



SATELLITE  
DATA

# Further exploitation of EPOSAR InSAR data for ICS-D implementation

Occhipinti M.<sup>1\*</sup>, De Luca C.<sup>1</sup>, Manunta M.<sup>1</sup>, Monterroso F.<sup>1</sup>, Casu F.<sup>2</sup>

<sup>1</sup>IREA-CNR, Naples, Italy

<sup>2</sup>IREA-CNR, Milan, Italy

\*occhipinti.m@irea.cnr.it



## State of art

The **Integrated Core Services - Distributed (ICS-D)** represent an extension of the ICS-C, furnishing **computing utilities** for the processing of the products deriving from different TCS. In the context of enhancing the EPOS services, as a key point of **EPOS ON** goals, new services supporting the ICS-D can be proposed, such as workspaces containing post-processing scripts designed for EPOS data and their management.

## Research question

The present research is aimed at proposing **new workspaces supporting the ICS-D** dedicated to the post-processing of **EPOSAR** database. In such way, the user will be able to manage the **EPOSAR** data, by performing the furnished processing script and extrapolating **new detailed information from Line Of Sight (LOS) displacement products or from the associated maps of LOS vectors**.

## Workspace proposal n°1: Extrapolation of the Vertical (Up) and Horizontal (East/West) components of the displacement field

The first proposed service is aimed at calculating the **Up and East components** of the displacement field using EPOSAR data as input dataset. In particular, the script is build in order to **combine the LOS displacement maps** for both ascending and descending orbits with the associated **maps of LOS unit vectors**, which indicate the conversion factors between RADAR LOS and the North, East and Up spatial directions. This type of information can be impactful for users involved in **Geosciences** or in **Environmental Monitoring**, where recognizing the detailed entity of the displacement is crucial. The script is written in Python and it is in a preliminary testing stage.

## Workspace proposal n°2: Comparison of EPOSAR data of displacement field with GNSS measurements

The second proposed service, still in ideation stage, is aimed at **integrating the information from EPOSAR dataset with GNSS measurement data**. The idea consists of **extrapolating the LOS direction** of the displacement from **GNSS information** (North, East and Up), by exploiting the information from LOS unit vector maps. The LOS information deriving from GNSS can be compared with the LOS displacement from EPOSAR data, in such way to assess the EPOSAR product accuracy. This operation is of fundamental importance in a context of information refinement, giving the possibility to obtain a high detailed database.

### Data type:

**Unwrapped Interferograms** ✓ i ☆ v

Categories: [InSAR](#)

Visible on: [Map](#) [Table](#)

Displacement maps projected along the Line Of Sight of the satellite, which can be decomposed to retrieve the effective three spatial components of the displacement field

**Map of LOS Vector** ✓ i ☆ v

Categories: [InSAR](#)

Visible on: [Map](#) [Table](#)

Maps associated to a precise interferometric geometry, and containing the values of the cosines of the angles between the LOS of the satellite and the North, East and Up axis of a cartesian system for each point of the map.

### Data type:

**Unwrapped Interferograms** ✓ i ☆ v

Categories: [InSAR](#)

Visible on: [Map](#) [Table](#)

Displacement maps projected along the Line Of Sight of the satellite, which can be decomposed to retrieve the effective three spatial components of the displacement field

**Map of LOS Vector** ✓ i ☆ v

Categories: [InSAR](#)

Visible on: [Map](#) [Table](#)

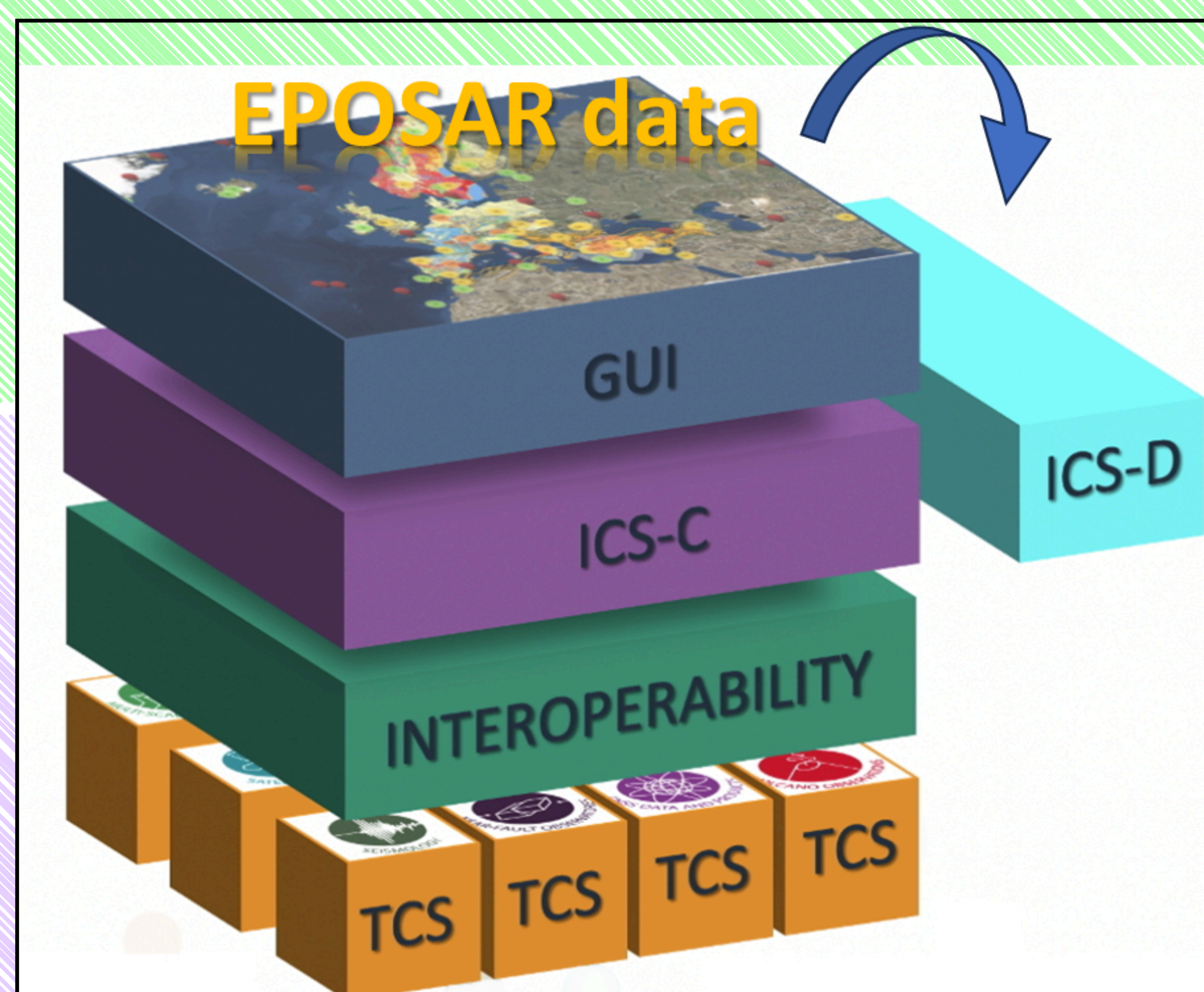
Maps associated to a precise interferometric geometry, and containing the values of the cosines of the angles between the LOS of the satellite and the North, East and Up axis of a cartesian system for each point of the map.



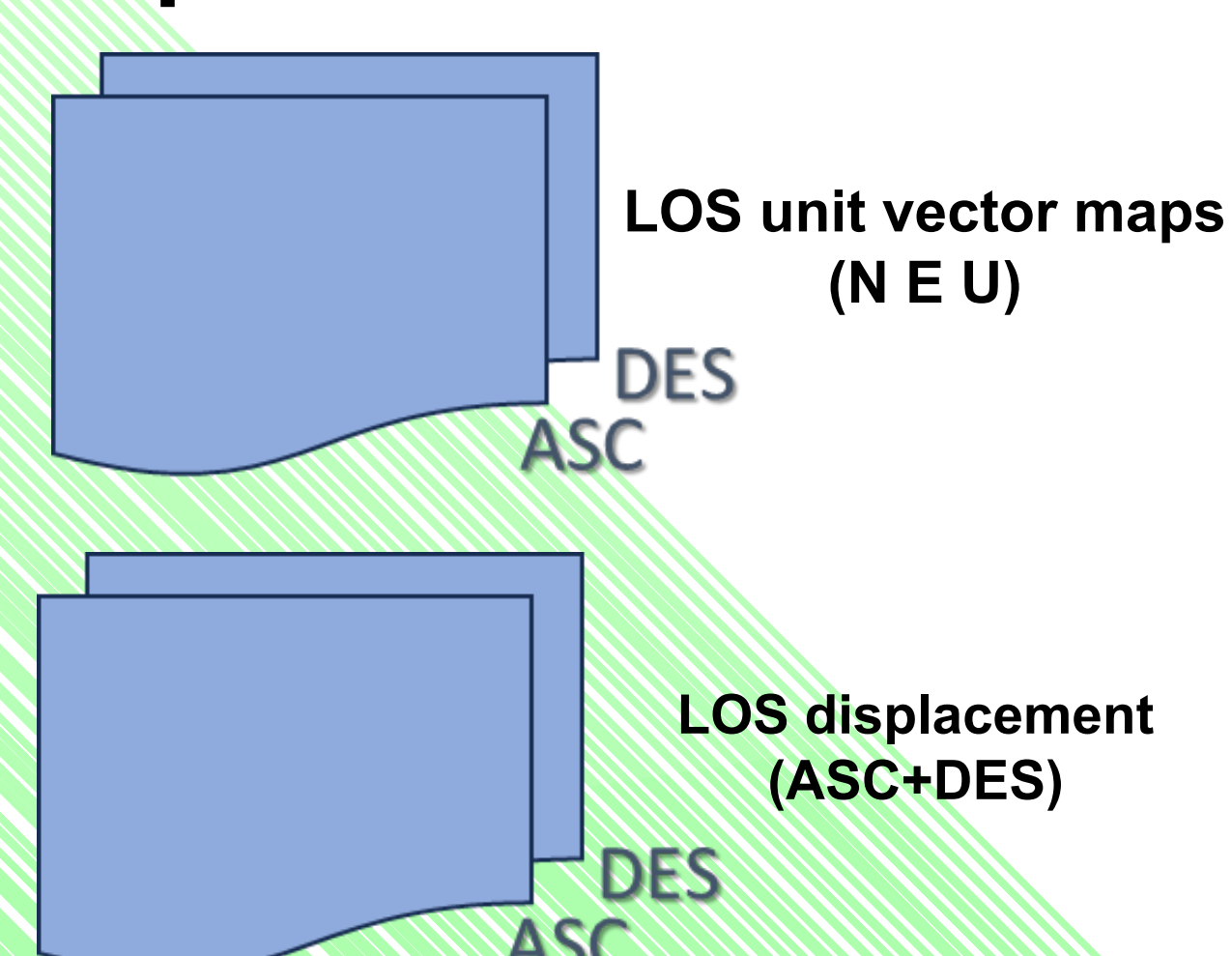
GNSS data

## Workspace proposal n°1 Extrapolation of the Vertical (Up) and Horizontal (East/West) components of the displacement field

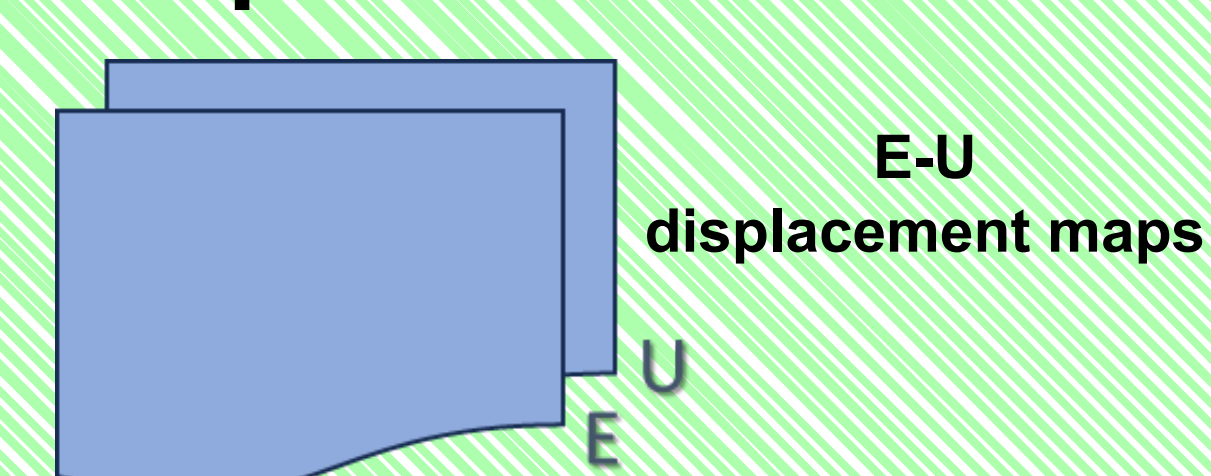
### Organization of dataset and processing workflow



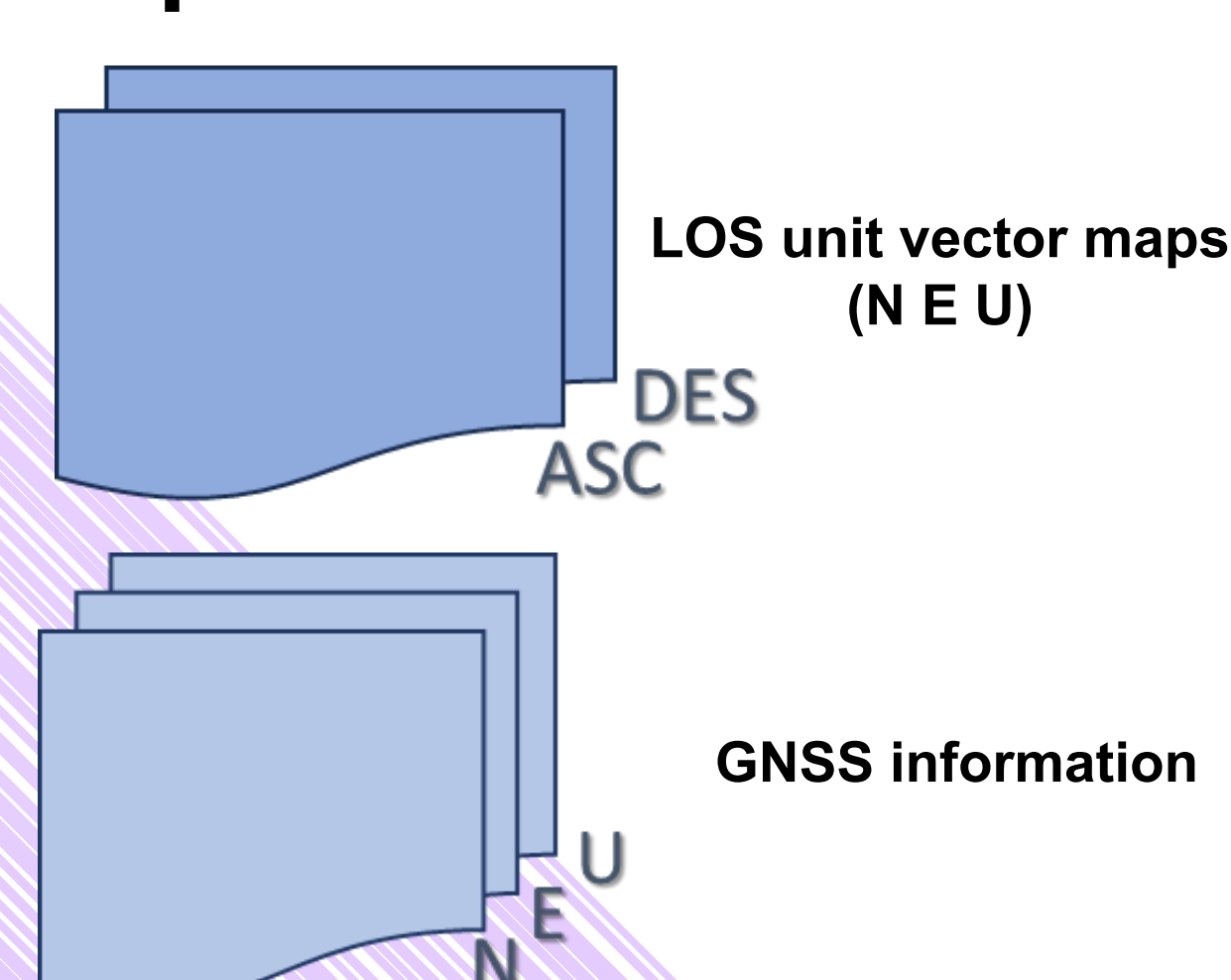
### Input data



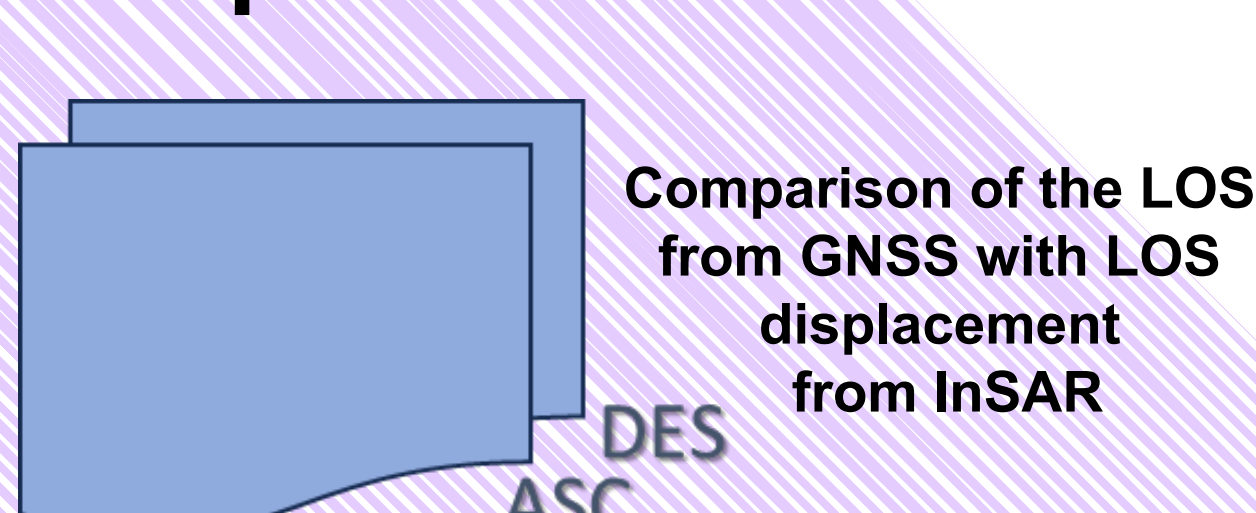
### Output data



### Input data



### Output data



## Workspace proposal n°2 Comparison of EPOSAR displacement field data with GNSS measurements Organization of dataset and processing workflow