

Forest Fire Management



Forest Firefighting
Concepts based on
Aerial Support Strategies

13th of December 2018

Bled, Slovenia

DI Alexander Almer

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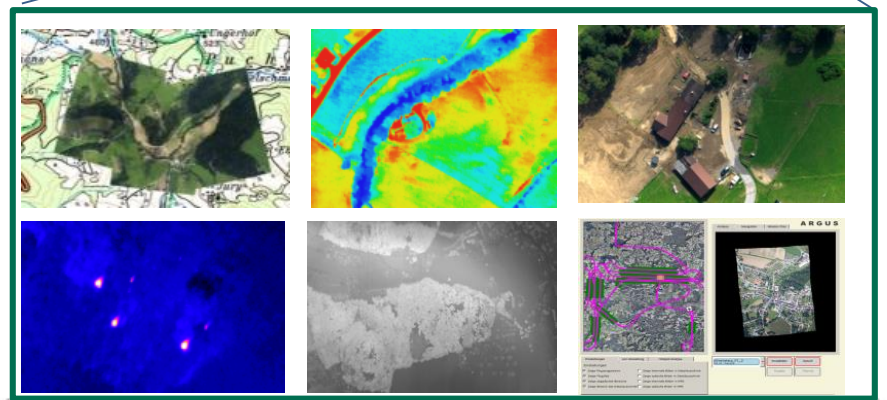
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Motivation

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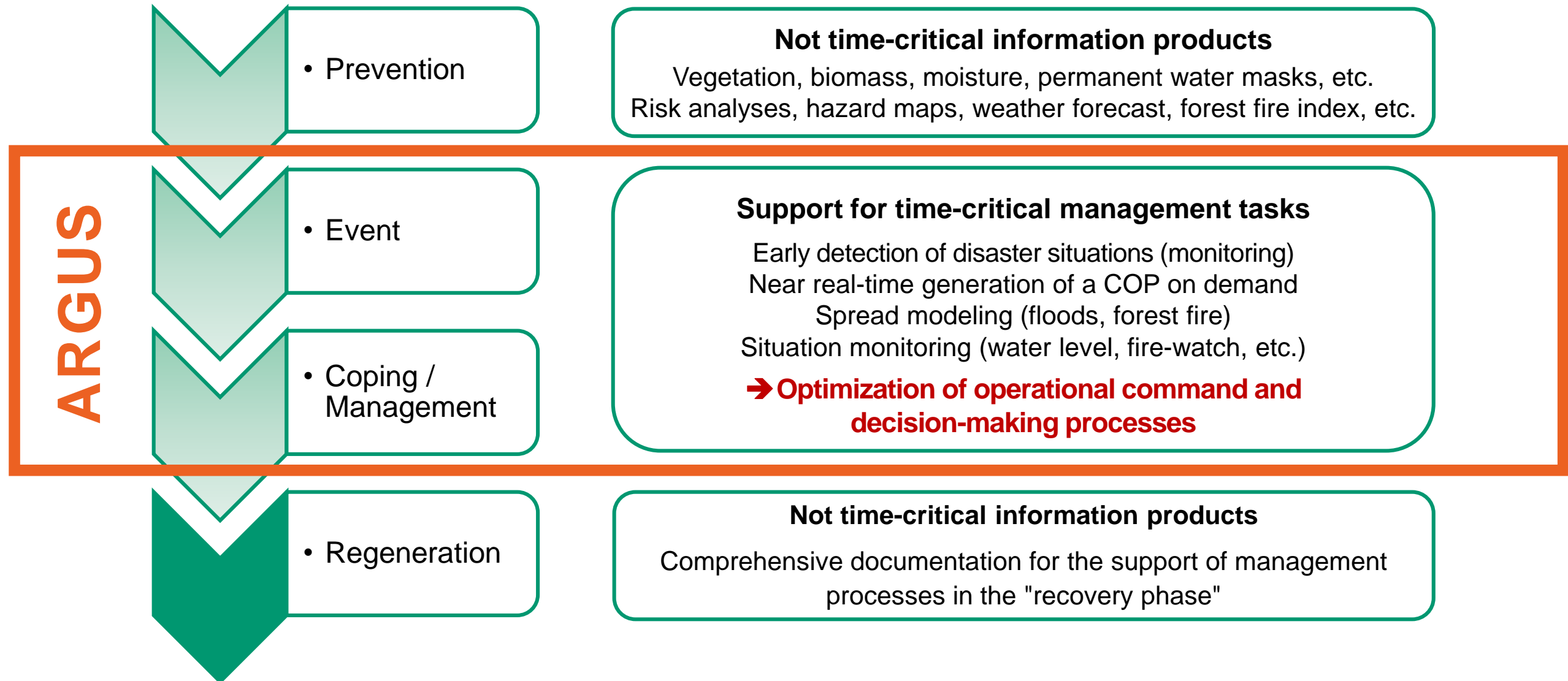
Meet requirements regarding the support of crisis management of natural disasters



Disaster management phases

Time-critical process

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System concept

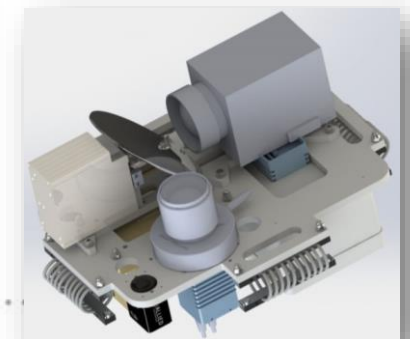


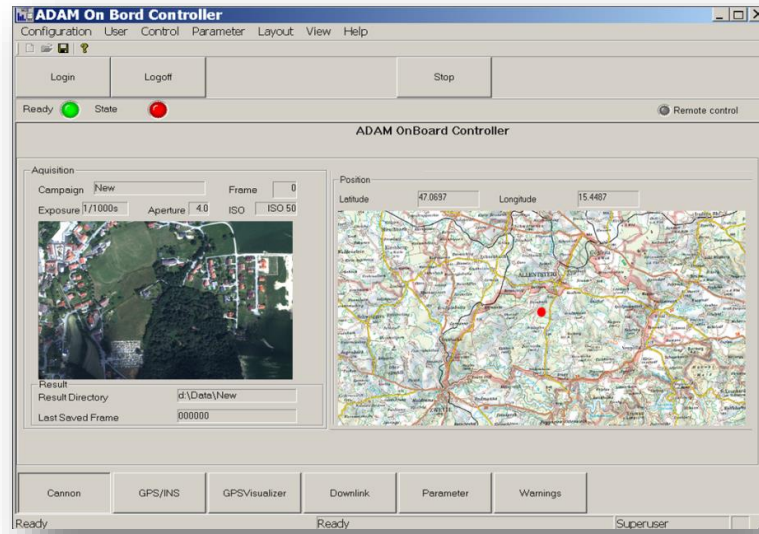
- Multi sensor platform
- Real-time communication to the ground
- Data processing and -analysis
- Geo-oriented management support applications

Flexible multi-sensor platform

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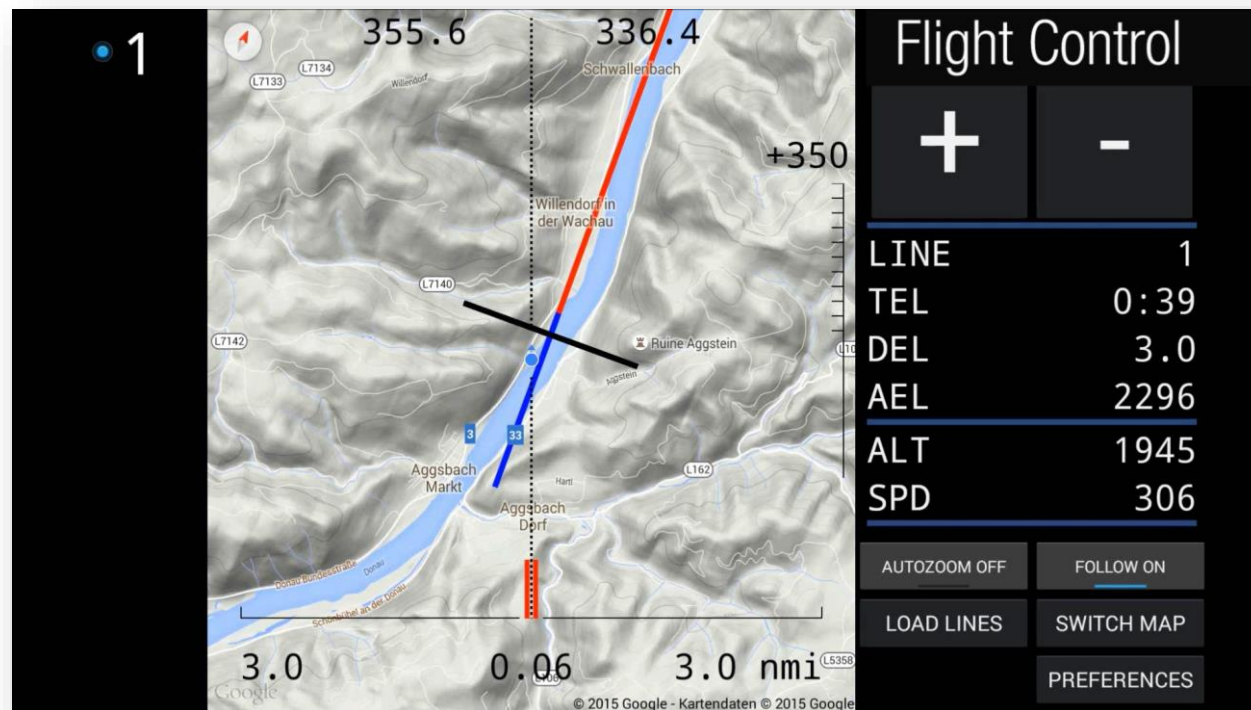
- 29 MP optical camera (RGB)
 10 cm @1000m AGL / coverage 720m @50mm
- 0,3 MPx thermal camera (moving)
 640 x 512 + swiping mirror technology
 50 cm @1000m AGL / coverage 720m
- Direct orthorectification / geo-sensors
 L1/L2 GNSS with IMAR/FSAS IMU
- Line of Sight (LoS)
 Bidirectional IP connection
 Time Division Multiplexing (TDD)
 Automatic tracking antenna
- Cost efficient sensors, good accuracy in real time
 Coverage ~100-200km² / h





On-board platform control

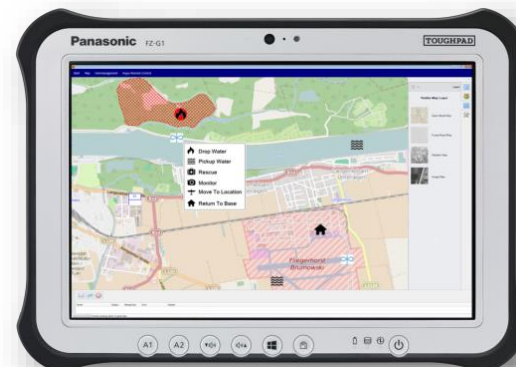
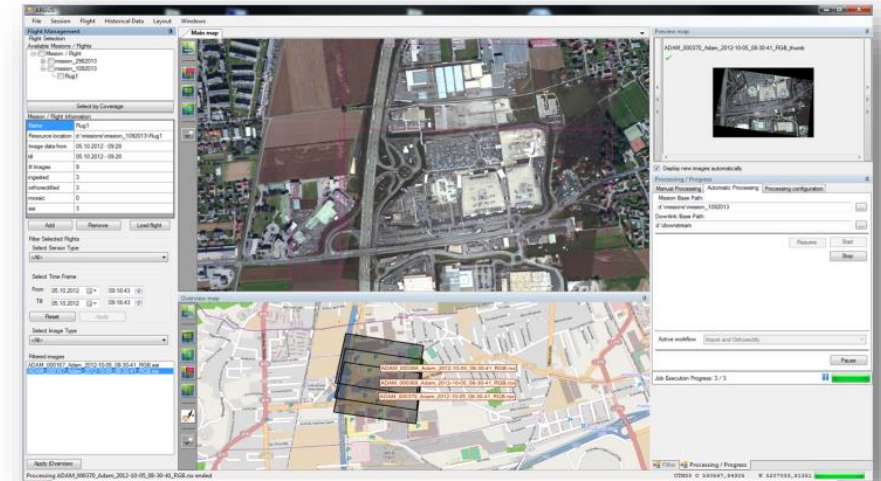
- Support applications for
- Pilot
 - Flight management and target allocation
- Operator
 - Sensor command & control
 - Data storage



Geo data management

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- Data acquisition planning, execution & monitoring
- Spatial- / temporal data storage and retrieval
- Interactive geo-based visualization & analysis
- Role & scenario based data distribution
- C4S integration, GIS, Web, analogue maps
- Interaction and task management with mobile units
- Support the generation of COPs



Geo-Datenmanagement

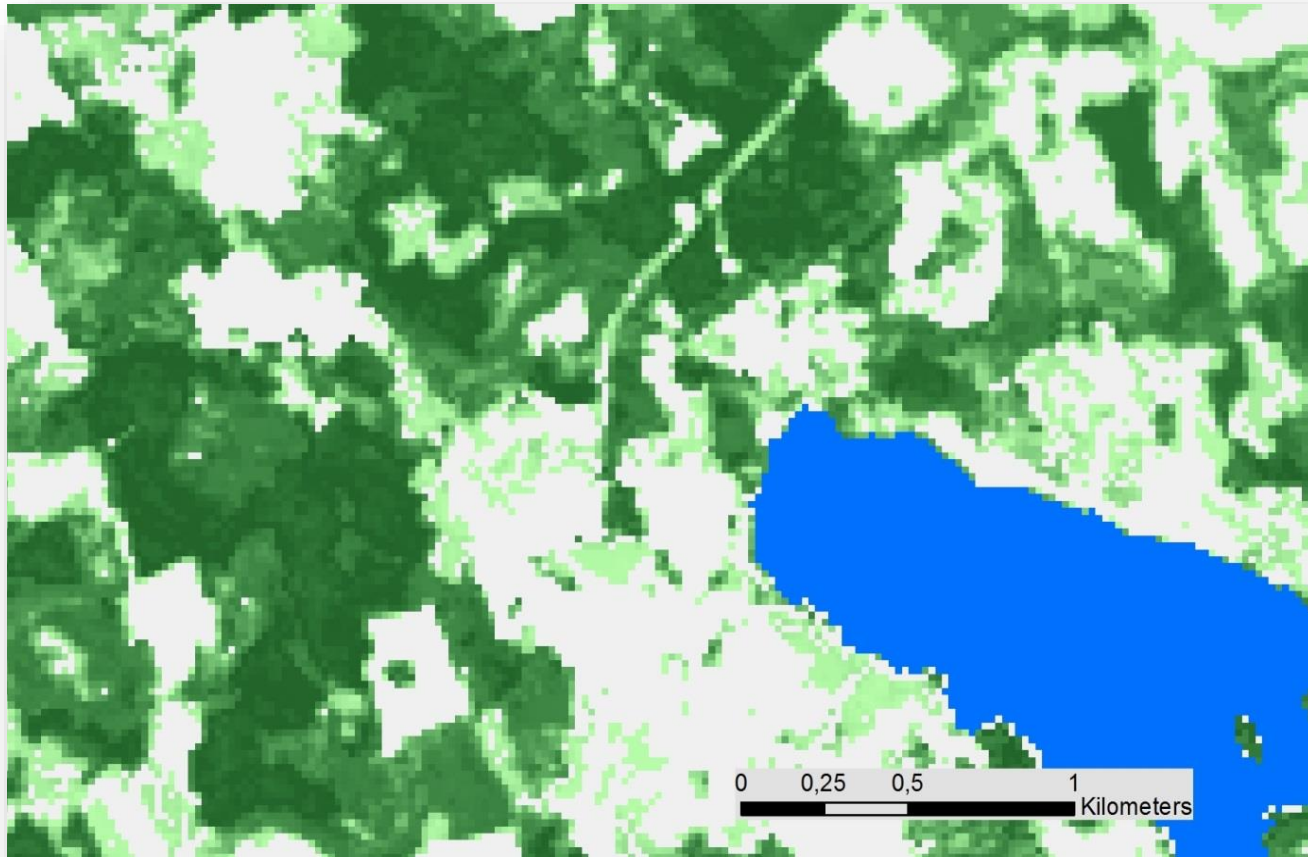
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Integration of reference maps and orthophotos
Forest situation, forest roads, water bodies, etc.



Copernicus Land Monitoring Service

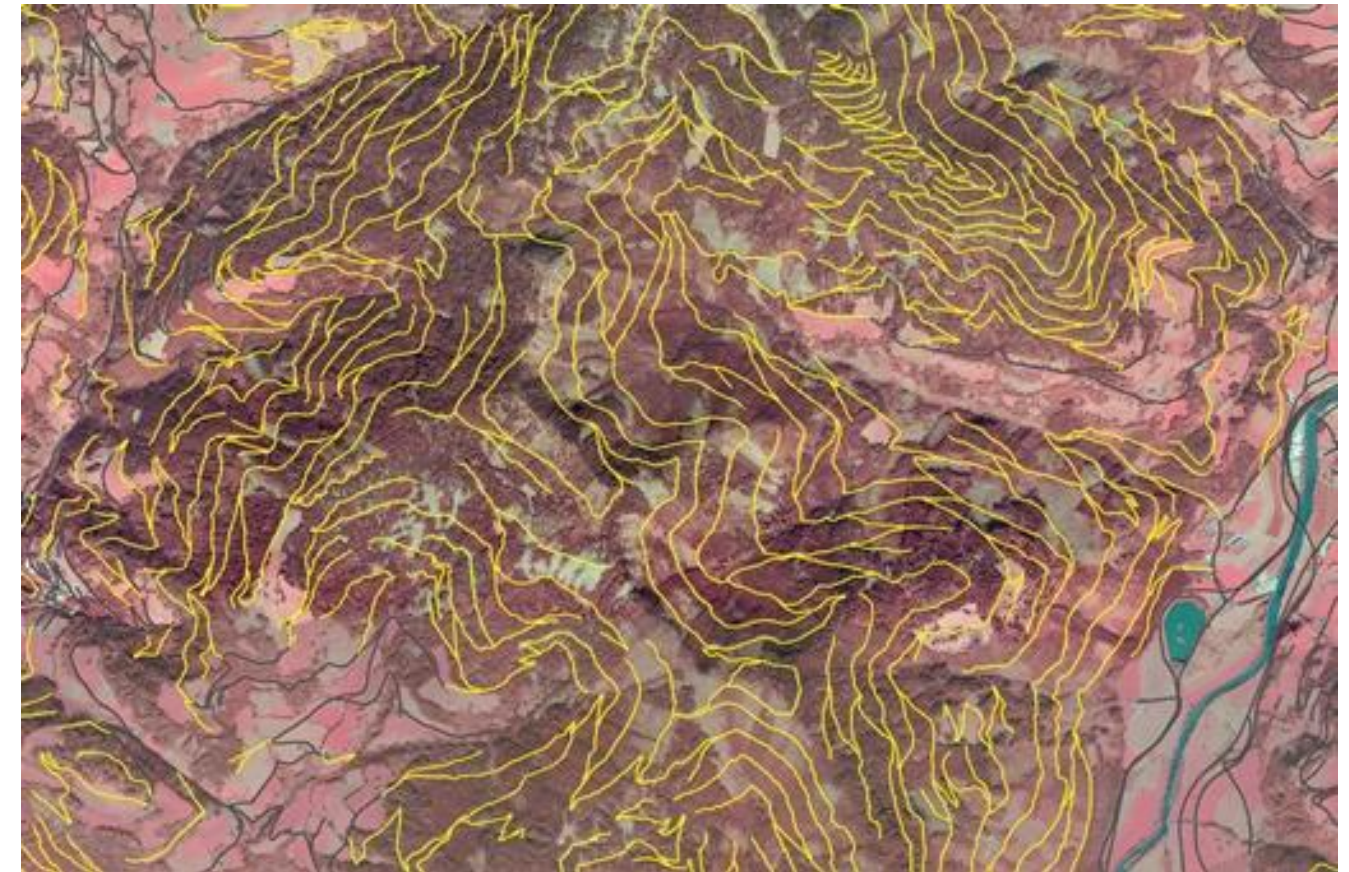
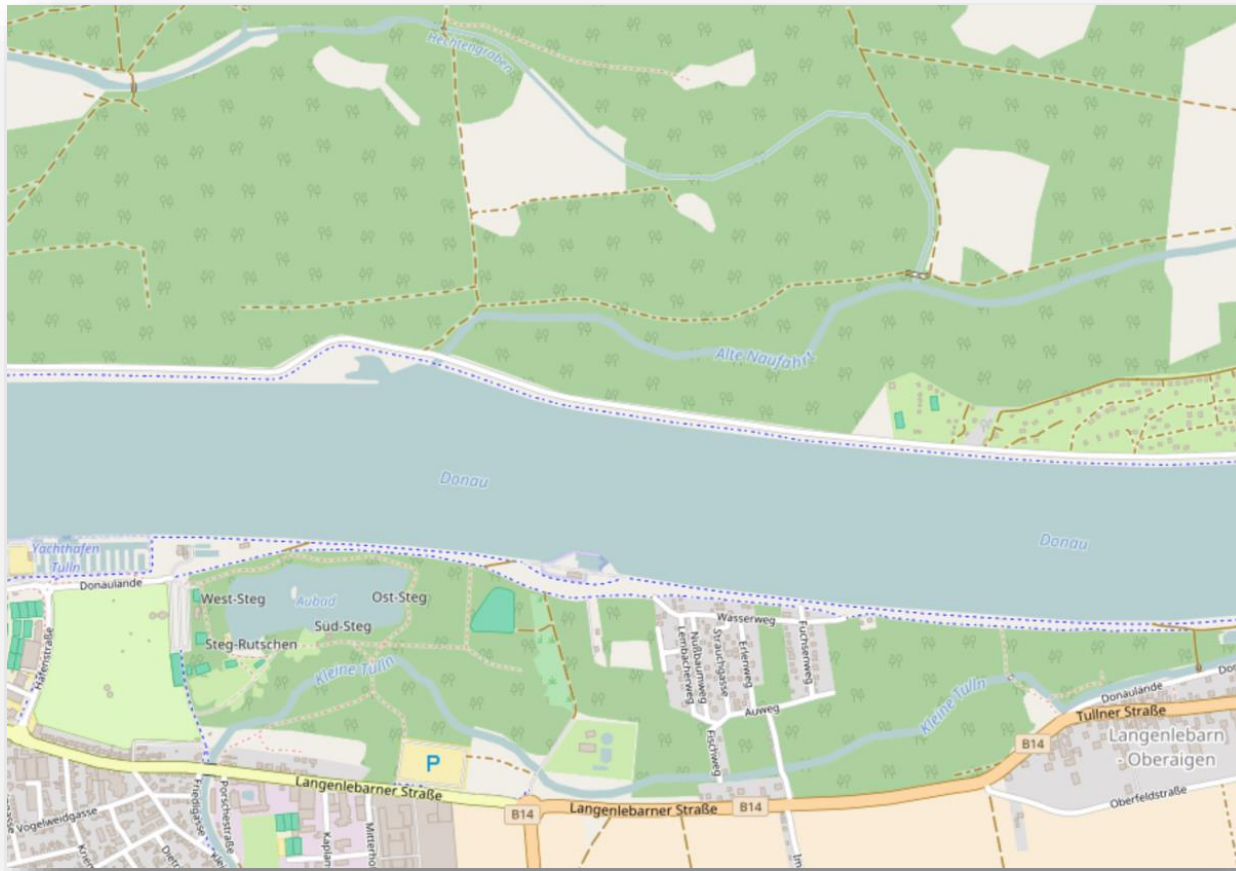
“HRL Tree Cover Density” and “Permanent Water Bodies” (20m resolution)



Geo-Datenmanagement

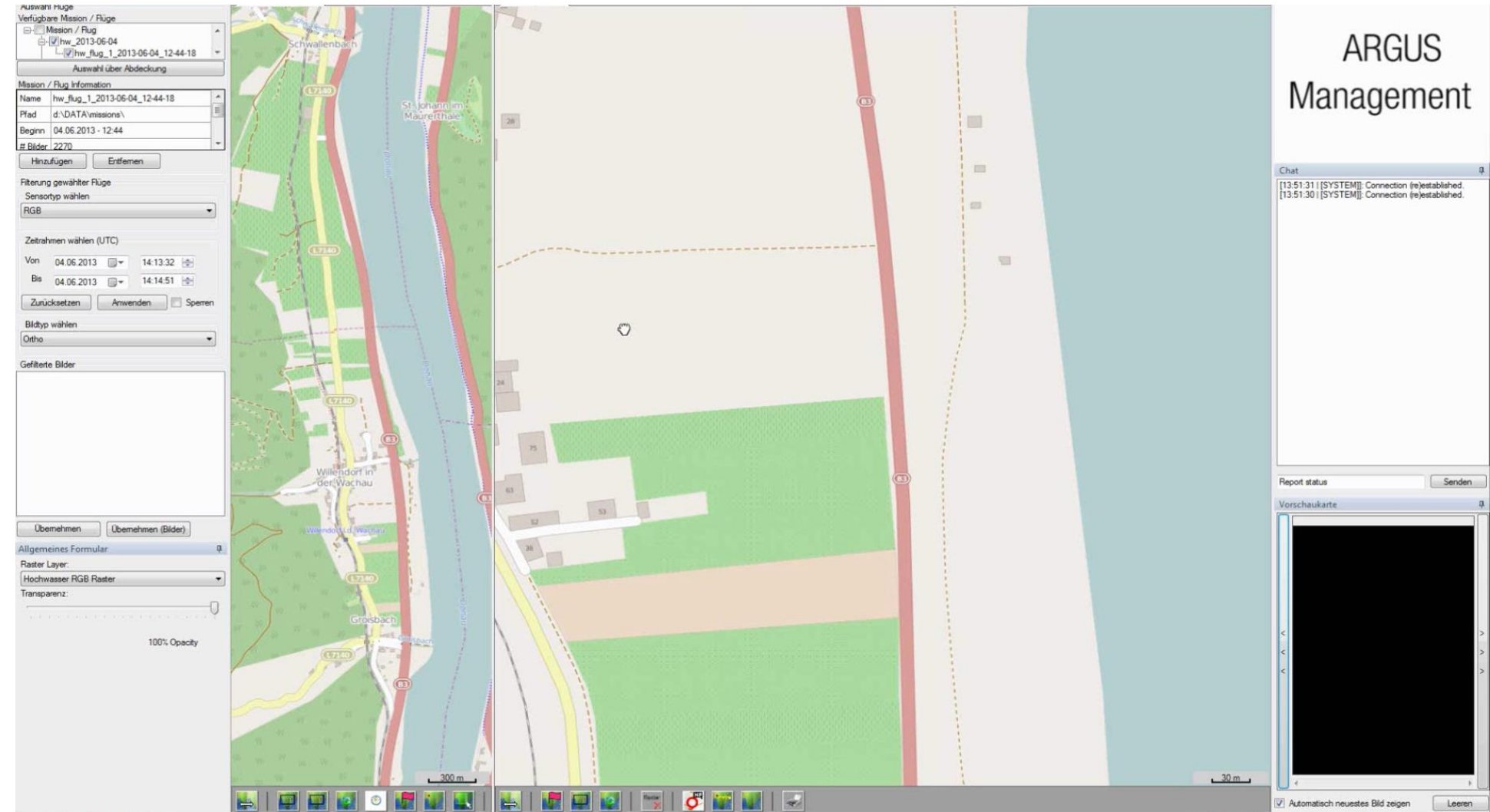
Integration of Open Street Map data
Build up a specific infrastruktur data base

Forest road network of Styria

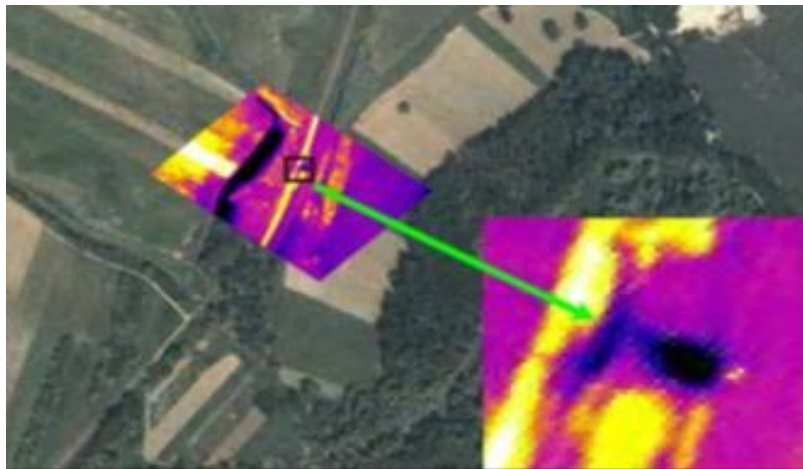
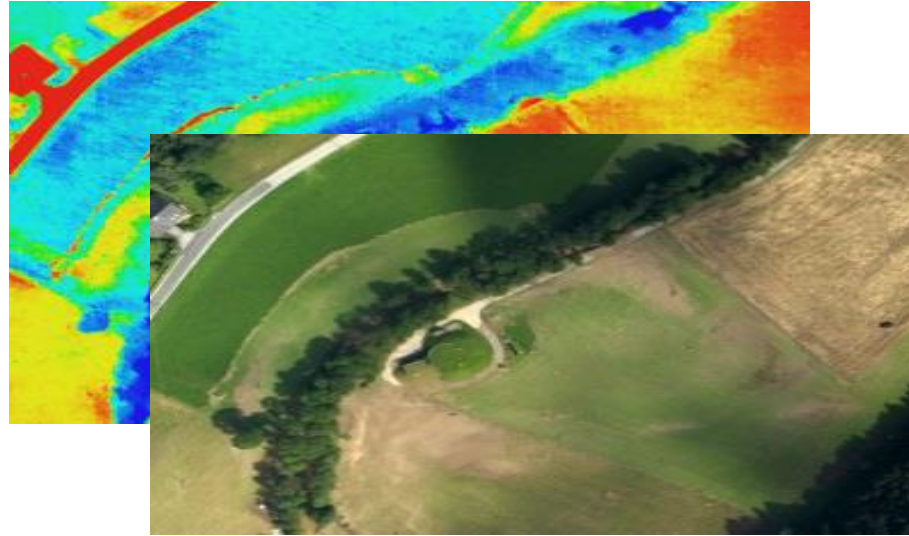


Geo data processing

- Near-real-time ortho-rectification
- Mosaicking
- Rapid value-adding
- Hotspot mapping
- Change detection
- 3D model generation
- Precision Mapping



Examples - Data products flooding



Forest Fire Multi-Level Management



Management topics

Monitoring - COP

- PC 6 airborne carrier platform
- ARGUS MS platform

Airborne operations

- Firefighting planes and helicopters

Ground operations

- Firefighting vehicles
- Ground forces

Mobile Operation Center

- Management
- Communication



Operational Command Support

■ ARGUS Fire

- Situation picture (COP)
- Resource management
- Communication with mobile units
- Networking of involved emergency forces and vehicles
- Logging of communication and event/operation log

■ ARGUS Fire Mobile

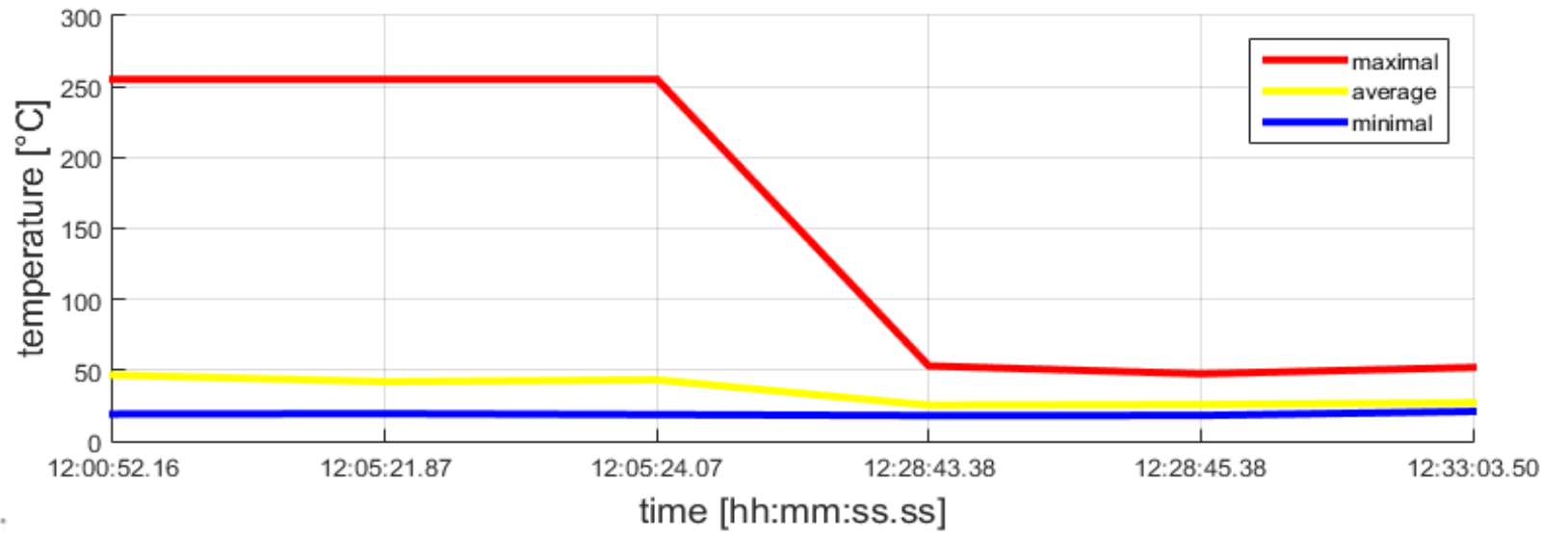
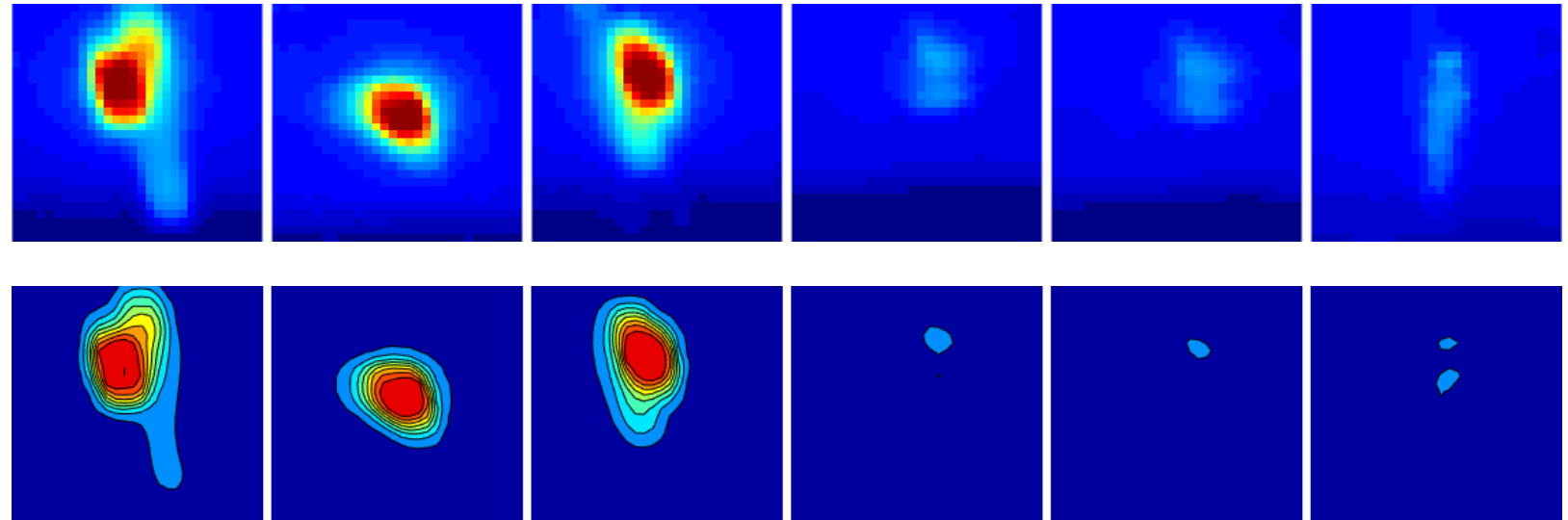
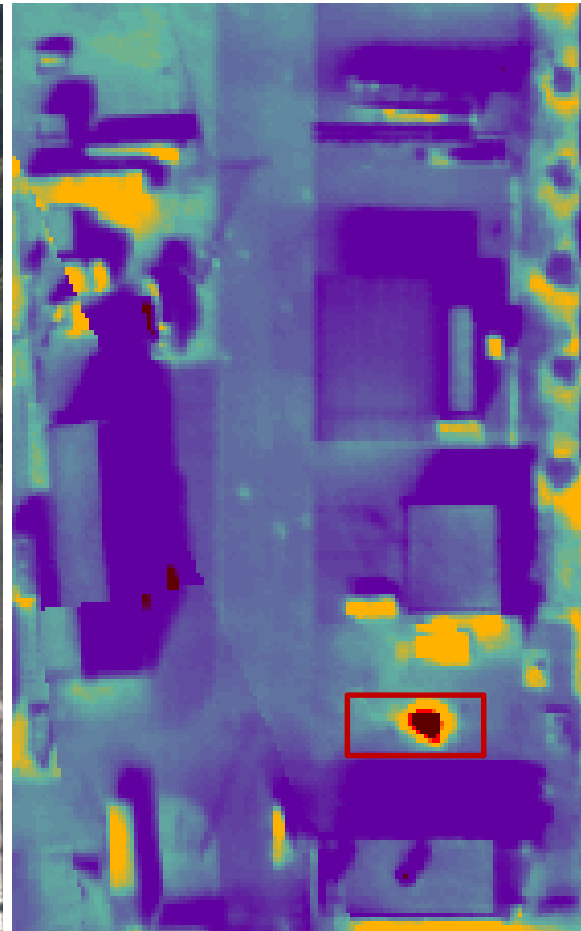
- Data exchange and communication module for ground and air forces



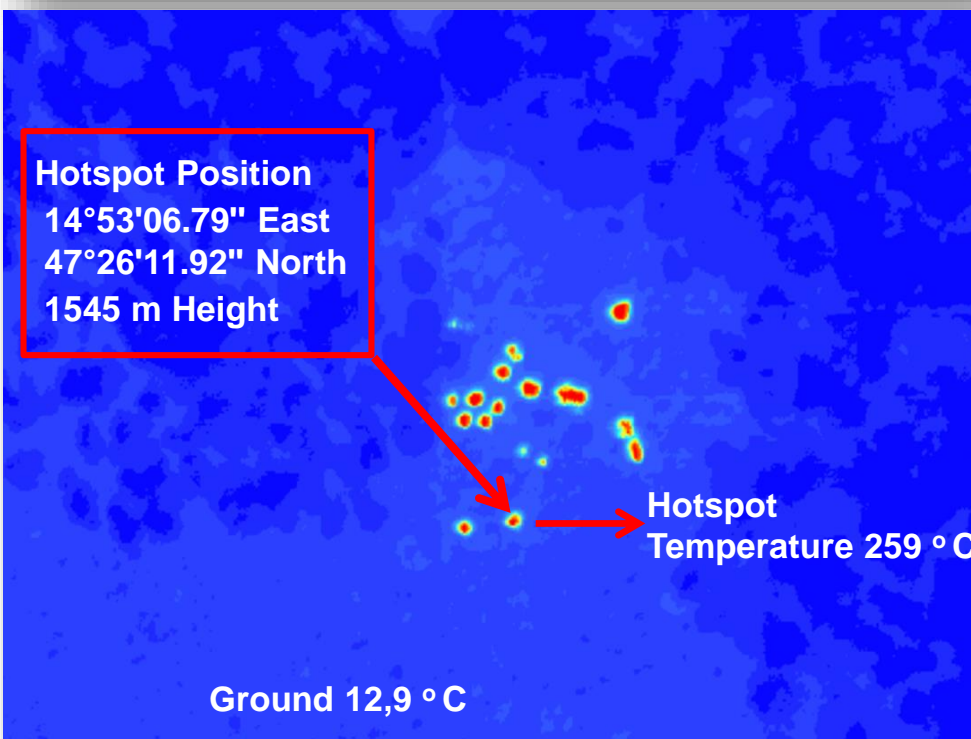
ARGUS
Airborne Real-Time
Ground Unit Support



Examples Thermal Analysis



Examples Thermal Analysis



ARGUS JOANNEUM RESEARCH

Start Insert Documentation Window

Map ARGUS Remote Control Communication Weather SharedMap

Map Layer

Cartographic Layers

- Open Street Map
- Forest Road Map
- Weather Map
- ARGUS RGB
- ARGUS IR

Resource Layers

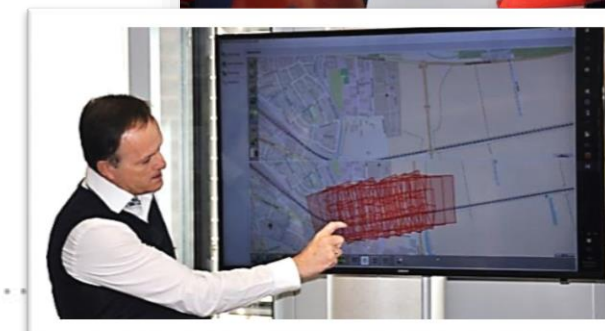
- My Position
- Teams
- Airborne Devices
- Ground Devices
- Equipment

317.3



Internationaler Experten-Workshop

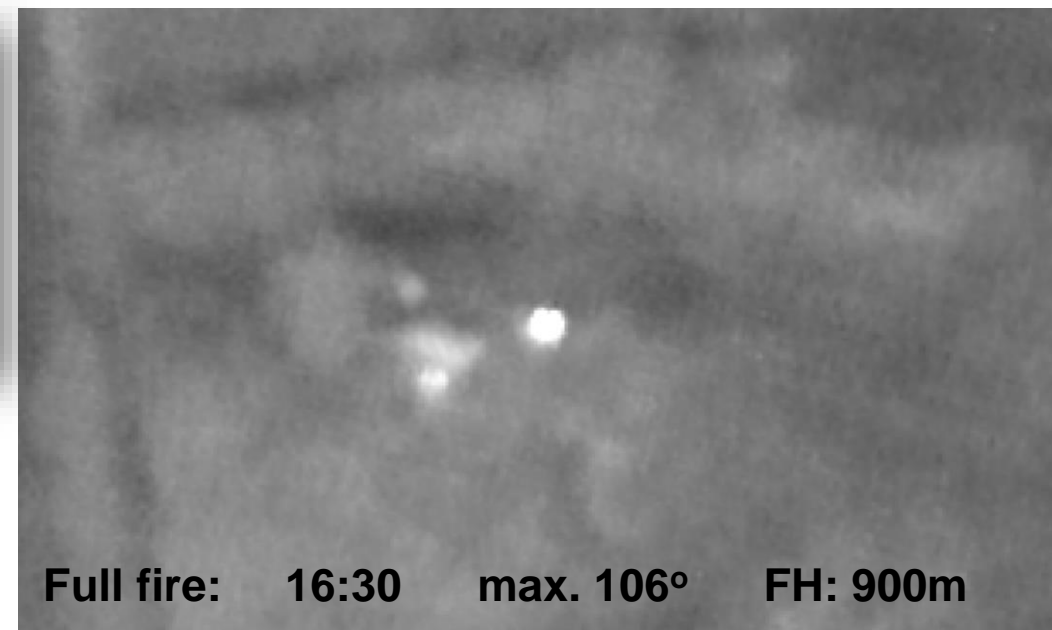
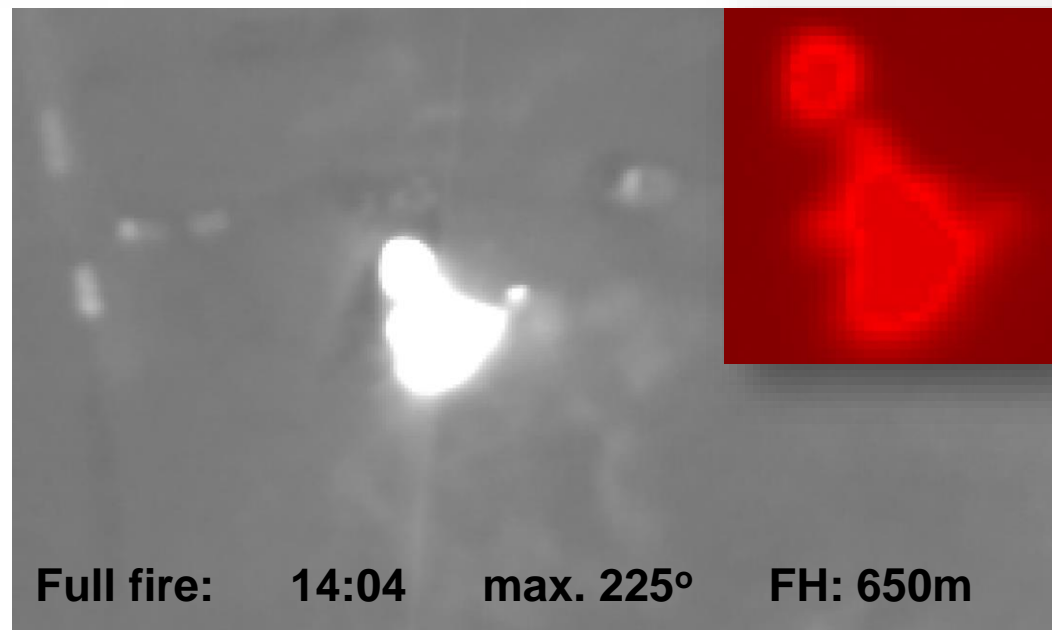
- EU Program „Exchange of Expert in Civil Protection“
- 3-day workshop with participants from 12 countries
- Real system demonstration
 - *Discussion of strengths and weaknesses*
 - Derivation of specific system requirements (*add. requirements*)
- Different organisation structures
 - National responsibilities
 - Involved organisations
- Different strategies to support the management phases
 - Early detection of fire sources
 - Event management support (COP, impact analysis, resources, etc.)
 - Post fire monitoring



Forest Fire Exercise Allentsteig



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Types of fire:

- Full fire
- Bush fire
- Wildfire



Ongoing Developments and Outlook

Flexible, small and light high resolution multisensor platform

- Phase One RGB medium format camera iXU 1000
 - Resolution: 11.608 x 8.708 pxl (100 MPxl)
 - Lenses: 28, 55, 80, 110, 150, 240 mm
- 3 thermal cameras synchronised
 - Resolution: 3x (640x512 pxl)
- Carrier platforms
 - Planes and ultra light planes
 - Helicopters

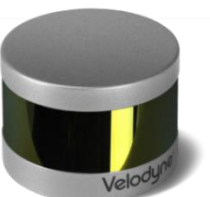
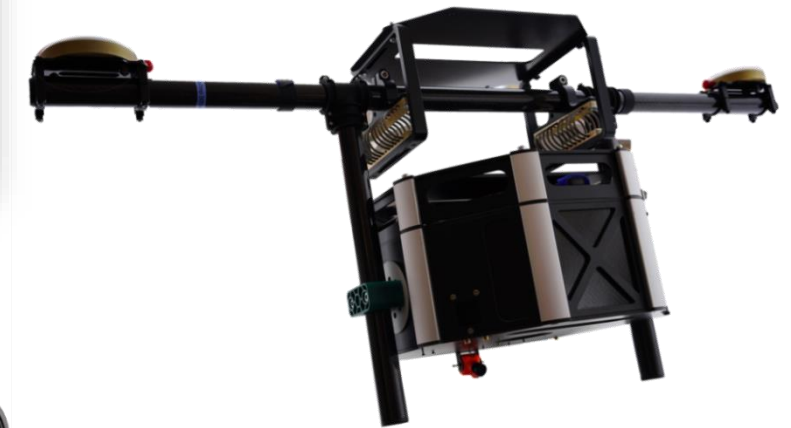




Ongoing Developments and Outlook

Flexible light UAV based multisensor platform

- Commercial RGB camera
Resolution: 42 MPxl
- 2 thermal cameras synchronised
Resolution: 2x (640x512 pxl)
- Precise geo-sensors (GPS/IMU)
- Carrier platforms
 - Fixed wing UAVs
 - Multicopter UAVs
 - Payload > 8 kg
 - Duration > 45'



Thank you for your interest!

JOANNEUM RESEARCH Forschungsgesellschaft mbH
DIGITAL – Institute for Information and Communication Technologies
Steyrergasse 17, 8010 Graz



DI Alexander Almer

alexander.almer@joanneum.at

Tel.: +43 316 876 1738

Mobil: +43 664 602-876 1738



www.joanneum.at/digital