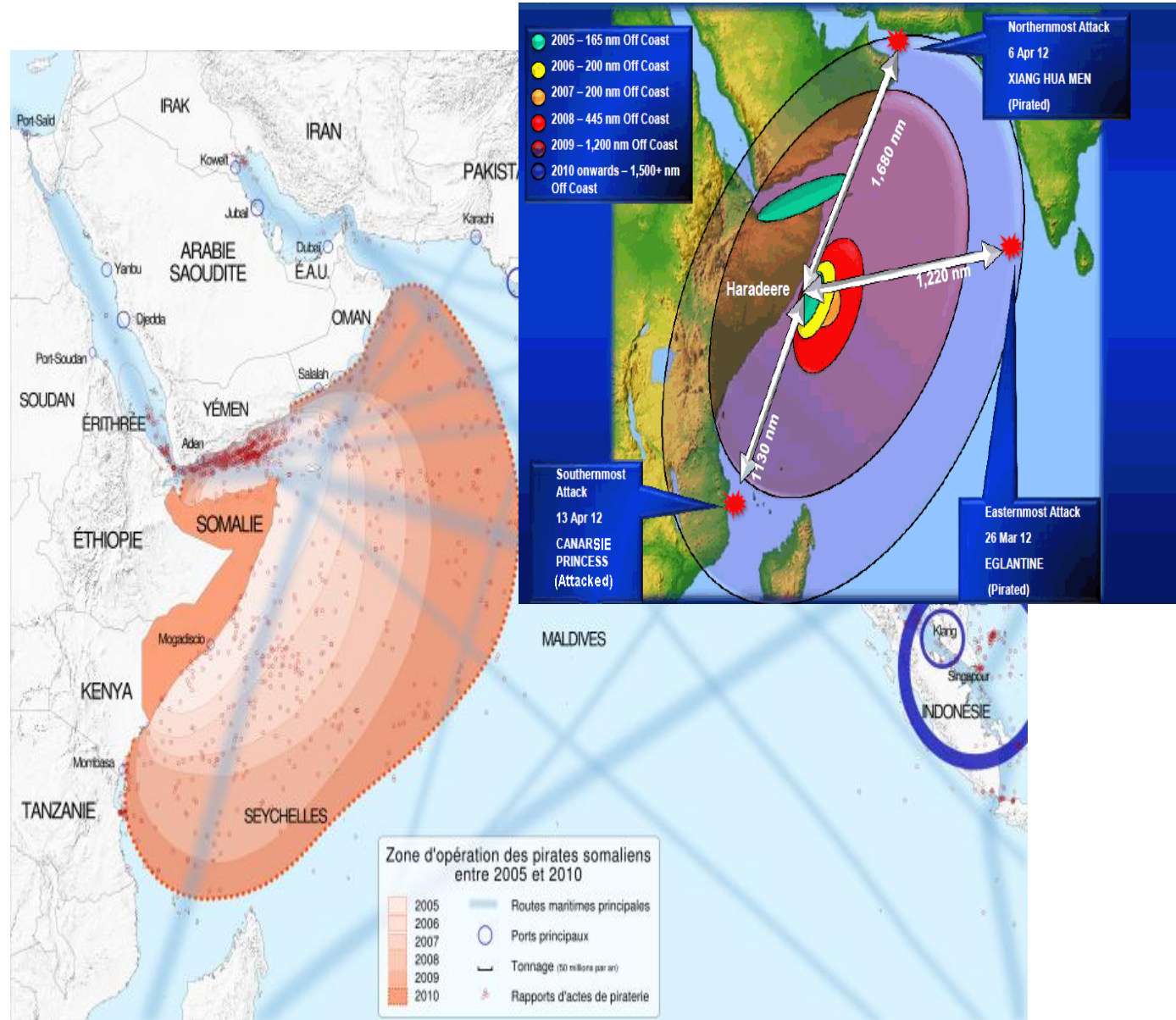
PROJECT MASE IN IOC

- **The MAritime Security (MASE)** project is Implemented by the IOC for Eastern and Southern Africa and Indian Ocean region. (ESA-OI),
- The MASE have mobilized against piracy and maritime security.
- This regional mobilization helped countries in the region to contribute in the fight against piracy.;
- This resulted in a regional strategy ESA-OI fight against piracy. Beyond regional responses, each country now seeks to empower the fight against maritime piracy.



Piracy in Indian Ocean from 2005 to 2010

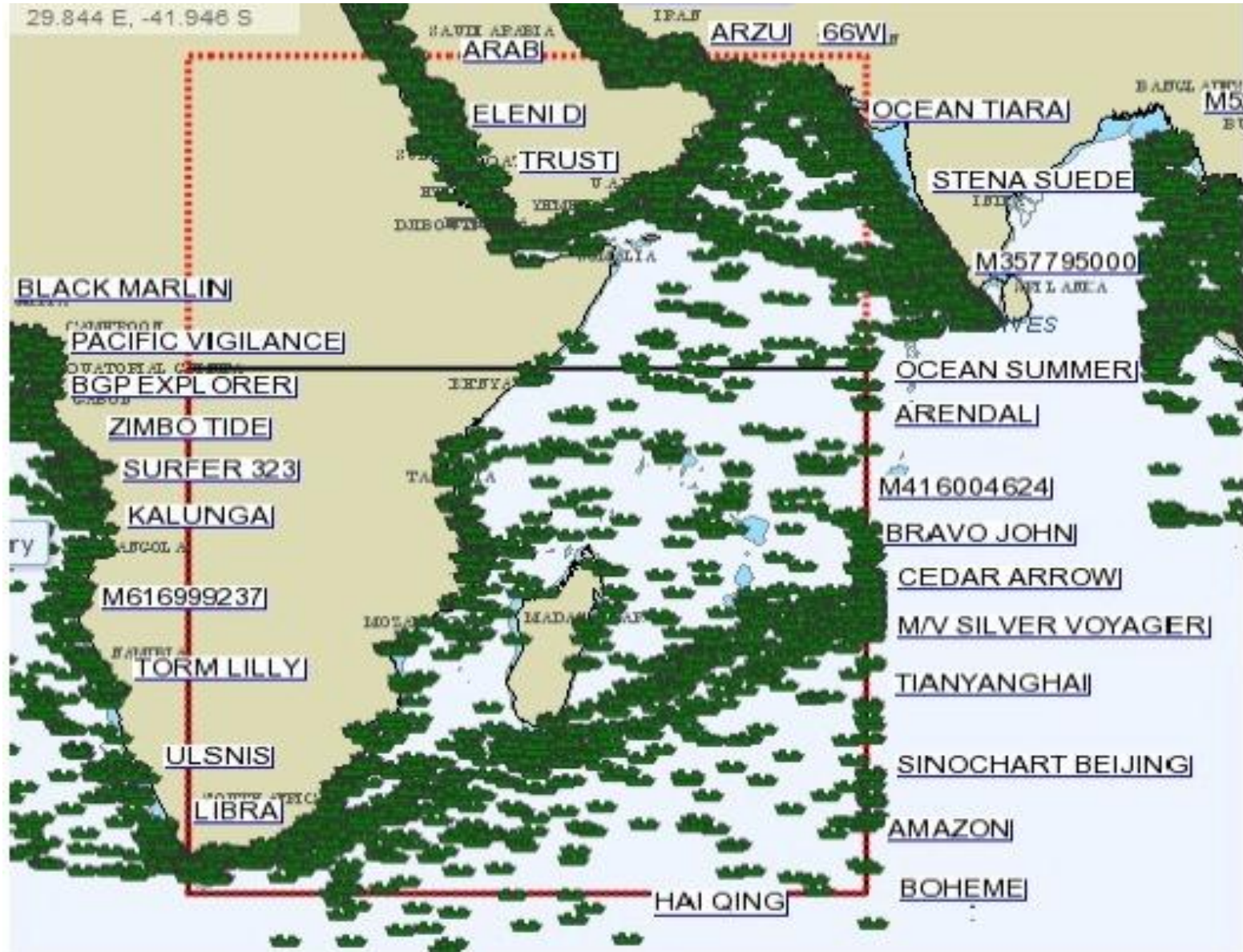
Due to the effective cost of the use of MPA (Air Maritime Patrol), the lack of dedicated Air assets and the limited capacity of drones (first generation), the contribution of Satellite was decisive in the fight against Piracy. But Satellites can have a dual use. Technical capabilities can be applied both for Piracy Survey and Natural Resources management. This is why Madagascar try to develop a global approach in order to optimize his own use of Satellite support as a National level, with an extensive approach in terms of collaboration at the Regional and international level.



PROJECT MASE

- This mobilization has also convinced the European Union as the main partner of the IOC,
- To support both national and regional levels. IOC in collaboration with other regional organizations of the ESA-OI, COMESA and the EAC have developed a project to support maritime safety (MASE Start-up) of which the officer is the IOC to implement the actions most urgent and prepare the region for the implementation of the regional strategy against piracy.

THE GREAT POWER COMPETITION IN THE INDIAN OCEAN



THE PROJECT MESA in IOC

Monitoring Environment and Security for Africa

- Monitoring Environment and Security for Africa has following the project AMESD in the IOC Region.
- The MESA thema in the IOC is : « Marine and Coastal Management in the South West Indian Ocean Région »..
- The countries covered by MESA: Seychelles, Madagascar, Mauritius, Comoros, Reunion, Kenya, Mozambique and Tanzania

OBJECTIF GLOBAL DU PROJECT MESA

- To increase the decision-making and planning capacity of institutions mandated for marine and coastal management in IOC member states and in neighboring countries of the Mozambique Canal, by enhancing access to and exploitation of relevant Earth Observation applications.

OBJECTIVE SPECIFIC OF THE PROJECT

MESA

- To increase the decision making and planning capacity of institutions mandated for marine and coastal management in IOC member states and in neighbouring countries of the Mozambique Canal,
- by enhancing access to and exploitation of relevant Earth Observation (EO) application.
- To provide an improvement and sustained access to Earth Observation (EO) data and information to stakeholders of IOC states and neighbouring countries of Mozambique channel



PERSPECTIVE IN MADAGASCAR





THE GEOSS - SOCIETAL AREA BENEFIT IN MADAGASCAR

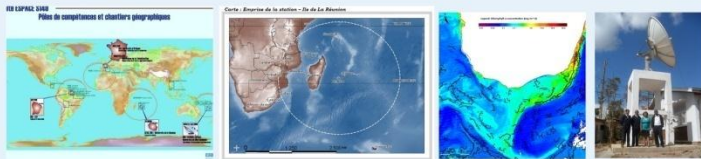
1. BIODIVERSITY OF MADAGASCAR (REBIOMA - MNP)



Le Réseau de la Biodiversité de Madagascar (REBIOMA) a fait des études spéciales à Masoala et Mananara Nord



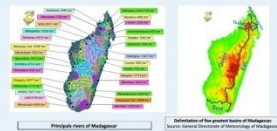
2. BLUE PLANET WITH SEAS OI (Ministry of Fisheries)



3. MONITORING OF THE EVOLUTION OF THE FOREST (FOREST and ONE)



4. WATER (REM page69)



5. DISASTERS (BNGRC)



6. STATIONS SATELLITAIRES (IOGA) (SANSa)



7. HEALTH-ENVIRONMENT (Institut Pasteur)



1. Biodiversity
2. Oceans
3. Ecosystems, Fire
4. Meteorology
5. Health
6. Disasters

IOGA

- **IOGA:** Institut Observatoire Geophysique of Antananarivo The University based in the capital and offers academic training in Geophysique. Another academic on remote sensing and natural risks is proposed jointly by University of Antananarivo and University of Réunion.

BIODIVERSITY

- **The Global Biodiversity Information Facility (GBIF) France** work in Madagascar to develop the MADABIF – (Madagascar Biodiversity Information Facility) with the **REBIOMA**- REseau des BIODiversity in Madagascar or Biodiversity in Madagascar Network. <http://www.rebioma.net/> . The Portal of the REBIOMA is in <http://data.rebioma.net/>

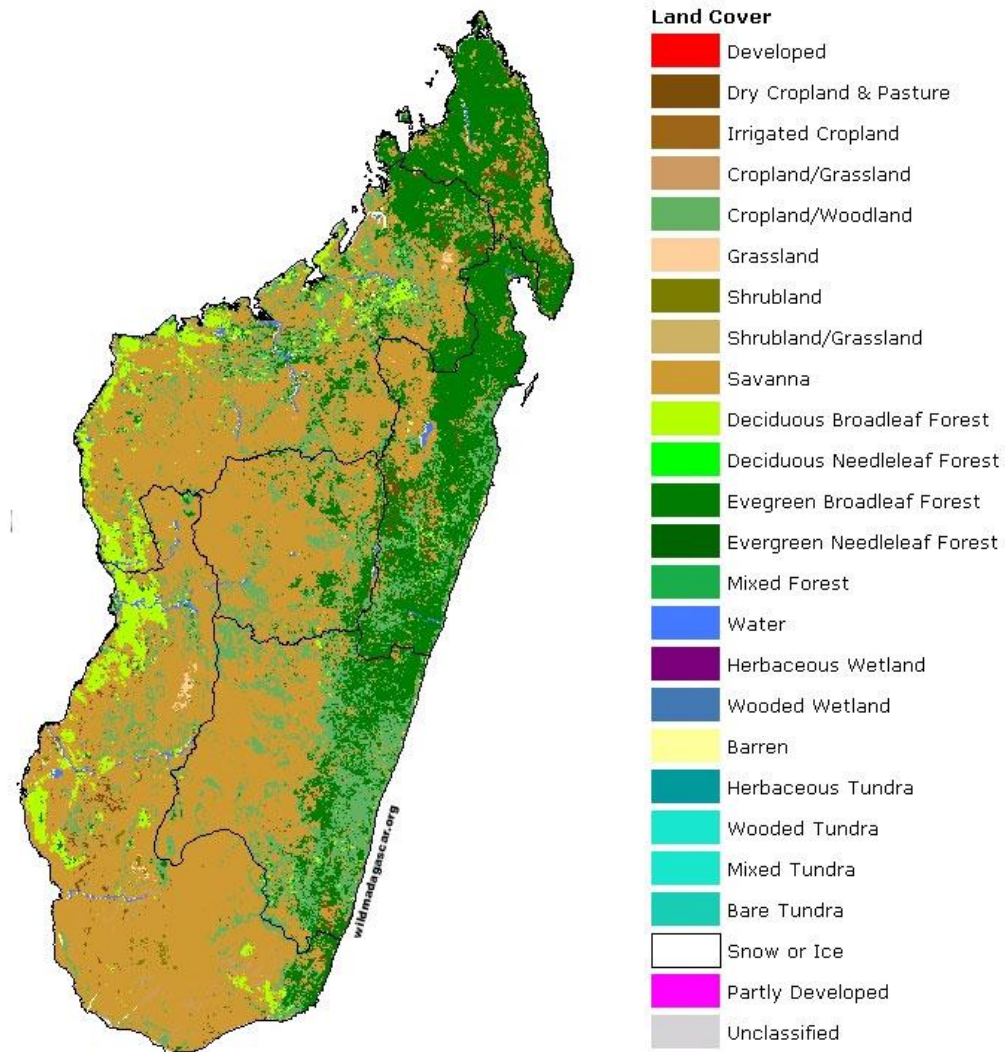


- **The SANSa** –South Africa National Satellite Agency has a great satellite station to cover the Mozambic Chanel and Madagascar and the South, South Est and South West of Africa



Land Cover of Madagascar

- Land Cover Map from
FAO Data Base ;



Map of 1990-2000- 2005-2010 deforestation, 2013

- Sustainable management of national forest resources needs complete, reliable and up-to-date
- forest data. The assessment of the change in Madagascar's natural forest cover, from 2005 to
- 2010, gave the following main results and highlights:
 - Natural forest cover in 2010 was estimated at 9,220,040 ha.
 - Approximately 36,000 hectares of natural forest were lost each year in Madagascar, between 2005 and 2010. The annual deforestation rate for the period 2005-2010 is estimated
 - at 0.4%. This represents a decline from previous periods because the rate was 0.8% between
 - 1990 and 2000 and 0.5% between 2000 and 2005.



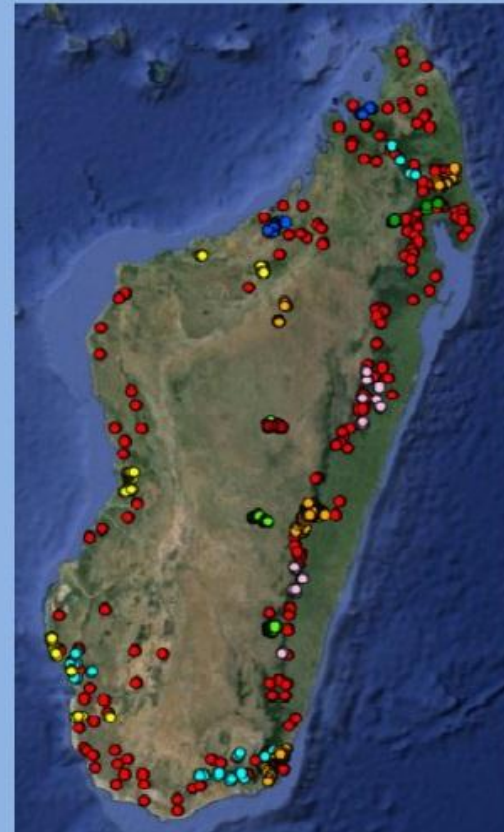
- • *Highest regional rates of deforestation were found in western dry forests with a loss rate of*
- *0.9% and 0.8% per year for this period, respectively, for Boeny and Atsimo Andrefana regions.*
- *In terms of area deforested, Atsimo Andrefana and Menabe regions are the most affected :*
- *almost 66,000 ha and 26,000 ha between the two dates; half of the lost area correspond to*
- *these two regions.*
- • *Spiny forests and dry forests are more vulnerable than moist forests as well as low altitude*
- *forests compared to high altitude forests.*
- *So, Madagascar remains in the category of countries with high rates of deforestation.*

FOREST CARBON DATABASE

Available data

Forest carbon database

Inventories	Year	Plot numbers
● IEFN-0 (DGF)	1995/96	795
● JariAra (DGF/USAID)	2006/07	550
● FORECA Ivohibe (GTZ)	2008	439
● FORECA Tapia (ESSA)	2008	385
● Makira (WCS)	2010	131
● Forêts sèches (CI)	2011	130
● CAZ/COFAV (CI)	2008/09	117
● PHCF (GoodPlanet/WWF)	2010	92
● Honko (BlueVenture)	2012	78
● Itasy (ONE/DGF)	2013	70
● Kirindy (ONE/DGF)	2012	15
● PK32 (WWF/CIRAD)	2012	14
Total		2816



Tr

ACD (Mg ha⁻¹)

ACD (Mg ha⁻¹)

ACD (Mg ha⁻¹)

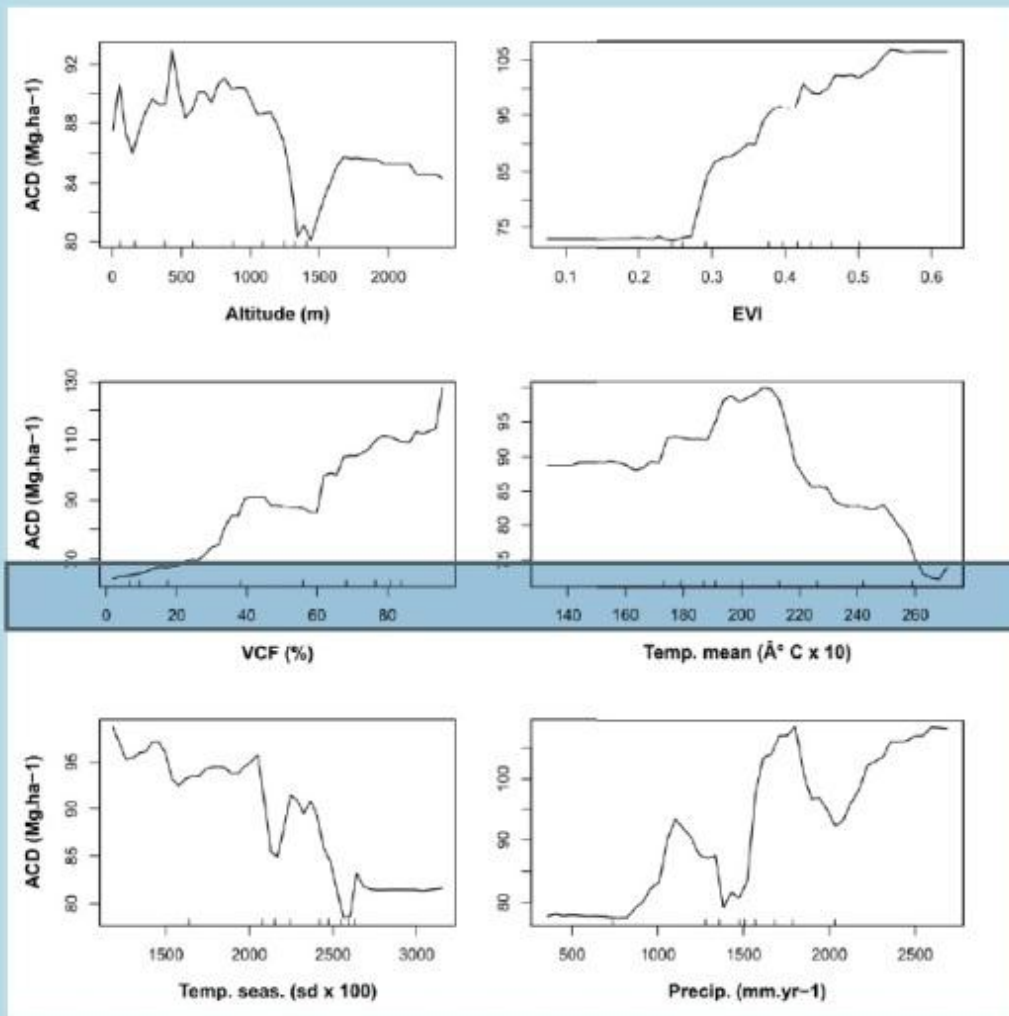
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Tracks ... The model



Random Forest model with explanatory variables:

- Altitude (SRTM)
- MODIS
 - EVI 2000 - 2010
 - VCF 2000 - 2010
- WorldClim
 - Mean Temperature
 - Seasonality temperature
 - Precipitation

The valuation of LiDAR data is in progress.

MAP OF FOREST BIOMASS

Map of forest biomass

- **Best available model**

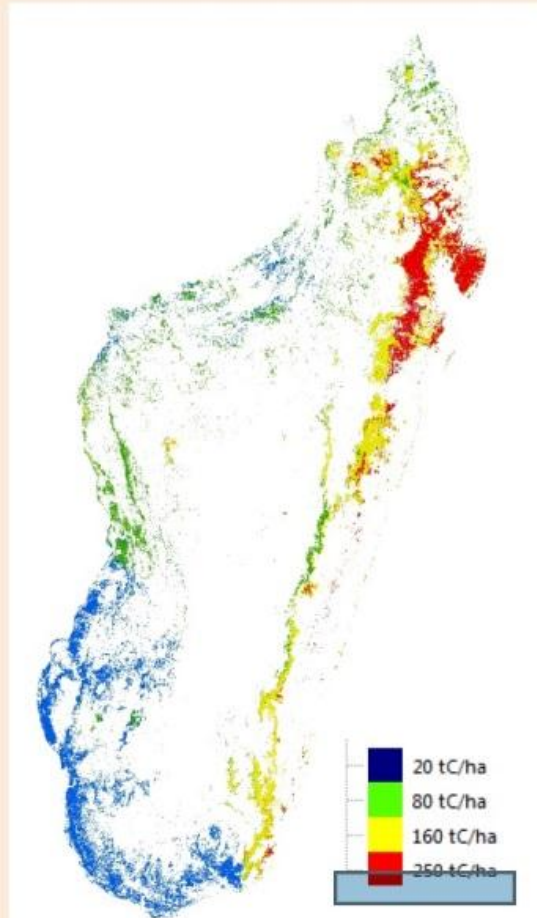
Values after cross-validation (10x)

Model	R2	RMSE	Bias
IEFN	0.52	50.2	106.8
RF	0.72	38.5	83.5
Baccini	0.38	54.8	149.7
Saatchi	0.34	59.0	216.2

- **Map with 250m resolution, dated 2010** (prediction based on the VCF / ITS 2010)

- **Lack of calibration for non-forest areas**

- **Scientific article writing ongoing**



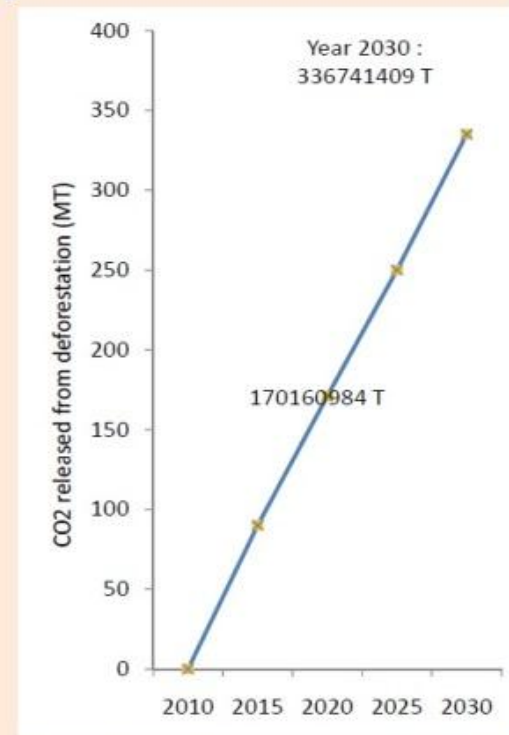
COMBINATION WITH 2010 CARBON MAP

Combination with 2010 Carbon map

- Emissions from 2000 – 2030 * deforestation

	Stocks tC	Emissions tC/year	Emissions tCO ₂ /year	Emissions tCO ₂ cum.
2010	835'284'606			
2015	812'505'525	-4'555'816	-16'704'659	-83'523'295
2020	788'877'065	-4'725'692	-17'327'538	-170'160'984
2025	765'818'143	-4'611'784	-16'909'876	-254'710'364
2030	743'446'039	-4'474'421	-16'406'209	-336'741'409

Annual emissions of ~ 17 MtCO₂



DATA FOREST 2000 – 2010 IN 22 REGIONS OF MADAGASCAR

Region	Forest 2000 (ha)	Carbon 2000 (tC)	Forest 2010 (ha)	Carbon 2010 (tC)	Deforestation (ha/yr)	Emissions (tC/yr)
ANALANJIROFO	1 125 690	196 522 540	1 115 574	187 746 470	-6 040	-877 607
VATOVAVY						
FITOVINANY	172 715	38 896 282	168 792	32 254 090	-4 163	-664 222
ATSIMO						
ATSINANANA	287 723	50 123 809	277 578	44 708 517	-4 069	-541 532
ATSINANANA	383 850	62 563 237	367 486	57 236 755	-3 725	-532 649
SAVA	885 253	165 090 066	870 186	160 766 363	-1 822	-432 370
ALAOTRA						
MANGORO	486 653	72 055 139	461 122	67 740 559	-3 574	-431 454
ATSIMO						
ANDREFANA	1 813 253	54 178 739	1 658 943	50 125 799	-19 291	-405 296
DIANA	563 710	74 630 078	543 219	71 315 763	-2 190	-331 433
ANOSY	515 327	40 971 421	484 016	38 264 822	-4 318	-270 661
BOENY	354 519	29 178 701	331 004	26 587 470	-4 326	-259 126
SOFIA	885 253	108 911 075	870 186	106 361 656	-3 589	-254 943
MENABE	888 059	45 671 047	835 229	43 146 504	-6 100	-252 456
MELAKY	530 406	41 996 836	509 642	39 954 241	-3 169	-204 257
IHOROMBE	156 414	19 971 995	151 362	18 727 956	-1 154	-124 405
AMORON'I MANIA	38 920	5 426 376	34 691	4 777 091	-669	-64 930
ANALAMANGA	55 197	6 857 897	51 836	6 242 615	-472	-61 527
HAUTE_MATSIATRA	61 887	7 019 930	61 124	6 598 909	-367	-42 104
ANDROY	479 371	11 063 767	460 653	10 710 127	-2 140	-35 364
BETSIBOKA	70 281	7 848 668	69 169	7 511 902	-342	-33 675
VAKINANKARATRA	8 971	2 866 522	7 073	2 555 239	-377	-31 130
BONGOLAVA	8 380	2 227 414	8 358	2 172 352	-34	-5 505
ITASY	51	39 453	36	10 951	-40	-2 849
TOTAL	9 661 695	1 044 110 992	9 220 040	985 516 151	-71 971	-5 859 495

