

**GMES**

**TERRAFIRMA**

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**Validation of existing processing  
chains in Terrafirma stage 2**



**SPECIFICATION OF VALIDATION APPROACH  
PART 3: GENERAL RULES  
TO RUN THE VALIDATION PROJECT**

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## 1. INTRODUCTION

The objective of this document, “Specification of validation approach – Part 3: General Rules to run the Validation Project”, is to define the key rules to run the Terrafirma Validation Project. It is organized in the following parts:

- Input data to be provided to the OSPs:
  - Information on the ground motion and goals of PSI analysis,
  - SAR images and auxiliary data,
  - Other inputs for the PSI processing,

This document is complemented by other two documents of the Terrafirma Validation Project:

- “Specification of validation approach – Part 1: Process Validation”,
- “Specification of validation approach – Part 2: Product Analysis Tasks”.

This document includes the outcomes of the 1<sup>st</sup> Terrafirma validation project meeting, held in Utrecht on 16<sup>th</sup> April 2007.

## **2. INPUT DATA TO BE PROVIDED TO THE OSPs**

The objective of this section is to specify in detail the data and information to be provided to the OSPs. The responsible is DLR, in cooperation with IG.

The input data to be provided to the OSPs are organized in the following sections:

- 2.1 Goals of the PSI analysis and other key issues,
- 2.2 SAR images and auxiliary data,
- 2.3 Other inputs for the PSI processing.

### **2.1 Goals of PSI analysis and other key issues**

Some basic information as to the nature of the ground motion and ground truth involved has been provided to the OSPs by means of the “Technical note on the site selection” and the information provided by Chris Bremmer (TNO) during the 1<sup>st</sup> project meeting. Note that the OSPs have not open access to the ground truth data before and during processing.

These are the main goals of the PSI analysis to be performed by the OSPs:

1. Detect and measure any significant deformation phenomena that occur in the covered area. This will represent a valuable input for the process analysis.
2. Measure the land deformation of Alkmaar. This will be used for both the process analysis and the product validation (using the Alkmaar ground truths).
3. Measure the deformation phenomena in the area of the N-S line in Amsterdam. This will be used for both the process analysis and the product validation (using the Amsterdam ground truths).

The OSPs will use their standard PSI processing (H-1 standard processing). However, they will use their processing at the best in order to achieve the above mentioned goals.

Three PSI processings will be performed:

1. Alkmaar area:
  - a. ERS-1/2 from 91 to December 2000.
  - b. ENVISATThe ERS and ENVISAT processings of Alkmaar will not be combined.
2. Amsterdam
  - a. ENVISAT

The results of the project will have an anonymous character.

## 2.2 SAR images and auxiliary data

- **A common SAR/ASAR dataset is defined, and the OSPs use the same data stack.**

In case of a specific images causes particular troubles in the processing, one OSP can label the corresponding data. Although, it was proposed that if one scene needs to be rejected by an OSP, this should be a consensus decision. This should be avoided to reduce project complexity.

- **The SAR data will be delivered in either Single Look Complex (SLC) or Level 0 (Raw data) format. For the SAR focusing the OSPs will use their own software and procedures, which have to be documented in the Parameter Matrix. Note that this represent a less strict requirement with respect to the original DLR's proposal discussed in Utrecht.**
- **Orbit information. The so-called precise orbit information will be made available to the OSPs.**

## 2.3 Other inputs for the PSI processing

- **Two “super-master” scenes (one for ERS and one for ENVISAT) will be used by all OSPs.**
- **The experiment is planned to get an accurate dataset co-registration in the radar space, directly from the OSPs. The entire PSI datasets generated by the OSPs will have the same slant range coordinate system of the above super-master scenes, see for details the document “Specification of validation approach – Part 1: Process Validation”, p. 27, section 6.7.**
- **The areas to be processed will be specified in the radar image space (on the super-masters).**
- **The OSPs have to use a common DEM to compute the DInSAR phases.**
- **References PSs for the PSI products.** The PS reference for the deformation velocities (and, therefore, the time series) and the elevation errors will be chosen by the OSPs. The used reference PSs have to be specified by the OSPs, as requested in the Audit, section 6.1, point 12, page 23, of the document “Specification of validation approach – Part 1: Process Validation”. I.e. this information represents a mandatory deliverable.
- **It would be useful to homogenize the way of computing the temporal coherence, in order to get a quality index that can be used to inter-compare the PSI results of different teams.** In the document “Specification of validation approach – Part 1: Process Validation” the coherence estimation is defined in detail. It is defined as correlation coefficient of, by all systematic effects which are modelled, complex compensated phase measurements. It is not important if the phase values are related to a single point or to a relative phase difference.
- **Fix the rules for appropriately choosing the origin of the time series a priori.** This is automatically resolved by using the same stack, and fixing the first image as the origin.
- **Fix the rules to geocode the PSI products:**
  1. Use the same DEM for the PSI processing

2. Provide orthoimage and maps (note, only a crop, because the rest will be used to check the quality of the geocoding) to accurately geocode the products.

We will get directly from the OSPs the geocoded PSI in the WGS84 geographical coordinates. The transformation in the Dutch local reference system, useful for the validation activities, will be made by TUD.

- **Deformation time series. We suggest that the teams properly filter the outliers in the time series.** A file with flags for masking the deliverables has been added to the set of OSP deliverables: `time_series_mask_msb.ras`, which is described in the document “Specification of validation approach – Part 1: Process Validation”, p. 31, section 6.9.
- **Document the PSI product geocoding.** This can be achieved by plotting the PS on orthoimage to show the correct global geocoding of the PS. etc.