



# MEOS™ NRTSAR

## System for providing services to the user in Near Real Time

The MEOS™ NRTSAR integrates SAR processing subsystems for fast and automated processing of SAR raw data to end services in near real-time.

### Main benefits

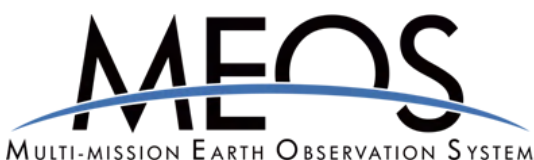
- A single system for all SAR missions saves costs
- End service available during data reception from the satellite
- Open architecture supports flexibility in deployment
- Ideal platform for research and development
- Supports agency certified products
- Saves operation costs by automation
- Supports TOPSAR data mode (main mode for Sentinel-1)
- Includes ultra-fast SLC and GRD processing

### MEOS™ NRTSAR architecture

The MEOS™ NRTSAR operates in a framework that contains subsystems suited to interact with each other to shorten time from data reception to an end-service. This is done through use of direct streaming technology, where data from the previous processing step is made available to the next subsystem, and in near real-time. The framework is also designed so that subsystems may be started from either intermediate internal formats or from official product formats to increase portability. An illustration where MEOS™ NRTSAR operates together with a MEOS™ NRTSAR Ship Detection from a downlink to an end-service is shown in figure on next page.

### MEOS™ NRTSAR processing algorithms

The set of processor algorithms includes Stripmap, ScanSAR and TOPSAR. Stripmap mode processing is done using an Extended Exact Transfer Function (EETF) algorithm, which is a fast phase preserving algorithm. ScanSAR mode processing is done using a SPECAN approach, including modifications to support Single Look Complex output with phase preservation. All algorithms are optimized for performance and quality.



### Key Features

- Multi-mission near-real time SAR framework
- Direct streaming between subsystems
- Input from official format (i.e. Level0, Level1), generic NRTSAR formats as well as via direct data stream from receiving system
- Customer specific input format can be added through use of tailor-made input modules
- Supports output as direct data stream, to NRTSAR specific formats, official agency Level1 data formats as well as customer specific formats
- Multithreading framework that automatically scales to available processing capacity
- Optimized for operational production
- Algorithms optimized for performance and quality
- Upgradeable with support for new missions by adding specific input- and output modules
- Supports customer optimization of key processing parameters

### MEOS™ NRTSAR processing performance

The MEOS™ NRTSAR is designed to work across several computer nodes, and utilizes Linux Operative System functionality to automatically scale processing power to available hardware. The hardware can be adjusted to meet specific needs related to performance of the complete system.

Stripmap and SPECAN processing are done in near real time. The selected algorithm for TOPS processing is optimized for speed and quality and processes data approximately twice as fast as the official ESA IPF on a similar processing platform.

The MEOS™ NRTSAR uses direct streaming of raw data from the front end (see MEOS™ HRDFEP) through the processor and through to further NRTSAR downstream applications.

An illustration of the benefits of this approach compared to traditional sequential processing is indicated in figure on next page.

## Individual customization and research

The MEOS™ NRTSAR is ideally suited for adding subsystems that provide new and innovative research. The existing core algorithm is furthermore configurable with respect to processing parameters (i.e. output spacing, bandwidth limitations and multilook configurations). This makes MEOS™ NRTSAR fully configurable to support enhanced end services.

An API is provided so the user can add innovative processing algorithms to work with MEOS™ NRTSAR.

## MEOS™ NRTSAR methodology

The following is an overview of each step of the methodology used by the MEOS™ NRTSAR processing algorithm.

### Raw data import

Data is either imported via direct streaming from available Instrument Source Packets (ISPs) or from an input Level0 product available on file(s). Raw data correction performed as needed.

### Establish parameters

Core processing parameters such as chirp replica, Doppler estimates and orbit information are extracted from input raw data and configuration files.

## Multithreaded processing framework

Configured blocks are processed using a multithreaded approach, in which a configurable number of available CPUs are used.

## Core algorithm steps

Algorithm steps as configured by the user regarding bandwidth limitation, multilook parameters and output spacing are done for each configured block. The algorithm suited for the input data mode is used. Potential transformation to a configured output frame is also done in this step.

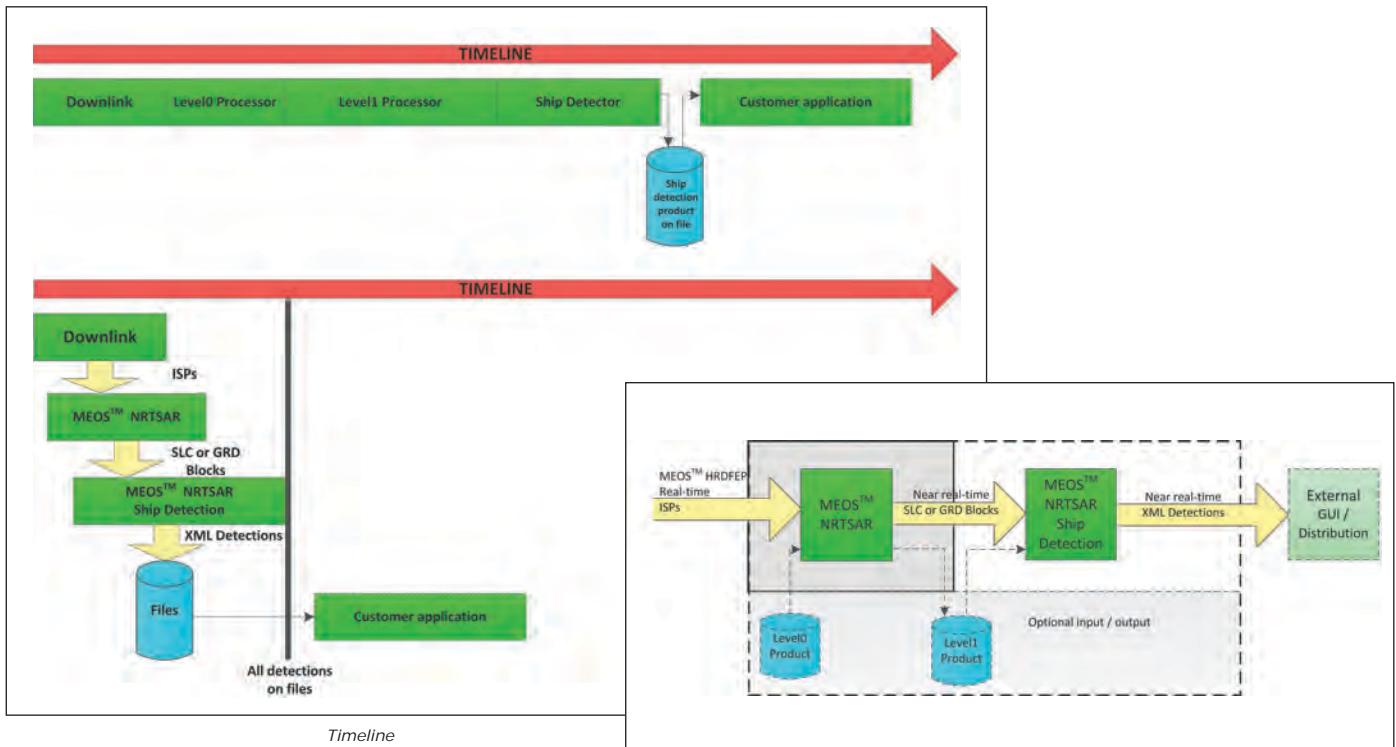
## Downstream availability

Results from the core processing steps are made available to a downstream application. If resulting data is also to be written to an official Level1 product format (i.e. Sentinel-1 data format) this is done now.

## Key supported input formats

Addition of new input formats is done through separate, expandable, input modules. Among the input formats supported are:

- Sentinel-1; Both as official Level0, and as direct ISP input
- RadarSat 2; RadarSat 2 Level0 format. Note that availability of this format has to be agreed upon with data owner
- Generic format; binary format with additional XML formatted auxiliary data



**Note:**  
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