

Guidelines for Best Practise and Quality Checking of rtho Imagery



v.3

AGRICULTURE UNIT
European Commission - Joint Research Centre

Overview

- Document's history
- Introduction to the revised version
- Major discussion points
- Further development
- Concluding remarks



Document's history

1993

- **Common Agricultural Policy reform**

- Area-based system for subsidies
- Need for geographically georeferenced data

1998

- **Guidelines v1.0**

- Support the process of procurement, production and quality control of orthoimagery across the EU

2003

- **Guidelines v2.0**

- Updated information on scanning, VHR imagery, digital airborne data

2007

- **Regular updates (v2.6)**

2008



Revised document **v.3**

- **Make it more general and process-based**
 - Focus on the main common aspects; describe only important deviations
 - Avoid technical details that change rapidly
 - Provide some brief self-explanatory information (diagrams, formulas) for values used as thresholds, tolerances or ranges
- **Consolidate the information introduced during the previous updates of the document (v2.6,2007)**
 - Include only commonly accepted practices
 - Avoid repetitions, unnecessary restrictions
- **Main updates on Image Quality (resolution, fusion, compression), Calibration of digital sensors, mosaicking**

Scope and Nature

- Photogrammetric process for medium/large scale imagery
- Emphasis on Quality assurance (QA) and quality control (QC)
- Descriptive (not a manual)
- As general as possible

Aims

- **Used as a reference document**
 - Common Agricultural Policy, Cadastre
- **Assisting the R.S. community to make smarter choices**
 - Multiple use for imagery
 - Great variety of options
 - Know-how and local market
 - Special conditions

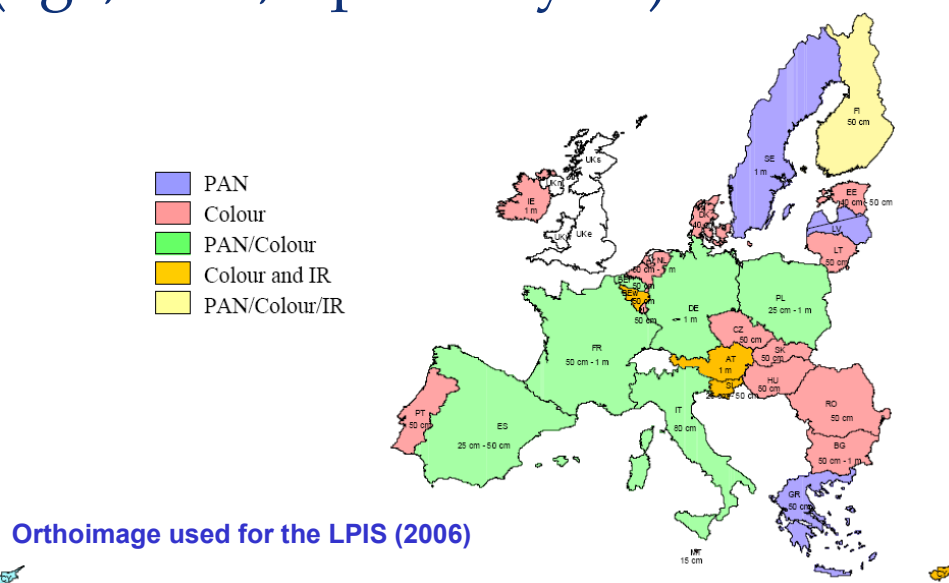
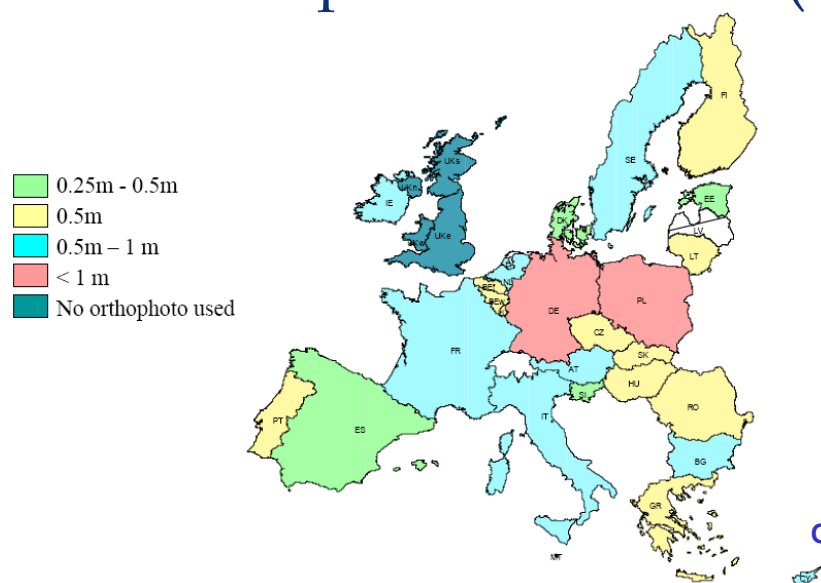
Content

- Resolution
- Image acquisition
- Radiometric processing
- Geo-reference
- GCPs requirements
- Camera/sensor calibration
- DEM handling
- Orthorectification
- Mosaicking
- Image compression
- Image fusion
- Requirements for Metadata
- Quality Assurance and Quality Control

Defining Orthoimage quality

• Image resolution

- Spatial resolution (GSD)
- Spectral resolution (B/W,MS,PAN)
- Radiometric resolution (bits/pixel)
- Temporal resolution (age, date, update cycle)

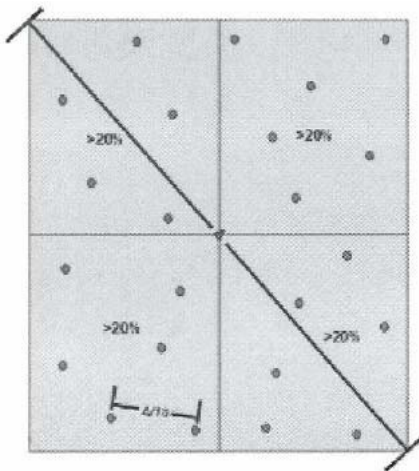


Orthoimage used for the LPIS (2006)

Defining orthoimage quality

- **Geometric accuracy**

- Well established process for defining it (RMSE of CPs)
 - >20 well-distributed Check Points per data set
 - Check 5-10% of the total



- **Additionally**

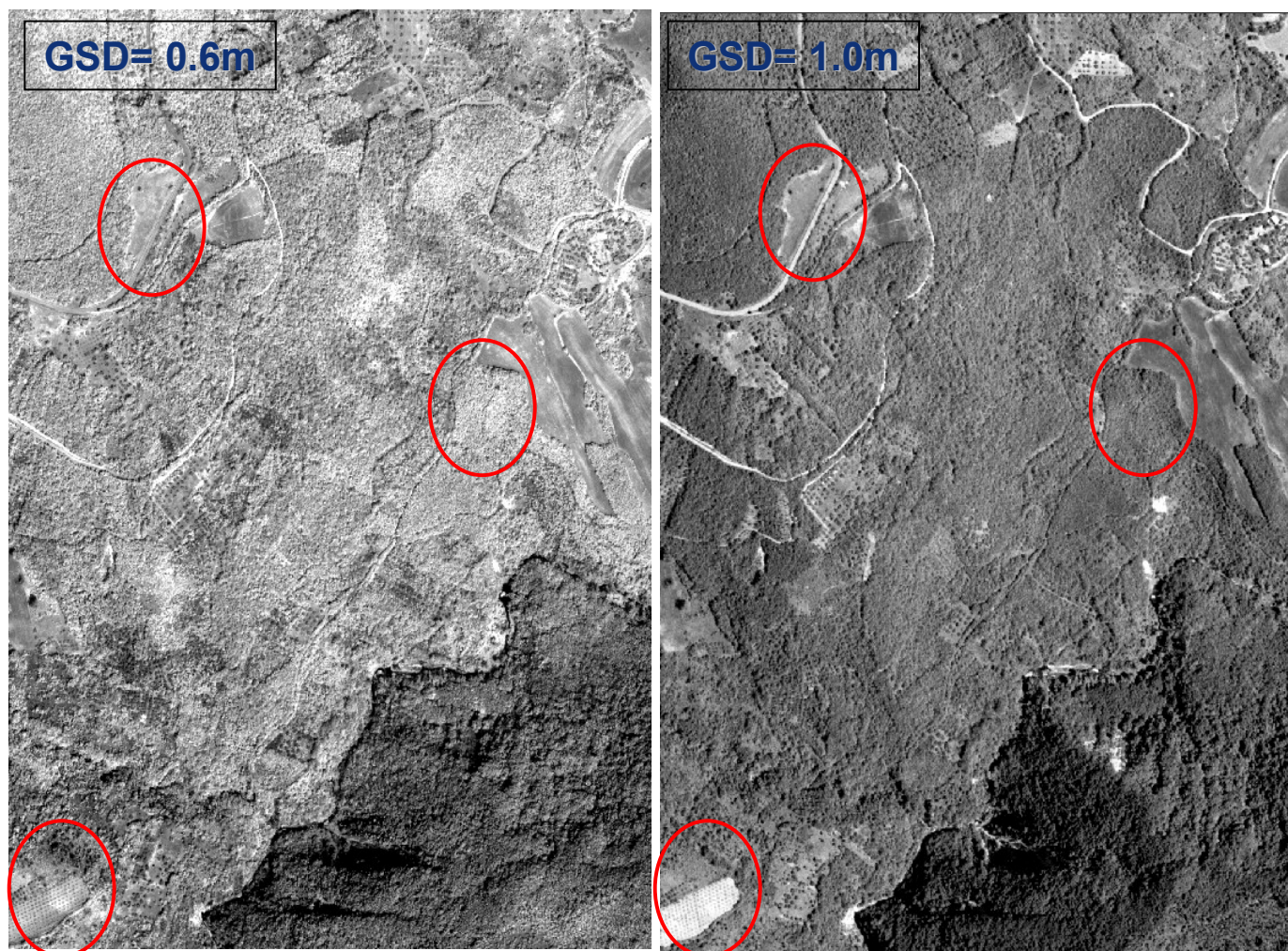
- Plots of errors
- Risk analysis for CP selection
- Check associated DEMs
- Use available accurate vector data

Defining orthoimage quality

- Radiometric quality
 - Very important but more complicated to be quantified
 - Relatively recent advent of different type of digital sensors
 - There is research taking place but not many operational tools



Defining orthoimage quality



**Resolution is not
sufficient for
defining image
quality**

- Histogram statistics (saturation, contrast, colour balance)
- Noise level
- Existence of cloud, artefacts, blur etc

Digital airborne sensors

- Extensive use; already won the battle over film
- Diverse imaging geometry and integration of additional sensors
- Traditional calibration methods do not apply
 - EuroSDR initiative (EuroDAC²)
 - USGS system certification



Image fusion (Pan-sharpening)



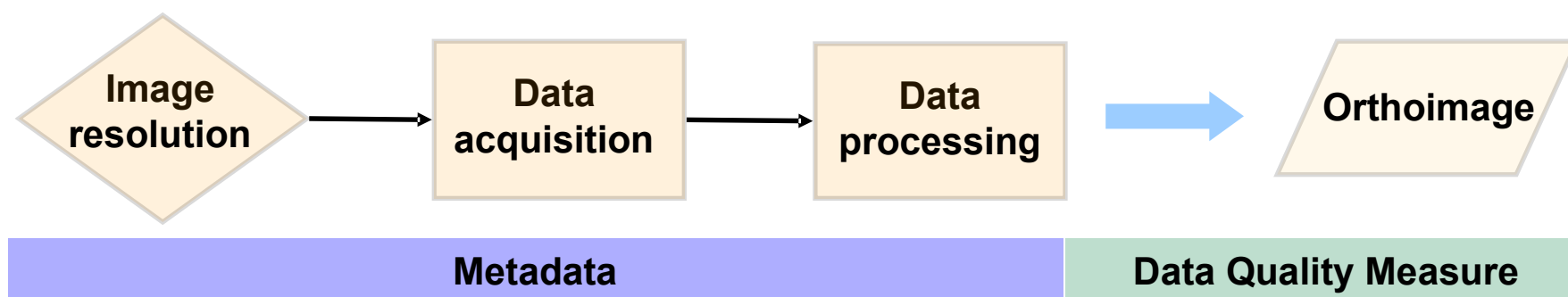
Example from 2007 CwRS site BILZ (BE). One day difference between the acquisitions

Image fusion (Pan-sharpening)

- **General requirements**
 - Sensors, co-registration, spatial image quality, radiometric and colour quality
- **Pan-sharpening of satellite data**
 - Geometric pre-processing (sensors, time)
 - Radiometric pre-processing
 - Algorithms

Further development

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- **Develop specification for the LPIS orthoimage**
 - Establish a core set of measures to ensure sufficient image quality for the purposes of LPIS
 - Define the set of metadata necessary for data documentation and overall job tracking

Objectives of common specifications

- Support the quality control process (faster, cheaper)
- Accommodate INSPIRE development (annex II theme)
 - provide input for the INSPIRE Implementing Rule
 - anticipate Compliance with INSPIRE requirements

Concluding remarks

- **v.3** of the Guidelines
 - built upon the previous successful document
 - focus on the important common steps of the process for orthoimage production
 - highlight important technical aspects
 - identify realistic and easy-to-define processes and indicators for QC
- **Used as a base for producing a core set of technical specs for LPIS ortho**
 - Independent of Imaging system & platform
 - Simple to check (automatically when possible)
 - ISO compliant
- **...and the required metadata**
 - Documentation of data
 - Full job tracking (no need for intermediate data)
 - Interoperability (INSPIRE)

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Thank you for the attention

Geoinformation management
GeoCAP - AGRICULTURE UNIT
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