# EARTH OBSERVATION SERVING REGIONAL FORESTERS

*Operational satellite-based Earth Observation services support the regional forestry sector to valorise a forgotten resource, Chestnut groves, providing fruit and rot-resistant wood.*

## The challenge

The chestnut species is considered promising as it acclimatises to global warming. The rot-resistant chestnut wood was used in German and French vineyards on the eastern flanks of the Vosges Mountains. No longer used, knowledge of this resource has dwindled. Furthermore, these forest stands are under attack by a canker.

Today, it is thought that its wood could be better exploited. Hence, an international Interreg IV project focused on conservation and on wood and fruit use was set-up. At the request of regional foresters, namely, the Lorraine-Alsace Regional Centre for Forest Owners (Centre Régional de la Propriété Forestière or CRPF), ICube-SERTIT's challenge was to map this species in Alsace.

## The space based solution

Specialised in satellite image processing and operational service development, ICube-SERTIT is very active providing services to regional foresters, covering forest inventory and resource monitoring within the Grand-Est Region of France. Furthermore, it provides customised windfall damage and tree die-off mapping services. All services are developed using satellite data and validated by the client. Here, ICube-SERTIT developed a method to precisely map chestnut stands throughout Alsace using multi-date satellite imagery and field samples.

The challenge was to distinguish chestnut trees from other species. Thankfully, chestnut trees bloom in early summer facilitating the task to distinguish them from other species that flower earlier or later. Hence, by acquiring images at several times during the same growing season, SERTIT has determined the percentage of the main tree species in the Upper Rhine region focussing on chestnut trees. The Earth Observation derived mapping results were validated during field campaigns. A partial validation was carried out by the Lorraine-Alsace CRPF. Concerning mature chestnut stands it shows an accuracy of 85%. The results highly convinced the foresters who are now exploiting the results.

## Benefits to Citizens

The chestnut grove is a defining feature of these piedmont landscapes, once punctuated by vineyards and orchards, inducing the agricultural use of wood, in addition to its use in traditional houses Local authorities are promoting and hence increasing the awareness of the socio-economic benefits of the chestnut groves by properly valorising them.

Environmentally, with global warming, climate forecasts show an increase in typical West France tree species including the chestnut tree. Conversely, beech which densely populates the region is vulnerable to climate change. Hence, the need to focus on the

Chestnut tree flowering in early summer
*© SERTIT.*

Thematic Area: AGRICULTURE, FOOD, FORESTRY AND FISHERIES

Region of Application: ALSACE

Sentinel mission used: S2

Copernicus Service used: –

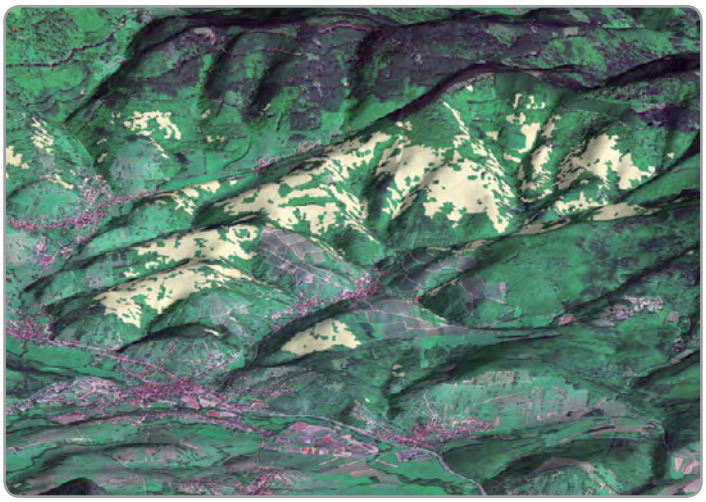
Usage Maturity Level: 4/5

chestnut tree. The knowledge of the geo-location of chestnut groves, often managed within small private forest estates, was not well known and will help preserve and enhance this species in forestry practices.

Economically, abandoned in viticulture, chestnut wood is presently under-exploited in Alsace, being often used for firewood. Comparable to exotic woods, German foresters are now producing quality timber. Quality trunks are abundant in Alsace groves but marketed volumes are small. The project's forestry guide and promotional activities have helped an emerging market of chestnut wood, i.e. avalanche barriers.

## Outlook to the future

Using a multi-temporal optical satellite image coverage, covering different phases of the annual chestnut development cycle and combining ALOS AVNIR-2 with SPOT 5 images, and geo-localised field data, a methodology to differentiate and map them was developed in collaboration with the CRPF Lorraine-Alsace. Exploiting Sentinel-2 with its high-resolution, high-frequency revisits, covering the entire vegetation cycle should help account for the window fluctuating from year to year depending on meteorological conditions making this service even more generic and operational. In conclusion, this operational service, which was awarded an Innovation Trophy by the NE French Forestry sector, can be applied to other regions and diversified to map other tree species.



3D view of Chestnut grove mapping (beige areas) in the Vosges, Alsace, France. SPOT5 image.
*©CNES (2009), processing ©ICube-SERTIT*

> "Really small chestnut groves, not represented on our initial maps were detected by satellite."
>
> ***Maren Baumeister, CRPF Lorraine-Alsace***

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## ABOUT COPERNICUS4REGIONS

This Copernicus User Story is extracted from the publication "**The Ever Growing use of Copernicus across Europe's Regions: a selection of 99 user stories by local and regional authorities**", 2018, Edited by NEREUS, the European Space Agency and the European Commission.
The model cases focus on local and regional authorities who successfully applied Copernicus data in 8 major public policy domains.

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