ROCK FALL MONITORING

Introduction – some examples

Rock Slide Moserstein (Tirol 1999)

Block with 7 m³ - app. 19000 kg

Examples of rock fall source areas – potential sites for monitoring

Rock Slide Kreuzlau (Tirol)

1998 600 m³

Rock Slide Rauher Lehner (Tirol)

1998 150.000 m³

Criteria for design of monitoring systems

- Alarmsystem required?
- Precision and tolerances necessary
- Quality of endangered landuse

Measuring devices applicable for forecasting rock falls/slides

- Geodetic survey/GPS
- Fissurometer/crackmeter
- Extensometer
- Tiltmeter
- Fiber optic cable
- Laserscanning
- Geophone - seismic vibration
- Video survey - Webcam
- (Directional microphone)
- (Borehole-measurements: inclinometer, TDR ...)

Just measuring – no alarming

- Primitive measuring gauge applicable
- Intervals of measurement not sensible
- No electronic data-storage necessary
- No real-time data available
- Punctual information of development

Alarm system – early warning

- Data logger – real-time data
- Remote data transfer
- Definition of trigger values
- Alarming devices necessary (siren, traffic light, phone-call)
- Alarm plan (persons to be informed, data flow etc.)

Datalogger/Alarmset

Functions:

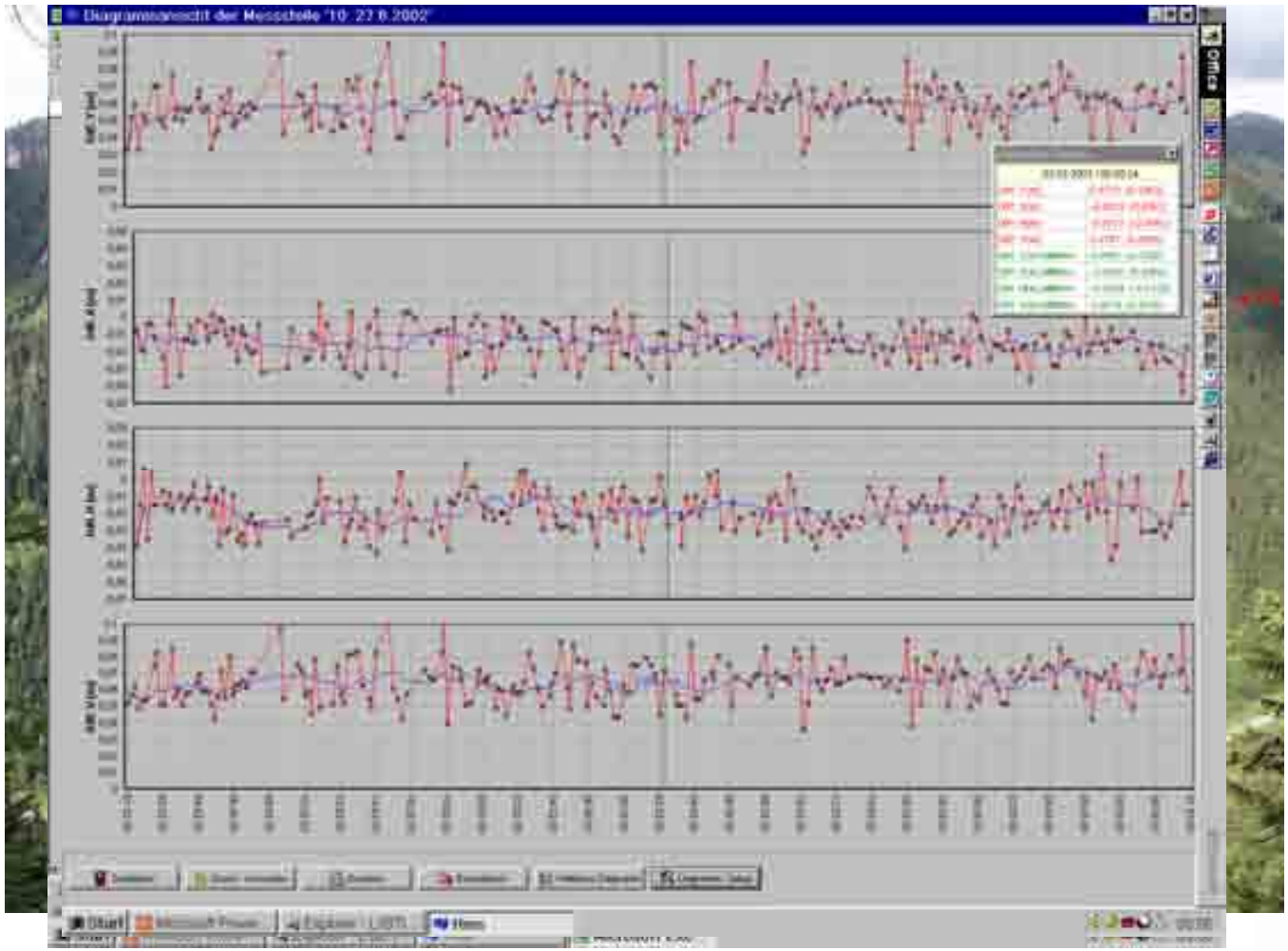
- Collects and stores data
- Sends data to server
- Controls alarmcalls
- Triggers alarms (sirens ...)

Geodetic survey/GPS

Autotheodolite
(manual measurement applicable if no warning system involved)

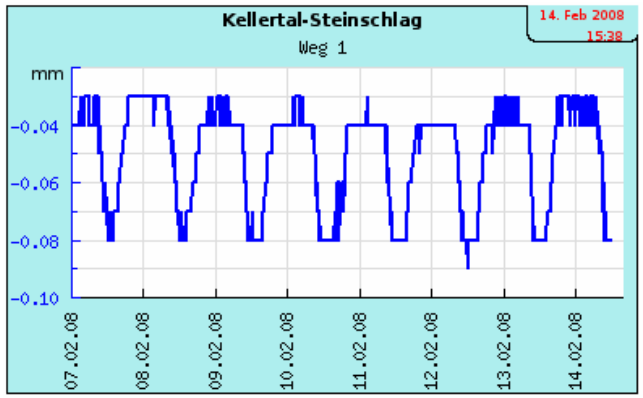
Reflectors

Unobstructed visibilities!



Crack meters

Results:


Kellertal-Steinschlag
14. Feb 2008
15:38
Weg 1
mm
-0.04
-0.06
-0.08
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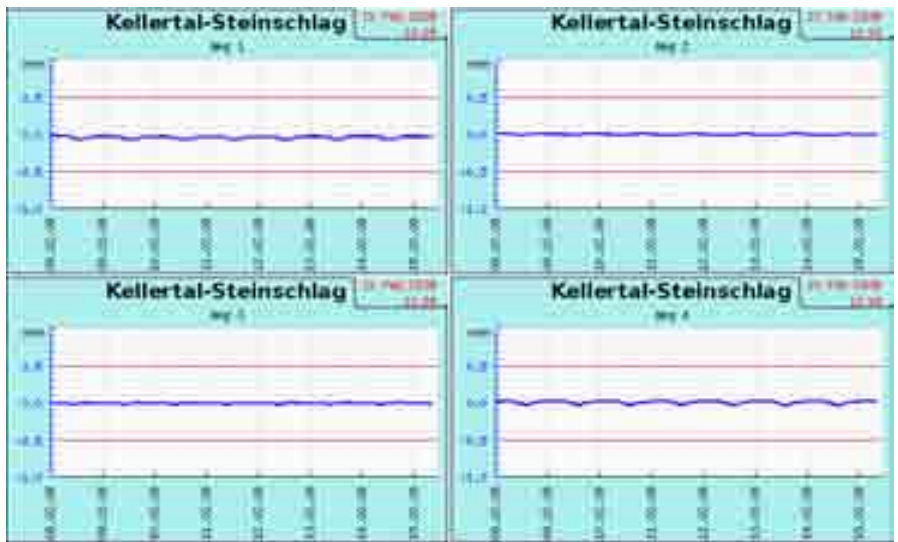
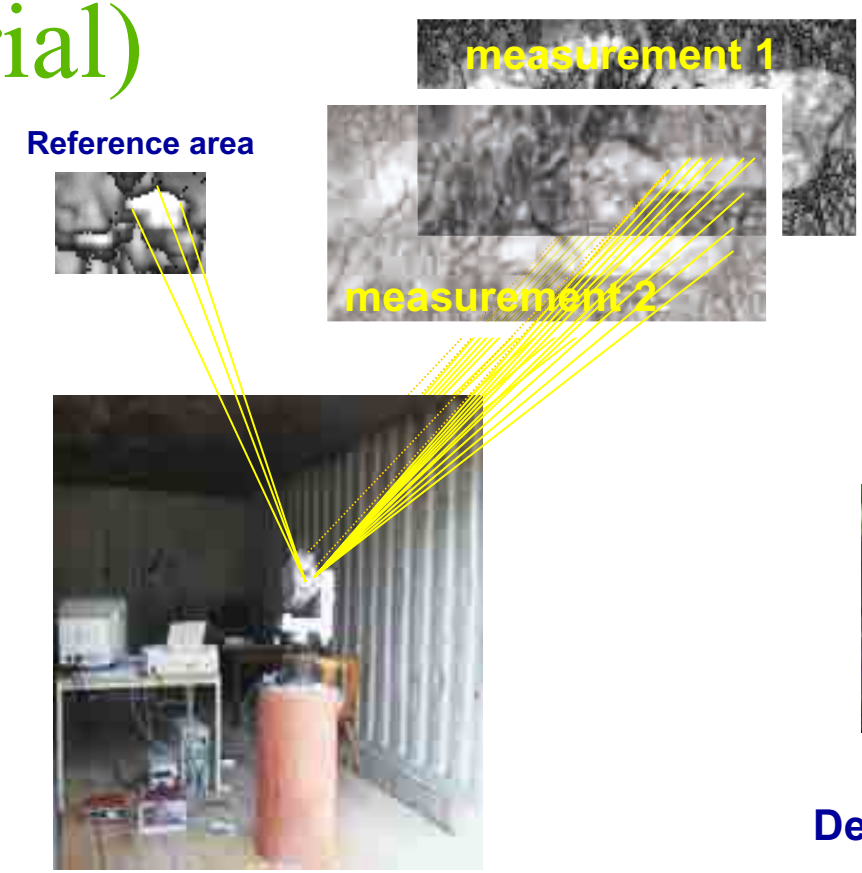

Kellertal-Steinschlag
Kellertal-Steinschlag
Kellertal-Steinschlag
Kellertal-Steinschlag

Extensometer

Tiltmeter

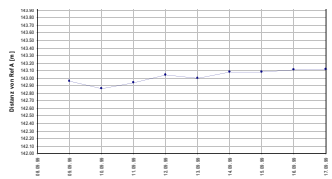
Fibre optic cable

Laserscanning (terrestrial)



differences of point-distances

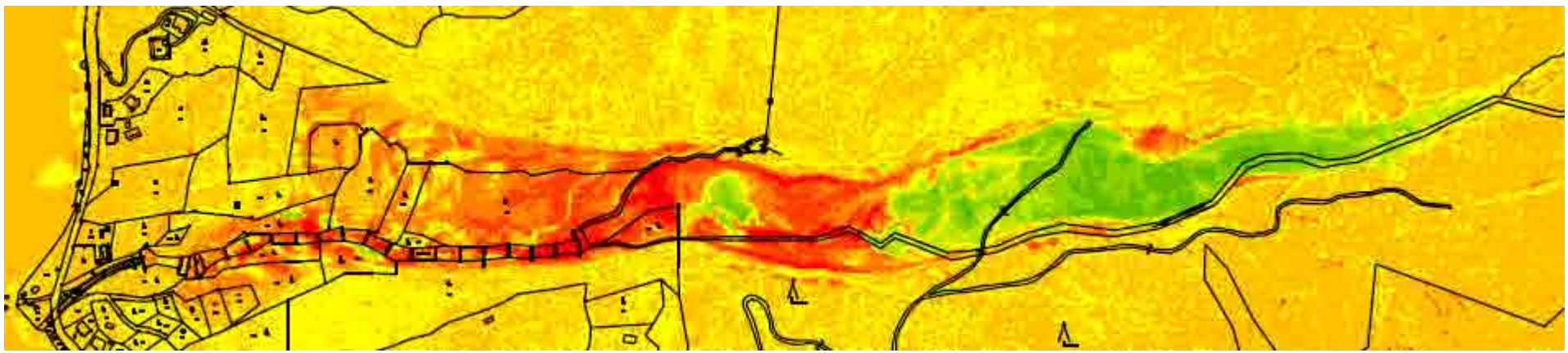
regions of interest (roi´s)



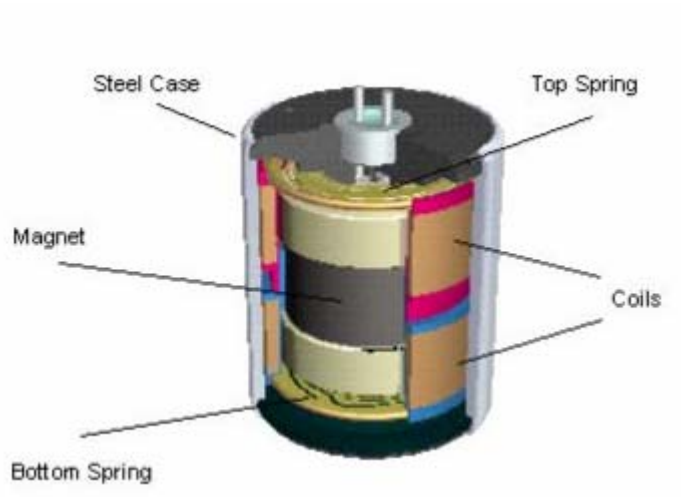
Isolines

Determination of volume

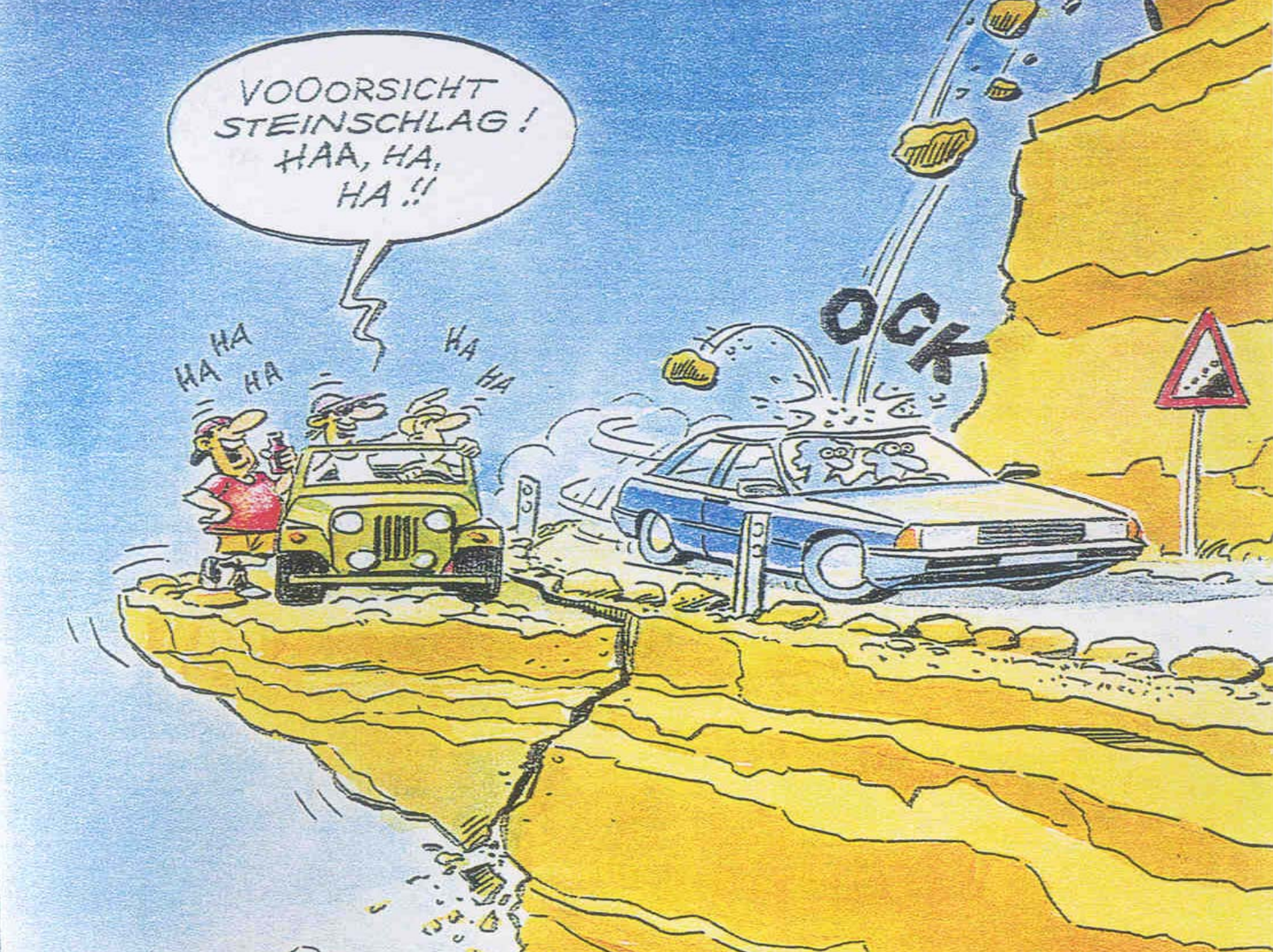
Laserscanning airborn
(differential datasets)



Geophones (seismic vibration)



Video-survey/Webcam


VOOORSICHT STEINSCHLAG ! HAA, HA, HA !!
HA HA HA HA HA HA
OCK

Thank you for your attention!