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D3.2-CERTIFLIGHT User Manual

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1 Introduction

This document represents the contractual deliverable of CERTIFLIGHT project: “D3.2 – Certiflight user manual”.

1.1 Scope of the Document

The purpose of the document is to describe the CERTIFLIGHT platform usage. The document is composed by the following chapters:


- Section 2 reports the CERTIFLIGHT context summarising the main used technologies such as authenticated position, blockchain and algorithms for spoofing detection.
- Section 3 identifies the target users and the profiles having different rights to access the platform.
- Section 4 is the administration manual explaining how different profiles may use CERTIFLIGHT platform.

This is the first version of the document after platform development completion. The final issue is planned after testing completion, where some adjustments are expected after testing and alpha test completion.

1.2 Acronyms

Acronyms	Description
API	Application Programming Interface
APP	Authenticated Position Propagation
C2	Command and Control
CERTIFLIGHT	Certified E-GNSS remote tracking of drone and aircraft flights
DB	Data Base
EGNSS	European Global Navigation Satellite System
ExpO	Expert Operator
GNSS	Global Navigation Satellite System
GSD	GNSS Spoofing Detection
IMU	Inertial Measurement Unit
INS	Inertial Navigation System
OSNMA	Open Service Navigation Message Authentication
PDF	Portable Document Format
PiLO	Pilot Operator
PlaO	Platform Operator
PVT	Position, Velocity, Time solution
QR code	Quick Response code
UAS	Unmanned Aerial System
UTM	Unmanned Traffic Management

Table 1-1 Acronyms list

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2 CERTIFLIGHT Platform Context

The CERTIFLIGHT platform represents the access point for every user. Each identified stakeholder may access with their profile for configuration, data ingestion, retrieving, visualisation and reporting according to the CERTIFLIGHT security chain. The collected data and the final report(s) allow the user to have all the certified information for the in-flight and post-flight services.

2.1 Platform usage at a glance


The CERTIFLIGHT platform is based on a responsive frontend so that a user can access using different platforms (i.e. desktop and mobile) to perform requested operations during the in-flight and post-flight sessions:

- registration/ profiling/login. It allows a user to create and access (reading/ writing) to his/her dedicated area after registration.
- UTM Box secure binding with user profile. It allows a user to associate the UTM box(es) to his/her profile.
- configuration – profiling. It allows a user to configure his/her profile for account management.
- Home Dashboard. It allows the user to access a dedicated area (Home dashboard) where for every day (in case data are retrieved) the acquired trajectories are shown on a map included in a sheet-window reporting main info. These windows are clickable to access to detailed data.
- UTM box real time data acquisition. After successful association with the UTM box(es) all data are automatically ingested in the platform anytime the UTM box(es) is (are) switched on
- UTM box real time data visualization. It allows the user to access a dedicated area for each created UTM box where the real time data are visualised in a map for each second when the UTM box(es) is (are) switched ON. Ancillary data are visualised on a tooltip clicking on the point in the map. This section of the platform also reports the UTM box status
- Offline full data ingestion. It allows the user to access a dedicated area to upload the full data (including payload data) using the CERTIFLIGHT security chain control.

2.2 Report Generator

The CERTIFLIGHT system issues signed reports to the users to guarantee the integrity and authenticity of the exported data stored on the Blockchain service which ensures long-term integrity and furtherly enforces data authentication as the CERTIFLIGHT service only is allowed to submit Device information. Two typologies of reports are envisaged:

- A light report, available just after a UTM box switching OFF. The following parameters are included:
 - Trajectory visualisation in a map (all points, one per second)
 - Position reporting including ancillary data (every minute) such as
 - Number of satellites used in the position evaluation,
 - Number of authenticated (OSNMA service) satellite used in the position evaluation,
 - ground speed,
 - heading,
 - signal strength,
 - battery percentage
 - Free text for remarks captured form the app frontend.

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- A full report, available after full data are uploaded for post processing. The following parameters are included:
 - Uploaded data visualisation in a map including relevant certified position and ancillary data such as
 - Number of satellites used in the position evaluation,
 - Number of authenticated (OSNMA service) satellite used in the position evaluation,
 - ground speed,
 - heading,
 - signal strength,
 - battery percentage
 - Trajectory visualisation in a map (all points, one per second)
 - Position reporting including ancillary data (every minute) such as
 - Number of satellites used in the position evaluation,
 - Number of authenticated (OSNMA service) satellite used in the position evaluation,
 - ground speed,
 - heading,
 - signal strength,
 - battery percentage
 - Free text for remarks captured from the app frontend.

2.3 Security chain based on Blockchain service

The Blockchain Service exposes a simplified API to the CERTIFLIGHT system to interact with one of several nodes participating in a blockchain network. Such service has two main purposes regarding the CERTIFLIGHT data:

1. Provide long-term integrity and storage guarantees.
2. Function as a system integrator with service complementary to the CERTIFLIGHT platform, e.g. respect of contracts, unlock of payments.

Since the CERTIFLIGHT platform may handle both essential live data streams coming from the Device during their flight operations and data enriched by the on-board instrumentation submitted at the end of a flight session, different quality of services should be guaranteed:

1. A service level able to process live Device's data up to the Device maximum transmission frequency.
2. A service level able to ingest the full data produced by the Device in a flight session.

2.4 Authenticated Position Propagation (APP) and GNSS Spoofing detection (GSD) Module

The APP function allows to provide a trustable position information starting from an authenticated position and to compute the propagated position to reinforce the authenticity of the PVT solution and the drone trajectory in post flight phase. The GSD function allows to guarantee the authenticity of data generated by the UTM Box, providing indications whether the authenticated PVT solution is genuine (Spoofing / Meaconing free). This module accepts in input GNSS observables and IMU raw measurement, providing in output a report a set of metrics related to confidence/trust of the authenticated position with a final indicator, providing an overall level of confidence about how and in which measure the solution is spoofing free.

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3 Targeted Users and Profiles

The CERTIFLIGHT platform can be accessed as <admin> or <User> profiles.

<admin> profile has complete access including:

- Full Users' administration, to manage all the registered accounts
- Full list of activities and relevant data

This profile is not intended for operational usage and it is used only for maintenance purposes.

<user> profile has a limited access including:

- User administration, to manage <user> account
- List of activities and relevant data created by the <user> account

This profile is intended as operational and includes the following roles created by <admin>

- Platform Operator <user_PlaO> accesses as <user> in order to configure the pilots, drones and GNSS tracker database for all the activities. This profile is created for any of the role identified in table 4-1 of D2.6 [AD 2]
- Pilot Operator <user_PilO> accesses as <user> in order to upload all data acquired concerning activities where he's involved in. This profile is created for any of the role identified in table 4-1 of D2.6, [AD 2]
- Expert Operator <user_ExpO> accesses as <user> in order to analyse all data and prepare elaborated products when needed concerning activities he's involved in.

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4 Administration manual

4.1 CERTIFLIGHT platform

This section aims to explain the platform functionalities also including traceability versus target profiles reported in section 3.

ID	Title	Description	Target role(s)
Access Policies			
1	Users' Management	Overall settings, password and access management Access to users DB Monitoring Synoptic for checking status of registered and activated users	<admin>
2	User Registration	Process for registration (sign up)	<user>
3	User Access	Process for sign in	<admin>,<user_PilO>,<user_PlaO>,<user_ExpO>
Utilities			
4	Languages	English, Italian	<admin>,<user_PilO>,<user_PlaO>,<user_ExpO>
5	Notification	Alerting when GNSS tracker(s) is switched on/ off	<user>PilO, <user>PlaO
Configuration			
6	Pilot(s) configuration	Process for pilot(s) DB creation	<user>PlaO

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ID	Title	Description	Target role(s)
7	Drone(s) configuration	Process for drone(s) DB creation	<user>PlaO
8	GNSS tracker(s) configuration	Process for GNSS tracker(s) DB creation	<user>PlaO
Dashboard			
9	Real time operations	Real time data collection	<user>Pilo, <user>PlaO
10	Acquisition	offline data ingestion and processing	<user_Pilo>, <user_PlaO>, <user_ExpO>
11	Report(s) generation	Data approval and final report	<user_PlaO>
Activities			
12	Statistics	Statistic analysis	<user_PlaO>

Table 4-1 CERTIFLIGHT Platform functionalities

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4.2 Access policies

4.2.1 Users' management (creation, editing and monitoring)

In this view the <admin> profile can manage all the registered users having right for creation, modification and deletion.

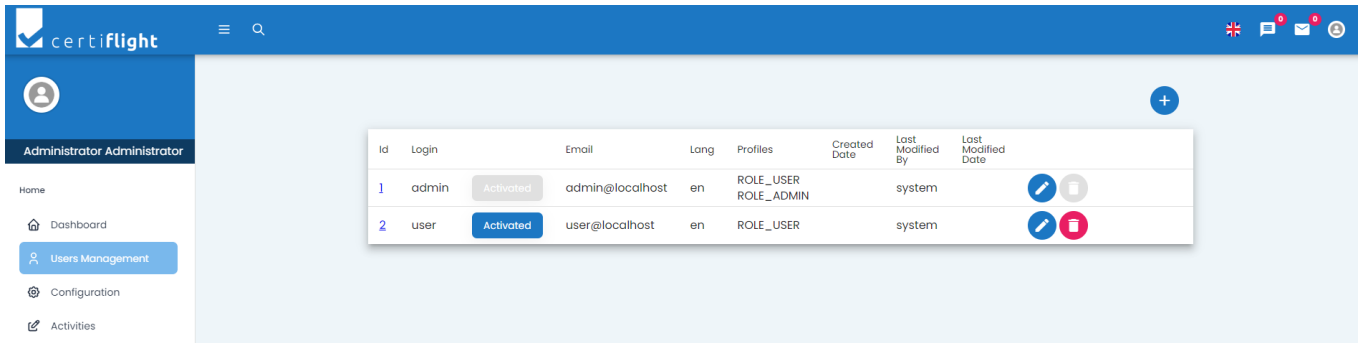
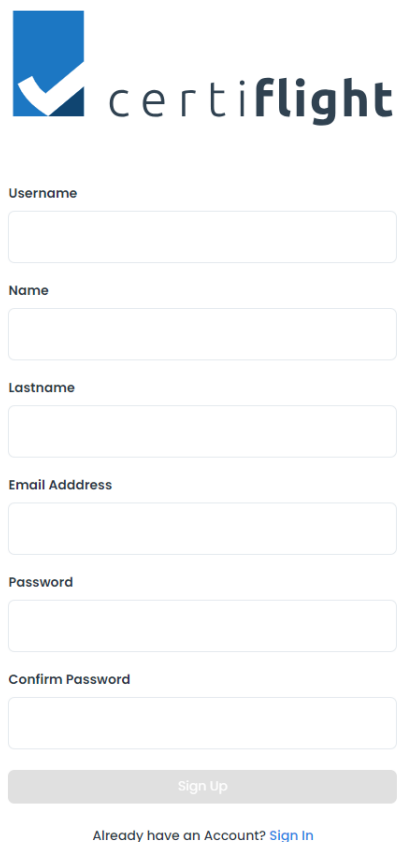


Figure 4-1 Users' Management

4.2.2 User Registration (Sign Up)

Each user can register to the platform with a dedicated view.



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Username

Name

Lastname

Email Address

Password

Confirm Password

Already have an Account? [Sign In](#)

Figure 4-2 User Registration

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4.2.3 Users Access (Sign In)

Each user can access the platform after registration completion (profile activation completed via mail).

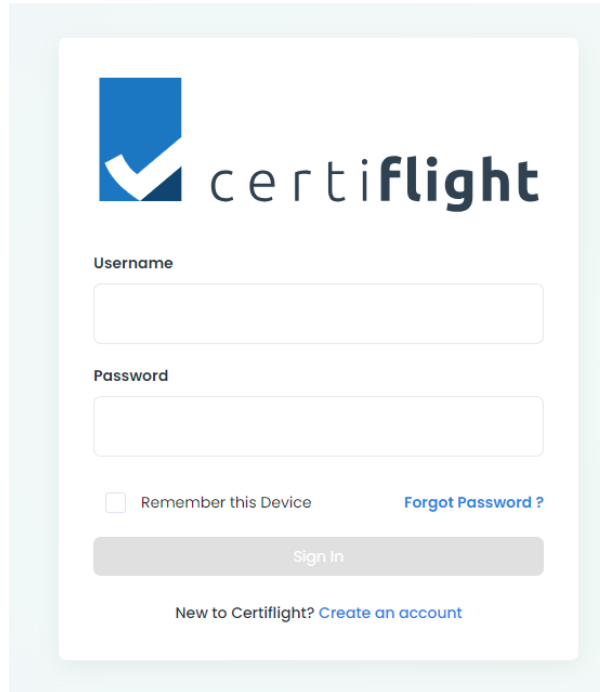


Figure 4-3 User Sign In

4.2.4 User Profiling

Each user can modify information provided during registration.

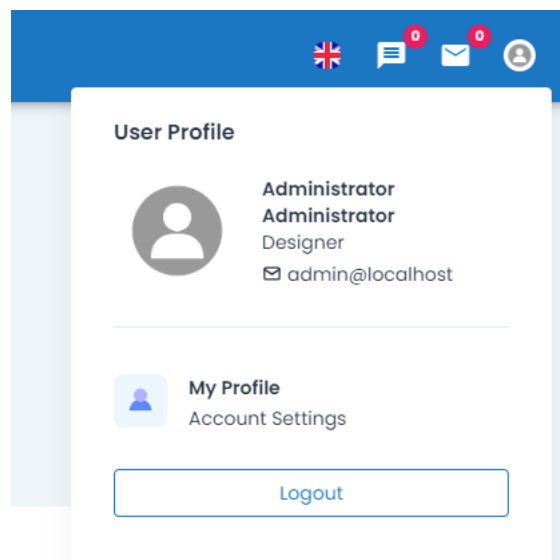


Figure 4-4 User Profiling

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4.3 Utilities

4.3.1 Languages

Each user can select the language. Italian and English languages are supported.

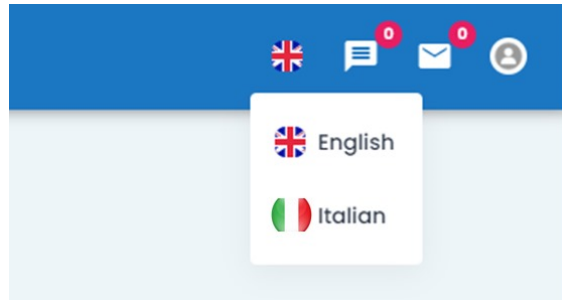


Figure 4-5 Languages selection

4.3.2 Notification

An alert is indicating when an associated GNSS tracker(s) with the user (see section 4.4) is switched on or switched off.

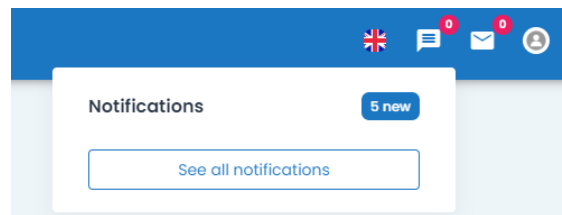
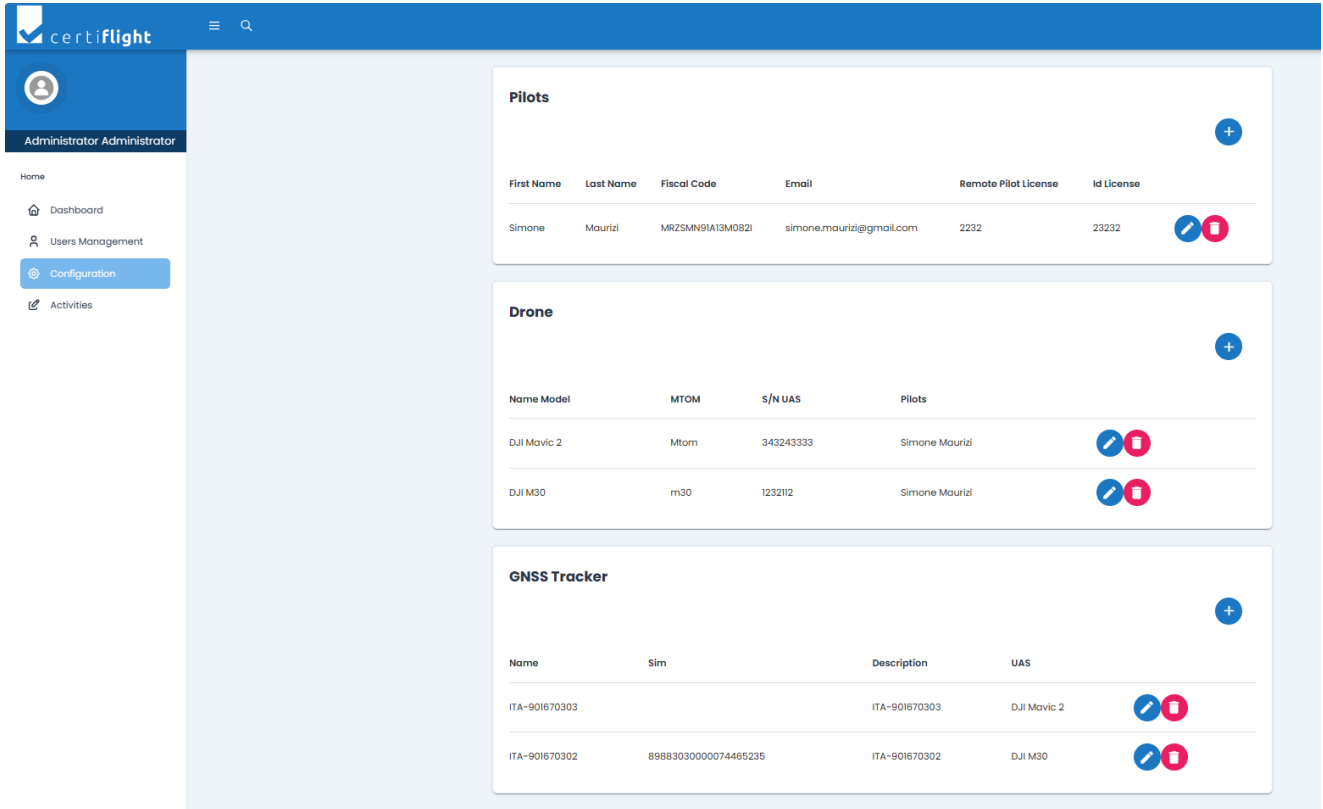


Figure 4-6 Notifications

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4.4 Configuration

<user_PlaO> can access configuration section to add, modify or delete Pilot(s), drone(s) and GNSS tracker(s) database.







The screenshot shows the 'Configuration' section of the Certiflight interface. It features a sidebar with navigation options: Home, Dashboard, Users Management, Configuration (selected), and Activities. The main content area displays three data tables, each with a '+ Add' button in the top right corner.

Pilots Table:

First Name	Last Name	Fiscal Code	Email	Remote Pilot License	Id License	
Simone	Maurizi	MRZSMN9IA13M082I	simone.maurizi@gmail.com	2232	23232	 

Drone Table:

Name Model	MTOM	S/N UAS	Pilots	
DJI Mavic 2	Mtom	343243333	Simone Maurizi	 
DJI M30	m30	1232112	Simone Maurizi	 

GNSS Tracker Table:





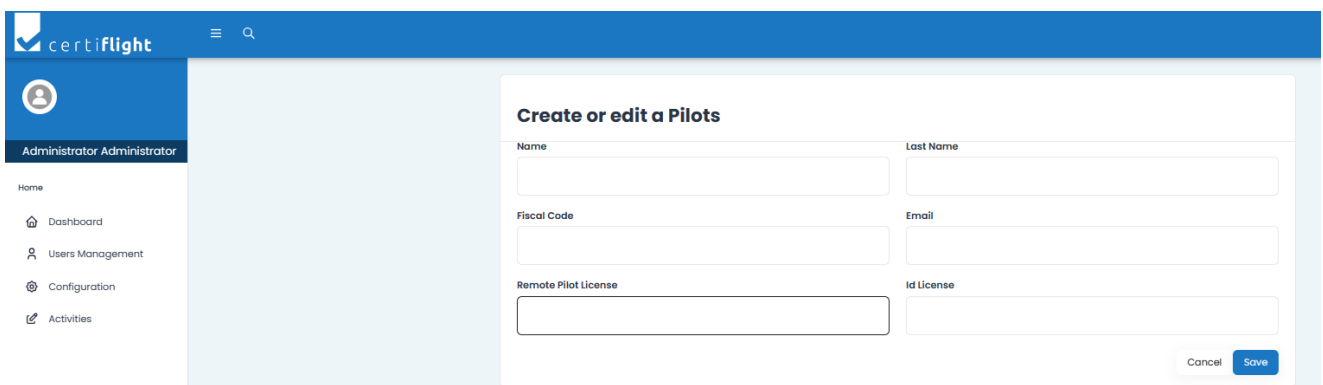
Name	Sim	Description	UAS	
ITA-901670303		ITA-901670303	DJI Mavic 2	 
ITA-901670302	89883030000074465235	ITA-901670302	DJI M30	 

Figure 4-7 Configuration Section

4.4.1 Pilot(s)

<user_PlaO> can add, modify or delete Pilot(s) database filling the following information.



The screenshot shows the 'Create or edit a Pilots' form in the Certiflight interface. The form is titled 'Create or edit a Pilots' and contains several input fields for user information. At the bottom right, there are 'Cancel' and 'Save' buttons.

Create or edit a Pilots Form:

- Name:
- Last Name:
- Fiscal Code:
- Email:
- Remote Pilot License:
- Id License:

Figure 4-8 Adding Pilot(s)

4.4.2 Drone(s)

<user_PlaO> can add, modify or delete drone(s) database filling the following information.

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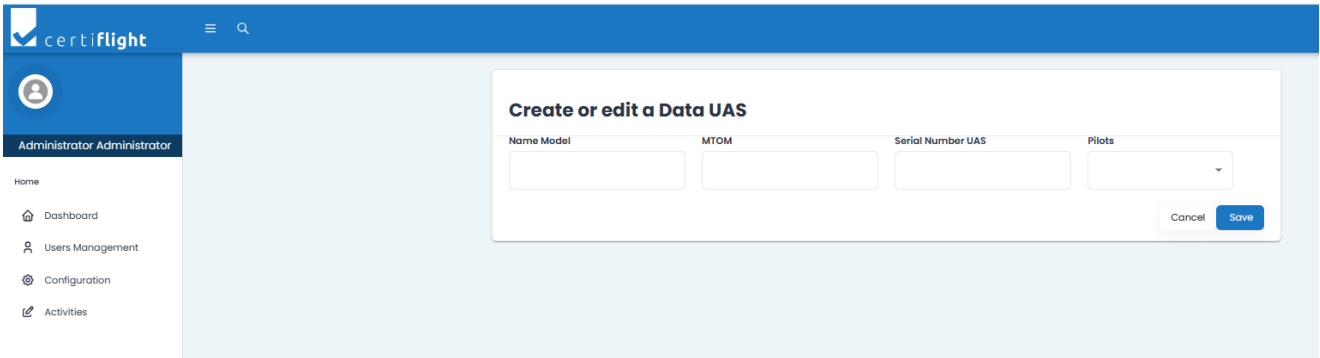


Figure 4-9 Adding drone(s)

4.4.3 GNSS tracker(s)

<user_PlaO> can add, modify or delete GNSS tracker(s) database filling the following information. Information can be edited manually or via QR code scanning.

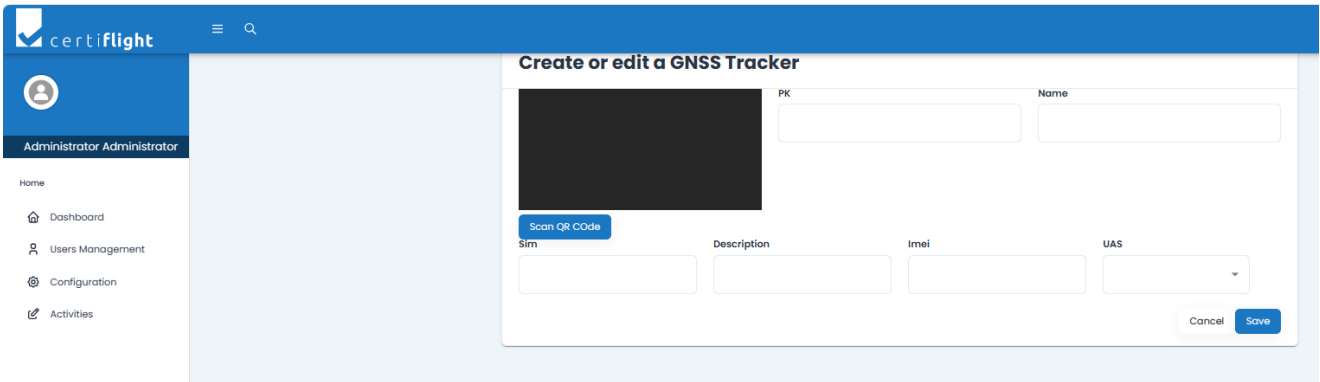


Figure 4-10 Adding GNSS tracker(s)

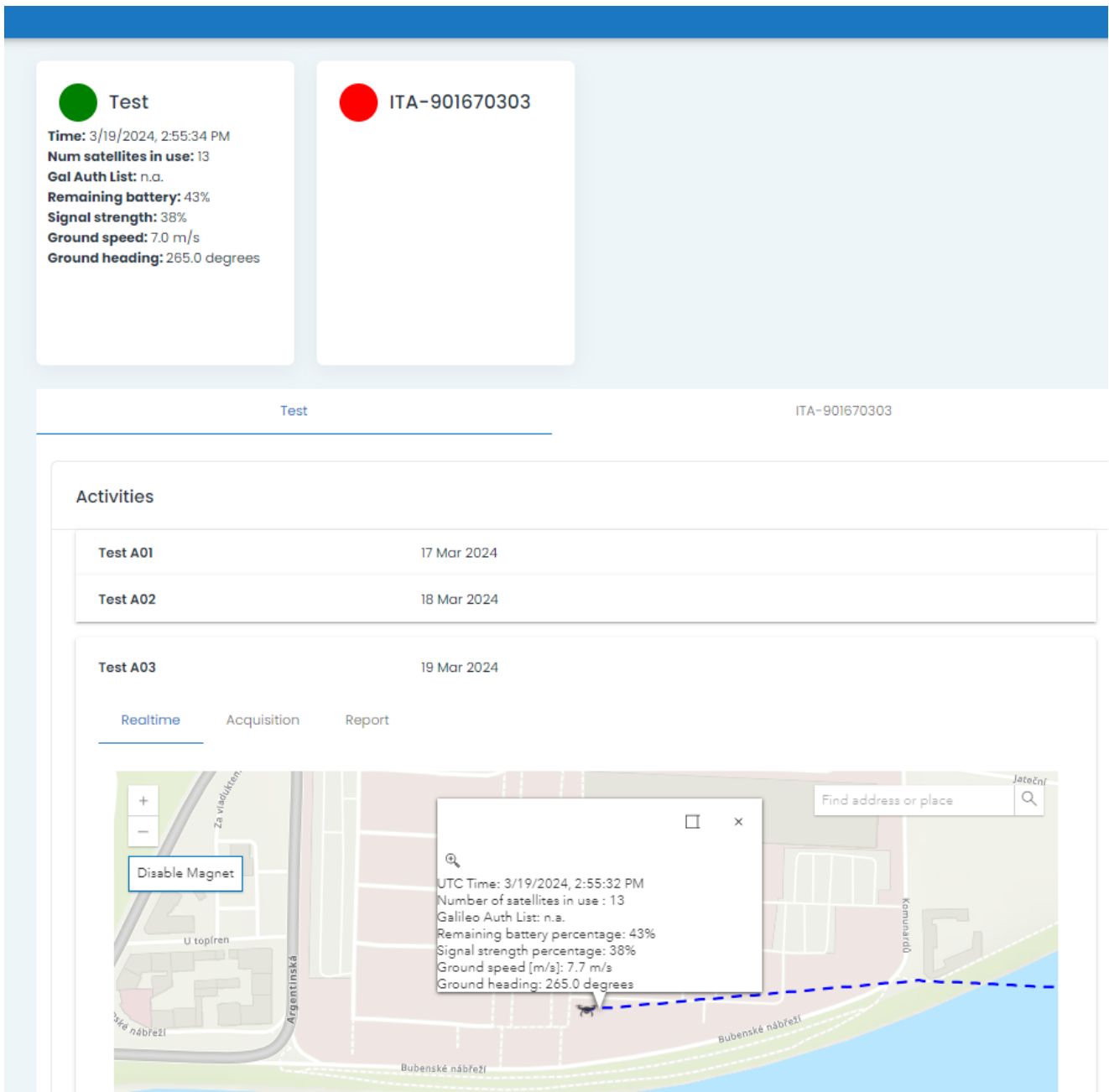
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4.5 Dashboard

4.5.1 Real time Operations

4.5.1.1 GNSS tracker data-sheet

Any time a GNSS tracker is switched on a green light appear and a notification is also sent to the associated <user_PiLO> and <user_PlaO>. Real time data are visible in the “card” and on the map. Also, an activity is created if the GNSS tracker is switched on for the first time in the day. Any further switching on will not generate a new activity. In one day only one activity is created containing all the daily collected information.



The dashboard displays real-time data for two trackers: 'Test' (green dot) and 'ITA-901670303' (red dot). The 'Test' card shows the following data:

- Time:** 3/19/2024, 2:55:34 PM
- Num satellites in use:** 13
- Gal Auth List:** n.a.
- Remaining battery:** 43%
- Signal strength:** 38%
- Ground speed:** 7.0 m/s
- Ground heading:** 265.0 degrees

The map below shows the location of the tracker with a data popup window displaying the same metrics. The popup window also includes a search bar and a 'Disable Magnet' button.

The activities section shows a list of activities:

- Test A01** - 17 Mar 2024
- Test A02** - 18 Mar 2024
- Test A03** - 19 Mar 2024

The 'Test A03' activity is currently selected, showing 'Realtime' data. The map shows the location of the tracker with a data popup window displaying the same metrics.

Figure 4-11 Realtime data acquisition, visualisation and storing

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4.5.1.2 Enable/Disable Magnet

<user_PiLO> and <user_PlaO> can visualise real time data in a map following a visualisation centered with the last received position (Magnet enabled) or having the possibility to freely navigate and zoom the map (Magnet disabled).

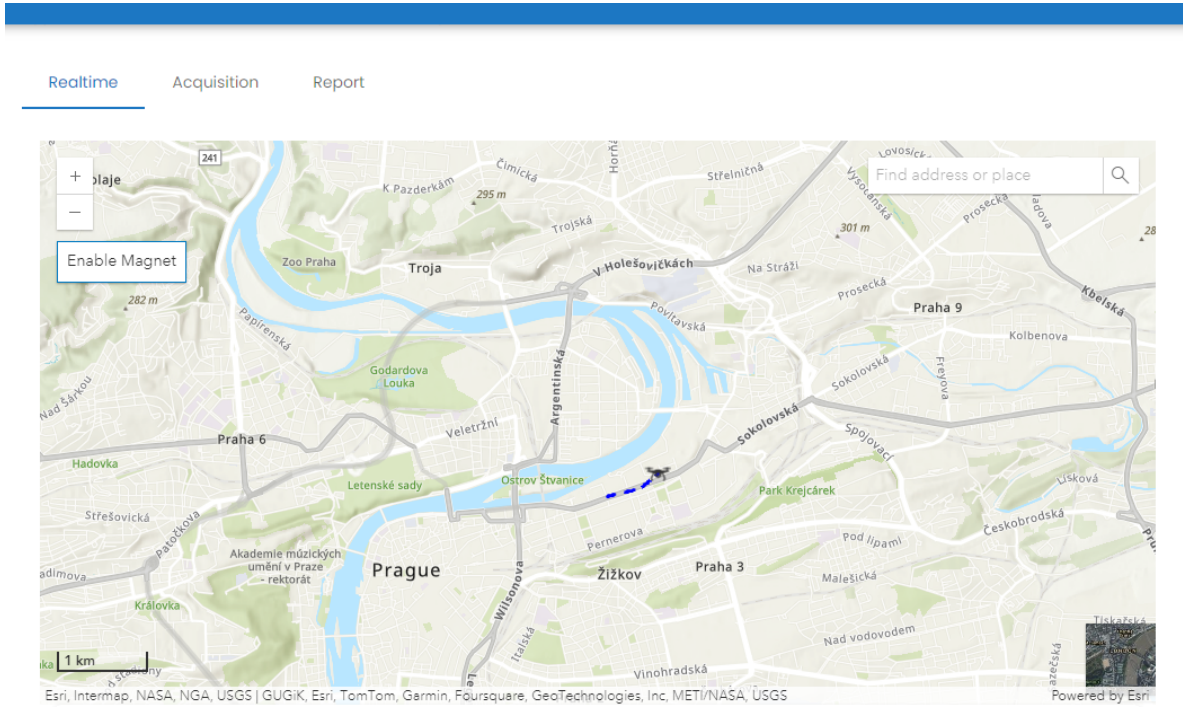


Figure 4-12 Disabled Magnet

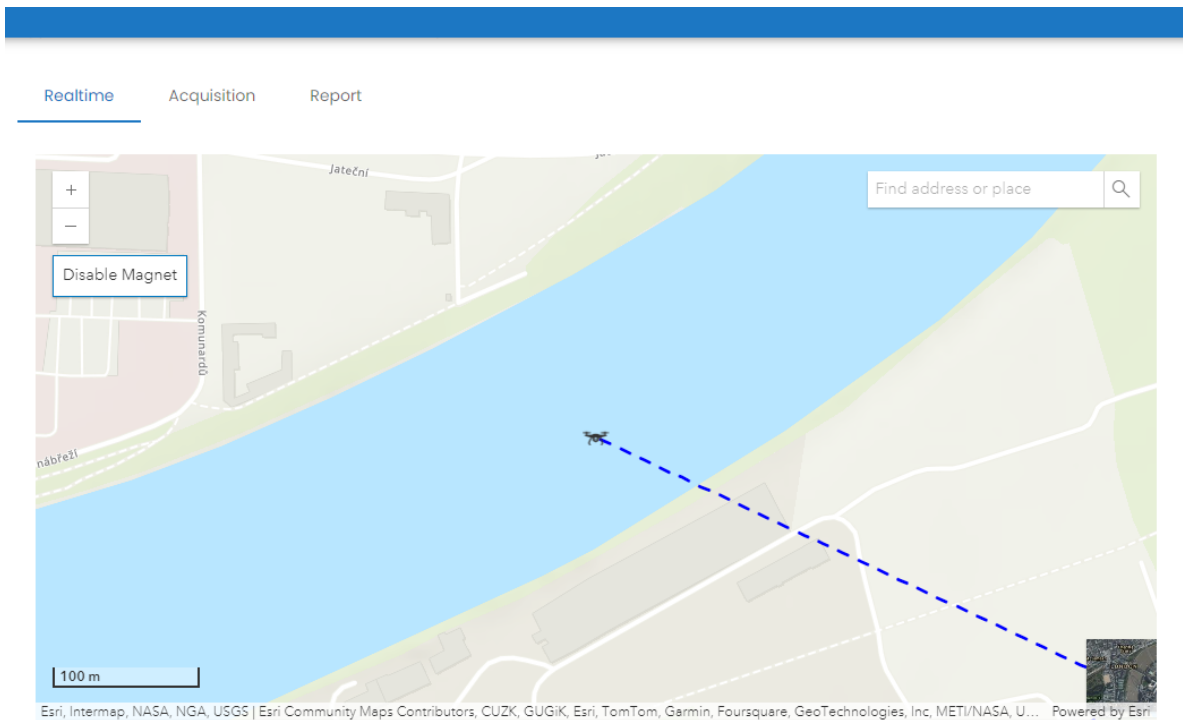


Figure 4-13 Enabled Magnet

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4.5.1.3 Map selection

Clicking on the icon on the bottom-right the map can be visualised on terrain or geometric view.

Realtime Acquisition Report



Figure 4-14 Map visualisation (satellite)

4.5.1.4 Logs

Logs are available (one per second) any time a position is gathered.



Figure 4-15 Real time Logging information

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4.5.2 Acquisition

4.5.2.1 Uploading data

<user_PiLO> can access this section to upload raw data gathered from UTM box (via trusted check).

<user_ExpO> can access this section to get raw data and upload elaborated product(s).

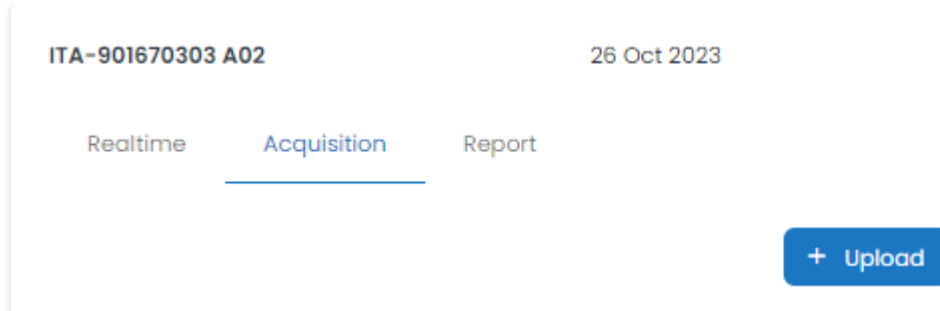


Figure 4-16 Uploading data

4.5.2.2 Viewing uploaded data

<user_PiLO>, <user_ExpO> and <user_PlaO> can access this section to see uploaded data.

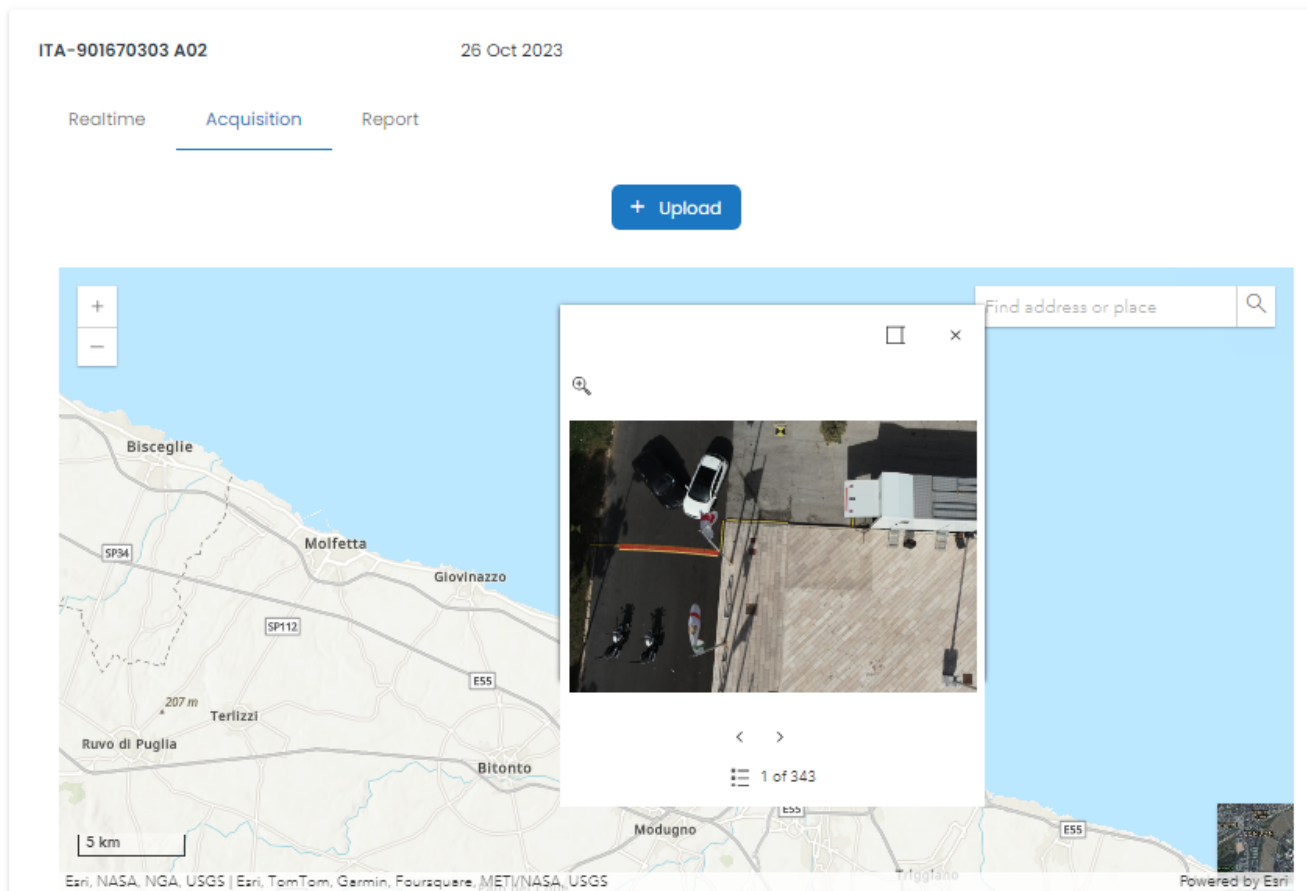












Figure 4-17 Viewing uploaded data on a map

Reset Apply

Name	Type	Thumbnail	Date	Actions
DJI_20231024131137_0032	IMAGE		11 Mar 2024 20:44:32	
DJI_20231024131136_0031	IMAGE		11 Mar 2024 20:44:31	
DJI_20231024131132_0027	IMAGE		11 Mar 2024 20:44:30	
DJI_20231024131131_0026	IMAGE		11 Mar 2024 20:44:27	
DJI_20231024131130_0025	IMAGE		11 Mar 2024 20:44:26	

1 - 5 of 27 < >

Figure 4-18 Viewing uploaded data (tabular representation)

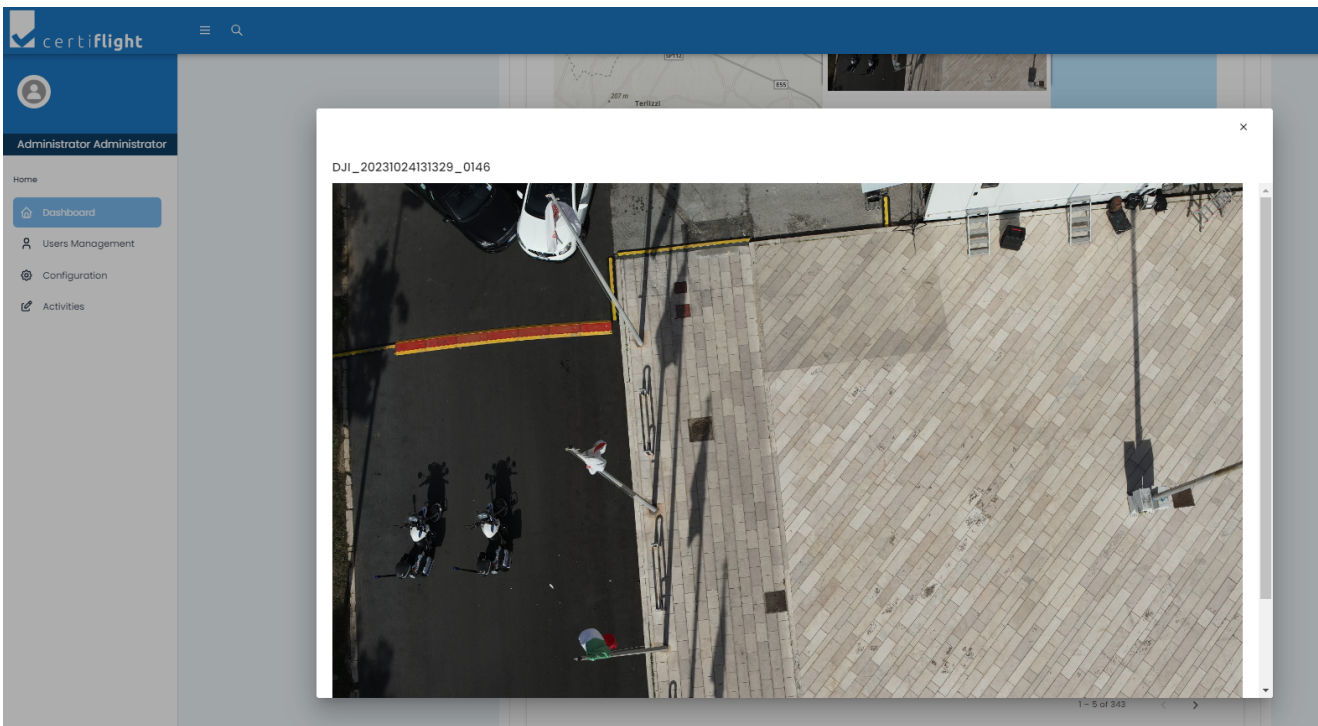
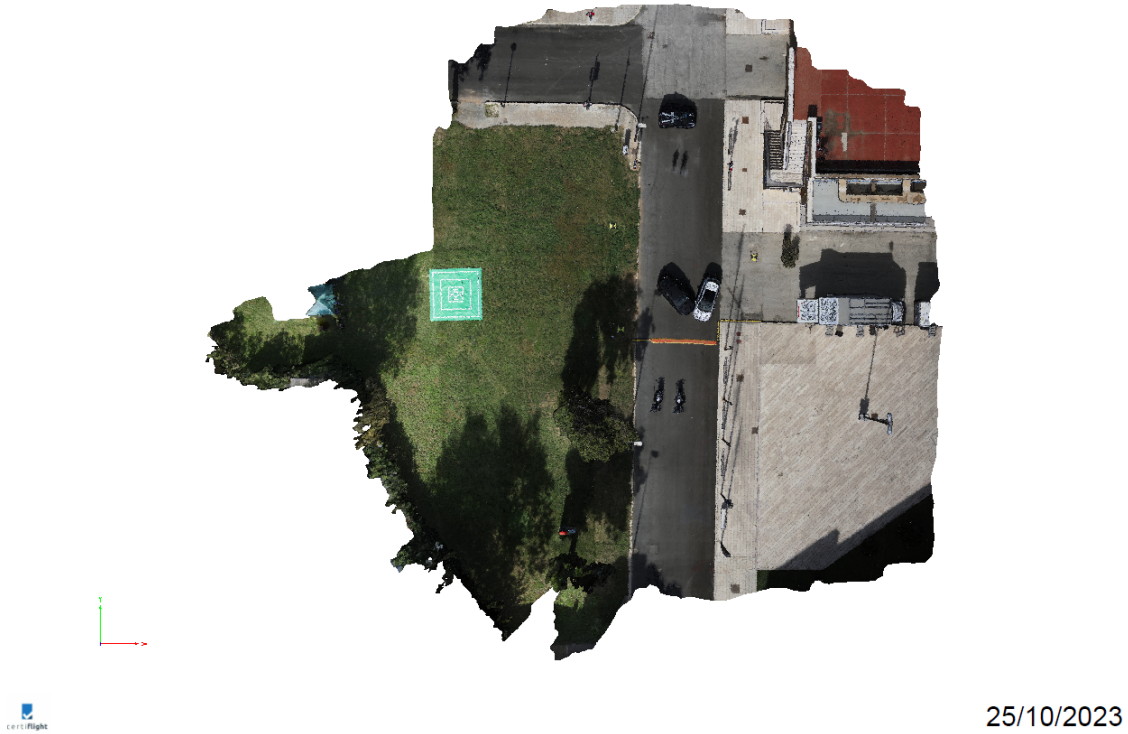


Figure 4-19 Viewing uploaded data (full view)

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Certiflight DB23_simplified_3d_mesh



Certiflight DB23_simplified_3d_mesh

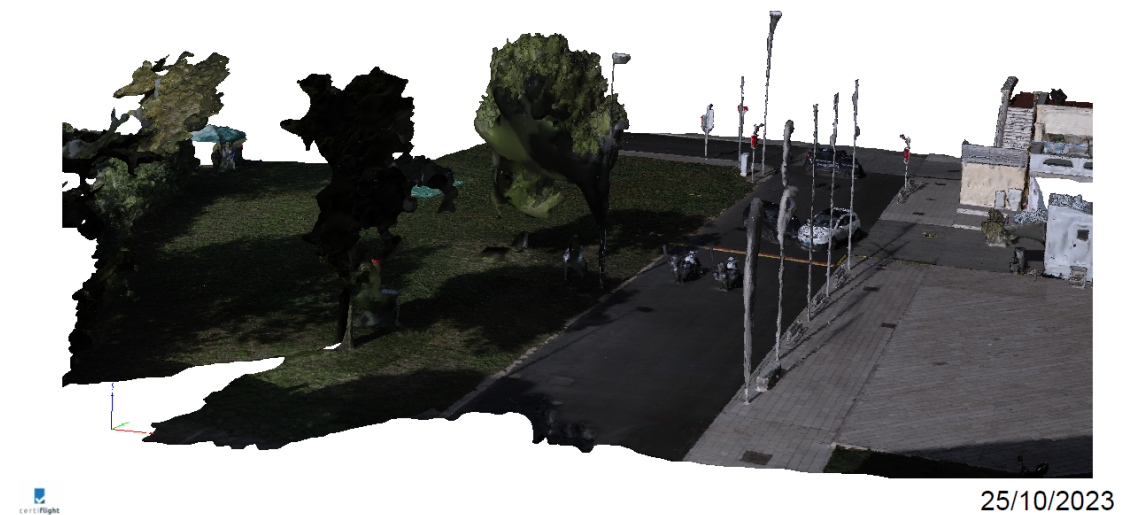


Figure 4-20 3D products

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4.5.3 Report(s) generation

4.5.3.1 Configuration

This section shows how to generate a report for each created activity.

4.5.3.1.1 Light or full report selection

<user_PlaO> can select wich report topology to generate.

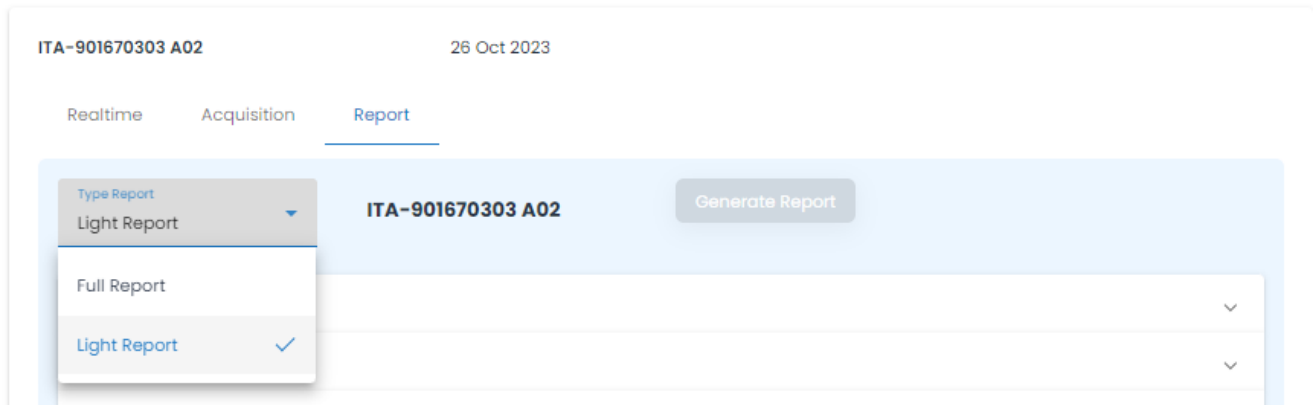


Figure 4-21 Light or full report selection

4.5.3.1.2 Introduction

<user_PlaO> can visualise the introduction static test which will be included in the pdf report.

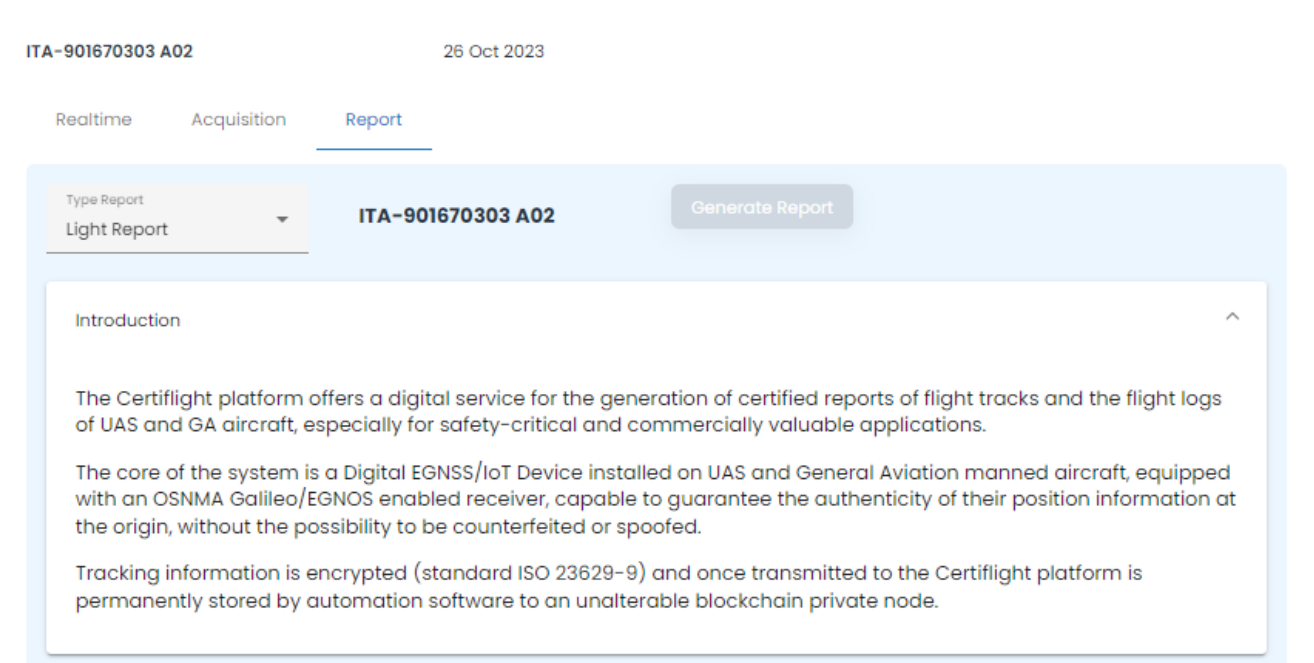



Figure 4-22 Light or full report selection

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4.5.3.1.3 Responsibilities

<user_PlaO> can visualise the responsibilities section which will be included in the pdf report according to the info filled in section 4.4.

ITA-901670303 A02
26 Oct 2023

Realtime
Acquisition
Report

Type Report
 Light Report

ITA-901670303 A02

Generate Report

Introduction
▼

Responsibilities
▲

GNSS Tracker

Name	Code	Description	UAS
ITA-901670303			DJI Mavic 2

Drone

Name Model	MTOM	S/N UAS	Pilot
DJI Mavic 2	mavic2	343243333	Simone Maurizi

Pilot

First Name	Last Name	Fiscal Code	Email	Remote Pilot License	Id License
Simone	Maurizi	MRZSMN9IA13M082I	simone.maurizi@gmail.com	342342	1232112

Figure 4-23 Responsibilities summary

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4.5.3.1.4 Certified trajectory

<user_PlaO> can select the certified trajectory screenshot which will be included in the pdf report.



Figure 4-24 Certified trajectory visualised in a map

4.5.3.1.5 Remarks

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<user_PlaO> can add free text commenting the activity which will be included in the pdf report.

ITA-901670302 A01 21 Mar 2024

Realtime Acquisition Report

Type Report
Light Report ▼ **ITA-901670302 A01** Generate Report

Introduction ▼

Responsibilities ▼

Certified Trajectory ▼

Remarks ▲

MAM-24

Figure 4-25 Remarks section

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4.5.3.1.6 Statistics

<user_PlaO> can visualise statistics about OSNMA usage, i. e. number of authenticated satellites used in the position determination. The platform indicates a mean value considering all the positions evaluated for each minute.

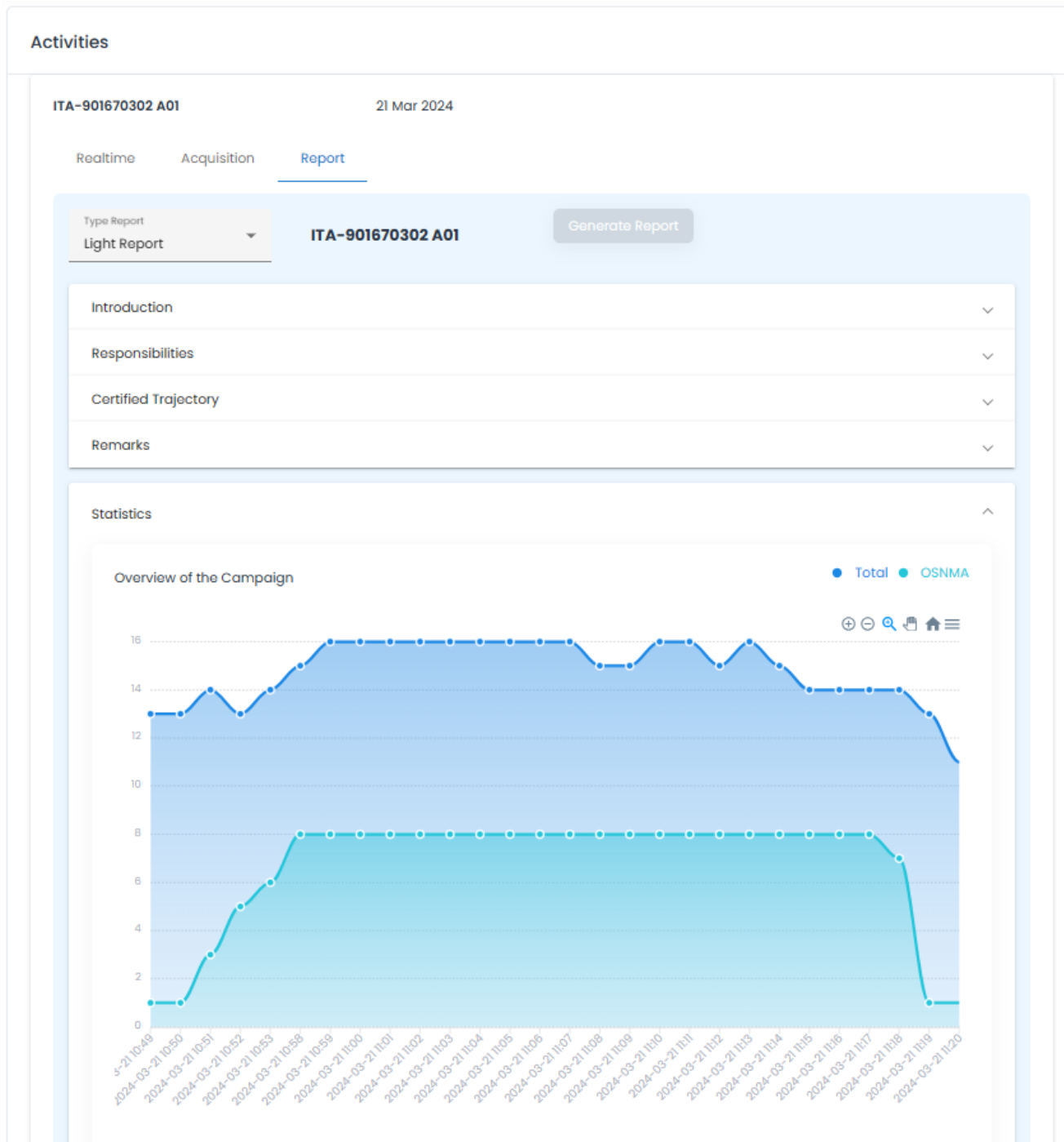


Figure 4-26 Total and authenticated satellites' statistics

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4.5.3.2 Document (pdf generation)

This section indicates the structure of the reports which can be obtained as output of CERTIFLIGHT.

4.5.3.2.1 Cover page

The cover page reports the report code, the typology (light or full report) and the date



Figure 4-27 Report cover page

4.5.3.2.2 Summary

This section indicates the report structure



Figure 4-28 Report structure

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		PU	D3.2	35
TITLE			REV	
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4.5.3.2.3 Introduction

The introduction is a static text explaining the CERTIFLIGHT context. This section cannot be modified by the user.



CERT_REP_11119
03/21/2024
Page 3

1. Introduction


The Certiflight platform offers a digital service for the generation of certified reports of flight tracks and the flight logs of UAS and GA aircraft, especially for safety-critical and commercially valuable applications.

The core of the system is a Digital EGNSS/IoT Device installed on UAS and General Aviation manned aircraft, equipped with an OSNMA Galileo/EGNOS enabled receiver, capable to guarantee the authenticity of their position information at the origin, without the possibility to be counterfeited or spoofed.

Tracking information is encrypted (standard ISO 23629-9) and once transmitted to the Certiflight platform is permanently stored by automation software to an unalterable blockchain private node.

Figure 4-29 Introduction section: CERTIFLIGHT context

4.5.3.2.4 Responsibilities



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03/21/2024
Page 4

2. Responsibilities

The following tables report information filled in by admin, dated Thu Mar 21 2024.

Certiflight has no responsibility on the data filled in this section.

Pilot

Id	Last Name	First Name	Fiscal code	Email	Id License	Remote Pilot License
46901	Maurizi	Simone	MRZSMN91A13M082I	simone.maurizi@gmail.com	23232	2232

Drone

Model Name	M_Tom	UAS Serial Number
DJI M30	m30	1232112

GNSS Tracker

The used GNSS Tracker is ITA-901670302

Figure 4-30 Responsibilities section

4.5.3.2.5 Certified trajectory

This section is the core of the report and reports the certified trajectory registered by the GNSS tracker and sent via trusted chain to the CERTIFLIGHT platform.

<user_PlaO> can select the map to be visualised as reported in section 4.5.3.1.4.

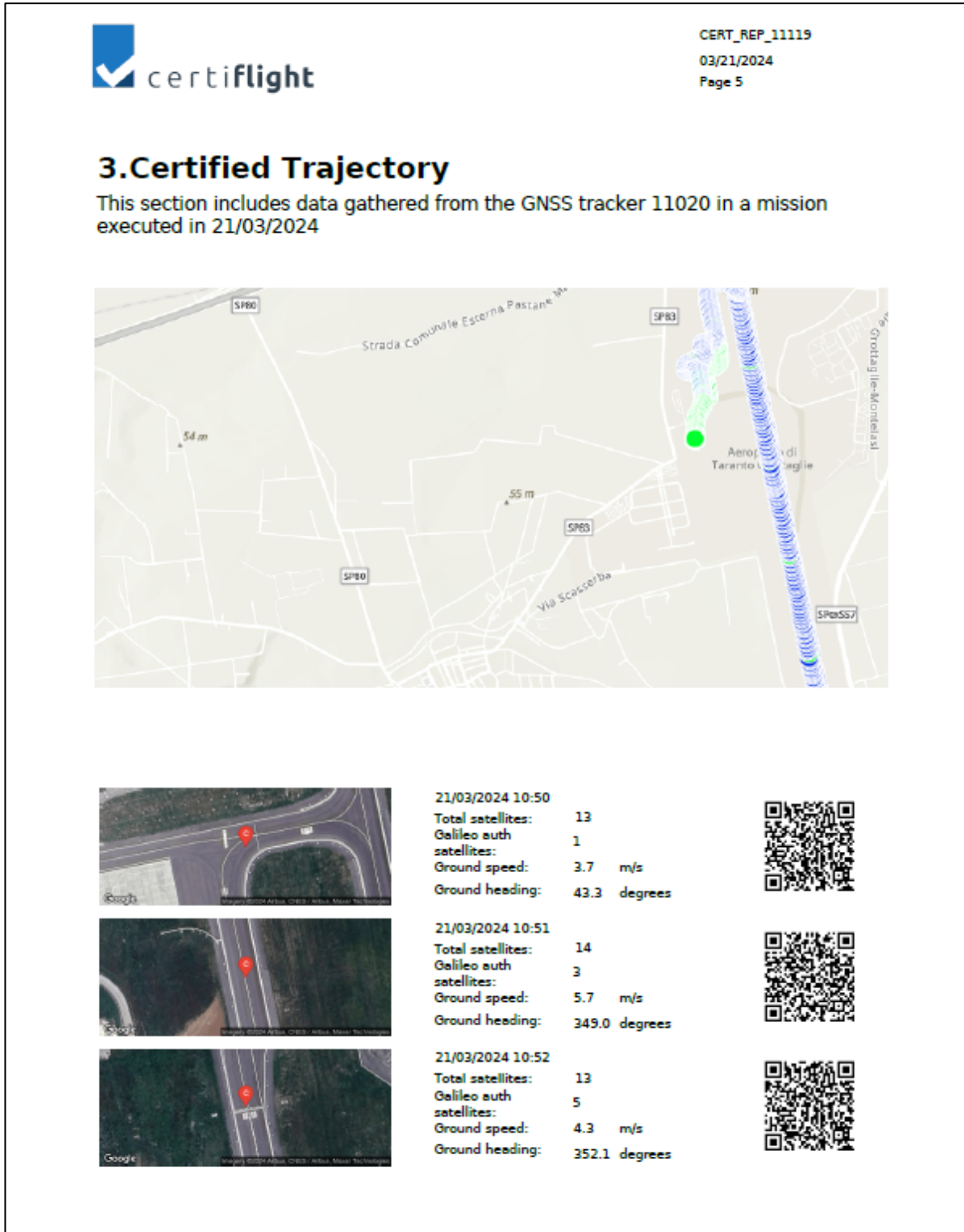


Figure 4-31 Certified trajectory section

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A QR code is reported for each dataset so that any reader of the report can check that the data is really provided by CERITFLIGHT. The result of this verification process is reported in section 4.5.3.3.

4.5.3.2.6 Certified data (only full report)

This section is only available in the full report.

For each data uploaded in the acquisition section (as reported in 4.5.2) relevant positioning information and ancillary data are reported certified by CERTIFLIGHT.

DJI_20231024131137_0032			21/03/2024 10:50 Total satellites: 13 Galileo auth satellites: 1 Ground speed: 3.7 m/s Ground heading: 43.3 degrees	
DJI_20231024131136_0031			21/03/2024 10:51 Total satellites: 14 Galileo auth satellites: 3 Ground speed: 5.7 m/s Ground heading: 349.0 degrees	
DJI_20231024131132_0027			21/03/2024 10:52 Total satellites: 13 Galileo auth satellites: 5 Ground speed: 4.3 m/s Ground heading: 352.1 degrees	

Figure 4-32 Certified data section

A QR code is reported for each dataset so that any reader of the report can check that the data is really provided by CERITFLIGHT. The result of this verification process is reported in section 4.5.3.3.

4.5.3.2.7 Remarks

<user_PlaO> can add free text to the final report as reported in section 4.5.3.1.5.


 certiflight	CERT_REP_11119 03/21/2024 Page 9
<h3>4.Remarks</h3> <p>Certiflight has no responsibility on the data filled in in this section.</p> <p>MAM-24</p>	

Figure 4-33 Remarks section

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4.5.3.3 Public blockchain verification

By scanning the QR codes printed in the reports, the redirection to following public link is obtained. This public page allow any user (also third parties) to check if the data reported in the report are really provided by CERTIFLIGHT with no tampering (integrity check).



Figure 4-34 CERTIFLIGHT public page. Valid dataset



Figure 4-35 CERTIFLIGHT public page. Invalid dataset

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4.6 Activities

4.6.1 Statistics

This section allows any authorized user to perform researches on the activities they are allowed to access and to identify OSNMA performances (i.e. number of used authenticated satellites for each positioning) as well as the value of any ancillary data retrieved in real time and visualized on a map.

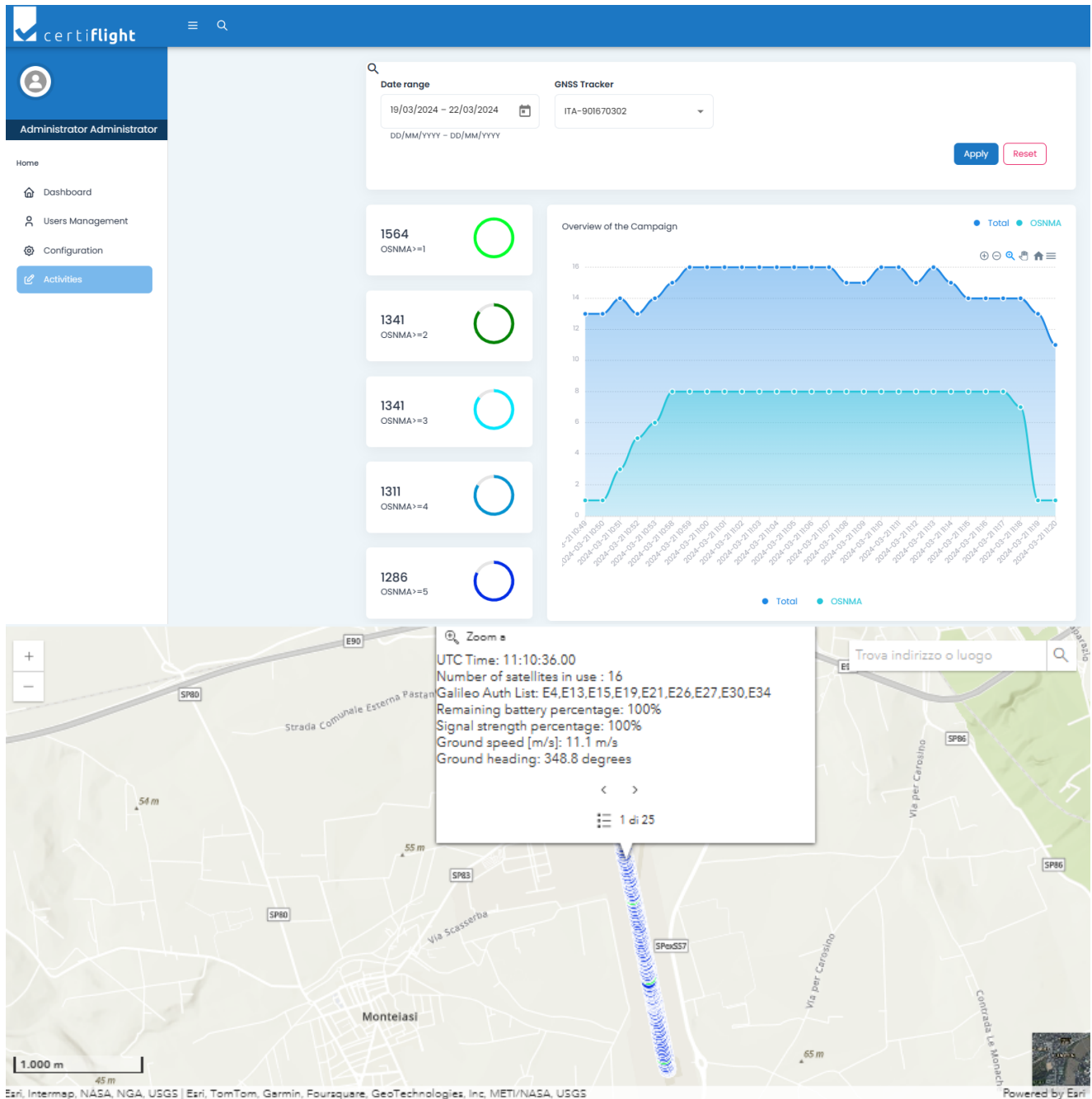


Figure 4-36 Statistics of performed activities

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