OEIL
Observatoire de l'environnement
Nouvelle-Calédonie

A fire monitoring system by OEIL

Measure the extent of fire pressure on biodiversity to help implementation of appropriate natural resource management measures

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Adrien Bertaud, head of environment department

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Observatoire de l'environnement
Nouvelle-Calédonie

OUR MISSIONS

Our Goal

Facilitate the decision of stakeholders on the measures to be taken to maintain the environment **in a good state**

Monitoring

Analyse and interpret data scientifically

Develop

Develop monitoring tools: indicators, method, benchmark

Inform

Disseminate information to decision-makers and the general public

The observatory :

a non-profit organization

supported by public authorities

24 member organisations : local authorities, environmental associations, local communities, etc.

www.oeil.nc

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- OBJECTIVES
- DATA SOURCES
- METHOD
- FIRE ALERT SYSTEM
- GEDI: geoportal & data analysis platform
- RESULTS
- NEXT STEPS

CONTEXT

Bushfires represent a major pressure on the environment that remains poorly caracterized

Lack of information

- Observation and reporting deficit
- Location and estimation of non-exhaustive and unreliable surfaces

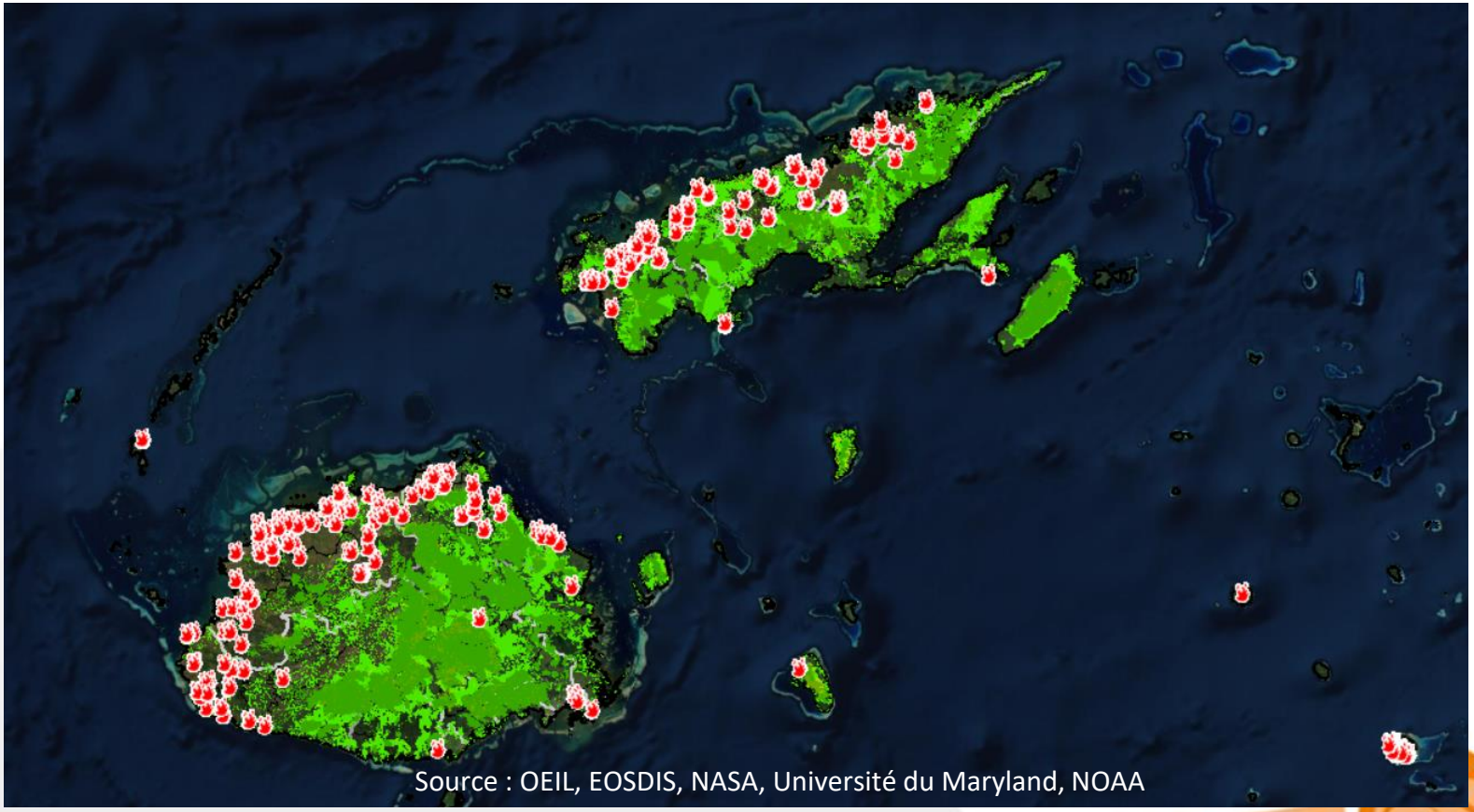
Lack of monitoring of the environmental impacts

⇨ **One of the work areas of the Observatory of the environment**

OBJECTIVES

Provide reference data to characterize fires in order to :

- **Monitor the impact of fires: environment,…**



Source : OEIL, EOSDIS, NASA, Université du Maryland, NOAA

OBJECTIVES

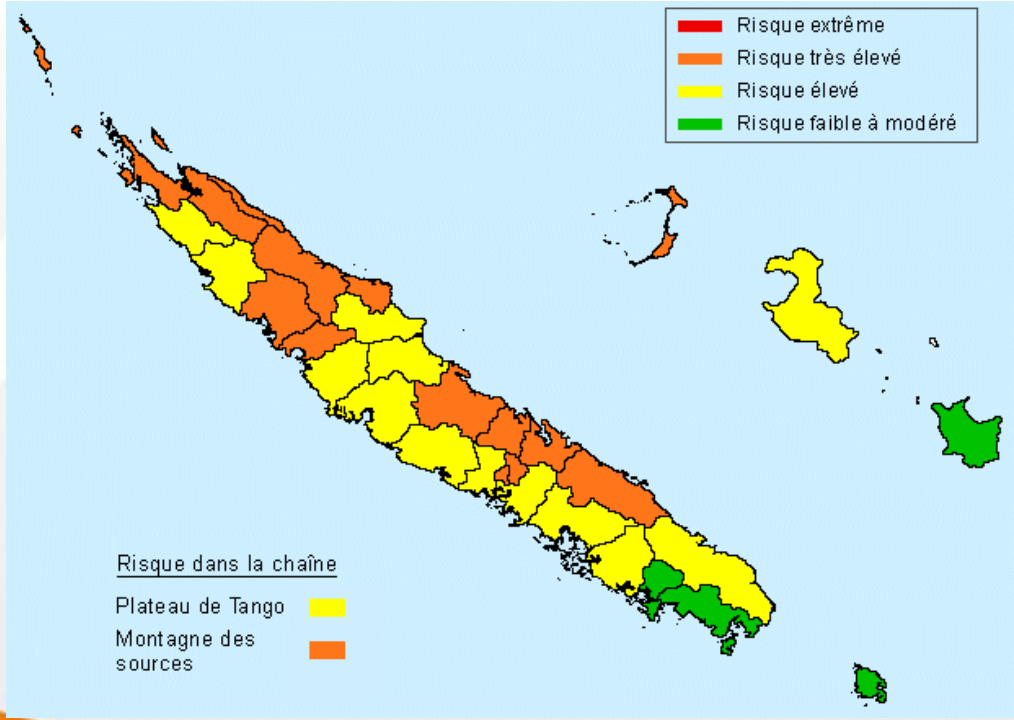
Provide reference data to characterize fires in order to :

- Monitor the impact of fires: environment,…
- **Inform the stakeholders and the population**

OBJECTIVES

Provide reference data to characterize fires in order to :

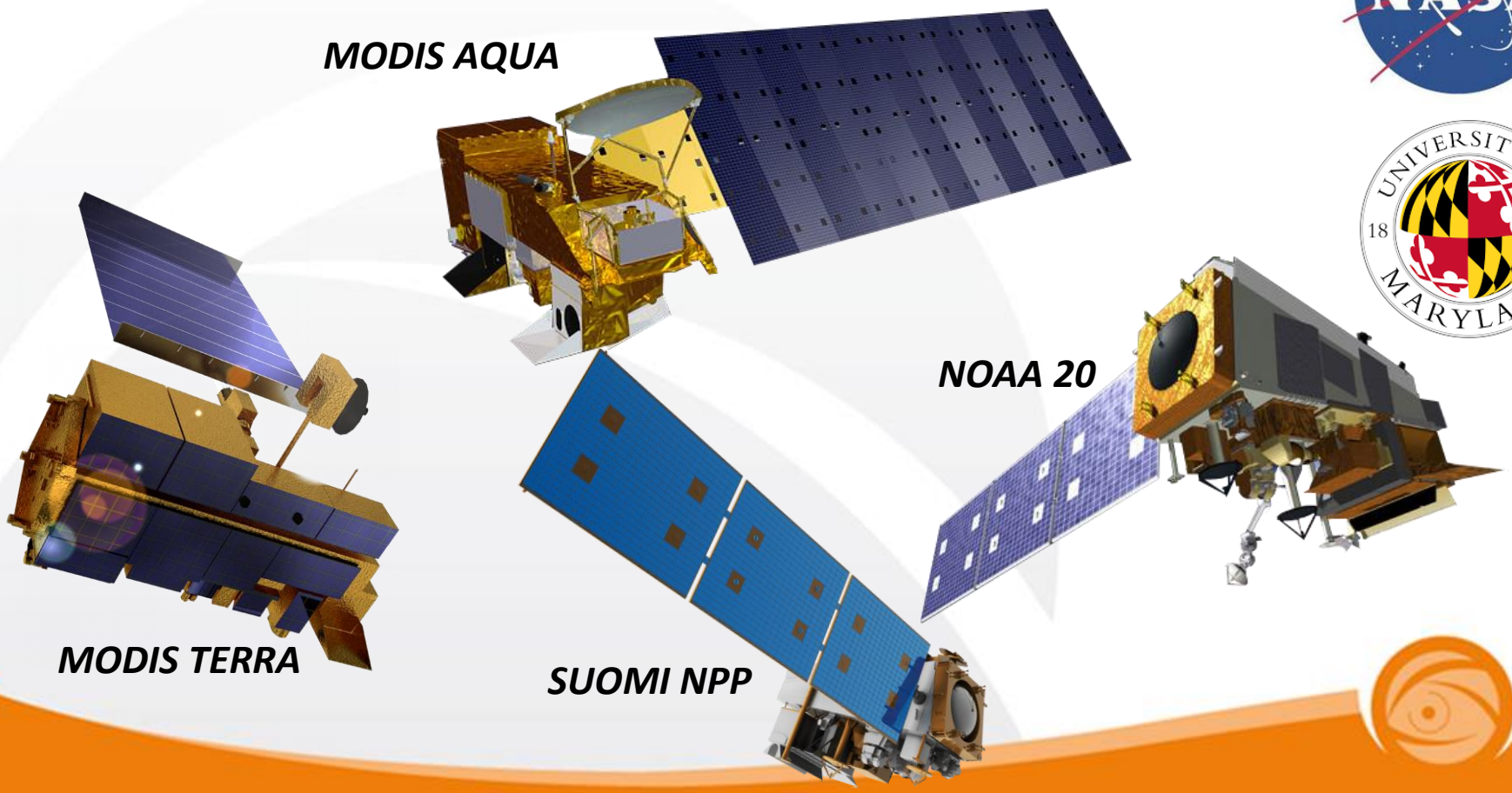
- Monitor the impact of fires: environment,…
- Inform the actors and the population
- **Support the management**



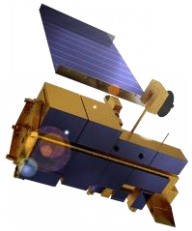
DATA SOURCES

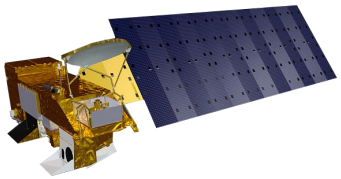
Free remote sensing satellite imagery exploitation

- **MODIS AQUA & TERRA, SUOMI NPP, NOAA 20**



DATA SOURCES





MODIS AQUA & TERRA (NASA, University of Maryland)

 daily detection of hotspots (for both sat.)

- Spatial resolution: pixel 500/1000 m
- Start date: november 2000
- Detection only for the most intense and important fires

Needs data cleanup to get rid of undesired detections of industrial, volcanic heat sources, etc

- **Allows an interesting extension of the data chronicle**
- **Limited use of fire alerts**
- **Not suitable for environmental impact assessment**

DATA SOURCES

SENTINEL

- Début chronique

2017

- Résolution spatiale

Décamétrique

- Revisite

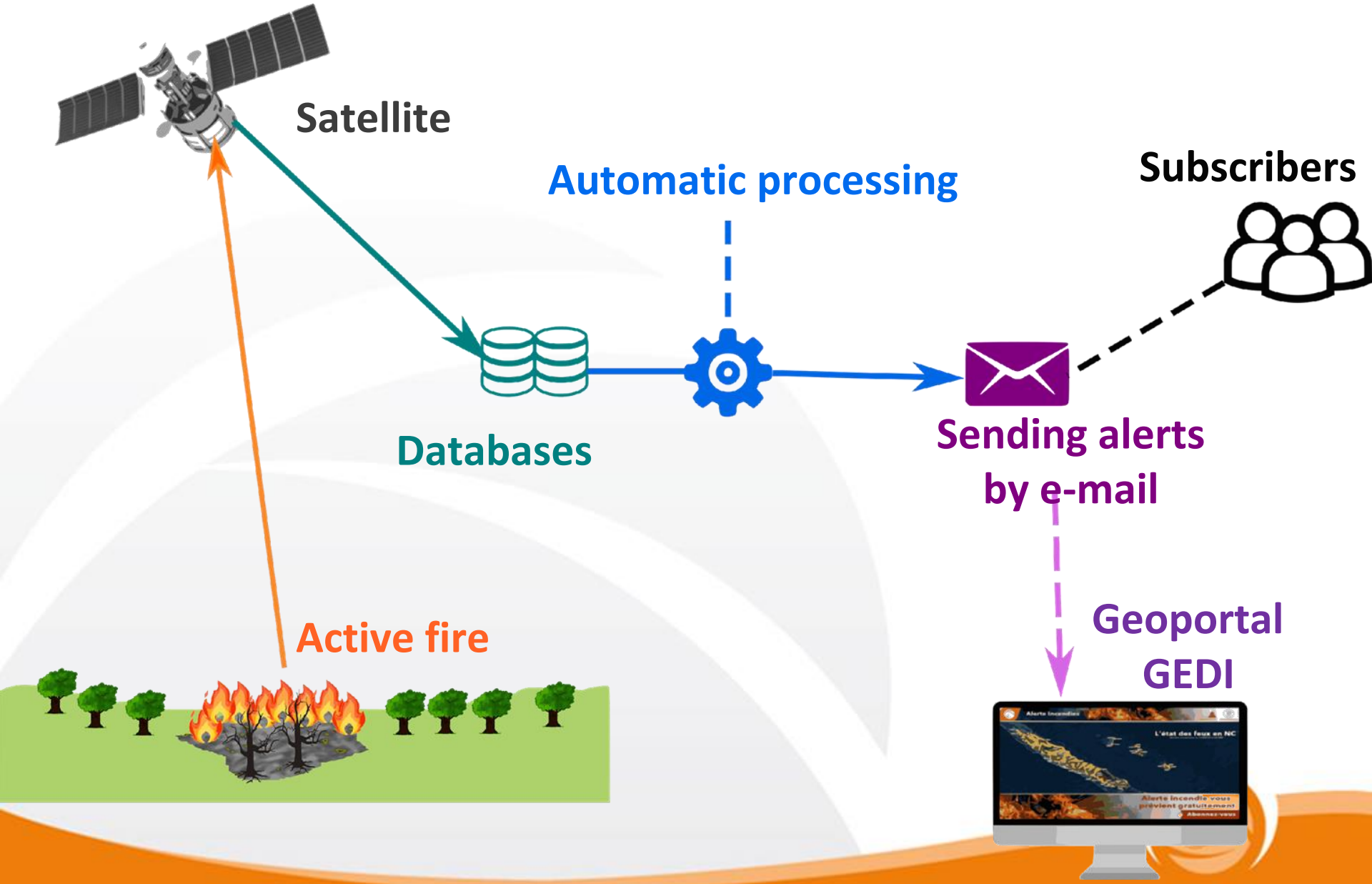
Tous les 5 jours

- **Helpful with pressure characterization**
- **Useful for alert giving and firefight triggering**
- **Gives a first approach to consider environmental impacts**

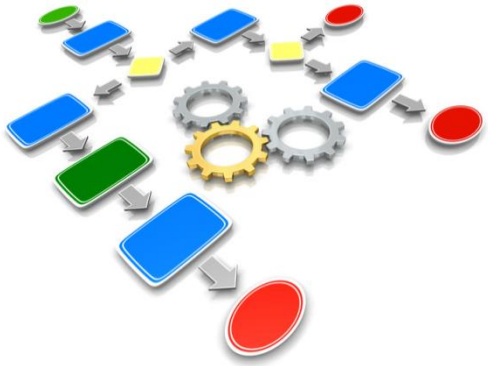
Methods

- Fire Alert System
- Burned area processing chain

METHOD


Satellite
Automatic processing
Subscribers
Databases
Sending alerts
by e-mail
Geoportal
GEDI
Active fire

METHOD

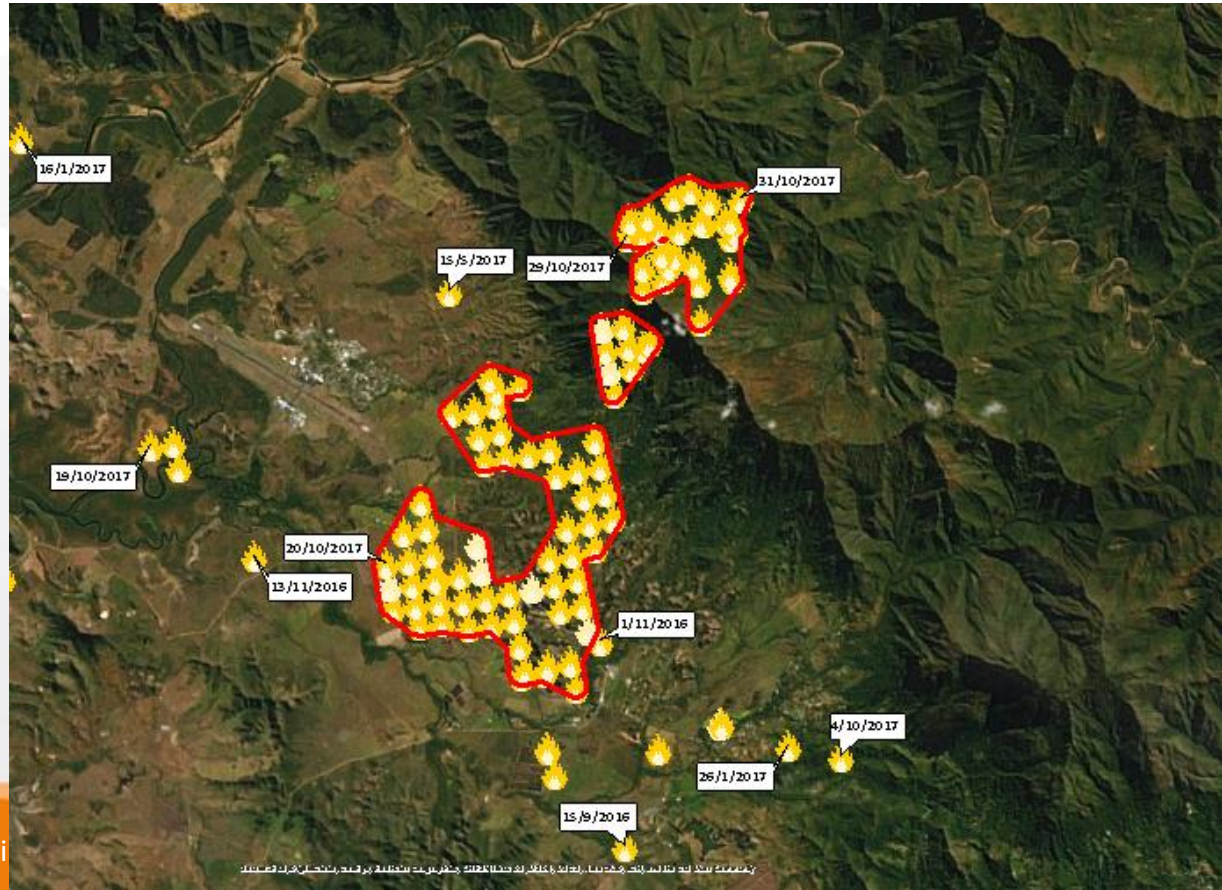


Work process Fire detection received

- Extract and capitalize the relevant data
- **Create potential fire areas in a GIS layer**

Rules of Data Management

- Distance
- Time



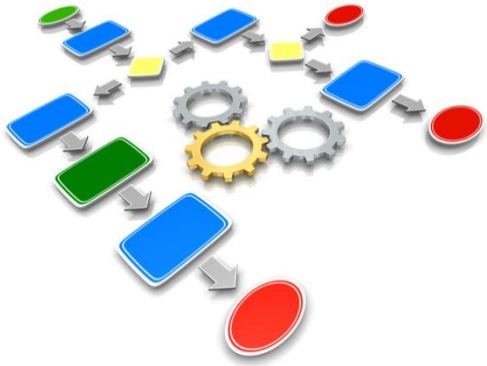
Results

Points -> Polygon

Detections -> Burned area

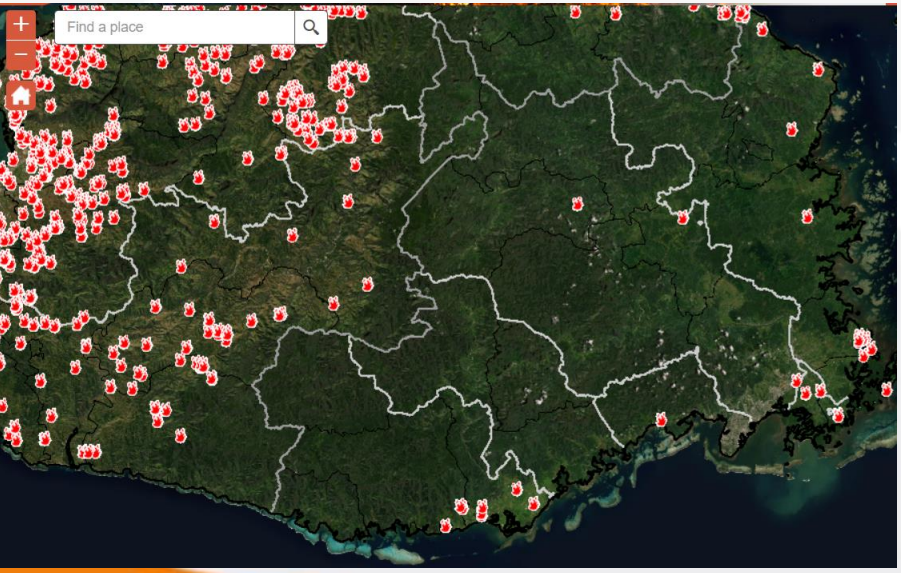
Date -> period

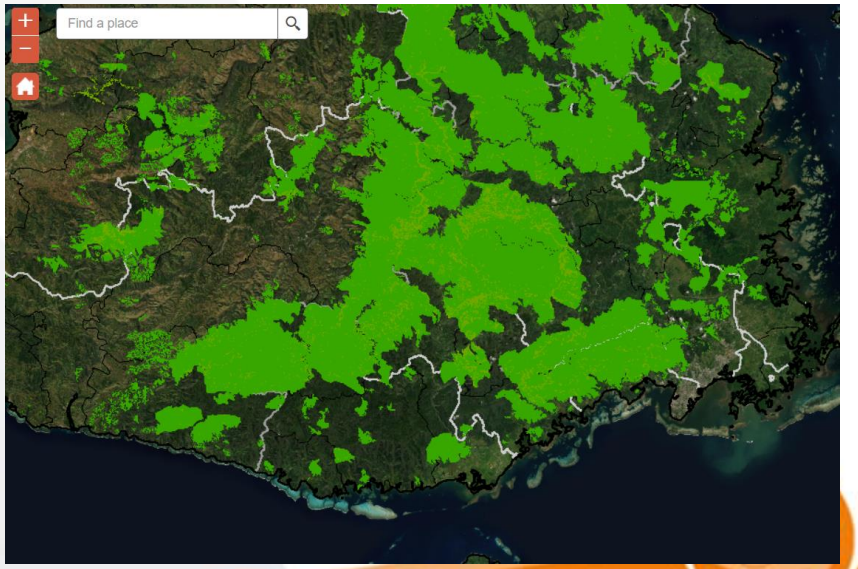
METHOD



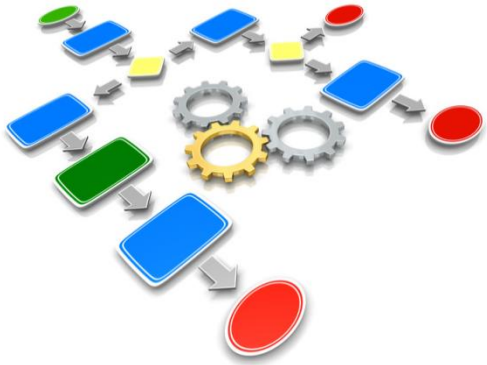
Work process Fire detection received

- Extract and capitalize the relevant data
- Create potential fire areas in a GIS layer
- **Cross the area of fire with GIS layers of interest**





METHOD



Work process Fire detection received

- Extract and capitalize the relevant data
- Create potential fire areas in a GIS layer
- Cross the area of fire with GIS layers of interest
- **Broadcast the information**

GEDI Geoportal

Fire Alert Service

https://geoportail.oeil.nc/FireAlert

https://www.oeil.nc/fr/page/fire-alert-subscribe

METHOD

Using NASA firms that provides fire alerts/informations

- powered with data from four satellites:

SUOMI, NOAA 20, MODIS Aqua & MODIS Terra

- 6 passings per day
- time to send alert from detection: between 2h-4h most of the time

SUOMI (VIIRS) : 23:00 - 02:00 & 12:00 - 15:00
NOAA 20 (VIIRS): 23 :00 – 1 :00 & 12h – 13h
MODIS Terra: 9:00 - 11:00 OR 22:00 - 00:00
MODIS Aqua: 00:00 – 02:00 OR 13:00 - 14:30

METHOD

Using NASA firms that provides fire alerts/informations

- powered with data from four satellites:

SUOMI, NOAA 20, MODIS Aqua & MODIS Terra

- 6 passings per day
- time to send alert from detection: between 2h-4h most of the time

Detection limit

- The fire is too small or not warm enough
- the fire may have started and ended between satellite passes
- cloud cover, heavy smoke, or tree canopy may obscure a fire
- (occasionally the instruments are inoperative)

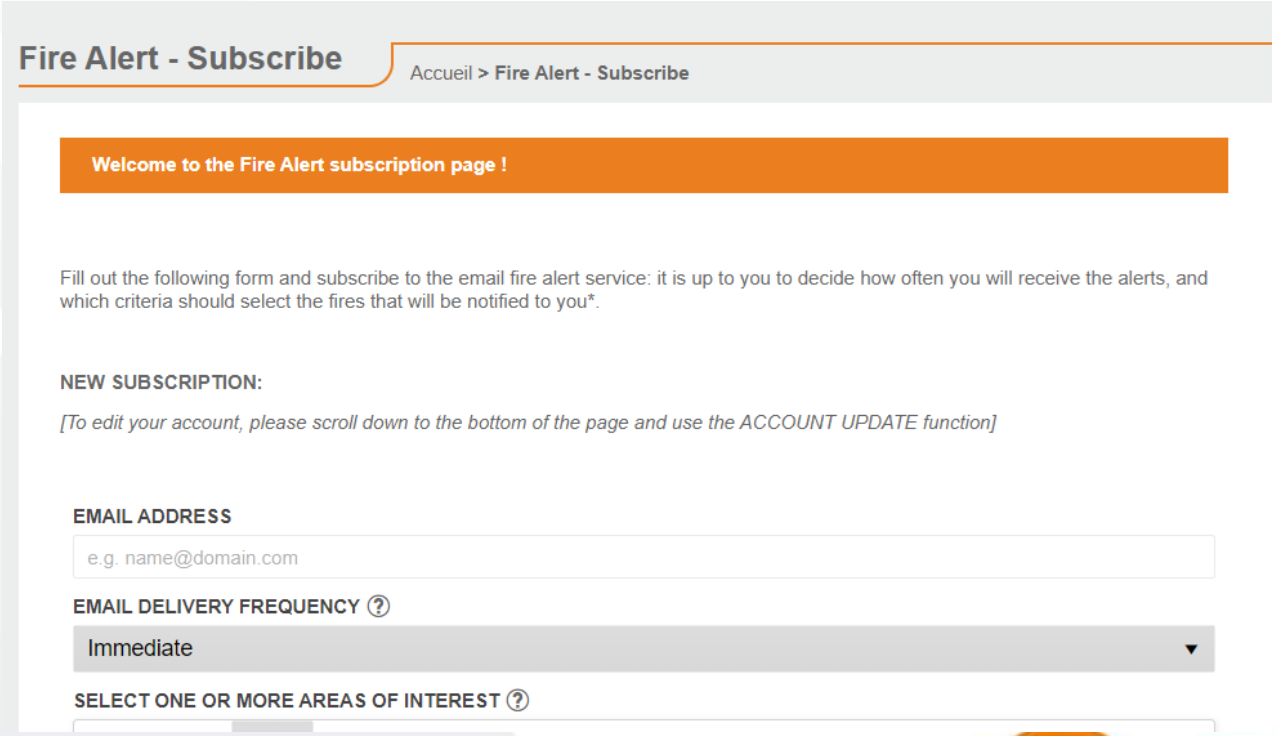
FIRE ALERT SERVICE

Fire Alert

LINK: https://www.oeil.nc/fr/page/fire-alert-subscribe

A subscription page allowing users to register accordingly to their preferences

- Geographical
- Thematic
- Temporal



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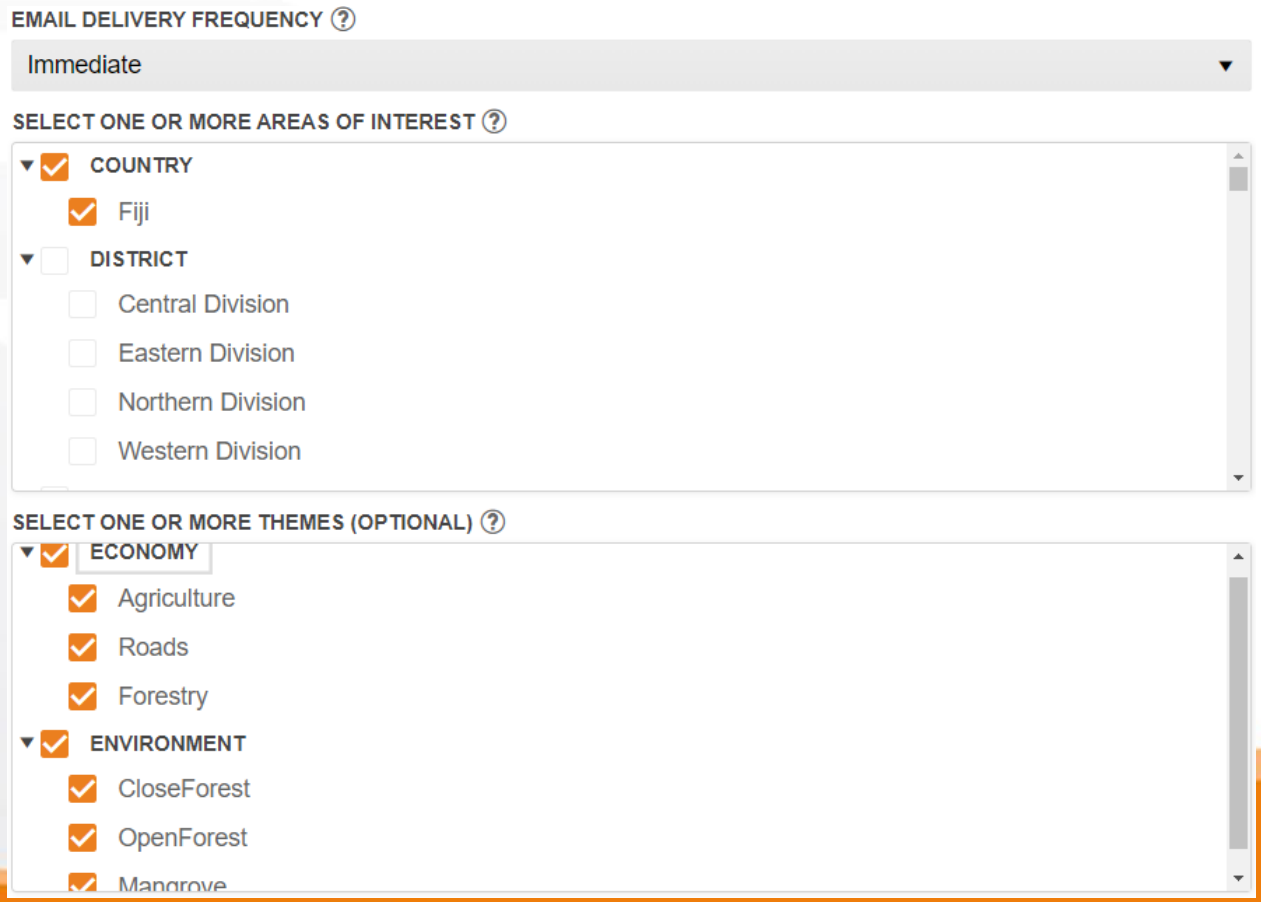

FIRE ALERT SERVICE

An email

- contains basic information accordingly to the preferences selected

Period	Area	Fires count	Burned area (in ha)	Thematic	Sub-Thematic	Source	Open map
24/11/2021	Naitasiri	1	0.00	Economy	Roads	VIIRS	Link
24/11/2021	Naitasiri	1	1.83	Environment	OpenForest	VIIRS	Link
24/11/2021	Nadroga_Navosa	1	24.31	Economy	Forestry	VIIRS	Link

Data sources : EOSDIS, OFIL, The Fijian Government

FIRE ALERT SERVICE

An email

- contains basic information accordingly to the preferences selected
- Refers and redirects to a geoportal

Period	Area	Fires count	Burned area (in ha)	Thematic	Sub-Thematic	Source	Open map
24/11/2021	Naitasiri	1	0.00	Economy	Roads	VIIRS	Link
24/11/2021	Naitasiri	1	1.83	Environment	OpenForest	VIIRS	Link
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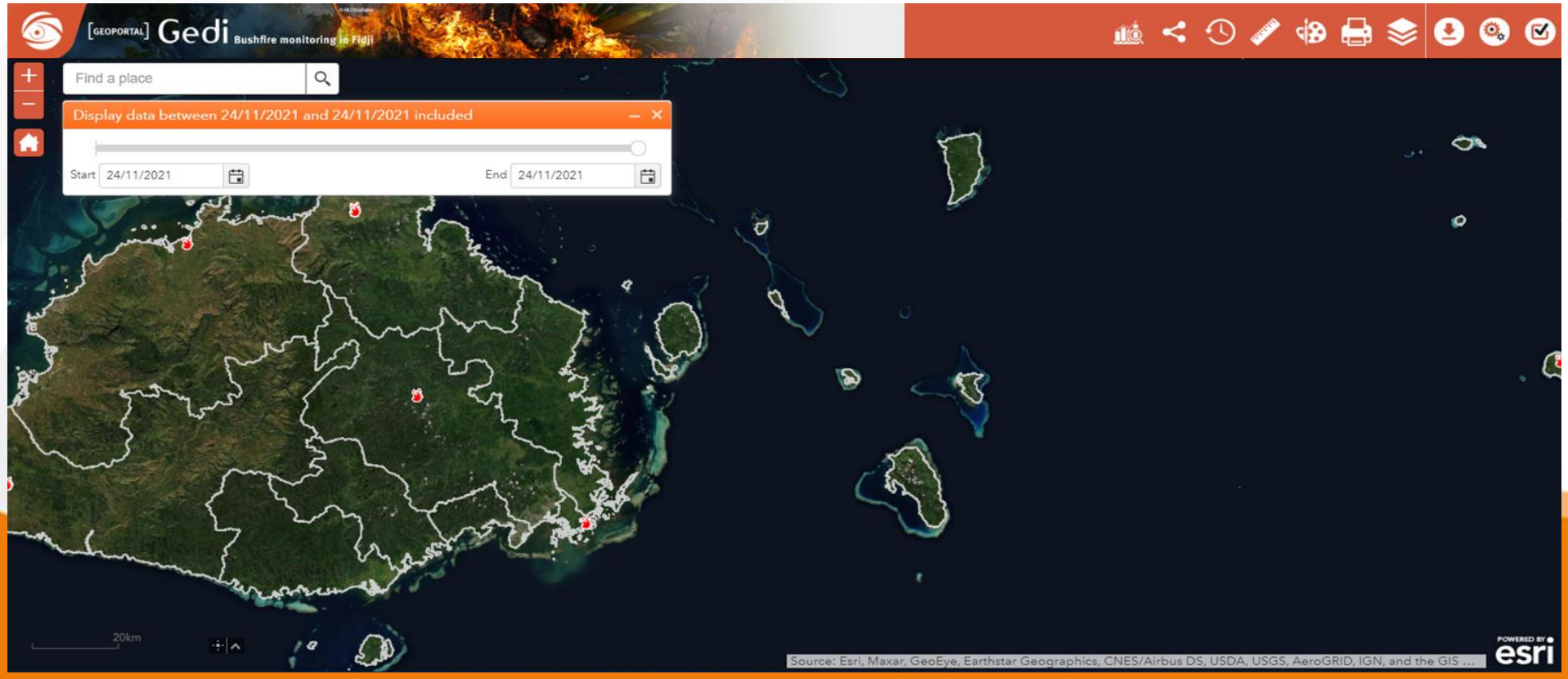
Data sources : FOSDIS, OFIL, The Fijian Government



FIRE ALERT SERVICE

- **Inform at the earliest** about the current fires

Users:
Fire management stakeholders (government,…)
Environment Managers, civil society, concerned civilians…

⇨ **Email Alerts Subscription Service**
indicating the active fires detected from the satellites

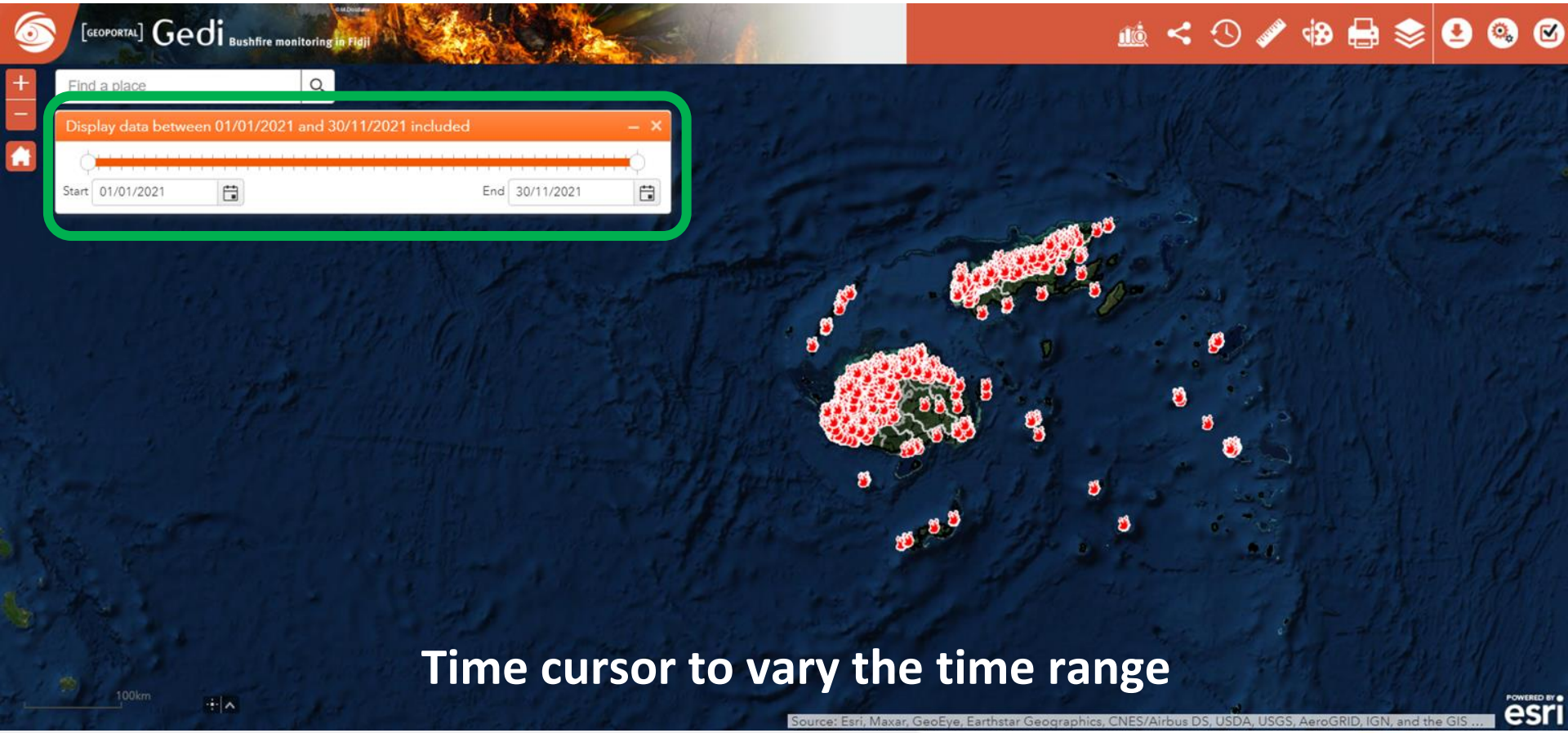
It is not a substitution to the official information circuit but a contribution

GEDI: Data Consulting and Analysis Platform

LINK: https://geoportail.oeil.nc/FireAlert

Webmap, Displaying fires for the last 12 months

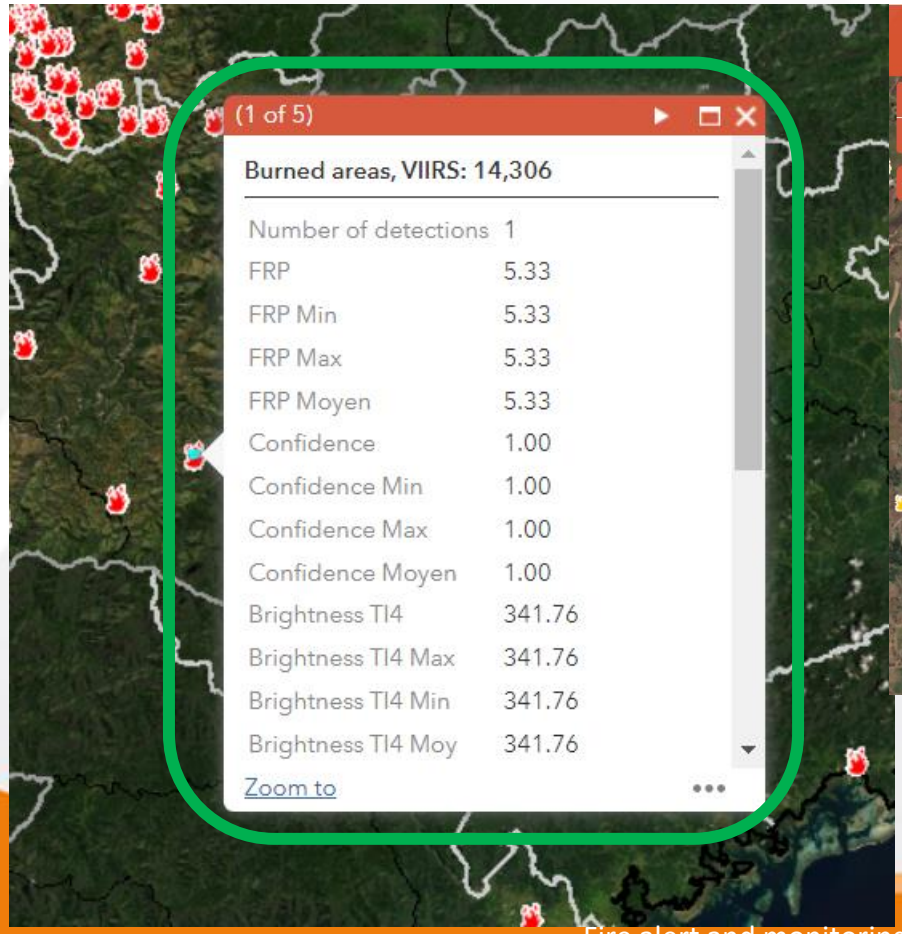
GEDI: Data Consulting and Analysis Platform

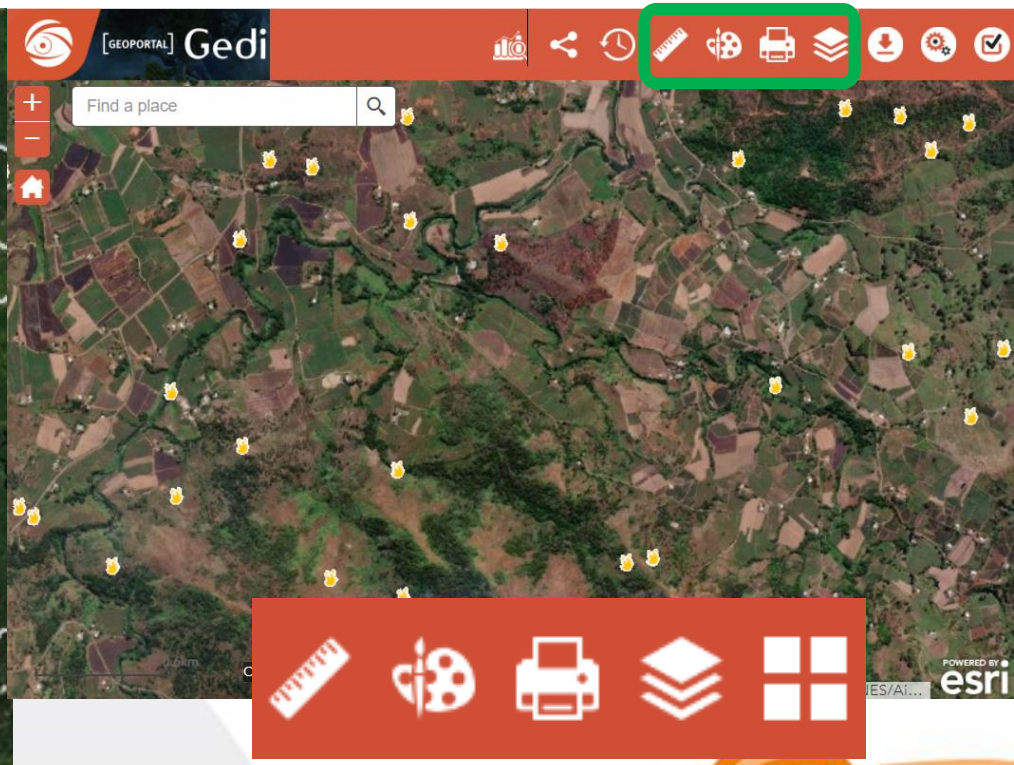


GEDI: Data Consulting and Analysis Platform

Tooltip providing data on burnt points and surfaces

Other tools: Measures, labels, print, layers, basemap





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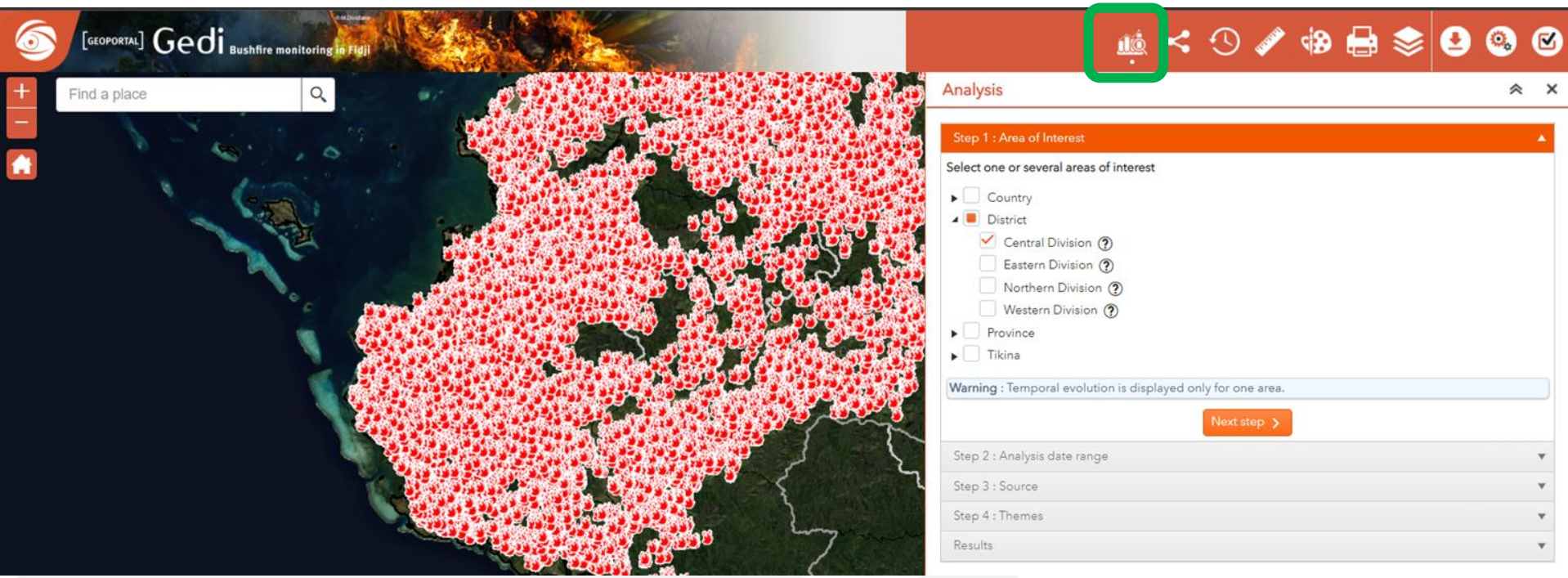
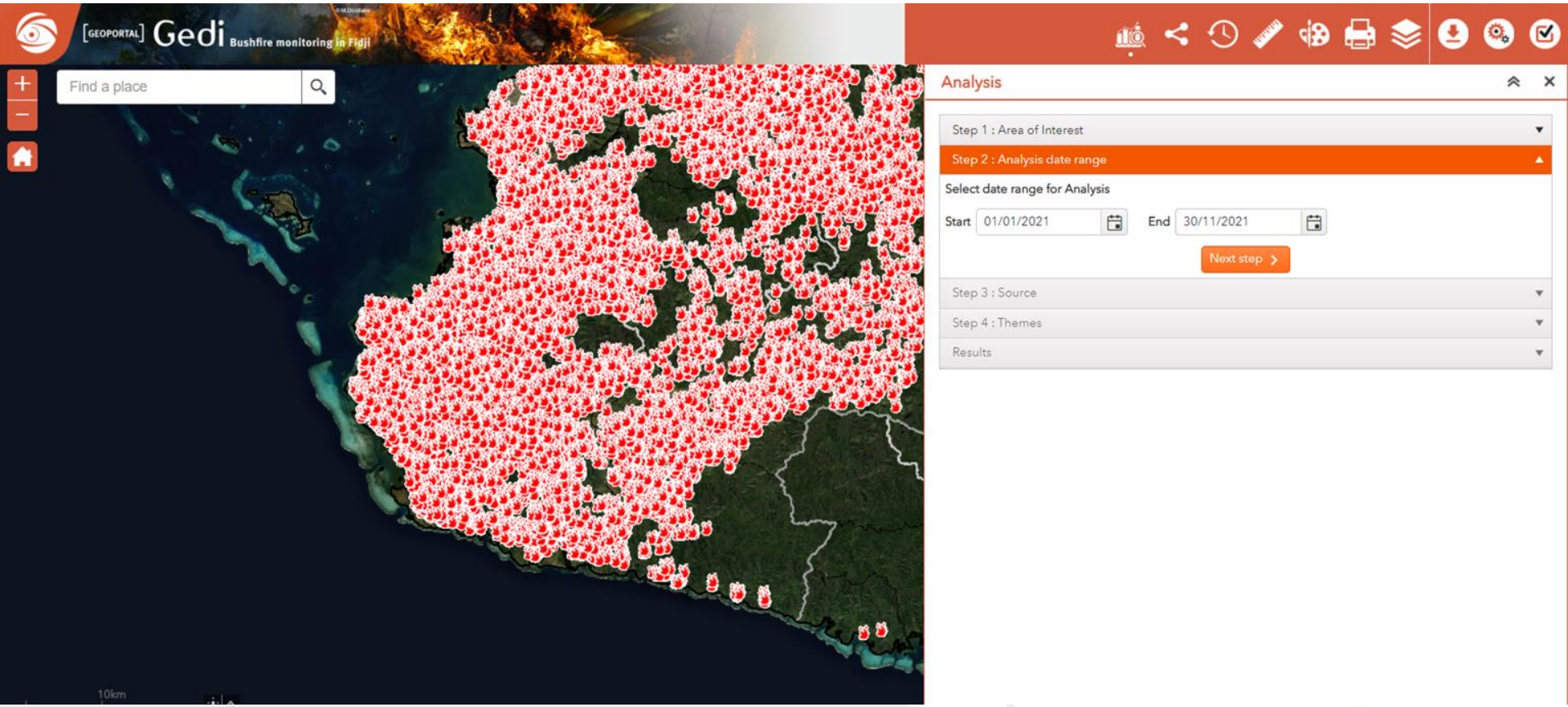


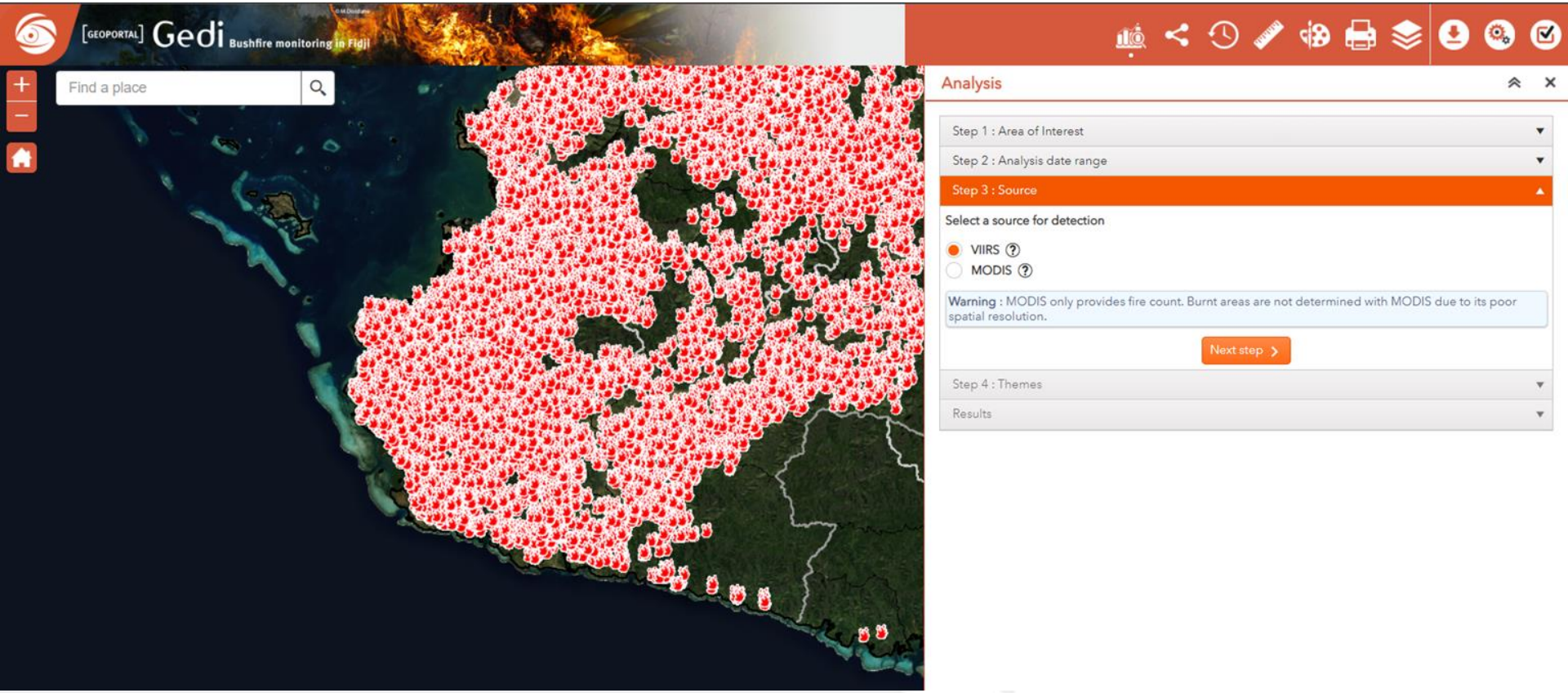
Cross-analysis – Selecting an area of interest

GEDI: Data Consulting and Analysis Platform



Cross-analysis – Selecting a date range

GEDI: Data Consulting and Analysis Platform



Cross-analysis – Selecting the detection source

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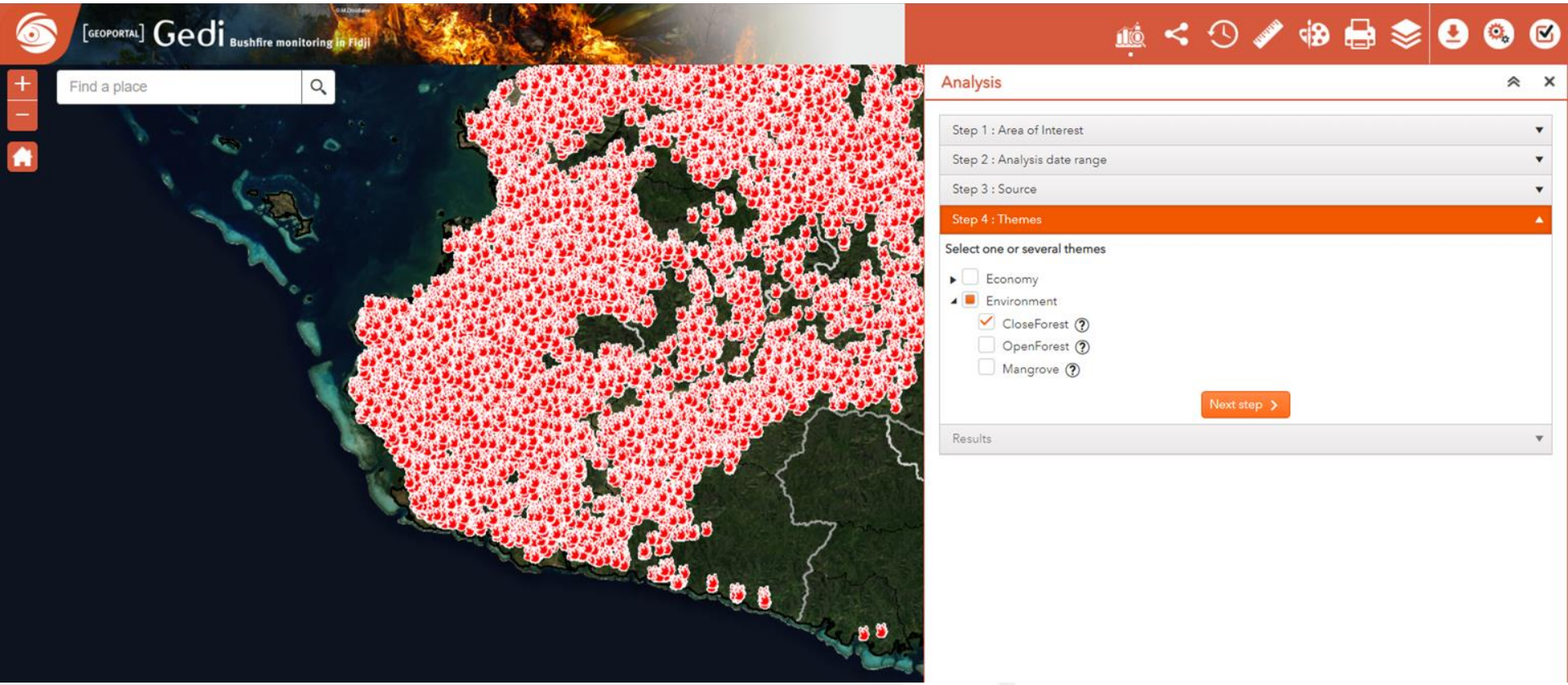
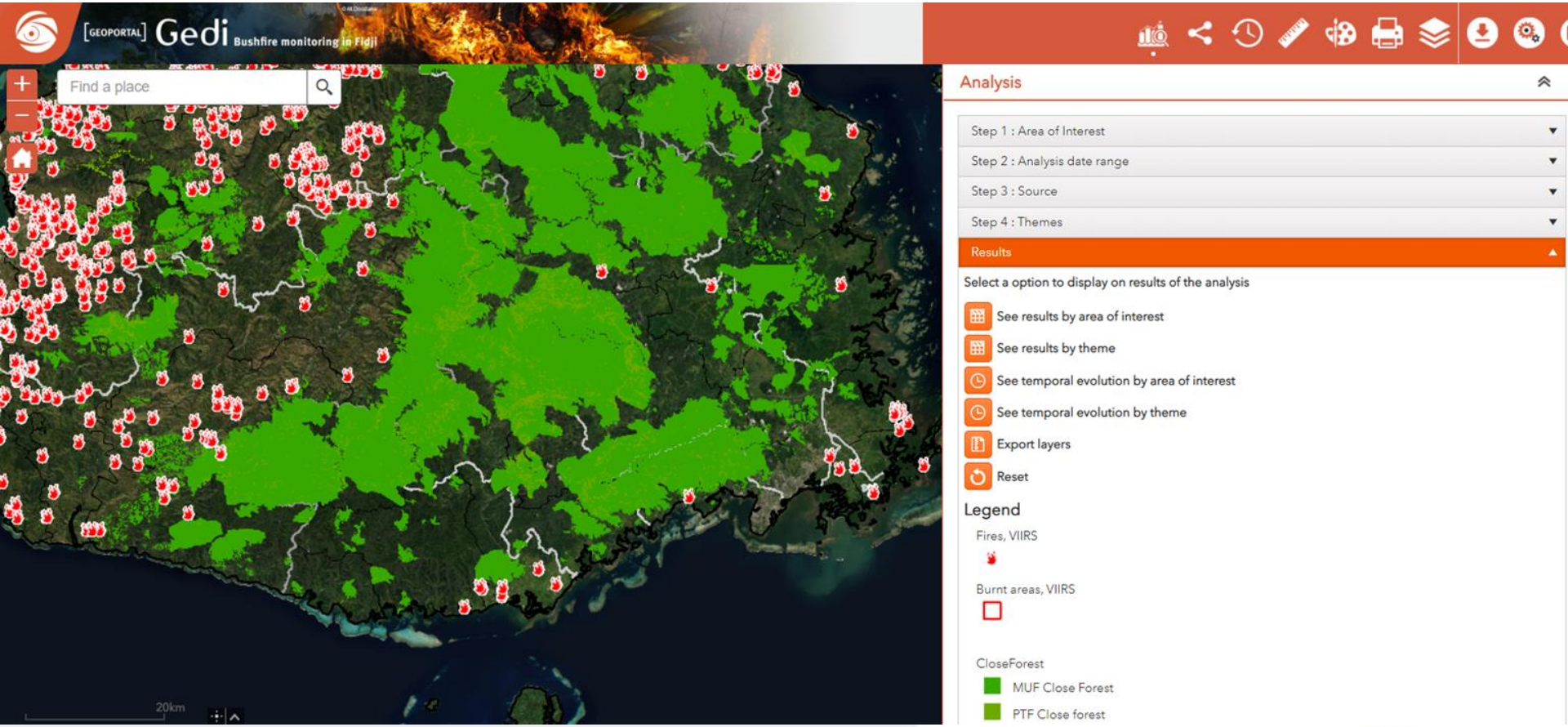


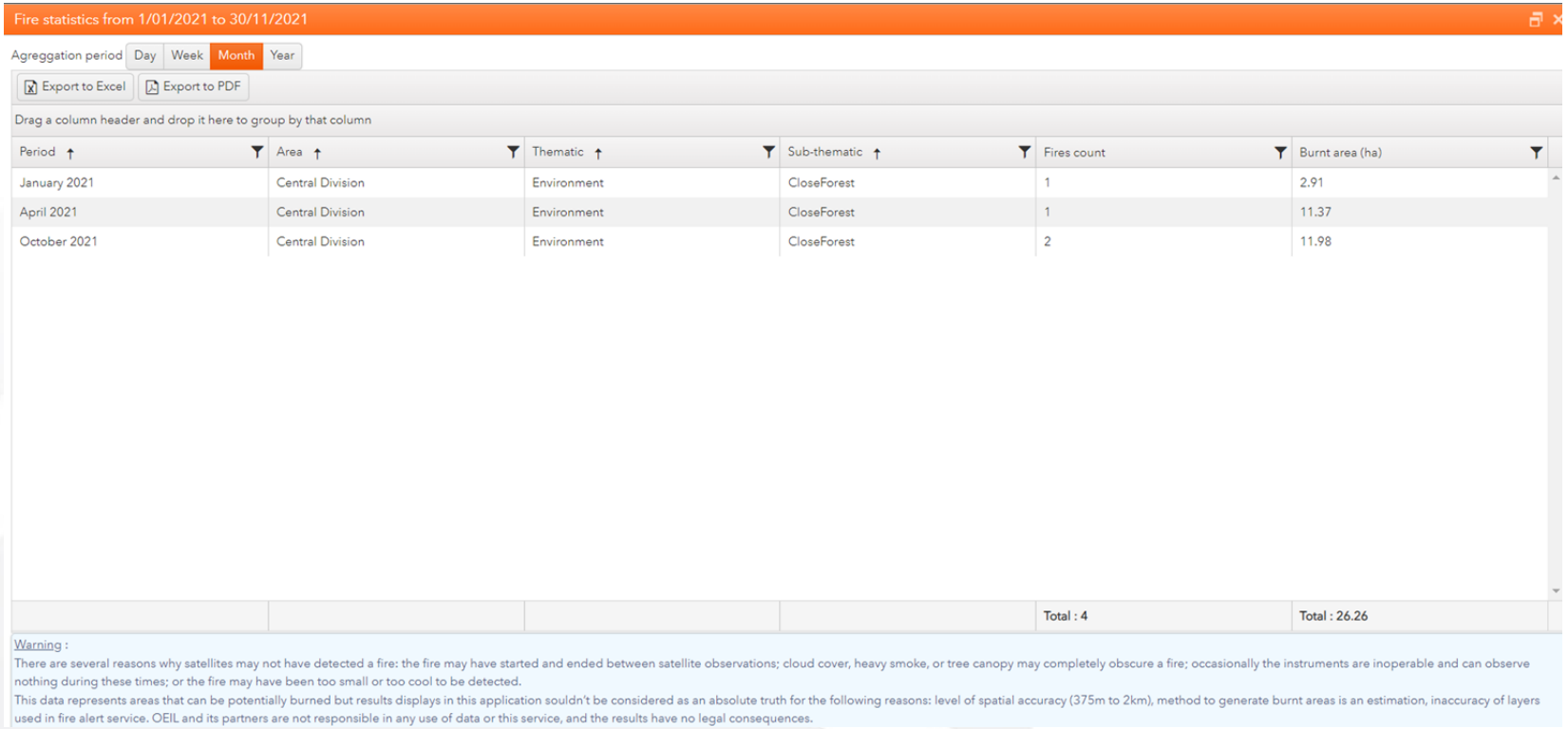
Cross-analysis – Selection of thematic layers

GEDI: Data Consulting and Analysis Platform



Cross-analysis – Displaying results, filtering the map and adjusting the caption

GEDI: Data Consulting and Analysis Platform



Fire statistics from 1/01/2021 to 30/11/2021

Agreggation period: Day | Week | Month | Year

Export to Excel | Export to PDF

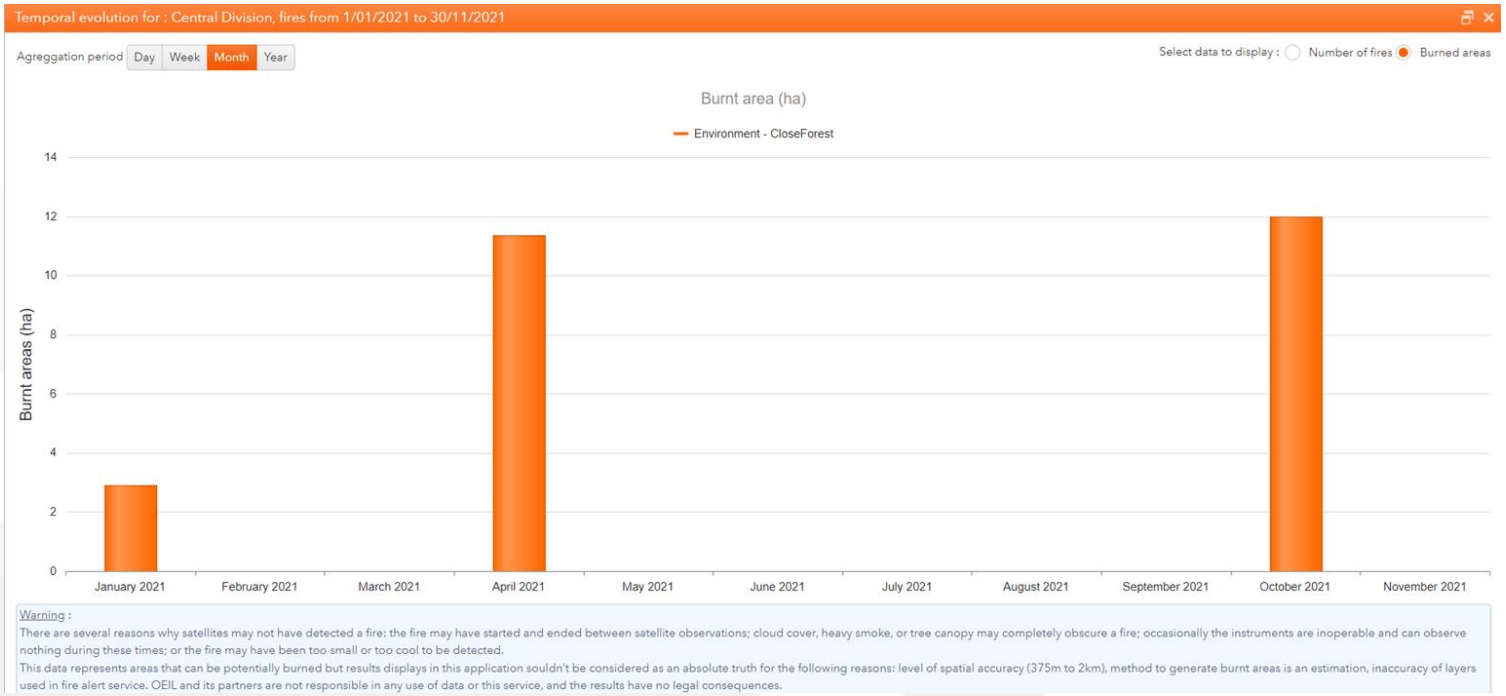
Drag a column header and drop it here to group by that column

Period	Area	Thematic	Sub-thematic	Fires count	Burnt area (ha)
January 2021	Central Division	Environment	CloseForest	1	2.91
April 2021	Central Division	Environment	CloseForest	1	11.37
October 2021	Central Division	Environment	CloseForest	2	11.98
				Total : 4	Total : 26.26

Warning :
There are several reasons why satellites may not have detected a fire: the fire may have started and ended between satellite observations; cloud cover, heavy smoke, or tree canopy may completely obscure a fire; occasionally the instruments are inoperable and can observe nothing during these times; or the fire may have been too small or too cool to be detected.
This data represents areas that can be potentially burned but results displays in this application souldn't be considered as an absolute truth for the following reasons: level of spatial accuracy (375m to 2km), method to generate burnt areas is an estimation, inaccuracy of layers used in fire alert service. OEIL and its partners are not responsible in any use of data or this service, and the results have no legal consequences.

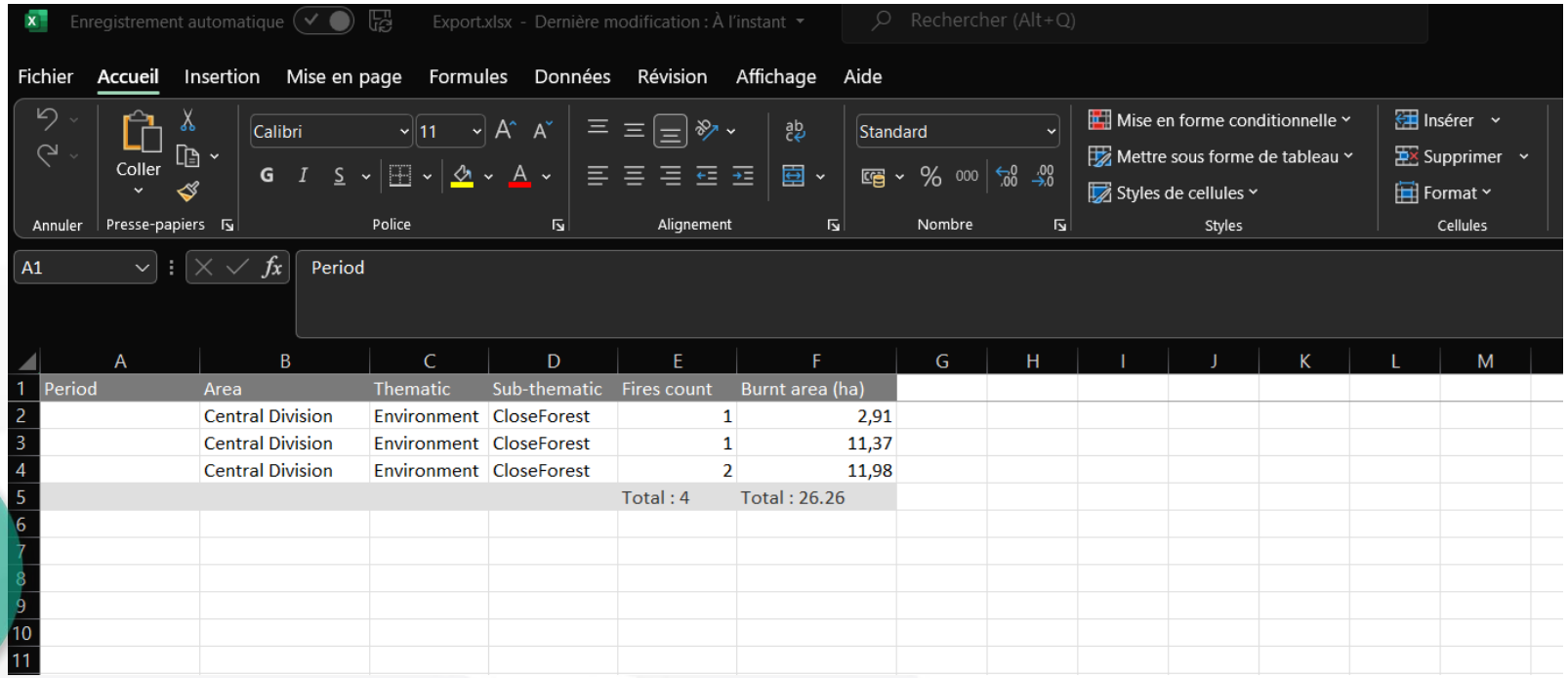
Cross analysis – Displaying results as a table

GEDI: Data Consulting and Analysis Platform



Cross-analysis – Displaying results as a chart

GEDI: Data Consulting and Analysis Platform



	A	B	C	D	E	F
1	Period	Area	Thematic	Sub-thematic	Fires count	Burnt area (ha)
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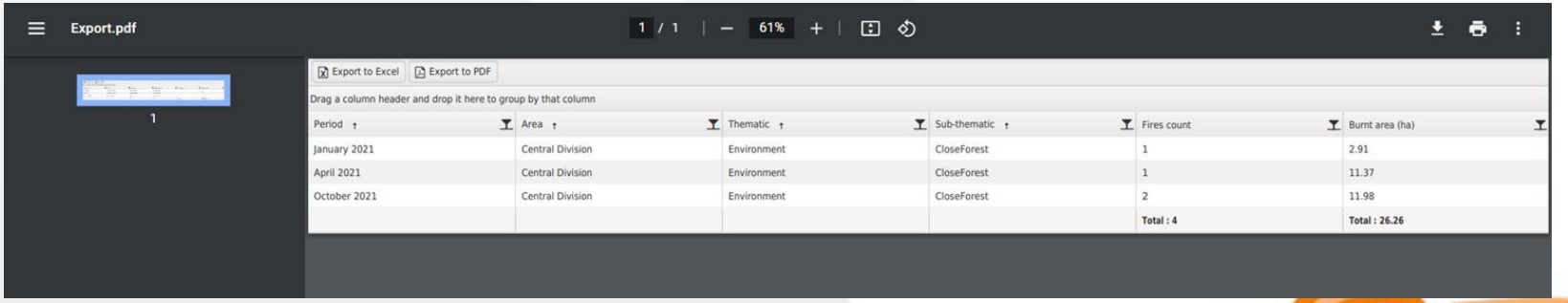

Cross-analysis – Excel and PDF Export

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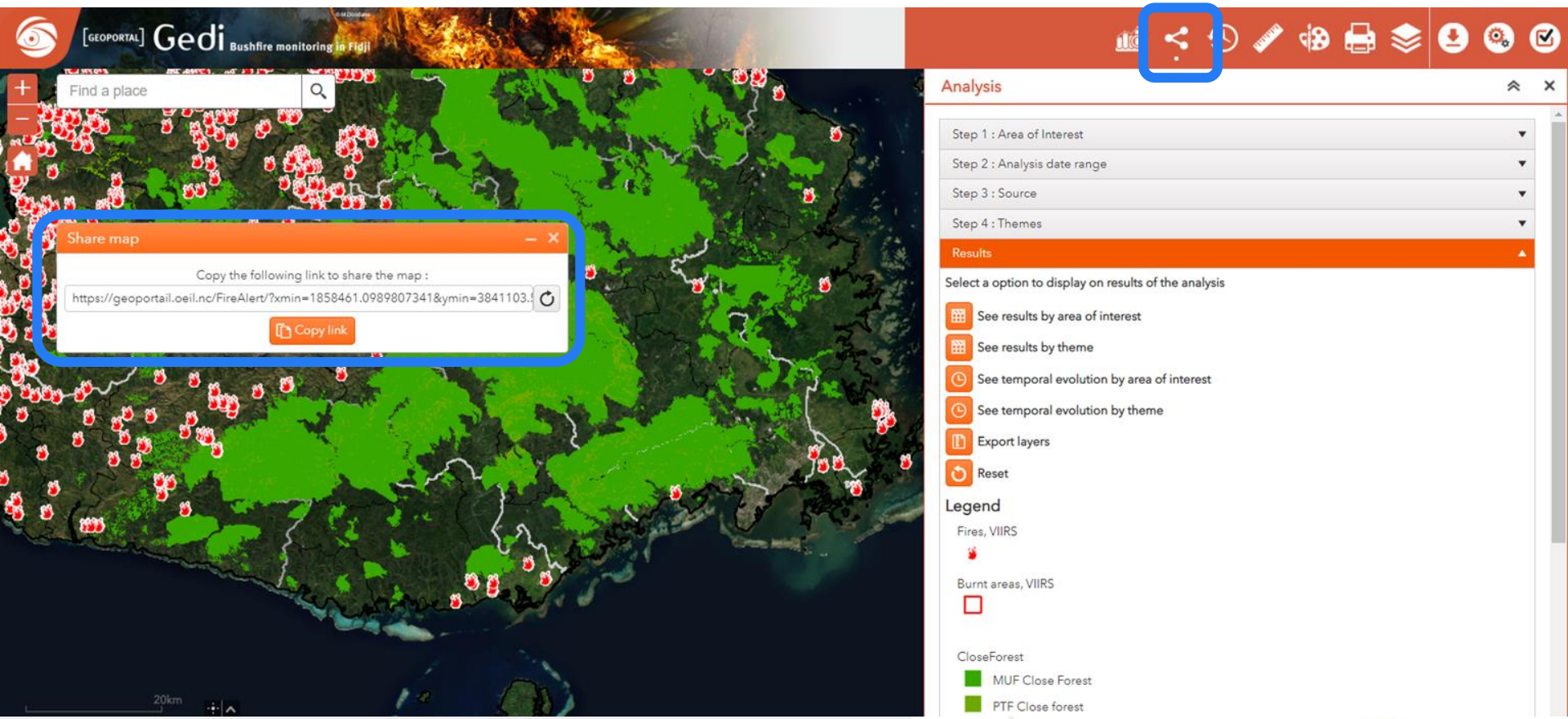
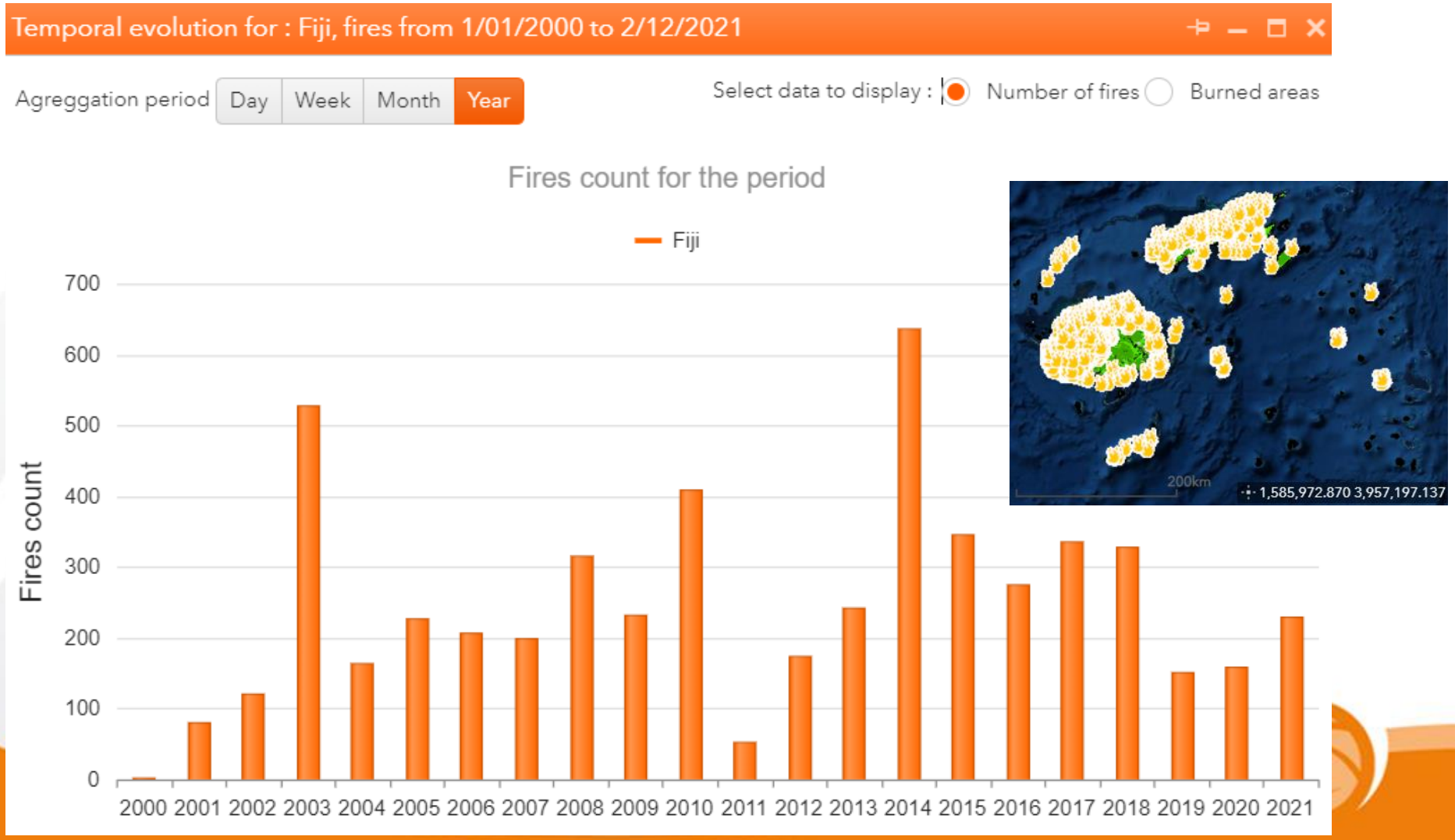


Sharing analysis

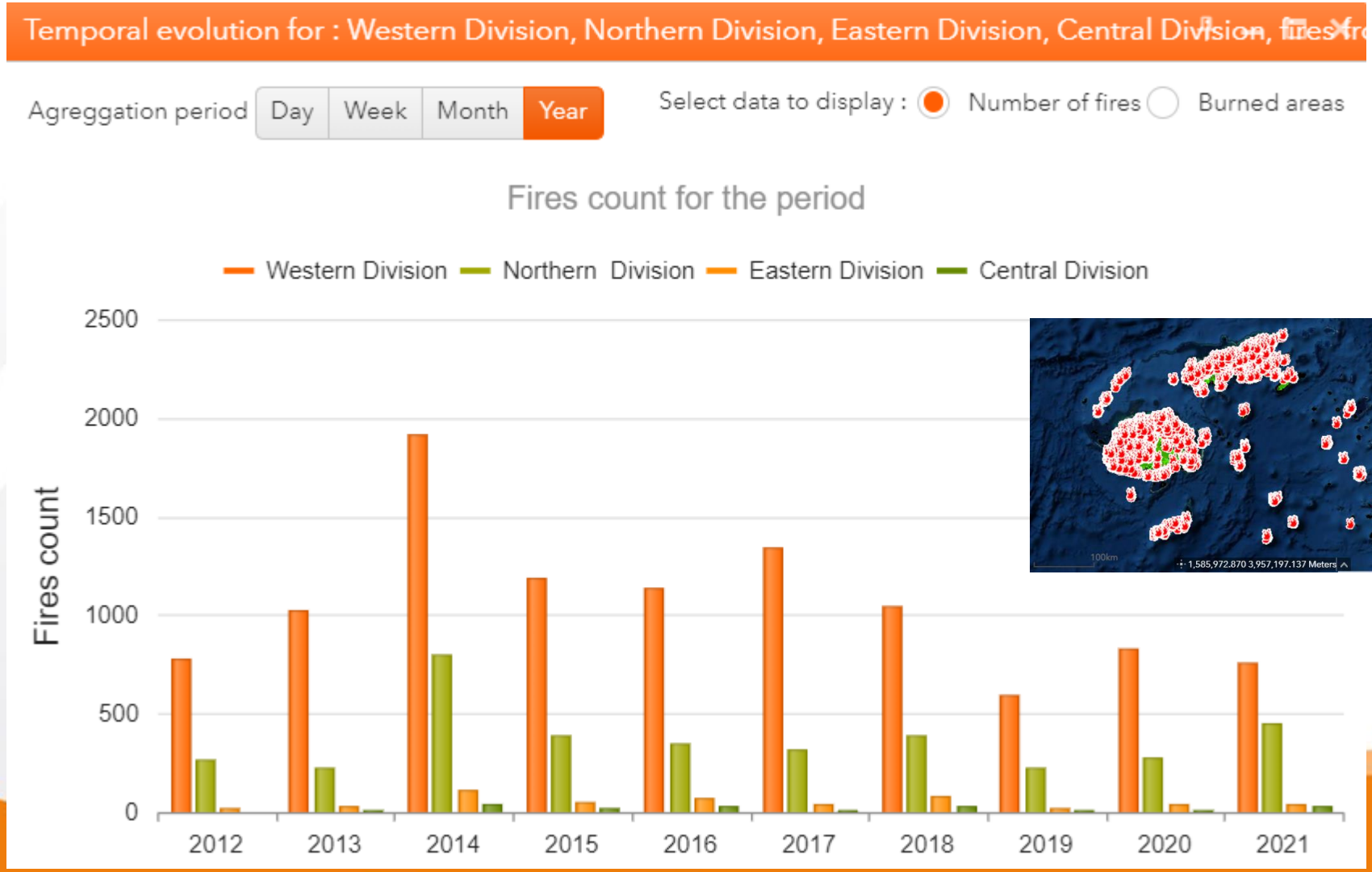
RESULTS

Exemple: annual fire count in Fiji since 2001 (MODIS)



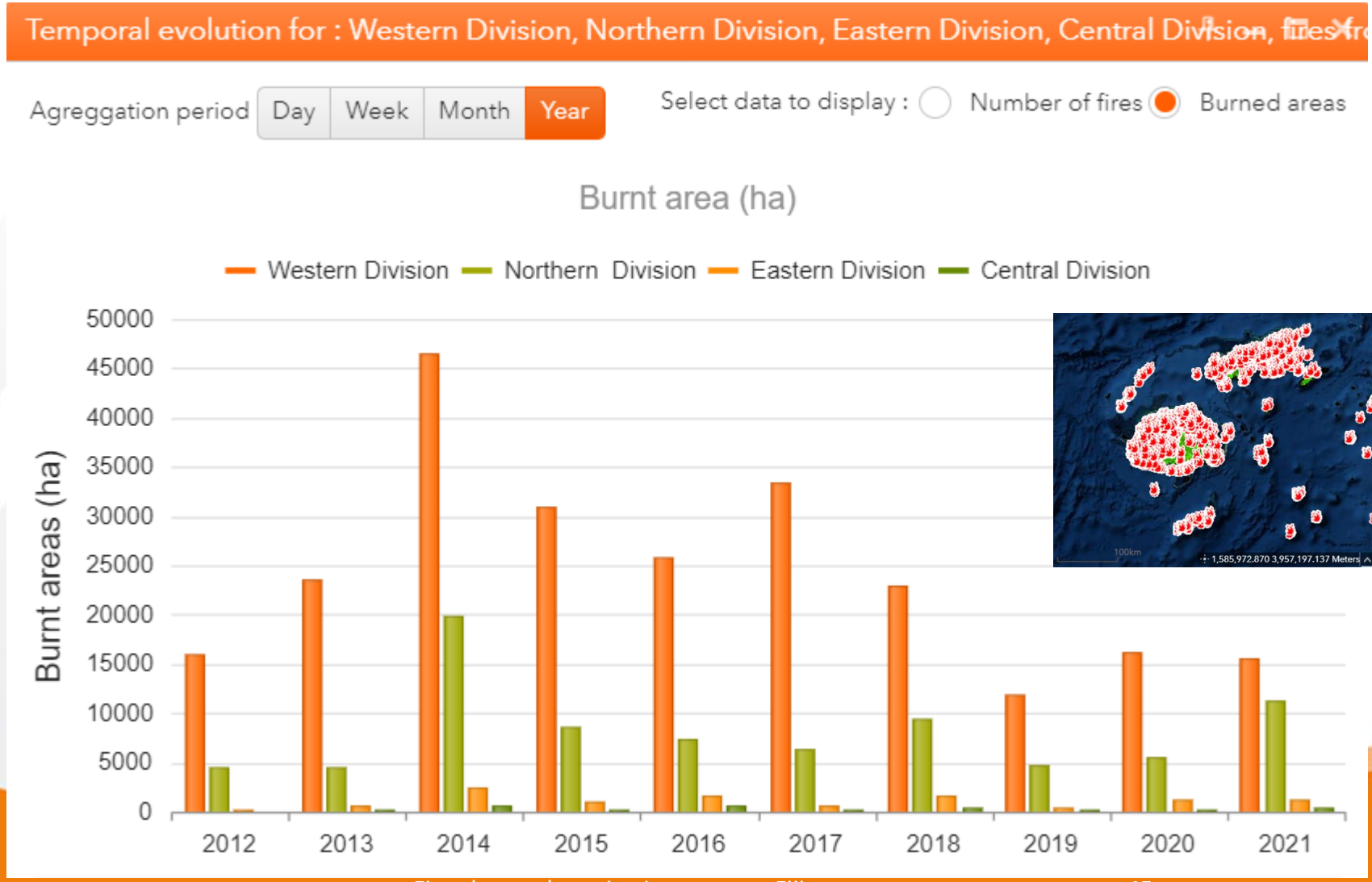
RESULTS

Exemple: annual fire count per geographical area (VIIRS)



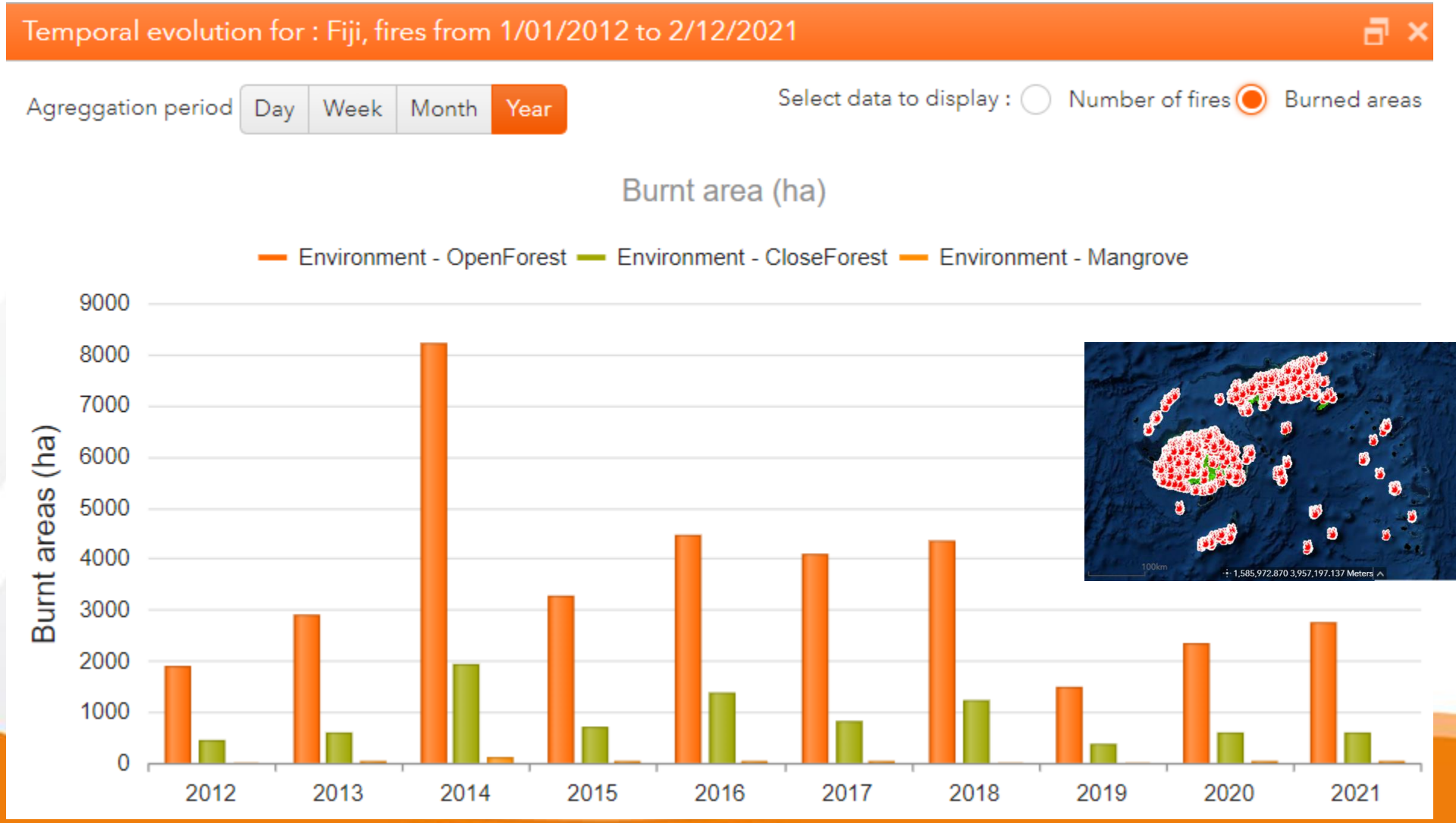
RESULTS

Exemple: annual burnt aera per geographical area (VIIRS)



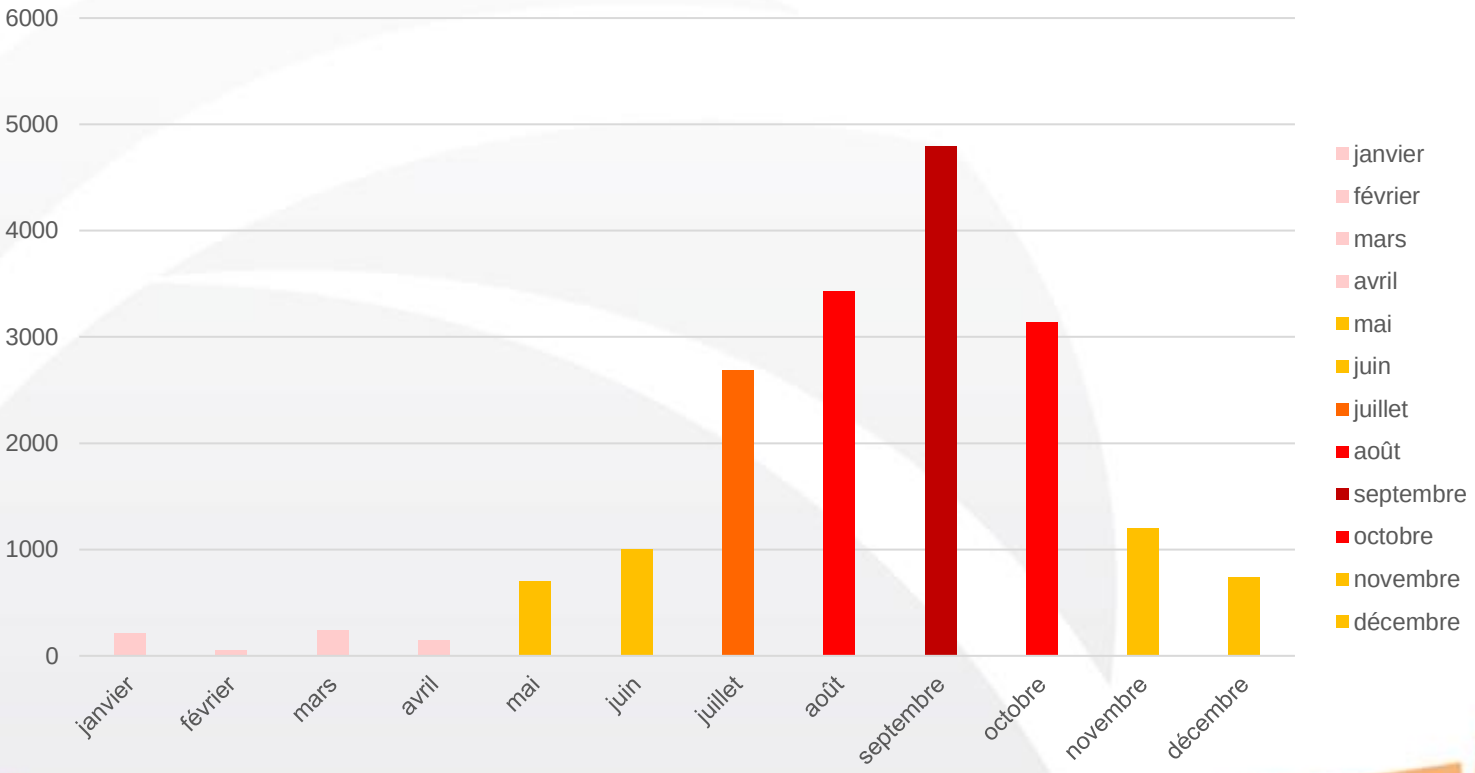
RESULTS

Exemple: annual burnt aera per type of vegetation (VIIRS)



RESULTS

Seasonal analysis of bushfires in Fiji



Source : OEIL, EOSDIS, NASA, Université Maryland, NOAA

RESULTS

5036 FIRE ALERTS SINCE OCTOBER 202

ONLY 3 REGISTRATIONS

AROUND **39 000** HECTARES PER AN (AVERAGE VIIRS: 2012 – 2020)

ALERT DELIVERY BY E-MAIL **2 - 5 MINUTES** AFTER DATA PROCESSING

FIRE DATA CHRONICLE SINCE 2001 (MODIS)

4 TYPES OF SPECIFIC GEOGRAPHICAL INFORMATIONS

NEXT STEPS

- Improve data treatment related to fijian particularities (e.g. solar exploitation, industries…)

NEXT STEPS

- Improve data treatment related to fijian particularities (e.g. solar exploitation, industries…)
- Organise a proper training to handle the application

Stakeholders:

- **Institution**
- **Local communities**
- **NGOs**
- **Medias**
- **Schools…**

NEXT STEPS

- Improve data treatment related to fijian particularities (e.g. solar exploitation, industries…)
- Organise a proper training to handle the application

- Add new geographical information of interest in the system (ie. Global forest watch…)

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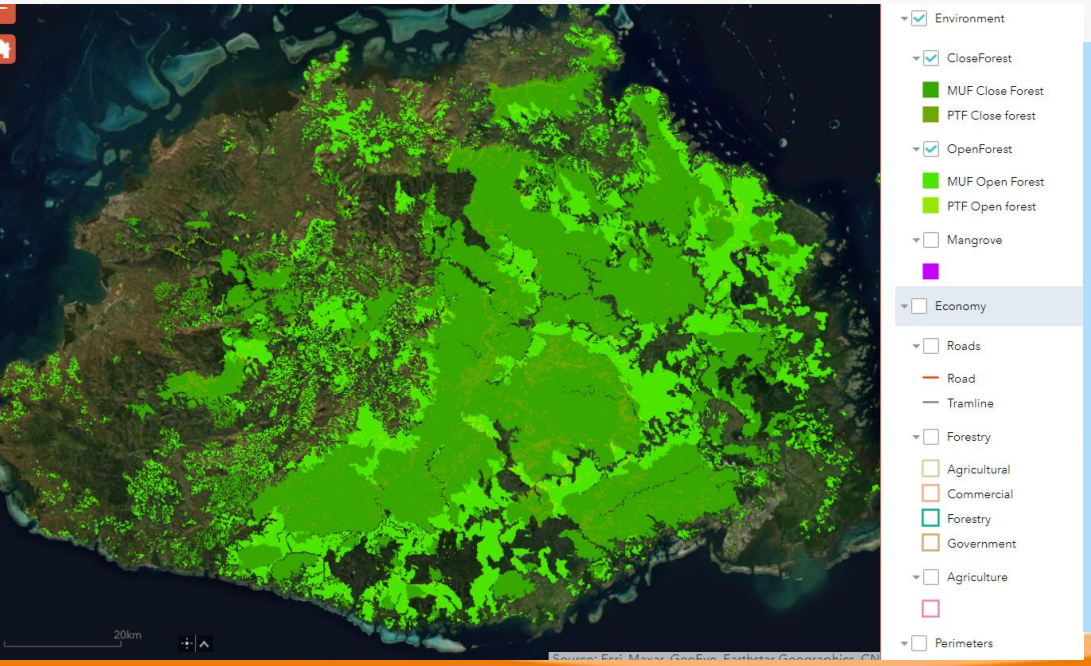


NEXT STEPS

- Improve data treatment related to fijian particularities (e.g. solar exploitation, industries…)
- Organise a proper training to handle the application

- Add new geographical information of interest in the system (e.g. Global forest watch…)

Currently 4 types of specific geographical information:

- Vegetation (close forest, open forest, mangroves)
- Roads
- Forestry
- Administrative / customary perimeters

Other potential layers of interest:

- Protected areas
- Freshwater resource (catchment)
- Buldings
- Threatned species…

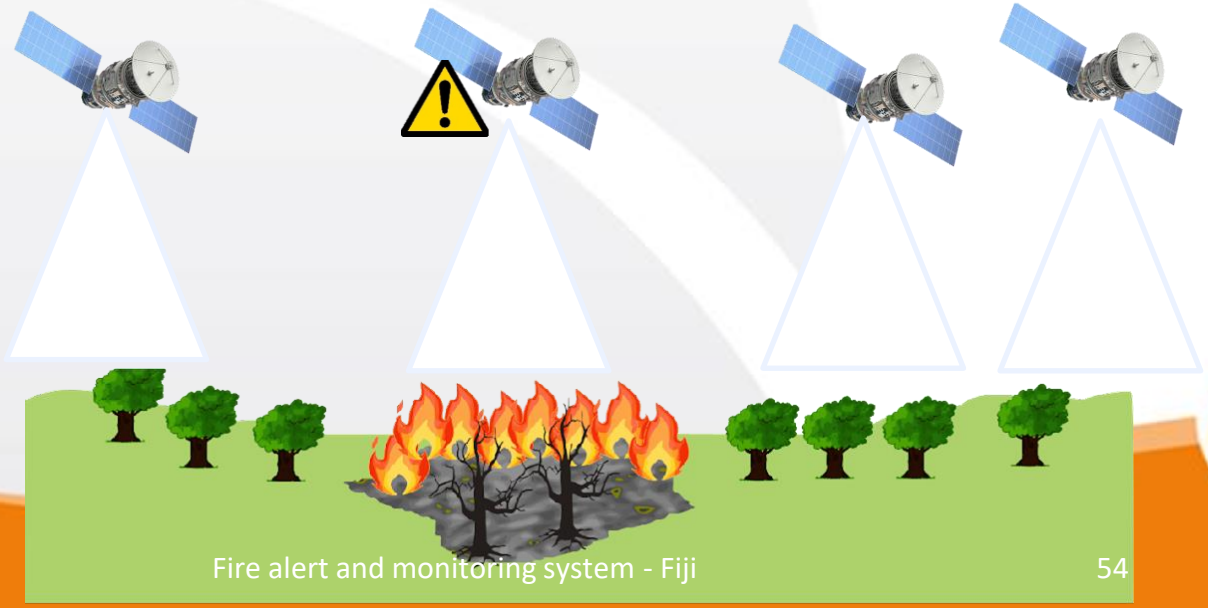
More information = More analysis power

NEXT STEPS

- Improve data treatment related to fijian particularities (e.g. solar exploitation, industries…)
- Organise a proper training to handle the application

- Add new geographical information of interest in the system (ie. Global forest watch…)

- Improve the system through the implementation of potential additional satellites data



NEXT STEPS

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PROJECT SYPAFI
APpropriation of the Fire Alert SYstem by Fijian stakeholders
funded by the french pacific funds with technical support from SPC and ŒIL

A project that has been delayed and needs to be carried out

USE

Fire alerte :

14 % of fires were known from Fire Alert System first

Early detection is the best natural ressource management measure

USE

IUCN : Red list Authority, use burned area to adjust priority indicator of endangered species

Recherche Chronik : comportement des déplacements des métaux suite à des incendies (quand, où, superficie)

Priorisation dans la réhabilitation :

- Forêt de saille
- Adaptions des mesures compensatoires

Et les surfaces non brulées:

- Transplantation d'espèces rares et menacées
- Mesure de protection des patchs de forêts / lisières restantes après un incendie

VINAKA VAKALEVU / MERCI !

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