



ISSUES RELATED TO VALIDATION OF THE TOOLS AND TECHNIQUES USED DURING THE ON-THE-SPOT CHECKS

Agriculture Unit, JRC Ispra

Outline

- Certification and validation – updates
- Technical tolerances – which value to use?
- Validity of certification/validation
- Positioning and area measurements errors

1. Certification and validation of the GNSS equipment – updates

What is obligatory ?

Commission Regulation No 972/2007, Article 1 (9),
amending **Commission Regulation (EC) No 796/2004,**
Article 30 (1)

*"Agricultural parcel areas shall be determined **by any means proven to assure measurement of quality** at least equivalent to that **required by applicable technical standard**, as drawn up at Community level."*

A document "**proving**" or **assuring** the quality of instrument in area measurements

How to obtain this proof:

New instrument: probably manufacturers go to a *Certification Body*
Still only one commercial Certification Body recognized by the JRC

Equipment officially certified:

John Deere StarFire iTC Receiver	Category A	
F@rmphone Satconsystem	Category B	
TOPCON GMS-2	Category B	Category A < 0.40m Category B < 1.25m
Trimble Pathfinder ProXRT	Category B	Category C < 1.50m

How to obtain this proof:

Instruments in use pre-2008:

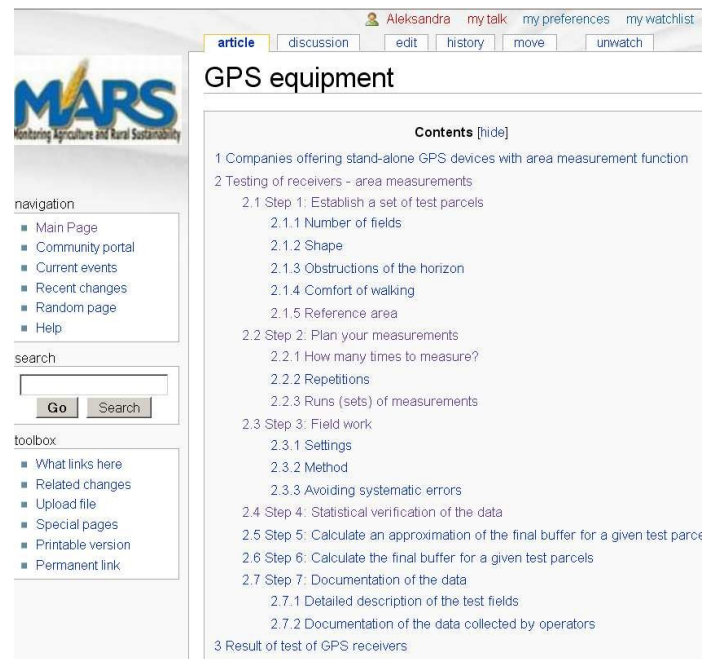
MS data collection and testing – following guidance and help from JRC

use existing statements (e.g. JRC statements about some models of: Trimble, Thales, Leica and Satcon)

worst case - default values (WikiCAP) (careful!)

Validation tests run along with the JRC guidelines

http://marsmap.jrc.it/romuald/mediawiki/index.php/GPS_equipment



Poster: Validation of GNSS receivers: step by step

Validation of the tool and method!!!!

hardware e.g. GNSS chipset, antenna type

+ software

+ settings e.g. max PDOP, horizon mask, S/N

+ method of measurements

e.g. continuous logging (time interval),
corner points only, correction signal



Validate and derive a technical tolerance to be used

2. Technical tolerances to be applied after validation/certification

Rationale of the technical tolerance

technical tolerance is to account for the uncertainty of a specific measurement technique

tolerances are applied to assess a difference between the declared and measured areas

term of **reproducibility limit** can be used

Reproducibility limit of the area measurements resulting from validation (tests), expressed as a buffer on perimeter:

$$R = 2.8 * \sigma$$

σ - reproducibility standard deviation of the area measurements, expressed as a buffer on perimeter

maximum difference between 2 measurements made by 2 operators using a comparable method (tool – same std dev) in 95% of the cases

Derive the technical tolerance to be used with that tool

- (1) "better than 1.5m" for tools presenting an R falling inside]1.25m, 1.5m], i.e. buffer width = 1.5m;
- (2) "better than 1.25m" for R inside]1.0, 1.25m];
- (3) "better than 1.0m" for R inside]0.75m, 1.0m];
- (4) "better than 0.75m" for R inside]0.50m, 0.75m]; and
- (5) "better than 0.50m" for R below 0.50m.

e.g.: $R=0.64m \rightarrow$ tolerance to be used = 0.75m x perimeter

3. Validity of validation results

When new validation is needed?

Change of hardware

SiRFstarIII GSD3tw – no SBAS

SiRFstarIII GSC3e/LP & GSC3f/LP – SBAS capable

Change of software

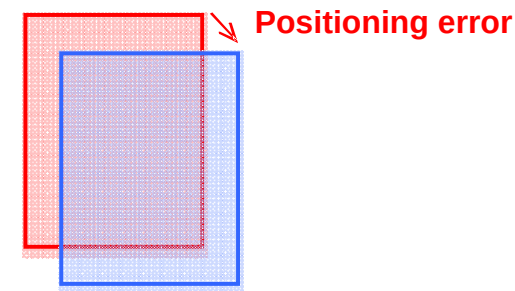
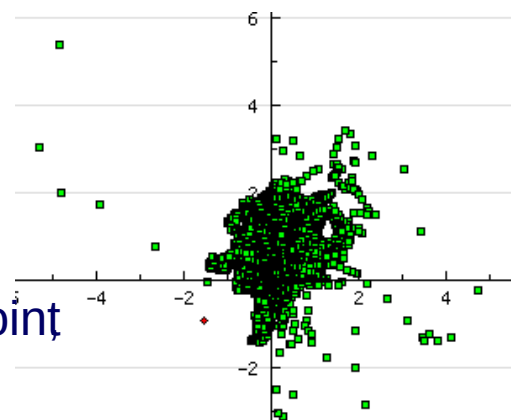
Change of settings

Change of methodology (e.g. differential correction, data collection method)

4. Positioning and area measurements errors

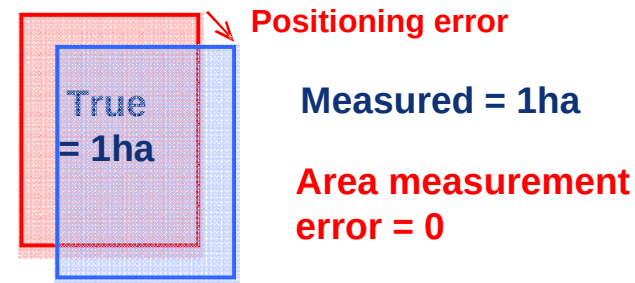
– positioning error

= Error in the **absolute** position of the point



e.g. in the production of orthophotos 1:10,000: RMSE in X & in Y should be < 2.5m
Or in technical specifications of the GNSS receivers: submeter accuracy (<1m)

- area measurement error



= Error in the **estimation of the area**, expressed as a standard deviation: absolute or relative (i.e. % of 'true' area) or as a buffer width x the parcel perimeter at different confidence levels

Thank you for your attention!