

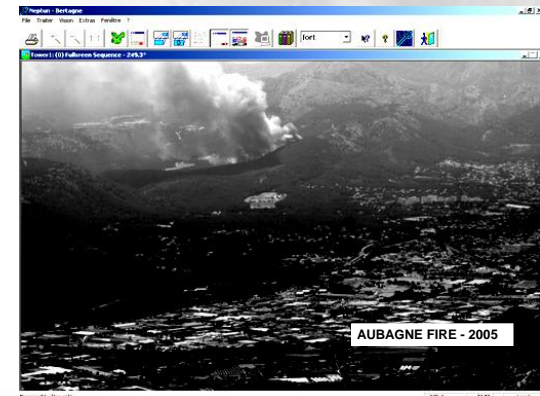
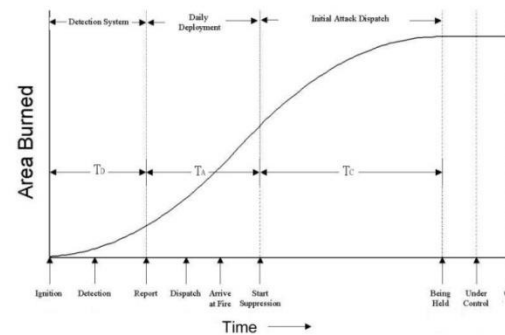
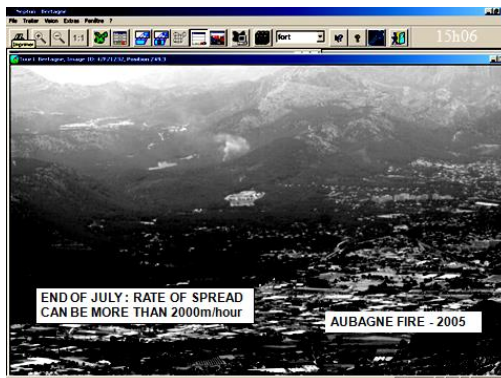
Automated Wildland Fire Detection in Combination with geological surface monitoring

Presentation by Joachim F. Dreibach

for vispectiv AG, Aarau, Switzerland

Detection requirements for remote sensing of fires

- ❖ Fast starting fires
- ❖ Day and Night fires
- ❖ Fast moving fires
- ❖ Fast changing weather /environmental conditions
- ❖ Difficult geographical areas (Hills, Mountains)
- ❖ No mains power available
- ❖ Fast detection, initial attack requirement < 20minutes
- ❖ **Provide much more functionalities and data, than only detect a fire**



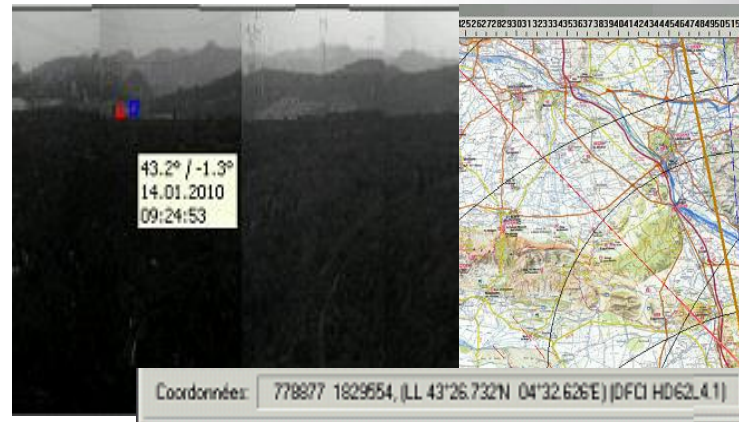
Data required for Fire Management procedures

- ❖ **Color- & B/W sensing for detection**
- ❖ **Black & White images for smoke identification**
- ❖ **Color Information for smoke classification and monitoring**
- ❖ **Day and Night Visual information**
- ❖ **Weather /environmental information**
- ❖ **Information about geographical areas (Hills, Mountains, POI)**
- ❖ **Position information (geo-referenced coordinates)**
- ❖ **Sensor status information**
- ❖ **Interactive sensor access for request of dedicated real time data by authorized users**
- ❖ **Database for event analysis- and training tasks**

Data provided for Fire Management

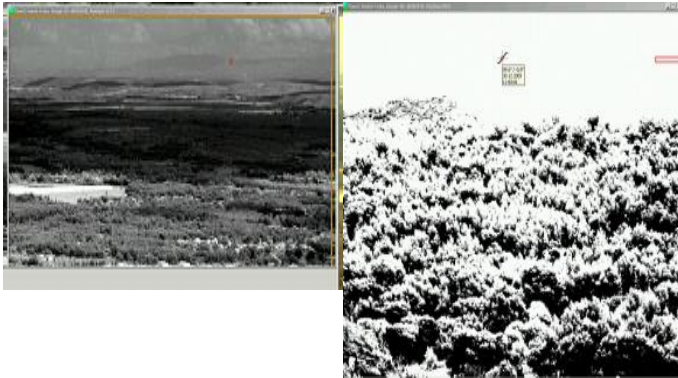
Numeric - , visual - and localization-information

Date/heure	Tour	Relèv...
14.01.10 09:17:55	2	79.5
14.01.10 09:12:42	4	143.1
14.01.10 09:12:03	2	130.0



Data provided for Fire Management

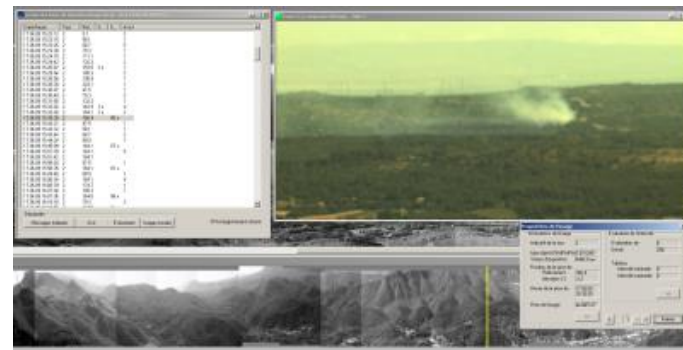
Visual image b/w with analysis functions



Night detection

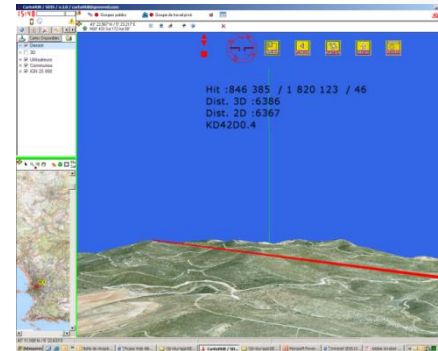


Color - & incident information
(Live monitoring & database)

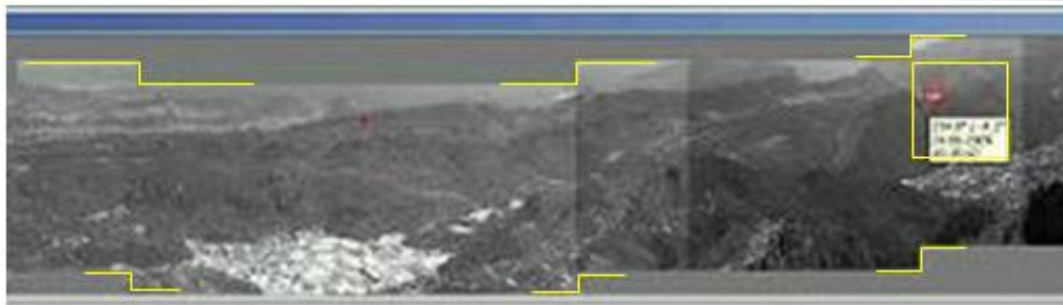


Data provided for Fire Management and Geo sense application

Geographic localisation



Georeferenced information (true azimuth & elevation related to sector and coordinates)



Land Slide surveillance

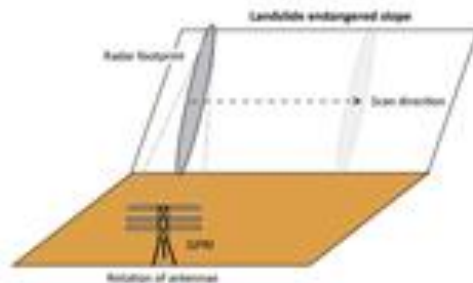


Ground-based Portable Radar Interferometry (GPRI)

Radar specification

- Frequency: 17.2 GHz
- Antenna length: 2 metres
- Range: 70 - 7'000 metres
- Horizontal resolution: 3.5m @ 500m
- Precision: < 2mm

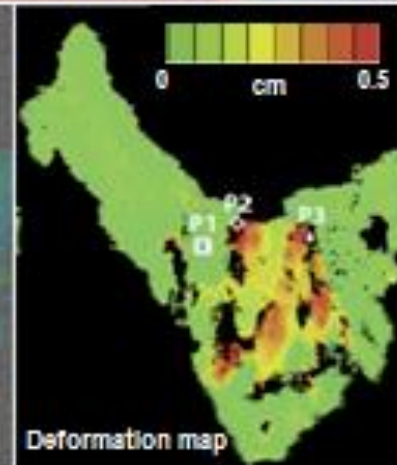
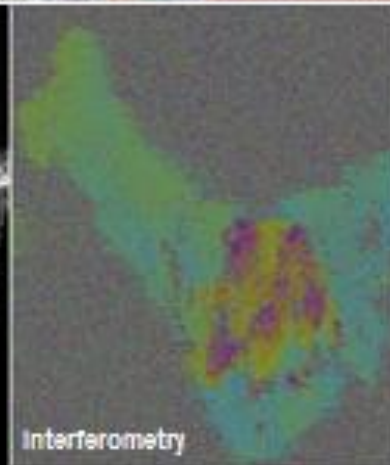
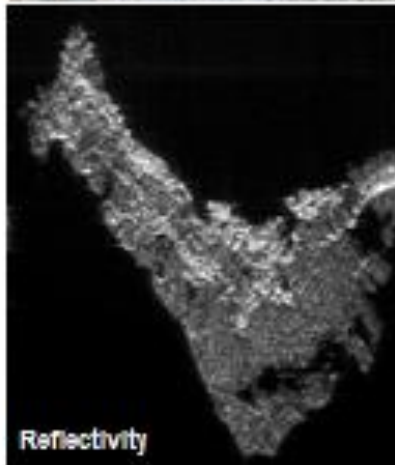
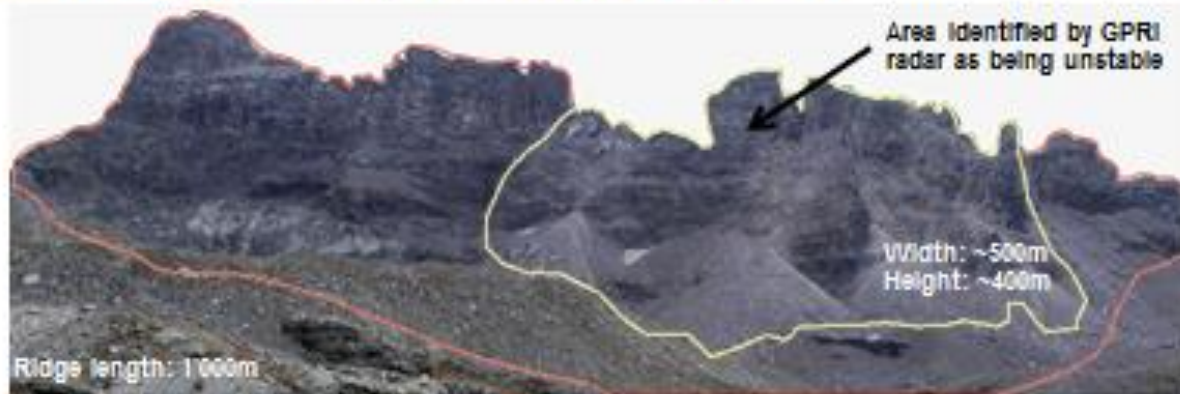
- Rapid rotating antennae (360°)
- 10 degrees per second
- Antennae sweeps in azimuth



Land Slide surveillance



GPRI Portable Radar Interferometry
Large-scale slope instability +2400 m.a.s.l

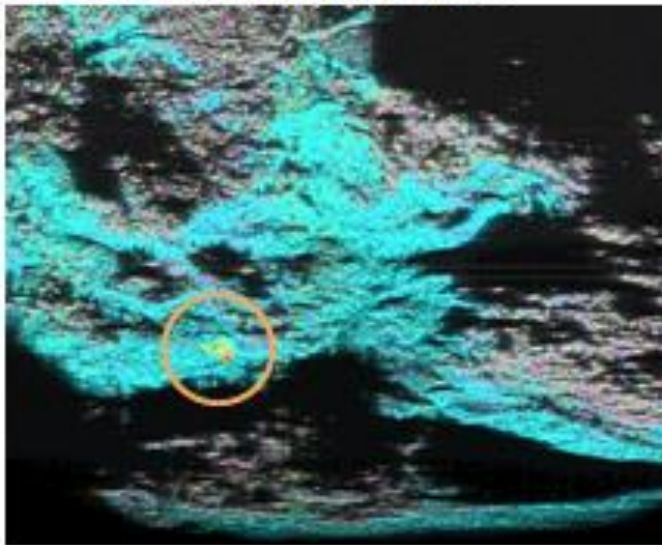


Land Slide surveillance



GPRI Portable Radar Interferometry Rainfall triggered landslide

Deformations of a 1-2 mm within 18 minutes



Radar reflectors used for high precision tracking of displacements (e.g. in forested areas)

Land Slide surveillance

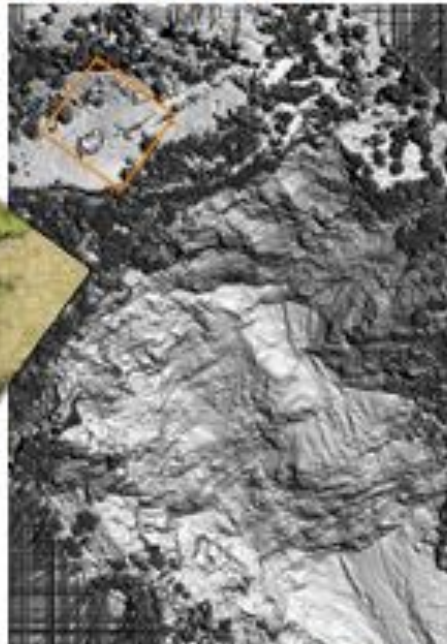


High Resolution Helicopter-borne Laser Scanning & Photogrammetry



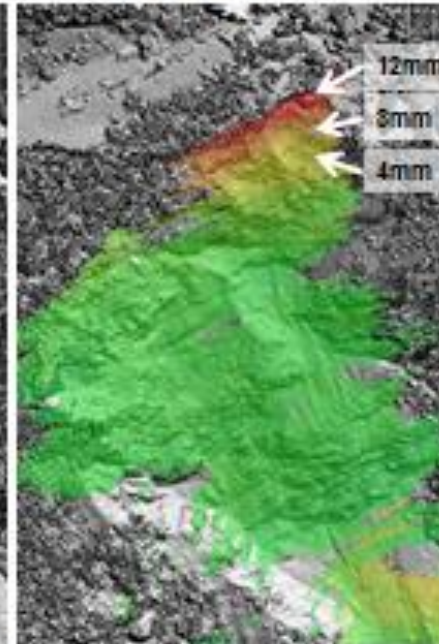
Helicopter photogrammetry

Shaded - Digital Terrain Model



-50 metres

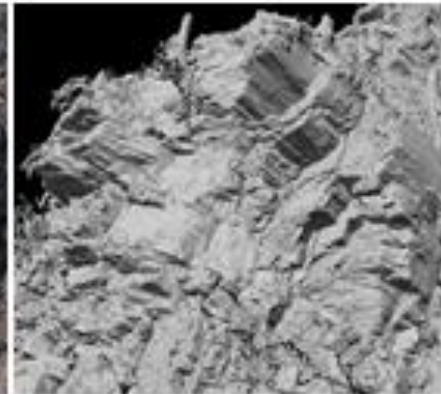
17 Day Radar Deformation Map



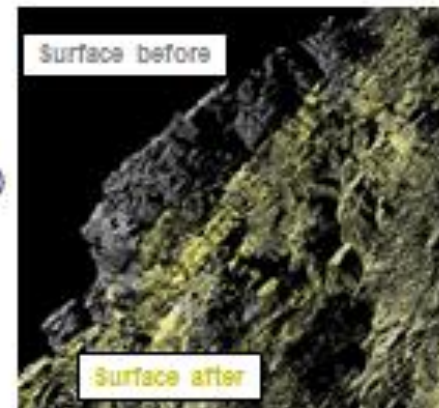
Land Slide surveillance



High Resolution Ground-based Laser Scanning



- Laser scanning instruments for geological applications
- Long range 3 – 2'500 metres
 - High resolution digital terrain models
 - Change analysis (e.g. surface change due to landslide activity)
- Service and instrumentation (Optech)



Land Slide surveillance



Terrarsense Switzerland Ltd

- Specializing in high precision spatial deformation monitoring
- Design & implementation of integrated geotechnical monitoring systems
- End to end monitoring (early warning) solutions for geological hazards
- Service (monitoring system set-up, acquisition, processing, interpretation)
- Radar and laser scanner instrument leasing
- Engineering geological and hazard assessment consulting

Land Slide surveillance

System combination: terrasense & Forest Ranger

Radarsystems expensive or temporär Installation

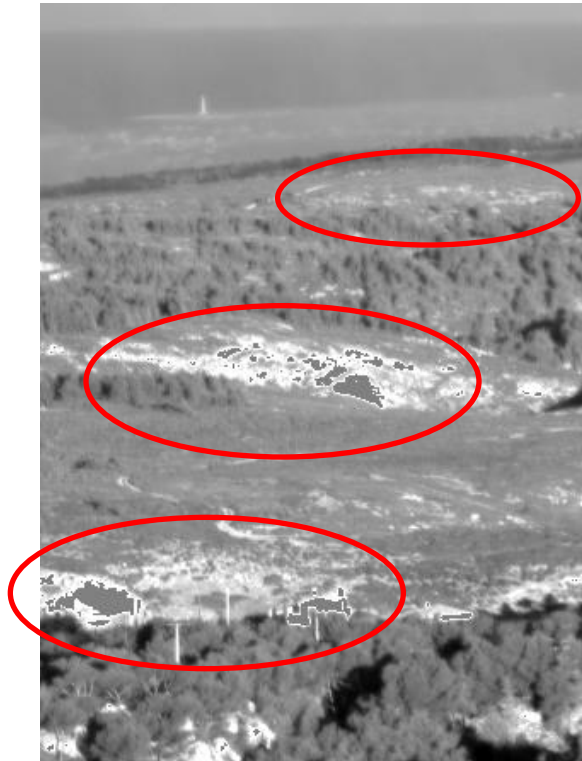
vispectiv AG approach - System Combination of :

Reference measurments with Terrasense (every 6-12month)

Integration of reference data into Forest ranger

Permanent observation of geological changes during fire detection

Land Slide surveillance



Analysis of geological shapes and calculation of changes
after integration of reference data from terrarsense

Land Slide surveillance

Terrasense is a proven system

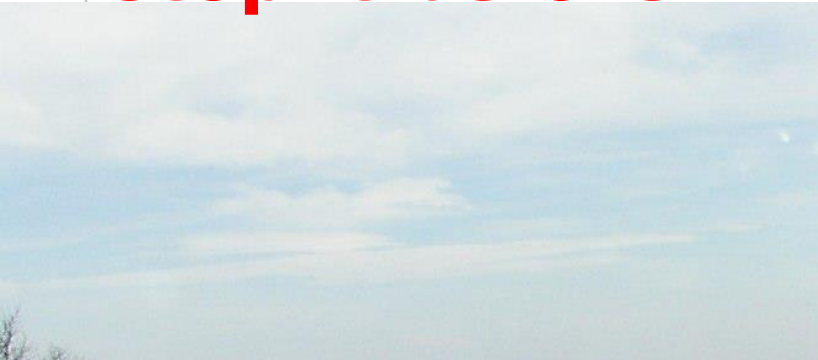
Forest Ranger is a proven system

The combination for the geo – sense application is in a laboratory status and needs some tests under real conditions and possible Software adaptation.

Basically the combined Operation works.

stop it before ...

see it before



Thank You for your attention

Joachim F. Dreibach