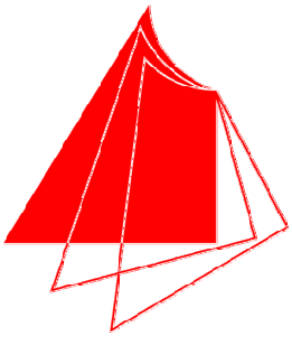

# Hochschule Karlsruhe
# Technik und Wirtschaft

**UNIVERSITY OF APPLIED SCIENCES**

# GOCA-Earth

## Visualization-Software
## for the Geo-Monitoring-System GOCA


www goca.info

IAF
Institut für
Angewandte Forschung

GOCA-Earth Version 1.2

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# Geo-monitoring

With the worldwide use of newer and more efficient construction methods, the demand for geodetic supervision rises. In the past, buildings were constructed with the highest possible effort regarding safety and stability. Today, however, for the planning of constructions, new methods are introduced which are edging technical feasibility. These new methods require an increase of measurement accuracy and also a decrease of the epoch timespans, aiming to a continuous online geodetic monitoring of the building or construction. Otherwise, the security for man and building cannot be guaranteed.

Global climate changes, population growth and the successive expansion of general land-use area lead to a conflict between land use and prevention of natural hazards, such as slopes or thawing permafrost zones. This conflict can also be transferred to generally critical areas, like regions with volcano activities or earthquakes.

Geodetic geo-monitoring starts with the storage of original measurements and ends with their reporting, - or in case of emergency, with the alarming of responsible persons. Completely automated, it also reduces permanent costs.

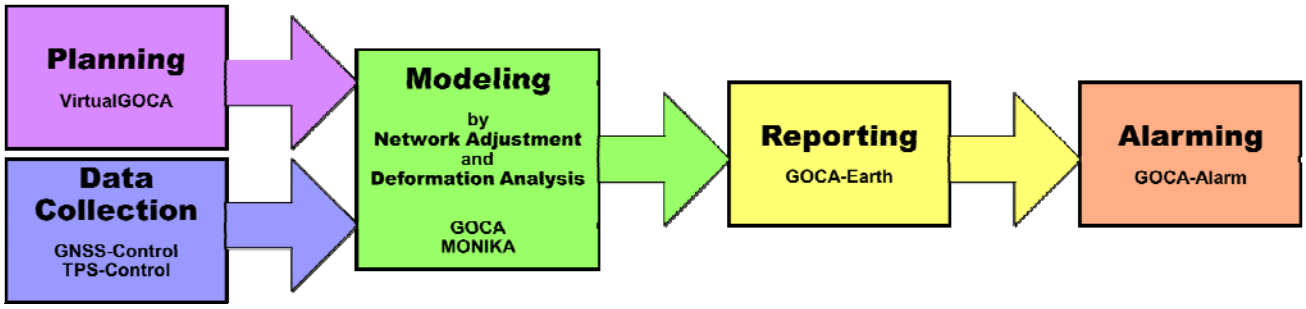


**Figure 1: General scheme of an automatic geo-monitoring system**

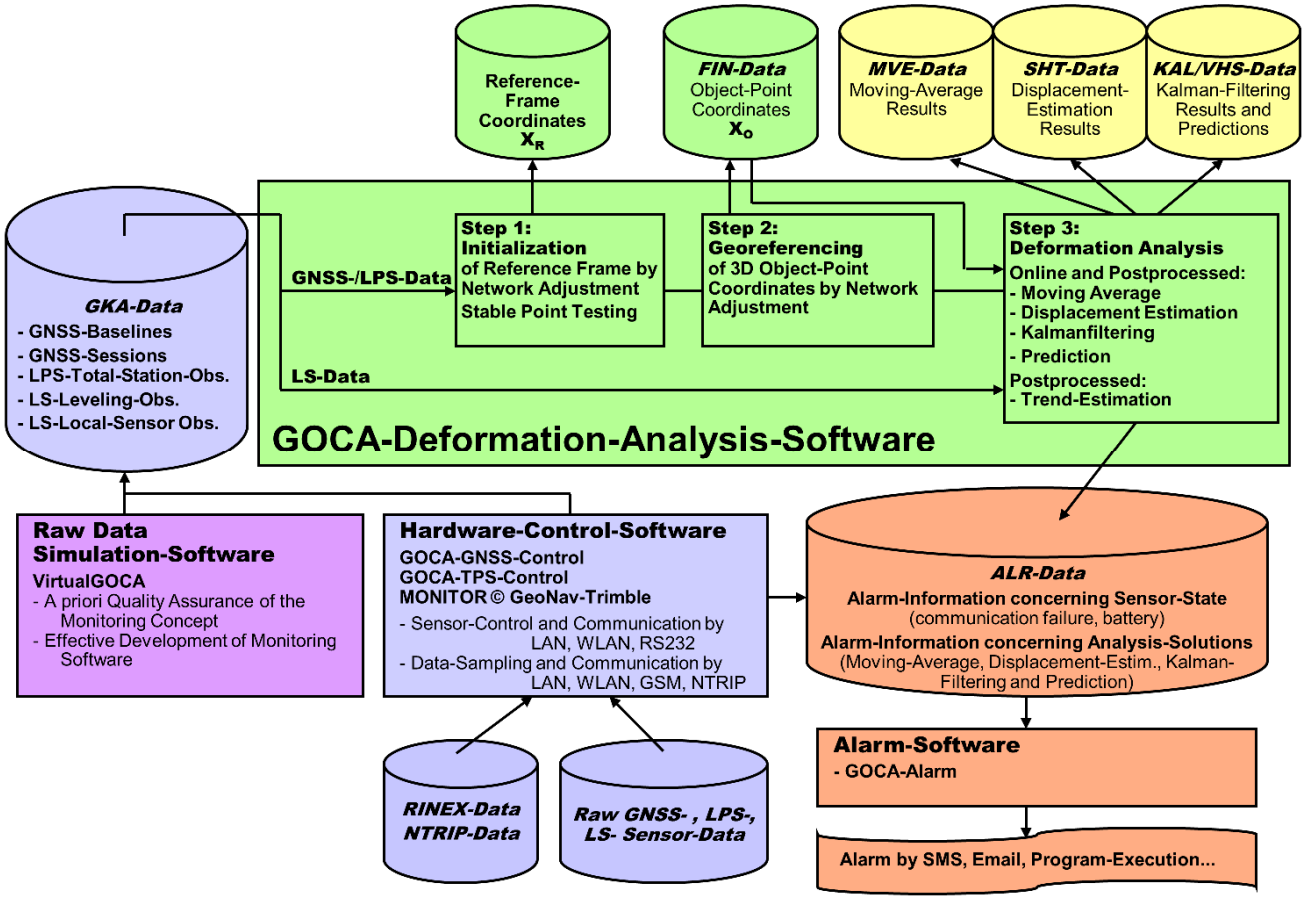


**Figure 2: Scheme of a deformation analysis with GOCA**

# GOCA

The GOCA-system is a multi-sensory system with GNSS receivers, terrestrial total stations or local sensors that are installed inside the observed object itself or temporary attached to it. Its sensors can be freely configured and combined in a GOCA online monitoring project.
GOCA can serve as a rapid alert system for natural hazards (e. g. earthquakes or volcano activities, etc.) or it can supervise geo-technical constructions or buildings such as mines, dams or tunnels. All over the world, GOCA has been installed over 30 times.
The deformation analysis software GOCA performs measurement data processing and a deformation analysis in consecutive adjustments. After initializing the reference frame (step 1), the simultaneous adjustments follow. In step 2 the object points are geo-referenced and in step 3 Kalman filtering and displacement estimations are performed. In case of critical values, a warning is given. All in- and output interfaces are open for further developments (Fig. 2).

# GOCA-Earth

The GOCA-Earth module is used for the visualization of the current geodetic monitoring state in GoogleEarth. The user can decide which type of GOCA deformation process estimation shall be displayed (Fig. 3). For each GOCA deformation estimation type (FIN, MVE, SHT, KAL) a separate kml-file is created. These files are automatically updated in GoogleEarth view (Fig. 5).

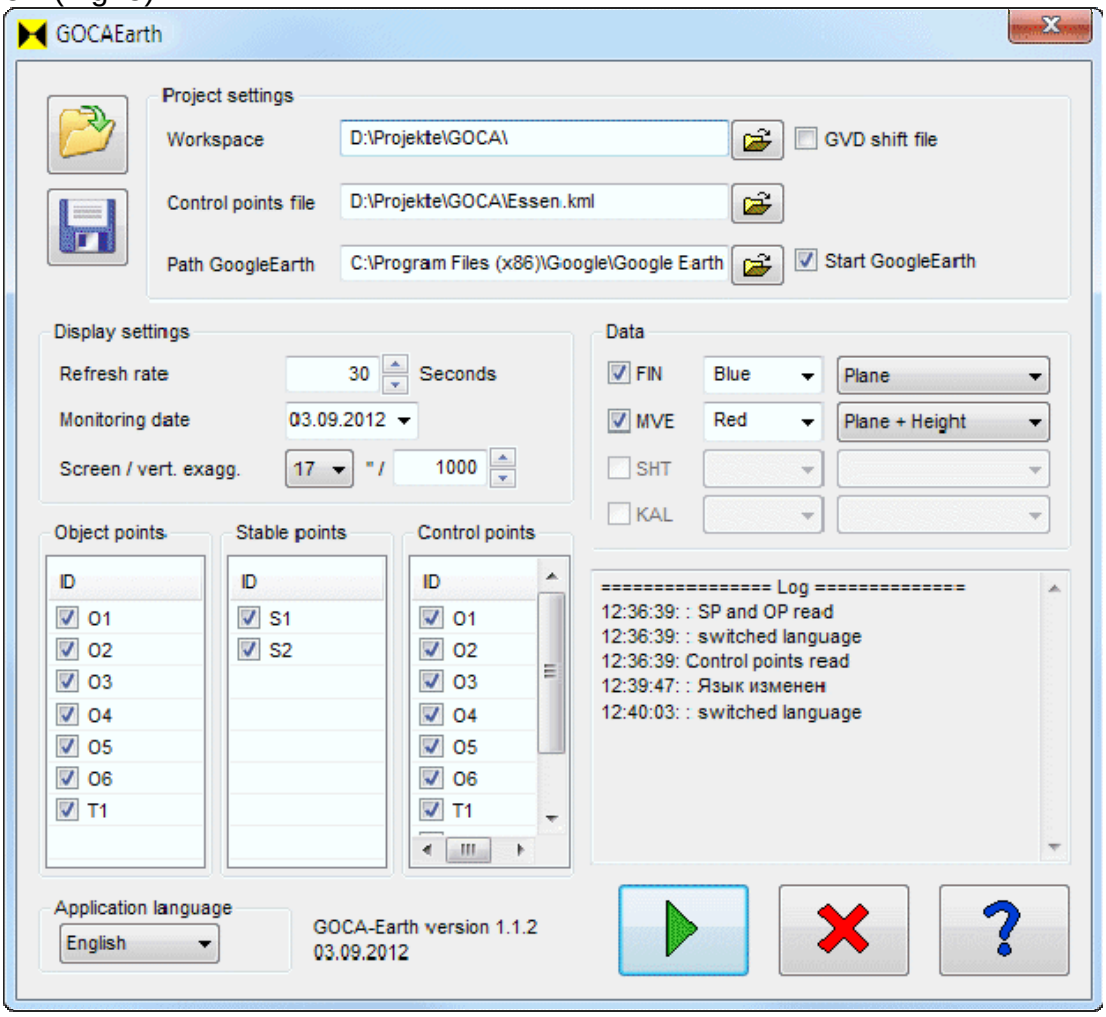


**Figure 3: GOCA-Earth settings dialog in English**

A click on the point symbol opens a view on the numerical values of the above deformation state estimates and the sensor-graphics (fig. 4). Several languages, e.g. Russian are also available in GOCA-Earth.

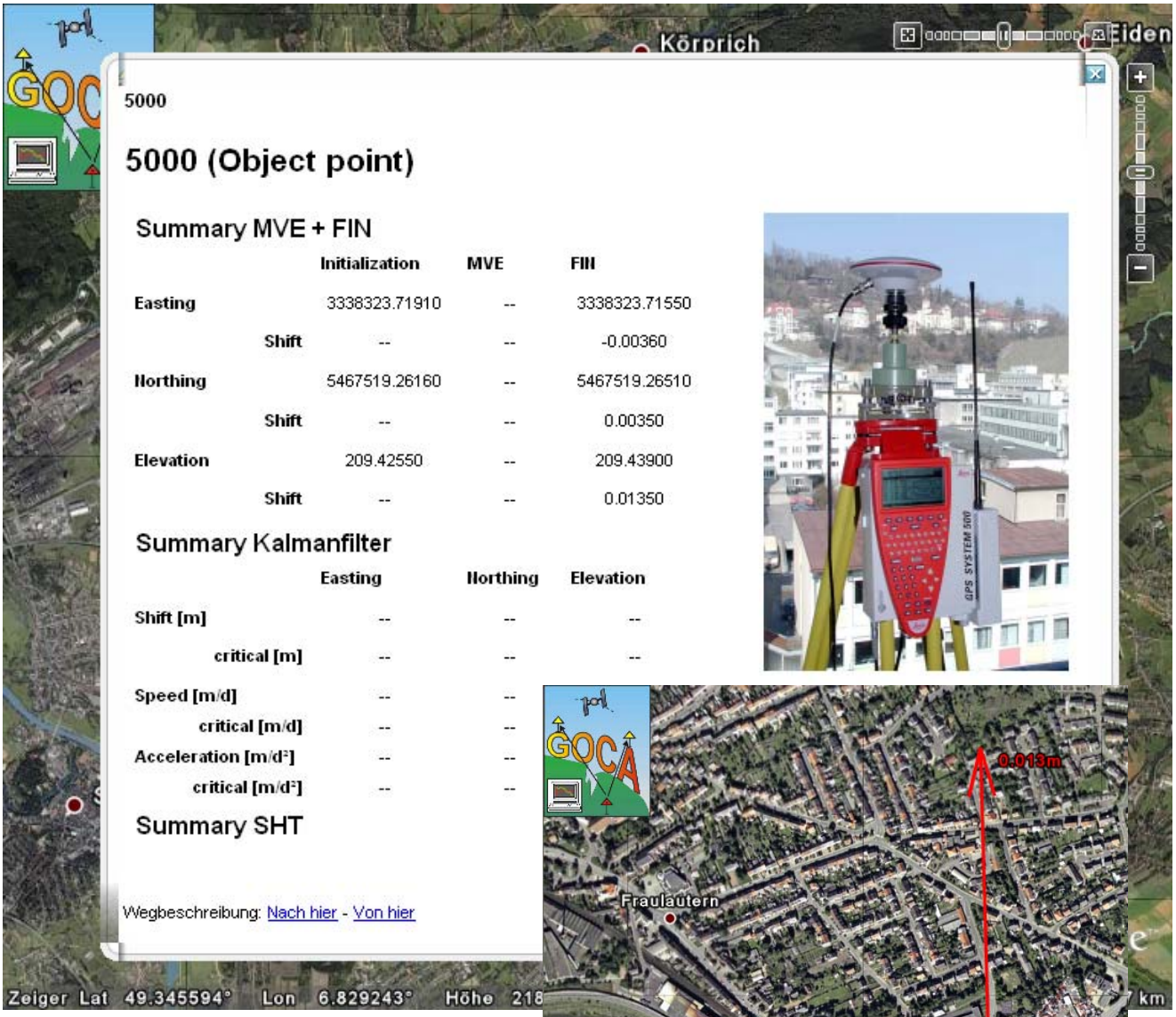


**Figure 4 (up): Visualization of some additional information of a GNSS-Sensors in GoogleEarth**

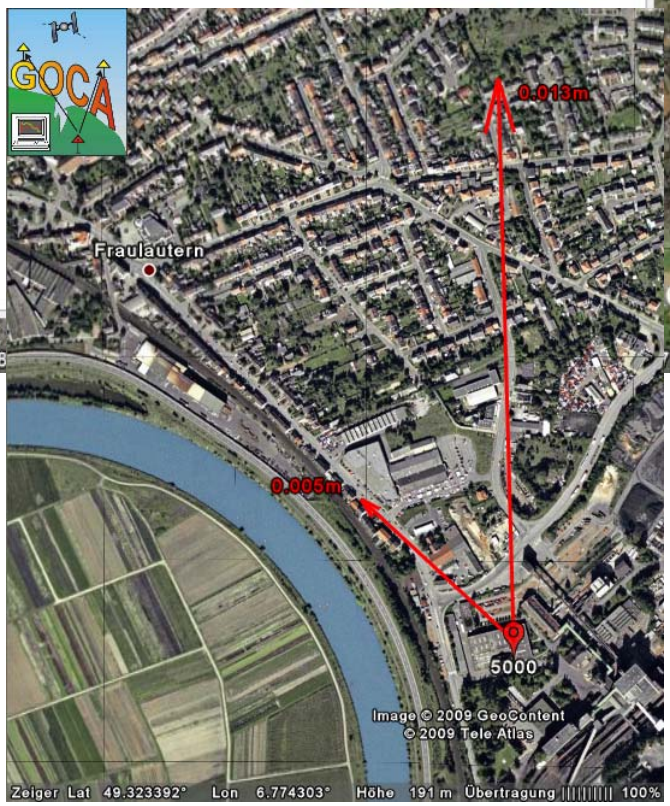


**Figure 5 (right): Visualization of displacement vectors in GoogleEarth**

## Contact (GOCA und MONIKA Project management)


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