
LIDAR Systems

A Major Step To

Efficient Surveying Methods

Ralf Schroth

Overview

- **Introduction FIG**
- **Sensors in Surveying**
- **LIDAR – The Success Story**
- **Summary**

Introduction - FIG



International Federation of Surveyors
Fédération Internationale des Géomètres
Internationale Vereinigung der Vermessungsingenieure

- **founded 1878 in Paris**
- **Federation of national associations**
- **the only international body that represents all surveying disciplines**
- **UN recognized NGO**



Introduction - FIG



International Federation of Surveyors
Fédération Internationale des Géomètres
Internationale Vereinigung der Vermessungsingenieure

More than 100 countries are represented

Members:

member associations

affiliates

corporate members

academic members

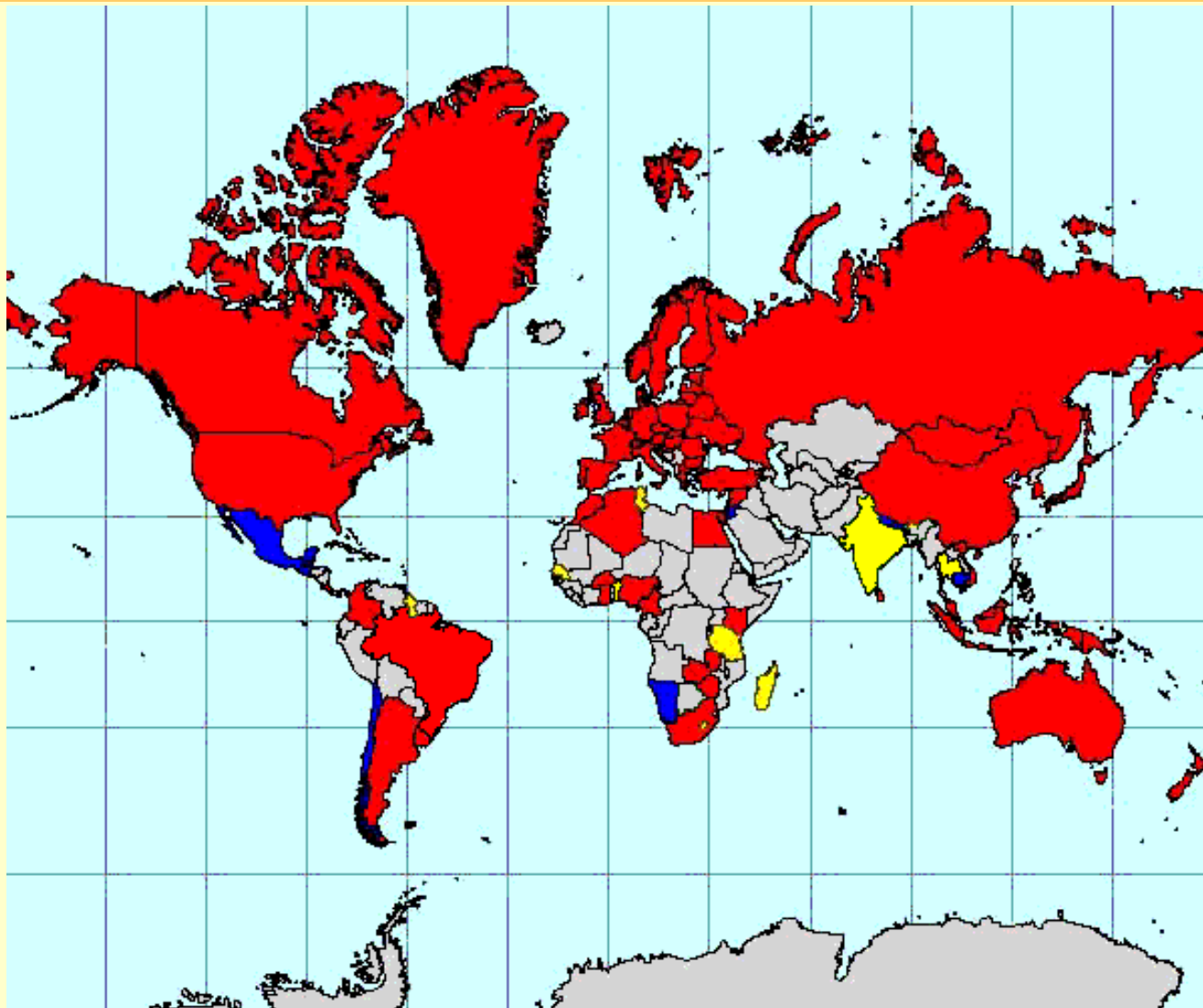


Fédération Internationale des Géomètres

MENSI 3rd DiMENSIon

Hansa Luftbild
German Air Surveys

Introduction - FIG





International Federation of Surveyors
Fédération Internationale des Géomètres
International Vereinigung der Vermessungsingenieure

FIG Office in Copenhagen



November 2002

Introduction – Hansa Luftbild

Employees

- 120 employees in Germany (50% with academic degrees)
- over 200 employees in total
- proofed excellence in Land Management Process know-how all over the world

Company

- Existing since 80 years
- Projects in 70% of all countries world-wide
- a world-wide reputation as an excellent solution provider



Head Quarters in Münster

Hansa Luftbild Branches



Sensors in Surveying

Contactless Measurements

I. Airborne

Photogrammetry

Radar

LIDAR

II. Terrestrial

Close Range Photogrammetry

LIDAR

Sensors in Surveying

Radar

active sensor system

broad radio waves

3D by interferometry



Sensors in Surveying

Photogrammetry

film cameras

digital cameras

GPS/INS



Sensors in Surveying



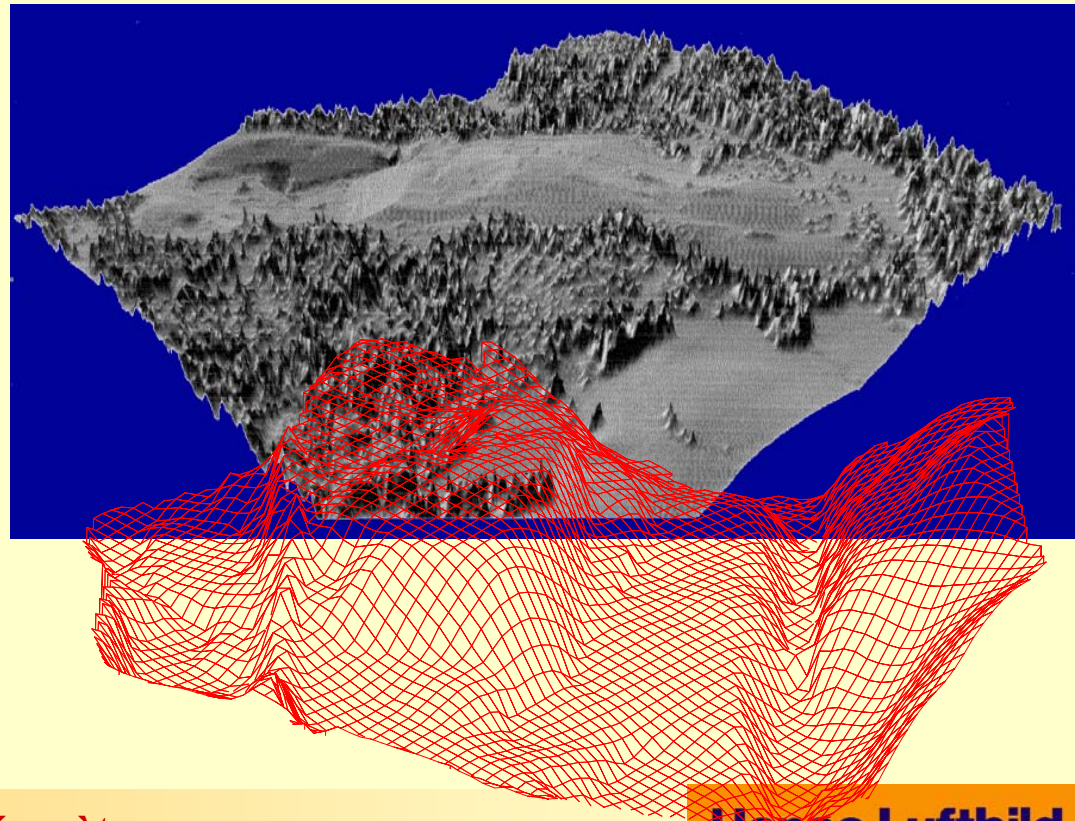
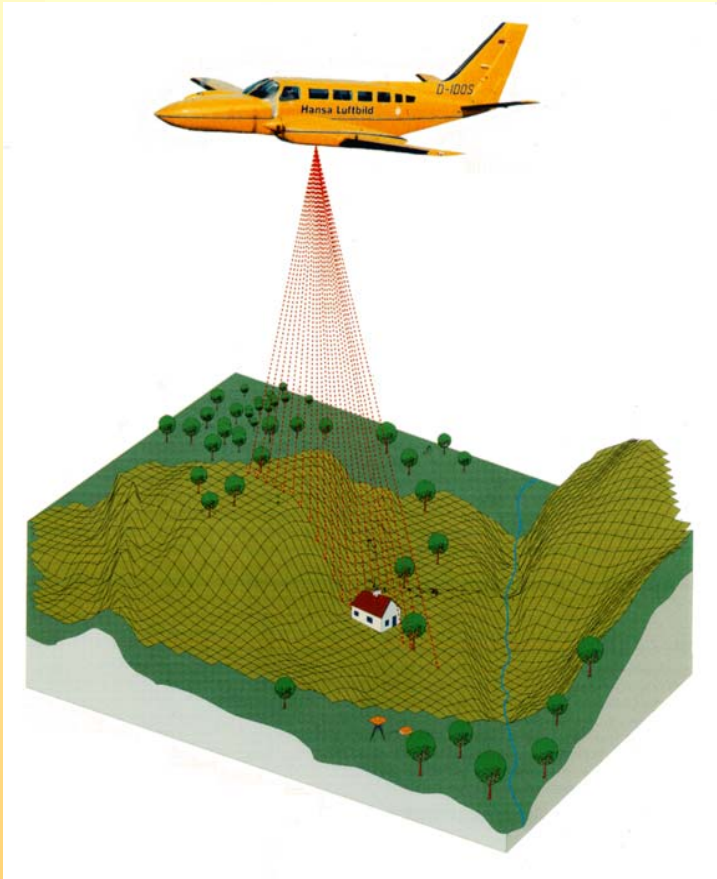
Sensors in Surveying

LIDAR Systems



Sensors in Surveying

Airborne Laser Scanning



LIDAR – The Success Story

Beginning : Laser Distance Measurement

1970 Laser Profilers

1990 Laser Scanning Devices

Challenge: sensor orientation

Sensor Orientation

Exterior orientation solved by GPS/INS

Example of a
complete system:

GPS

IMU

flight navigation



Airborne LIDAR

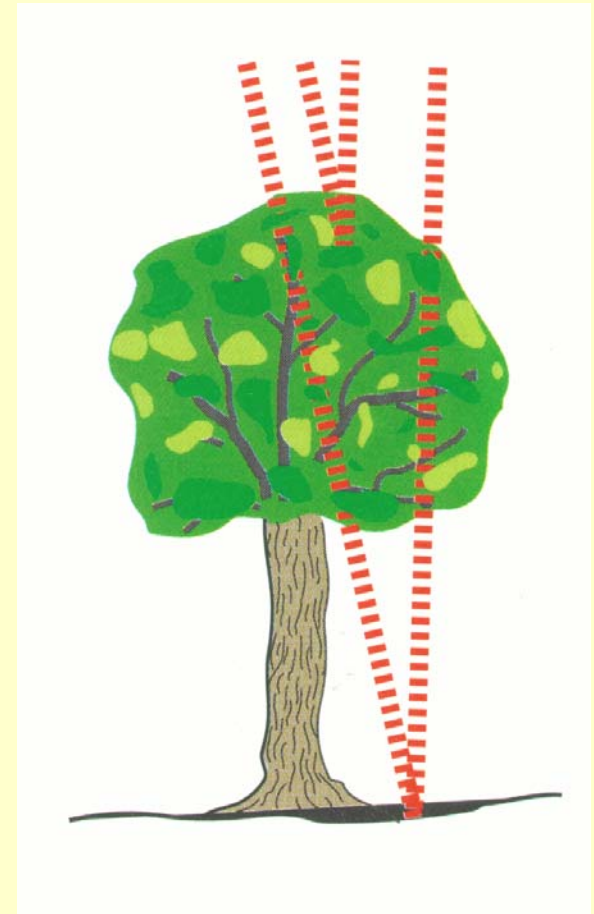
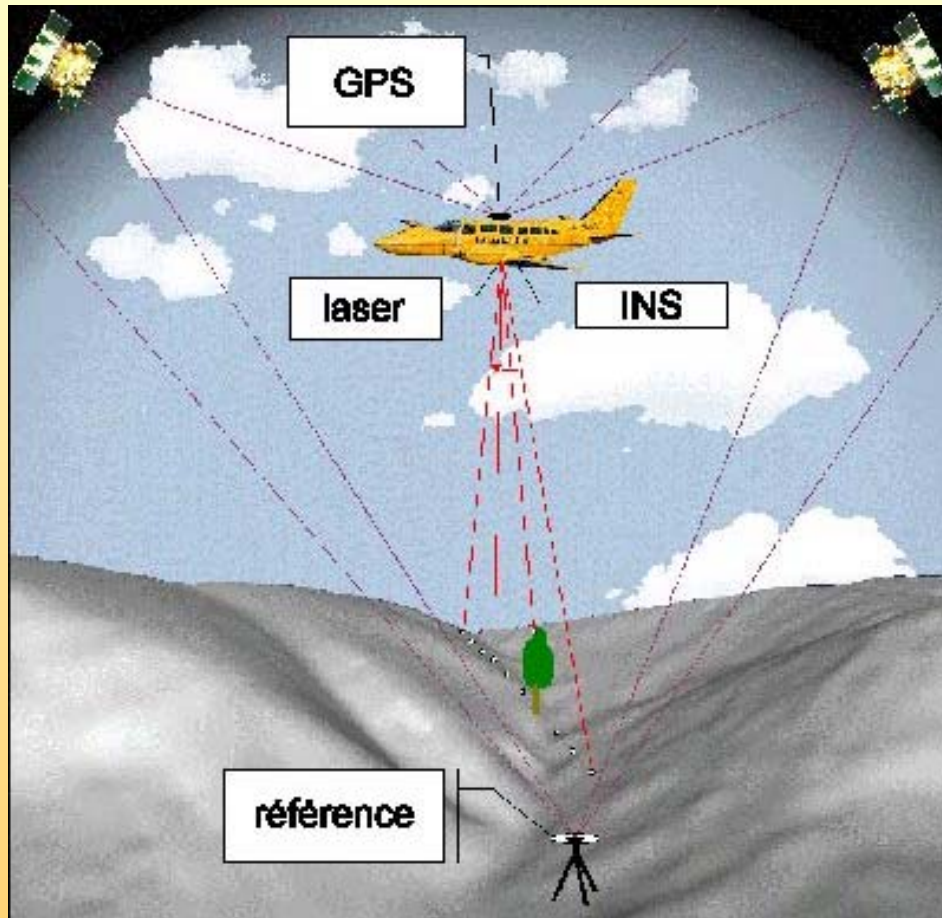
Since 1992

Hansa Luftbild
German Air Surveys

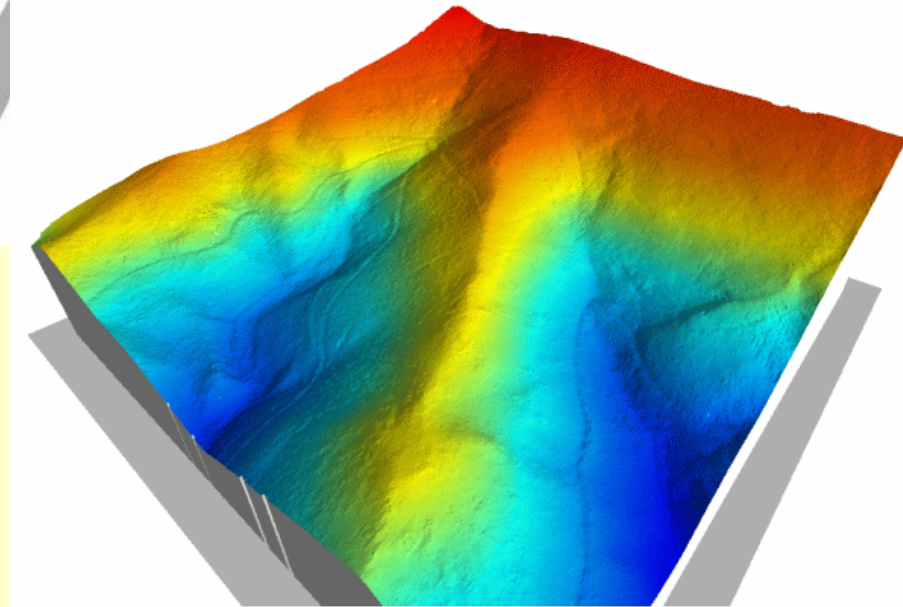
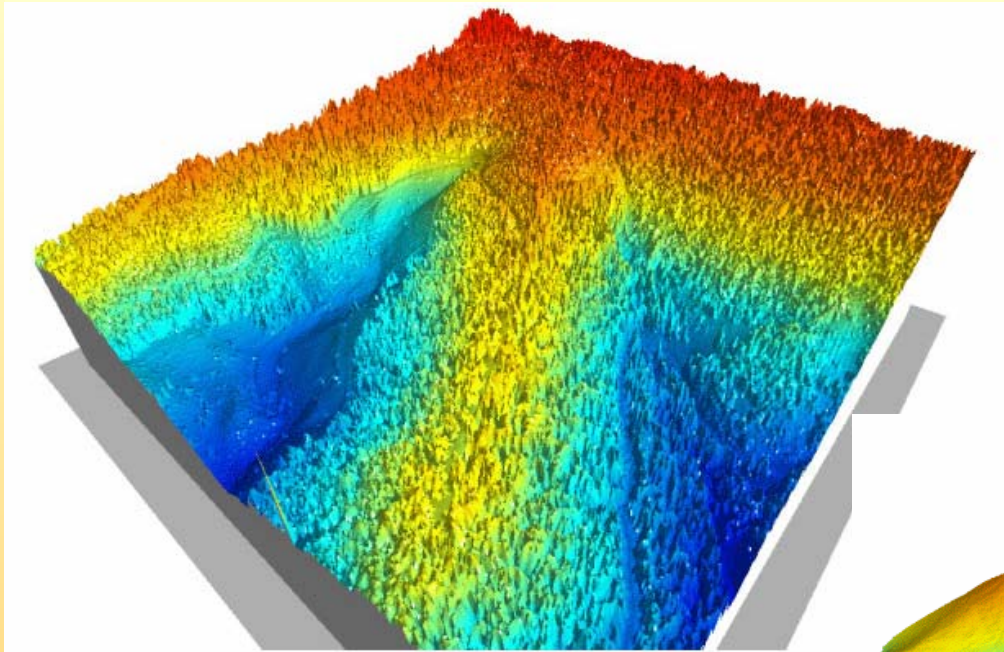


type	sampl. rate	angle	range
ALTM 2050	50 kHz	+/-20°	210 - 2000 m
ALTM 1225	25 kHz	+/-20°	300 - 2000 m
ALTM 1020	5 kHz	+/-20°	330 – 1000 m

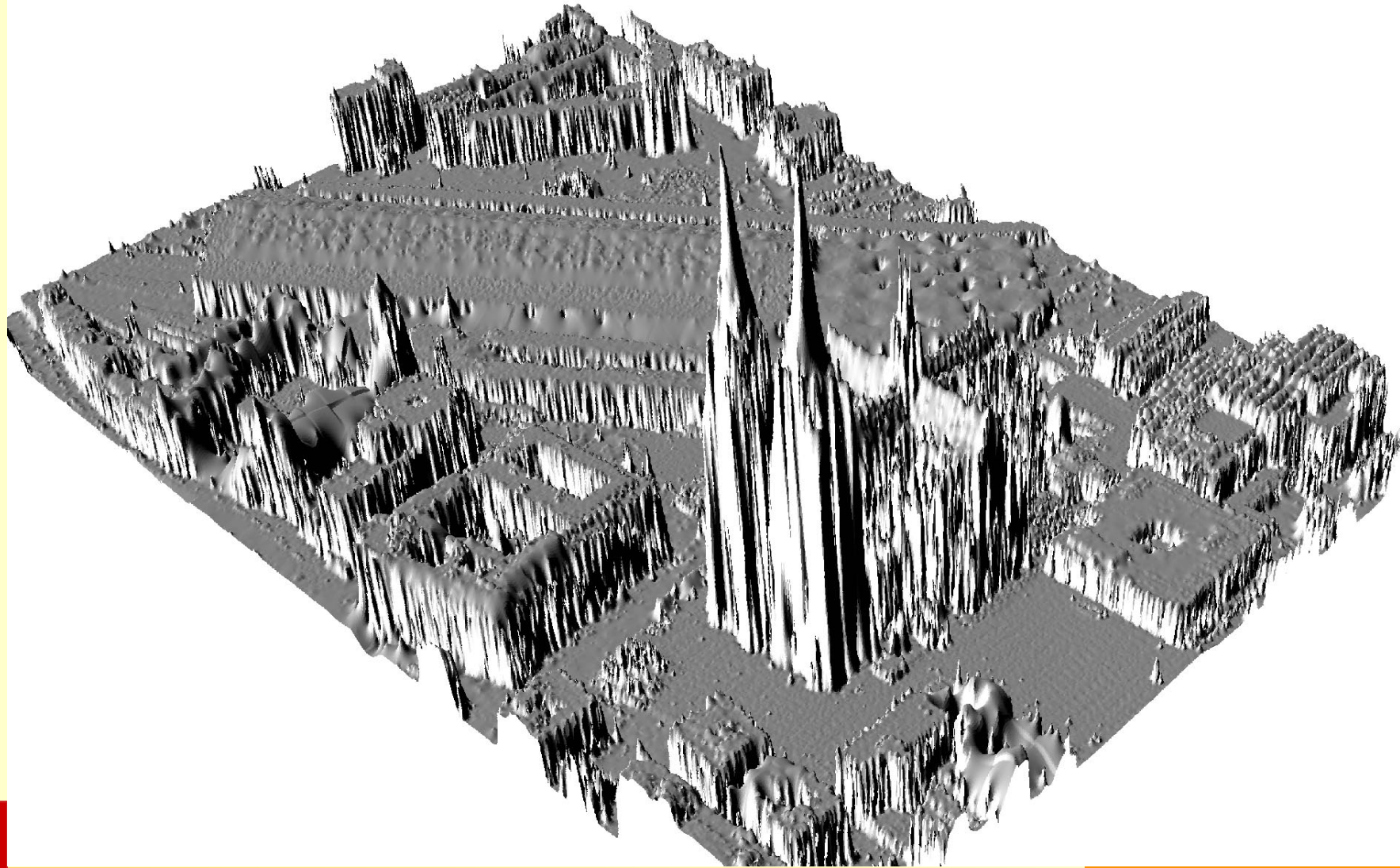
Airborne LIDAR



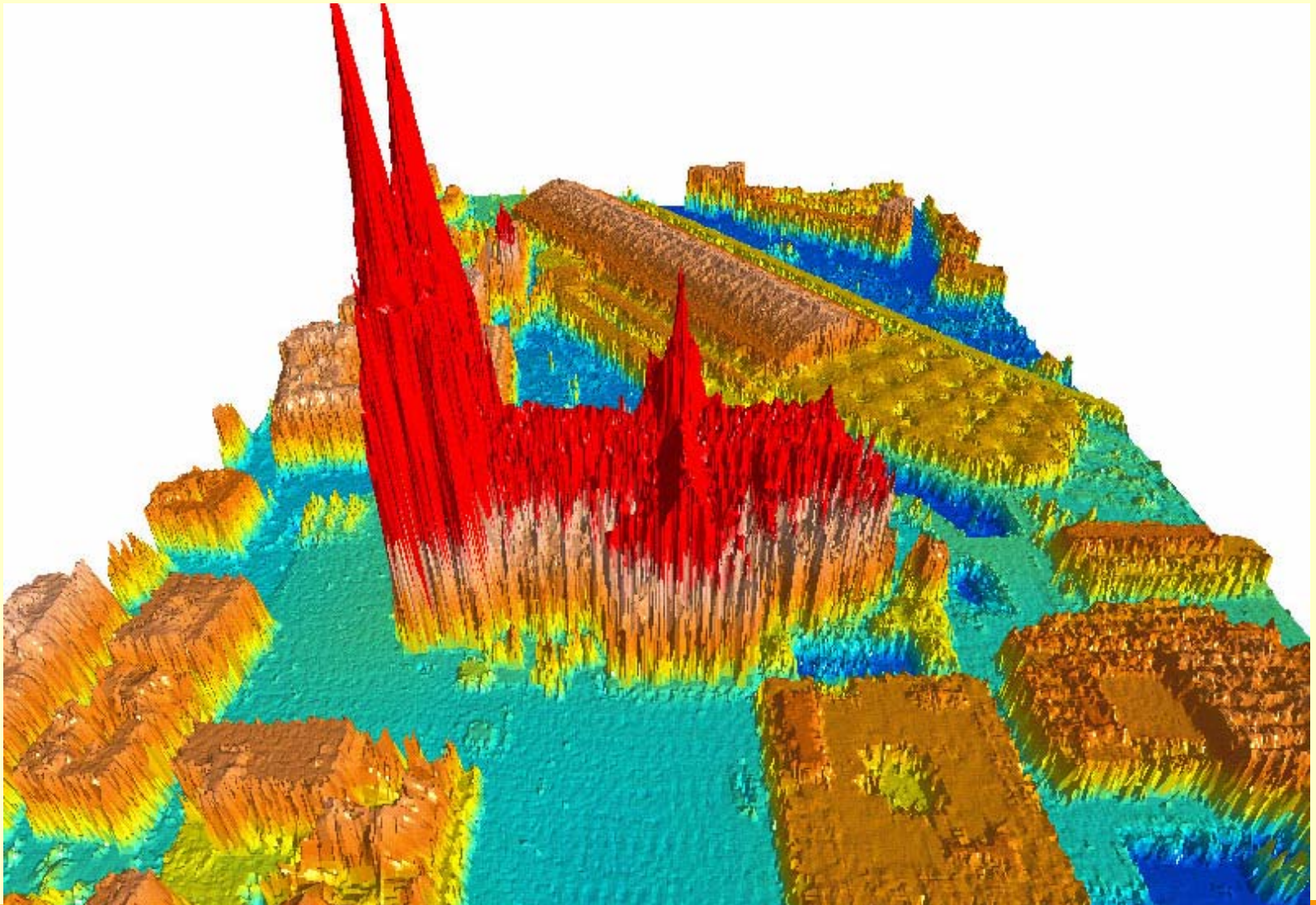
Airborne LIDAR



Airborne LIDAR



Airborne LIDAR



Airborne LIDAR

Intensity Image



Airborne LIDAR - DSM



Terrestrial LIDAR



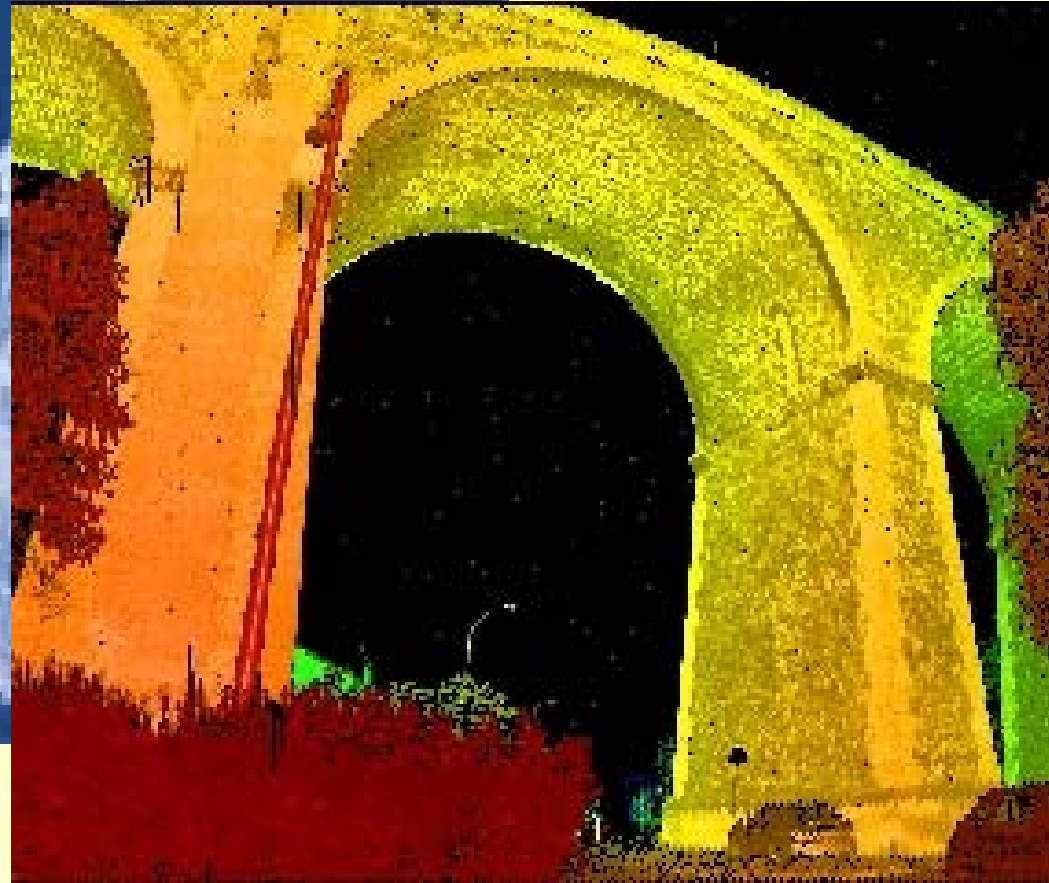
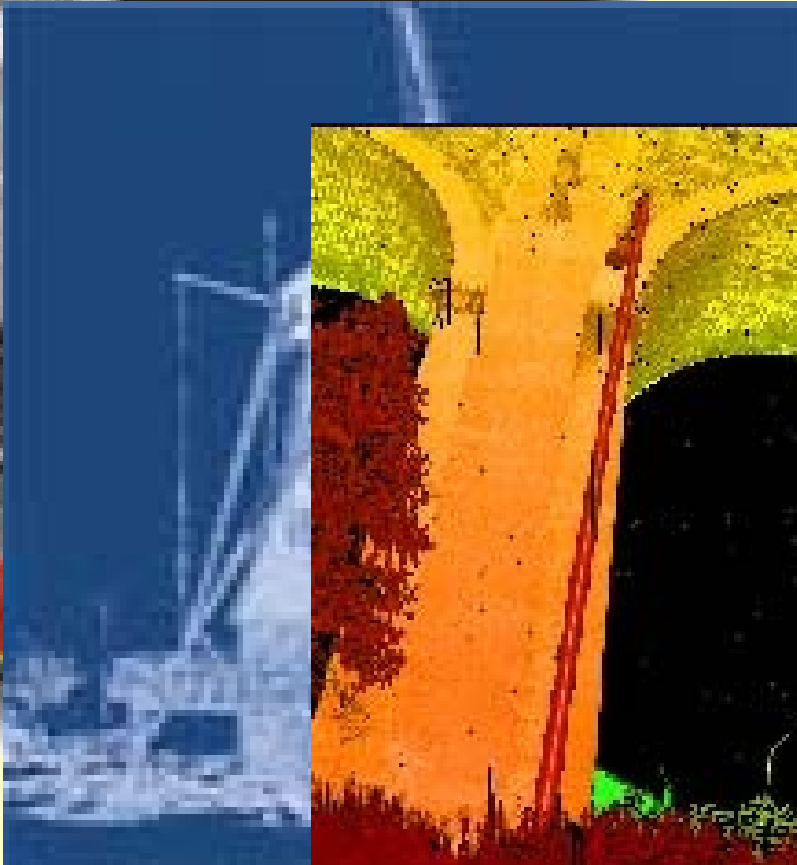
Mid

and

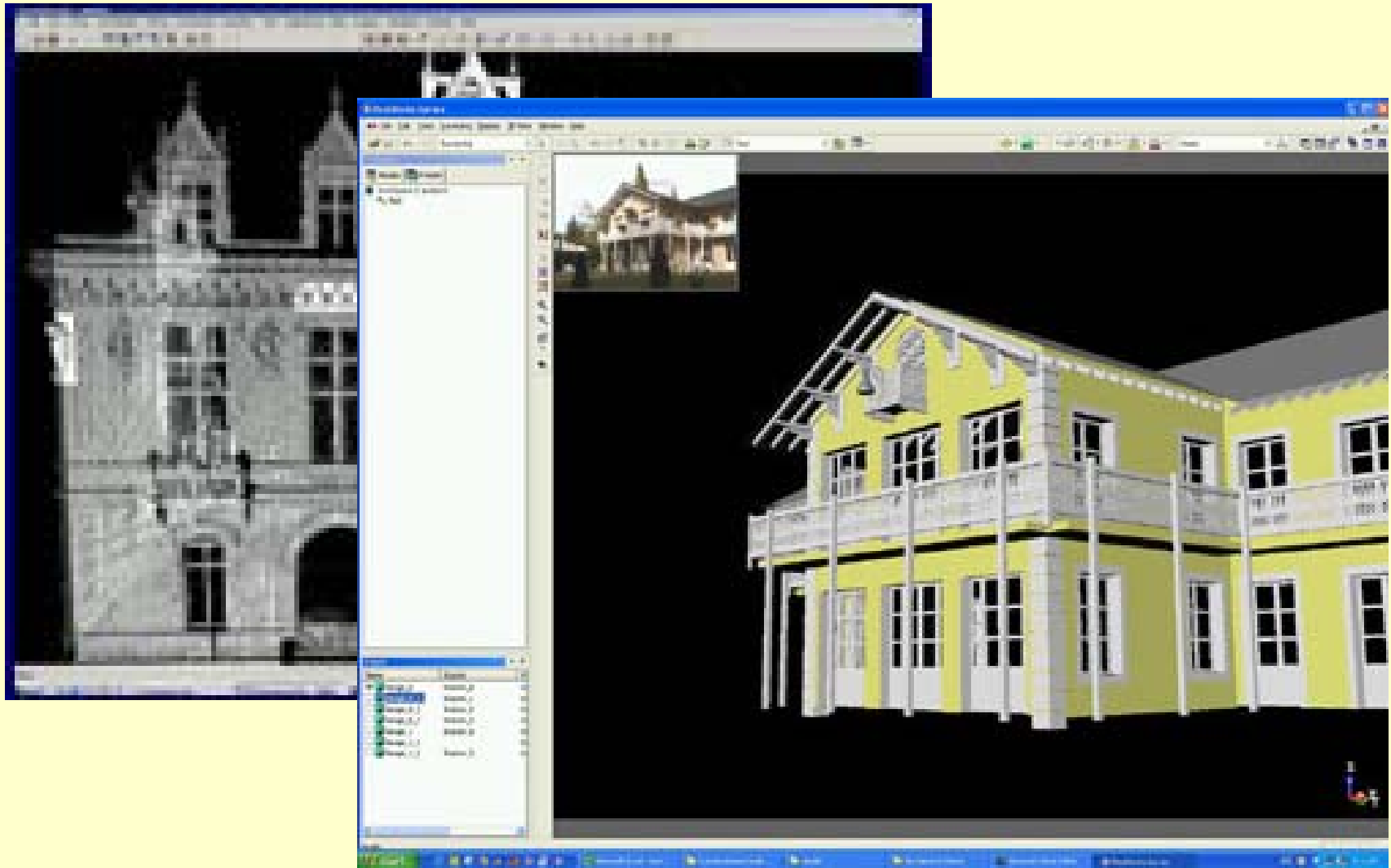
close range applications



Terrestrial LIDAR



Terrestrial LIDAR



LIDAR

General Results of LIDAR

3D point cloud

besides intensity no attributes

Major Step

Generation of objects out of data

LIDAR – The Success Story

Airborne LIDAR

**automatic filtering
manual verification**

Terrestrial LIDAR

**sophisticated software like
MENSI RealWorks Survey**

**3D CAD software like AutoCAD
or MicroStation**

Summary

- **LIDAR systems are established as surveying tools like GPS or Photogrammetry**
- **Last 10 years have shown a growing market for these applications**
- **LIDAR is not only a competition to existing surveying methods, it is a real supplementation with many new applications**

Summary

- **The terrestrial LIDAR systems will have the same success as the airborne systems**
- **We are at the challenging beginning of a new generation of surveying devices**

Thank You For Your Attention

