

PROCESSING LINES AND OPERATIONAL SERVICES COMBINING SENTINEL AND IN-SITU DATA FOR TERRESTRIAL CRYOSPHERE AND BOREAL FOREST ZONE

SEN3APP

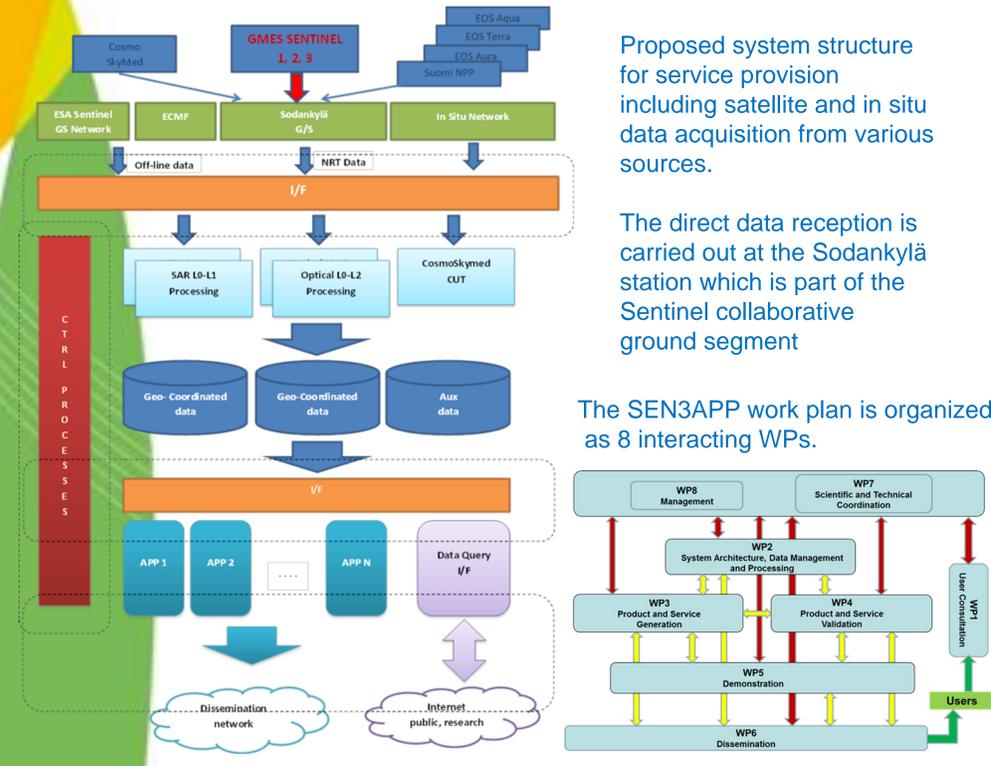
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 Associated Beneficiary(ies): GAMMA, ENVEO, SYKE, VTT
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BACKGROUND

□ The Sentinel- satellite series aims at frequent global coverage of the Earth surface in full spectrum of remote sensing. This enables the use of well-established satellite products, built up with earlier more research oriented satellites, to be used for the benefit of people in six core areas of Copernicus/GMES: security, land monitoring, climate change, atmosphere monitoring, emergency management and marine environment monitoring. The SEN3APP project which is funded by EU FP7 program addresses three of these, namely climate change, land monitoring and security.

□ At the heart of many of the challenges for the global human community lies the climate change. The understanding of the processes require vast amount of information. The cryosphere, especially seasonal snow cover and including the frozen ground and permafrost, plays a very important part in global Earth system.

□ The inter- and intra-annual changes in the cryosphere, phenology and land cover have proven relevant not only for climate change studies, hydrology, hydropower, traffic etc. but they have an impact to and interact with many other environmental phenomena. For example, changes in the water quality (freshwater and coastal water) are significantly affected by the duration of winter conditions. Snow melting as well as the thawing and freezing of soil, induce and restrain different processes in the aquatic ecosystems. Changes of land cover are relevant in these processes as well.



OBJECTIVES

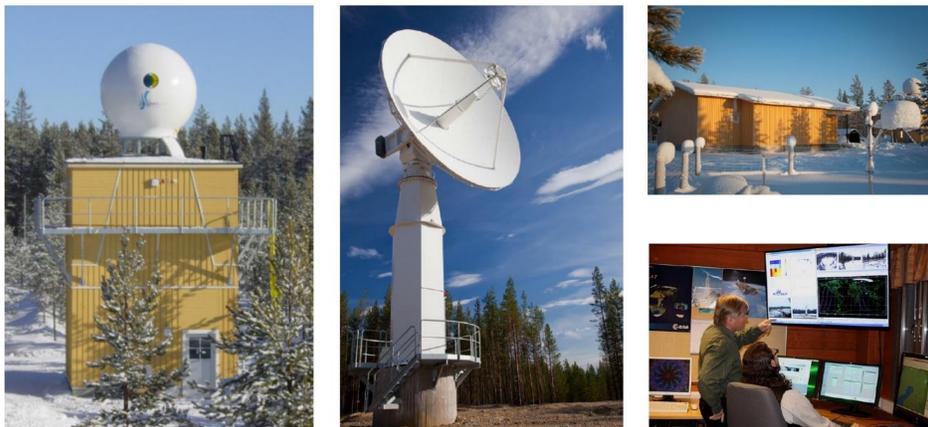
SEN3APP is concerned with the development, implementation, operationalization and validation of Sentinel data processing lines for cryospheric (terrestrial) and land cover/phenology applications. Both global and regional applications are included, focusing to high latitudes of the Earth and other parts of the cryosphere:

- Global and regional snow cover: snow water equivalent (swe), snow extent, snow melt line, fractional snow cover (FSCA), wet (melting) snow area
- Glaciers: extent, snow/ice maps, glacier displacement maps
- Water bodies including the mapping of extent of (seasonally varying) water areas and lake/river ice processes
- Soil freezing and thawing processes (tundra, boreal forests, wetlands and alpine regions) and concurrent changes in forest vegetation
- Permafrost subsidence
- Intra-annual monitoring of ecosystem functioning, based on time-ser vegetation indices relevant in northern boreal zone
- Monitoring of inter-annual changes in land cover
- Intermediate products such as cloud-screened surface reflectance.

The overall objective of the proposed project is to provide end-users with products and services relevant to:

- ✓ Numerical Weather Prediction (NWP): land surface processes and albedo
- ✓ Local/regional scale climate change studies and planning of adaptation strategies
- ✓ Ecosystem studies & assessment of ecosystem services
- ✓ Evaluation of nutrient leaching caused by different land use and management practices for implementation of Water Framework directive objectives
- ✓ Hydrological forecasting and monitoring including hydro-power industry, flood prevention and water resources assessment
- ✓ Carbon balance monitoring and assessment
- ✓ Environmental monitoring including disasters, forest diseases and crop yield
- ✓ Construction and logistics as to soil frost and permafrost (roads, buildings, timber collection)

Sodankylä Satellite Data Centre



National satellite data center providing satellite data reception and data processing services to Finnish and international partners



Sentinel Collaborative Ground Segment concept

- Access to Sentinel data through collaborative agreements allows further valorising the Sentinel missions exploitation
- The collaboration provides a frame for specialised solutions in 5 main areas:
 1. Sentinels data acquisition and Quasi Real Time production (Local stations)
 2. Complementary collaborative data products and algorithms definition
 3. GSC core data product dissemination and access (e.g. mirror sites)
 4. Development of innovative tools and applications
 5. Complementary external Validation support activities

Finnish Collaborative GS

