

Cartographier la vulnérabilité au retrait-gonflement des argiles (RGA) par l'interférométrie radar (InSAR)

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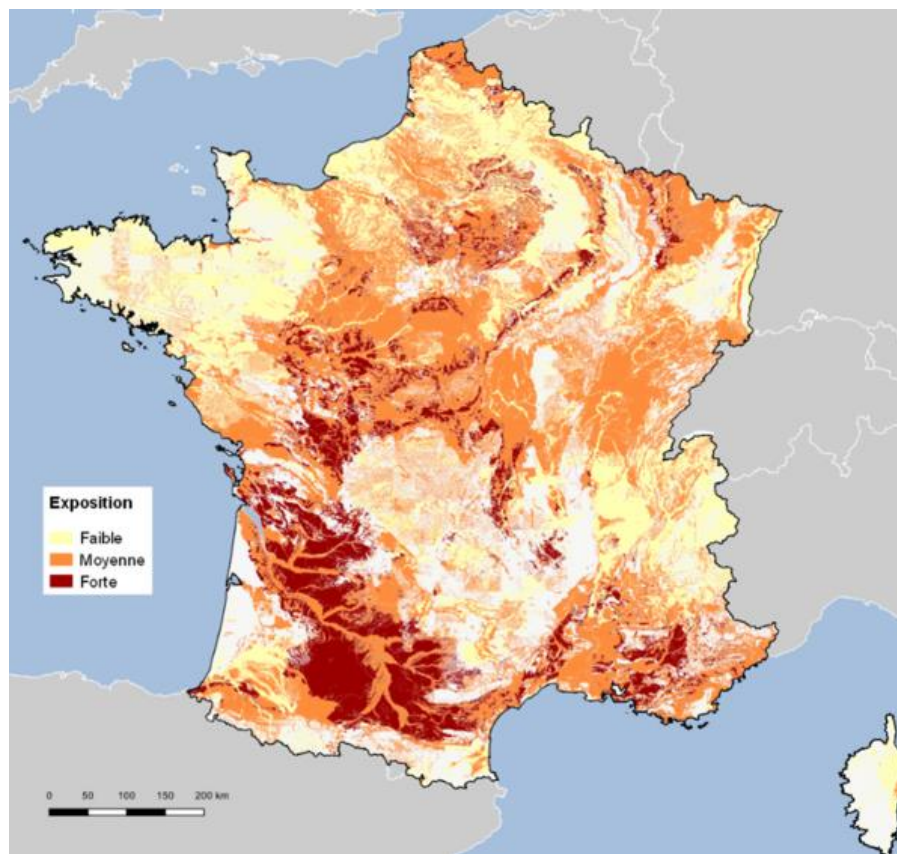
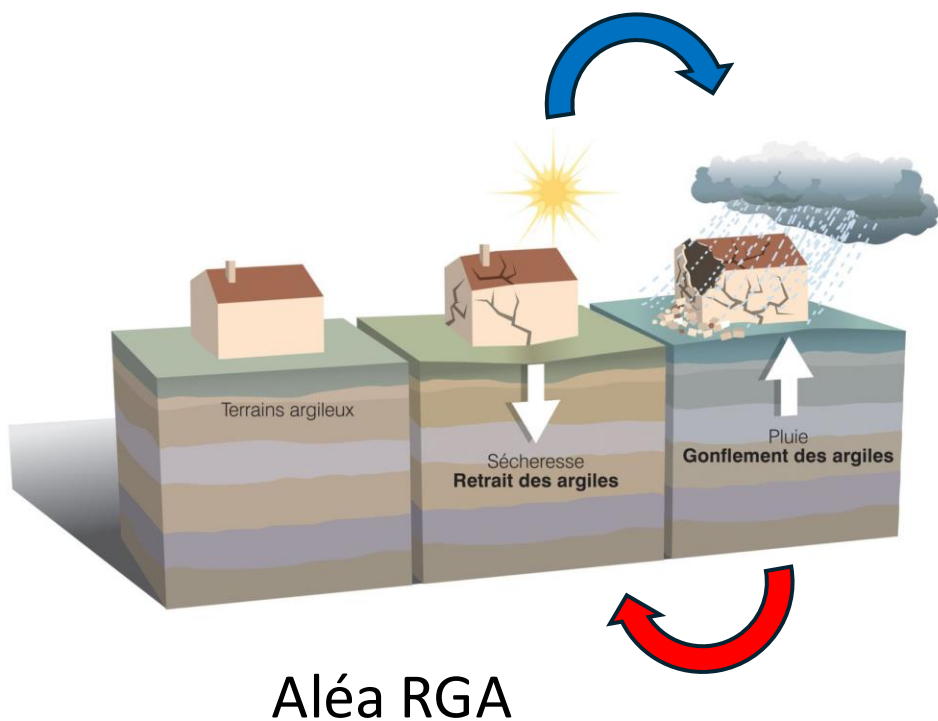
Pluridisciplinaire

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traitement du signal et data sciences
Tournée vers les risques naturels,
l'énergie et l'industrie



La problématique

Le mouvement saisonnier des sols argileux



Carte d'exposition au RGA

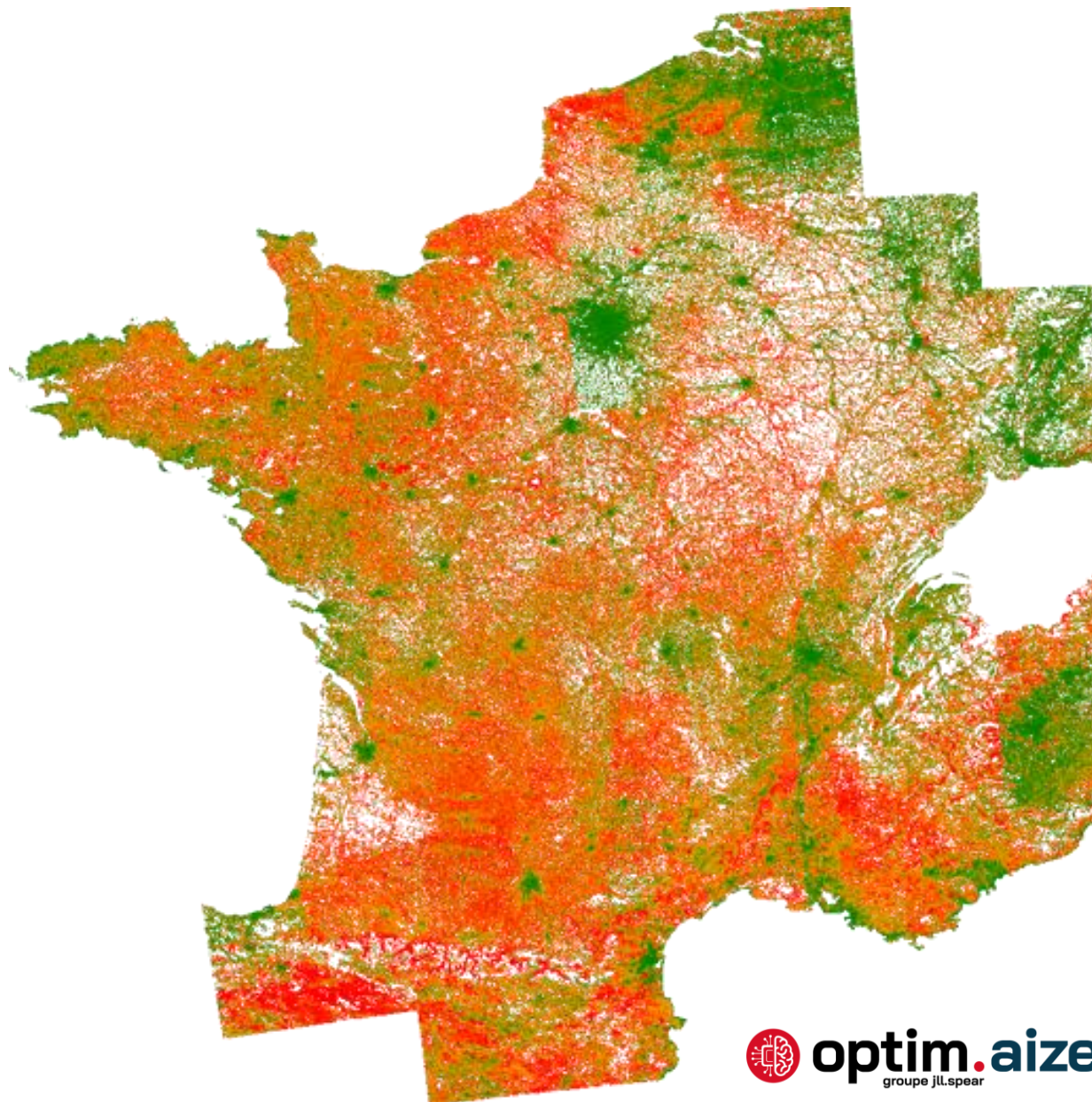
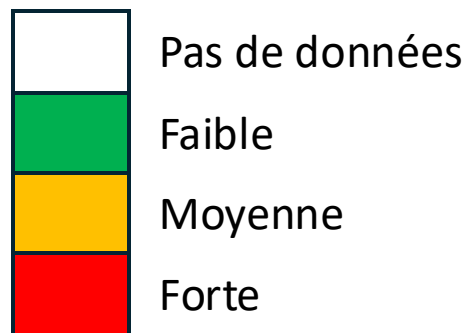


Sinistre RGA

La solution

Variation saisonnière moyenne du sol détectée par InSAR (2015–2021)

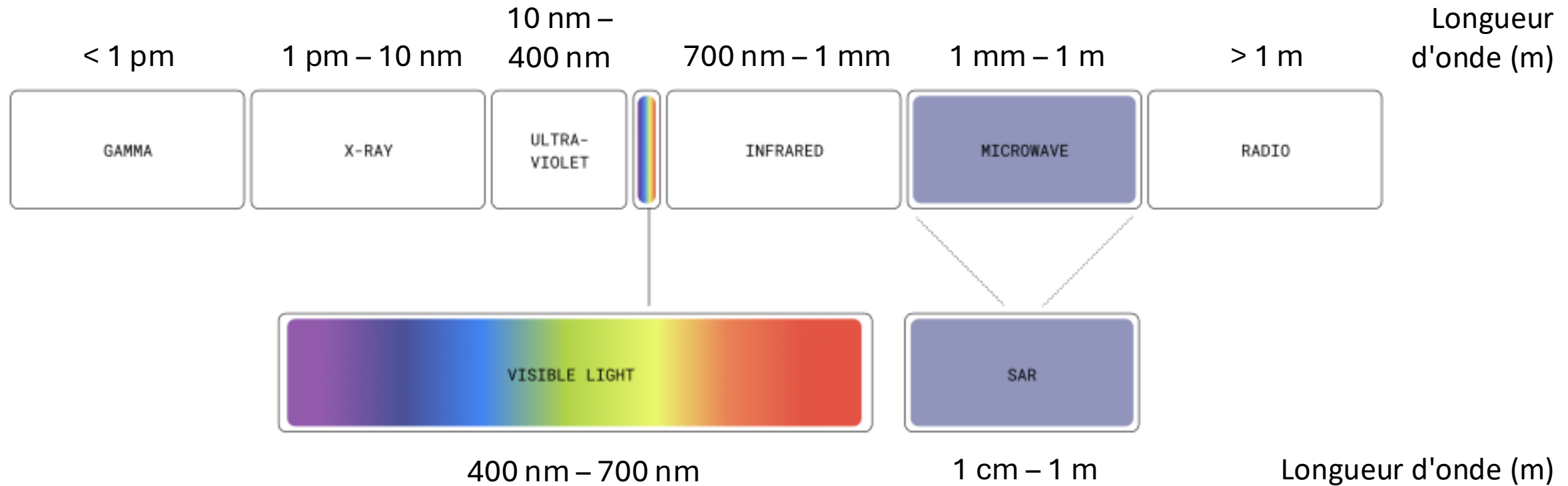
Amplitude



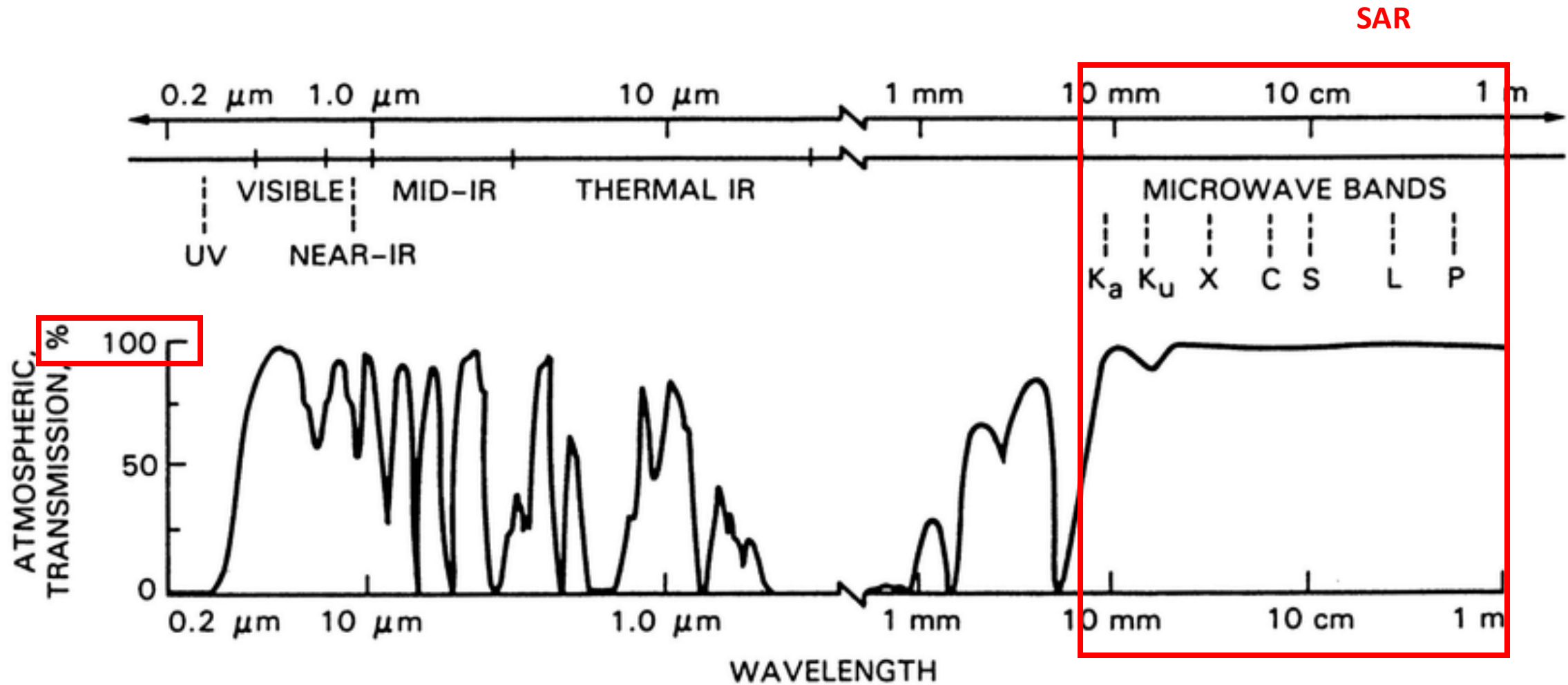
La technologie radar

Le spectre électromagnétique

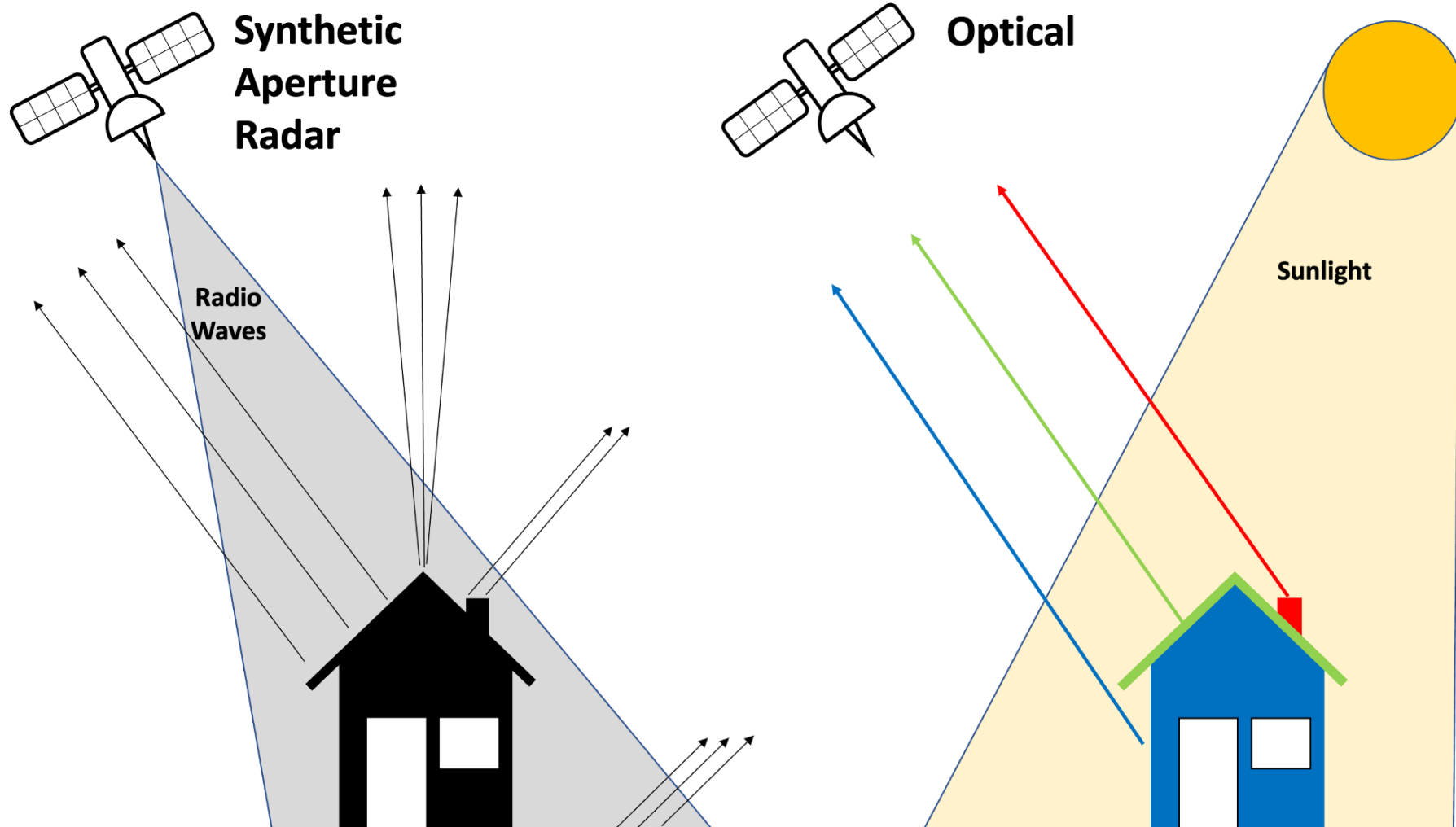
ELECTROMAGNETIC SPECTRUM



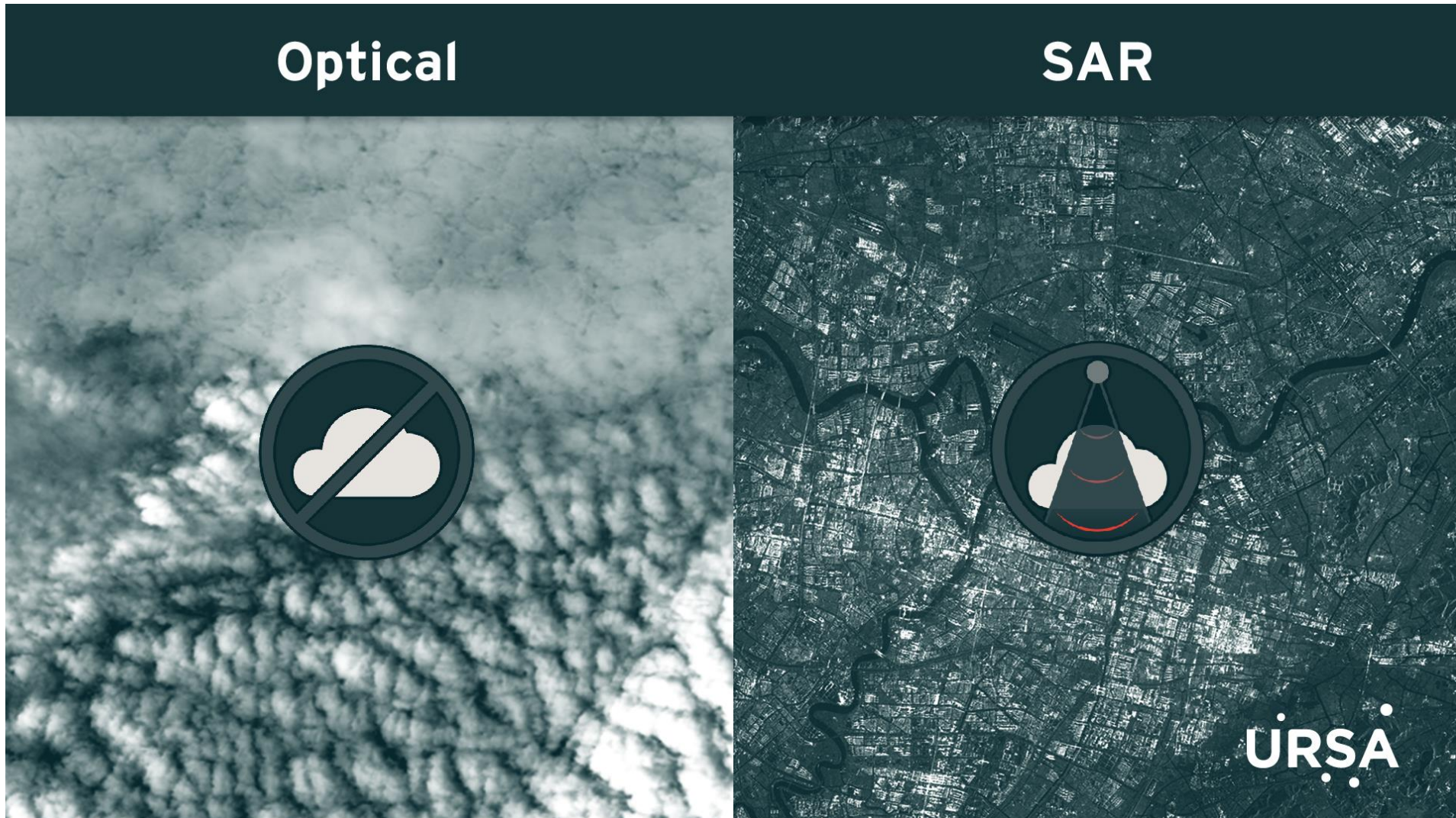
Le spectre électromagnétique



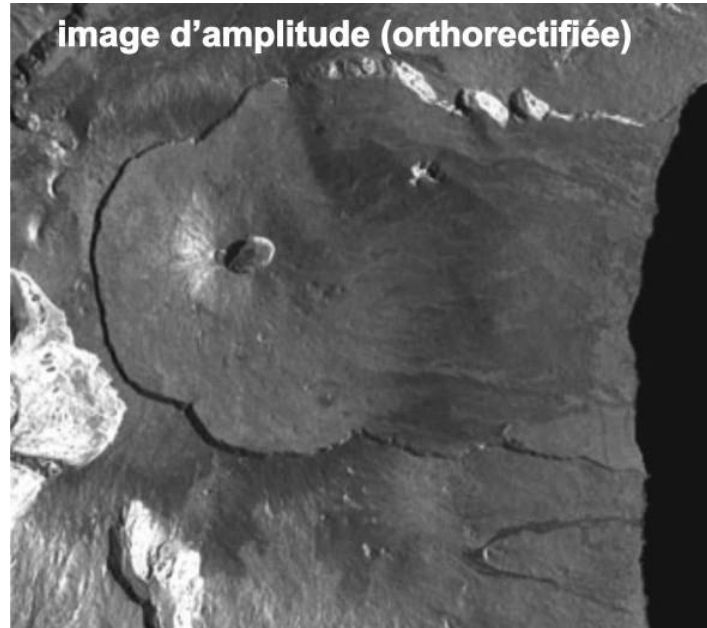
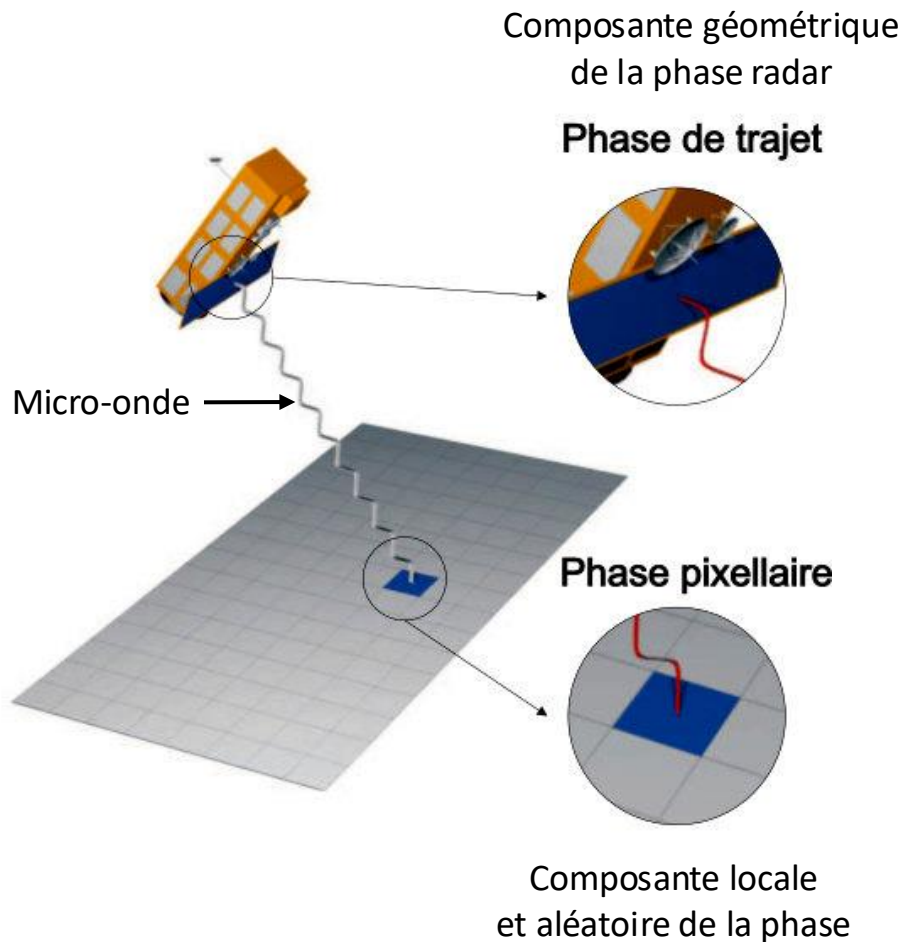
Différences entre satellites optique et radar



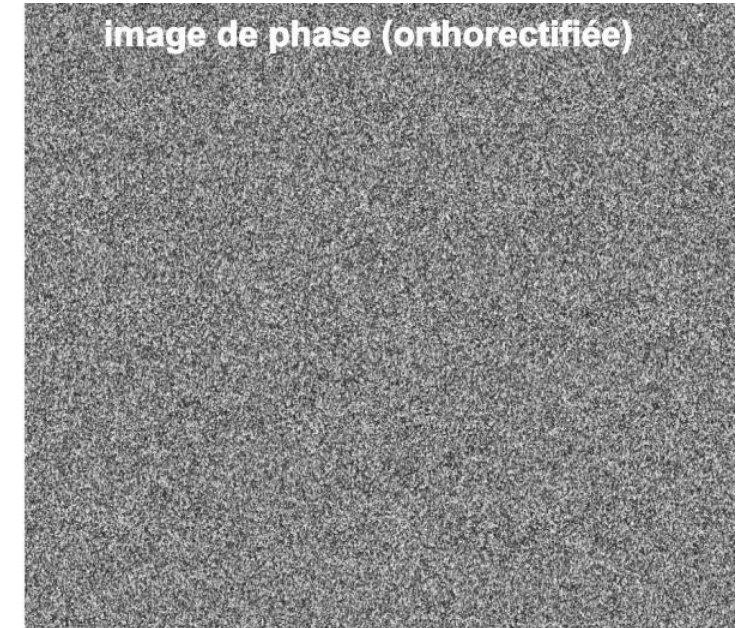
Différence entre satellites optique et radar



SAR : principe d'acquisition et nature des données



Amplitude = intensité rétrodiffusée

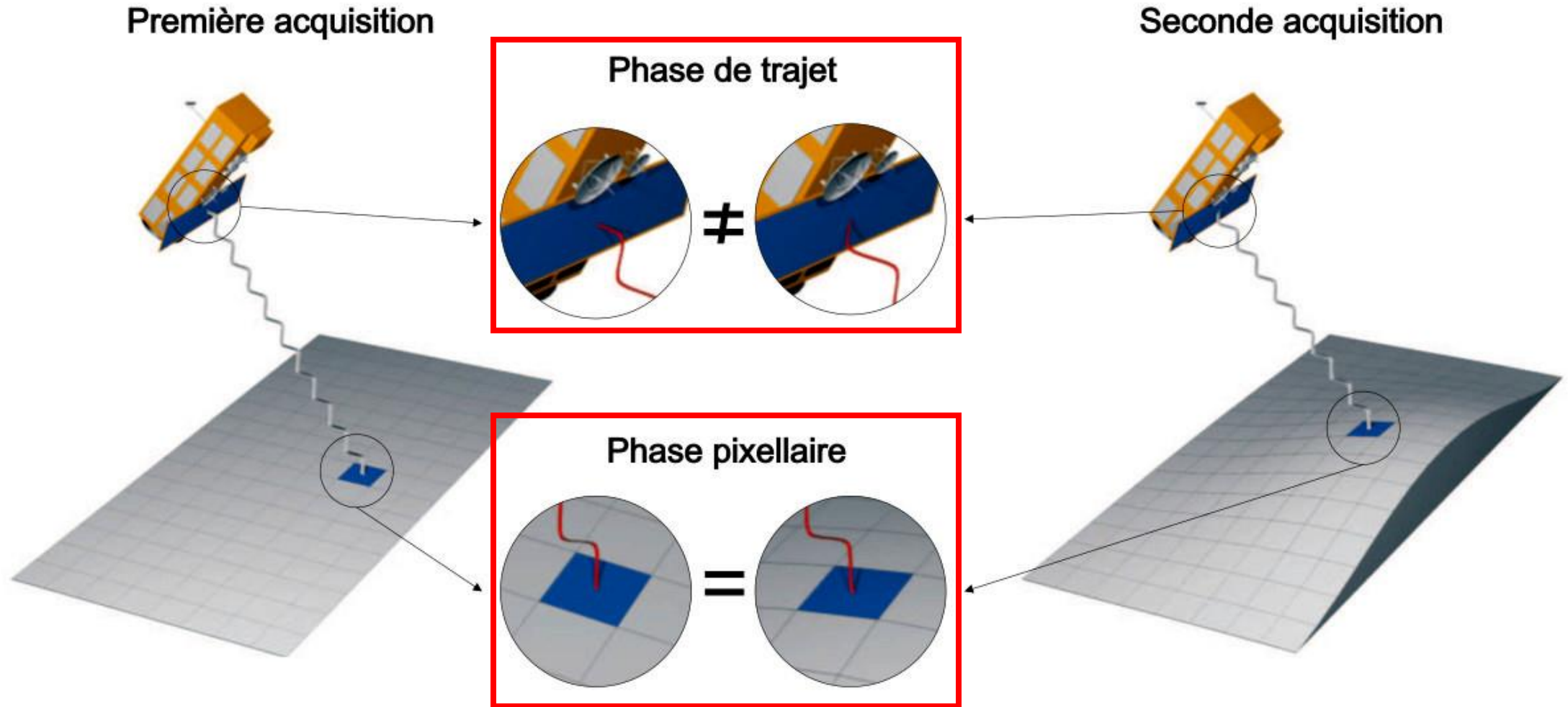


Phase = position de l'onde, utilisée pour la mesure de déplacement (InSAR)

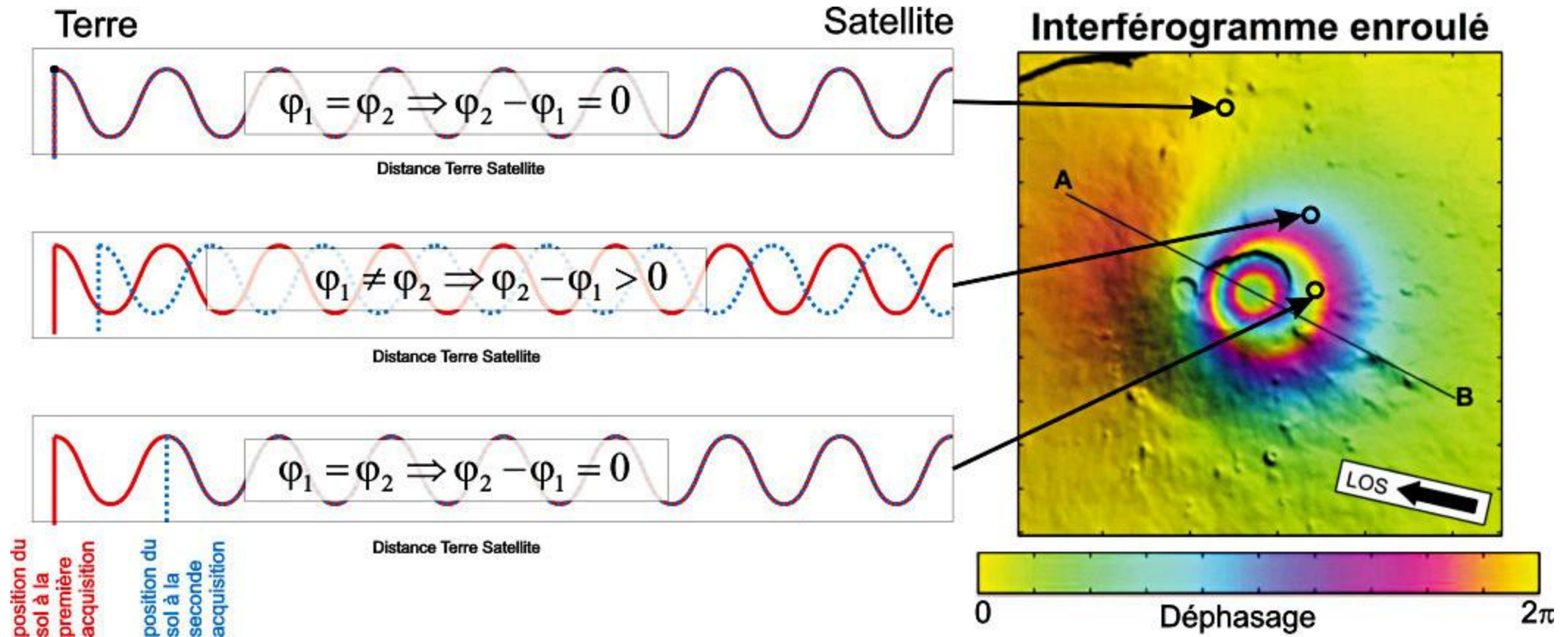
Source : © 2019 A. Augier

<https://planet-terre.ens-lyon.fr/ressource/interferometrie-radar.xml>

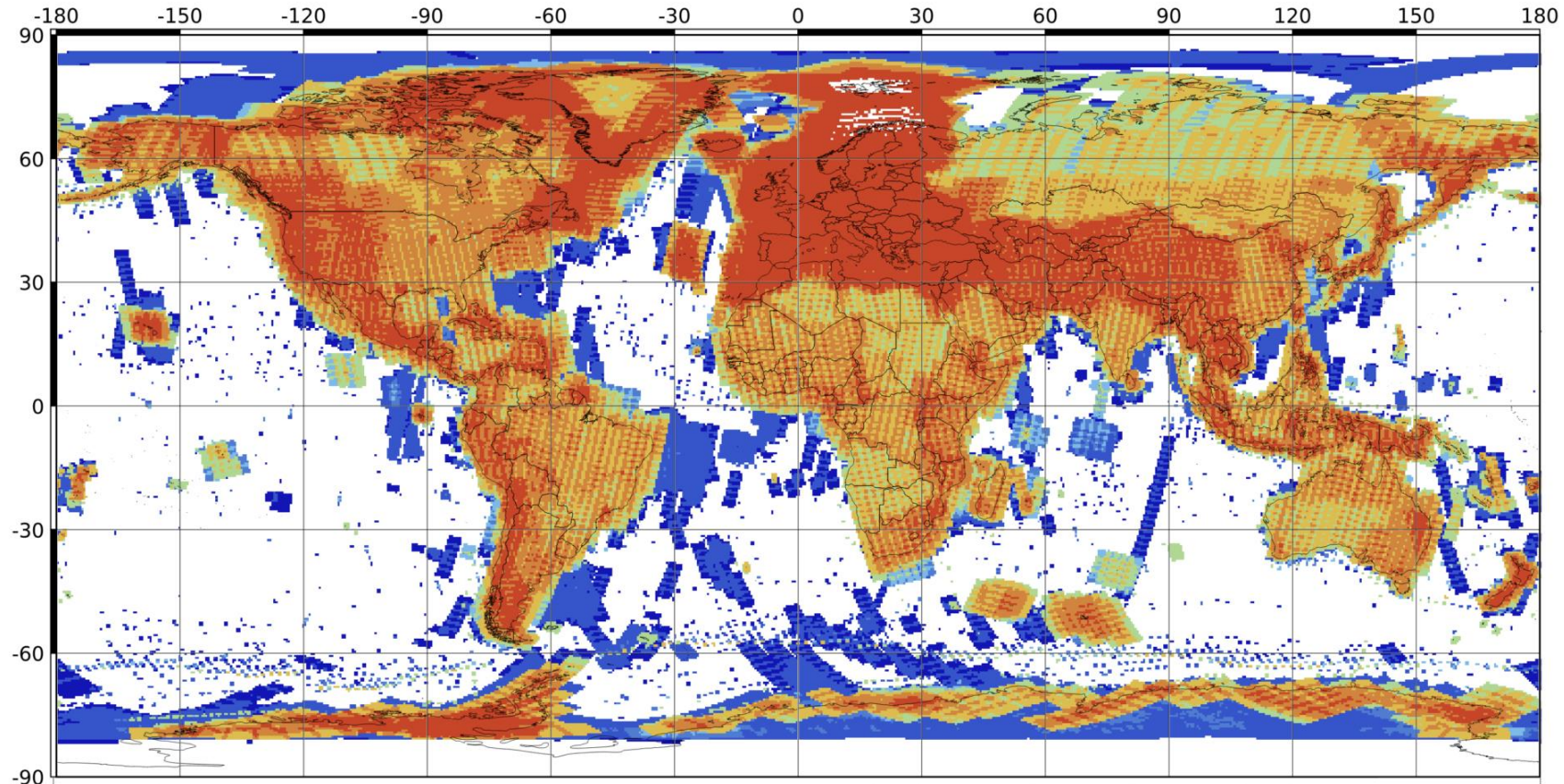
La mesure du mouvement par interférométrie radar (InSAR)



La mesure du mouvement par interférométrie radar (InSAR)



Cartes d'acquisitions cumulées



Sentinel-1 Level 1 SLC Data Coverage

Copernicus Sentinel-1A and Sentinel-1B data,
2014-2025
Current: 31 March 2025

Legend

No. Observations

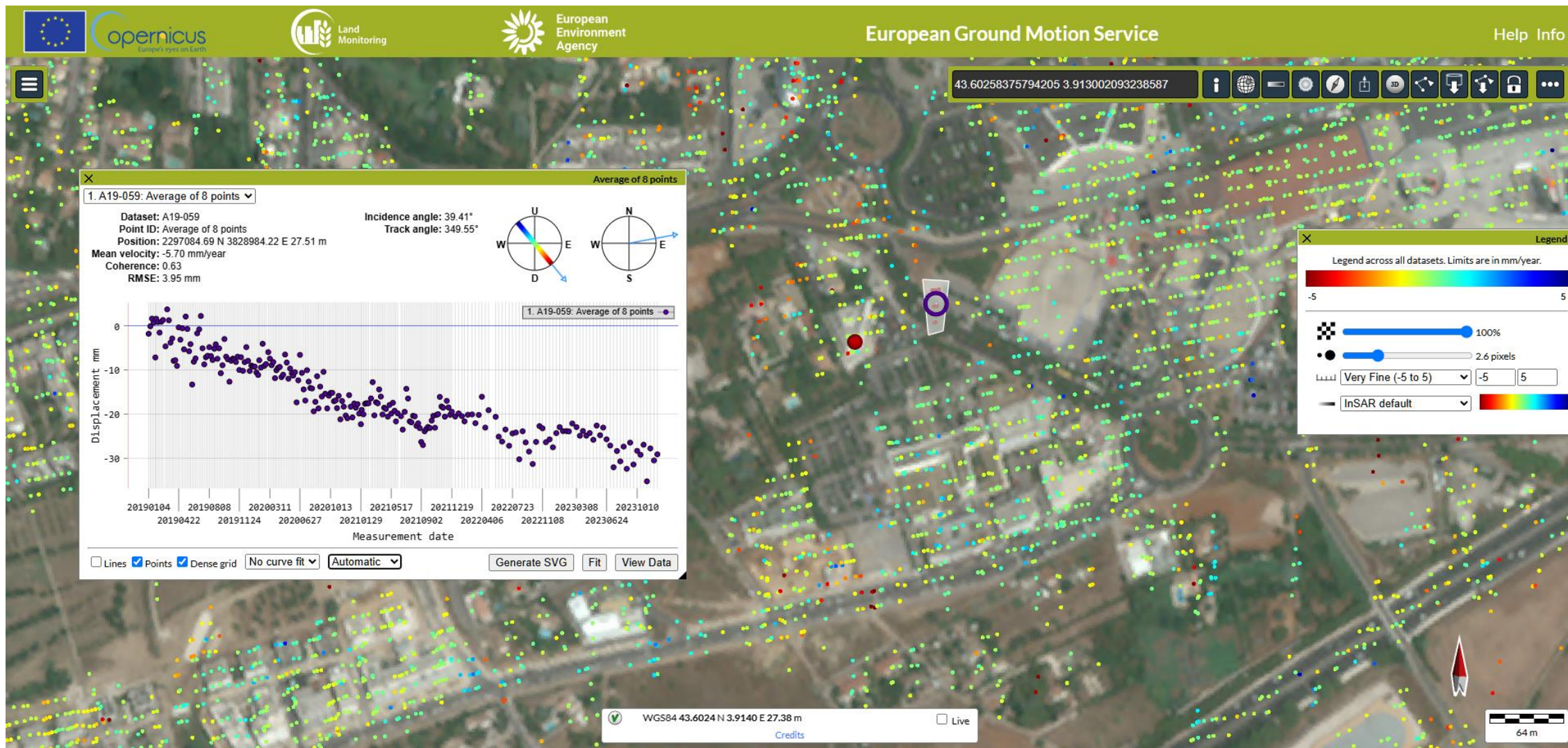
≤ 1
2 - 25
26 - 50
51 - 100
101 - 250
251 - 500
501 - 1000
> 1000



Map shows the total of Sentinel-1 SLC product
global coverage.

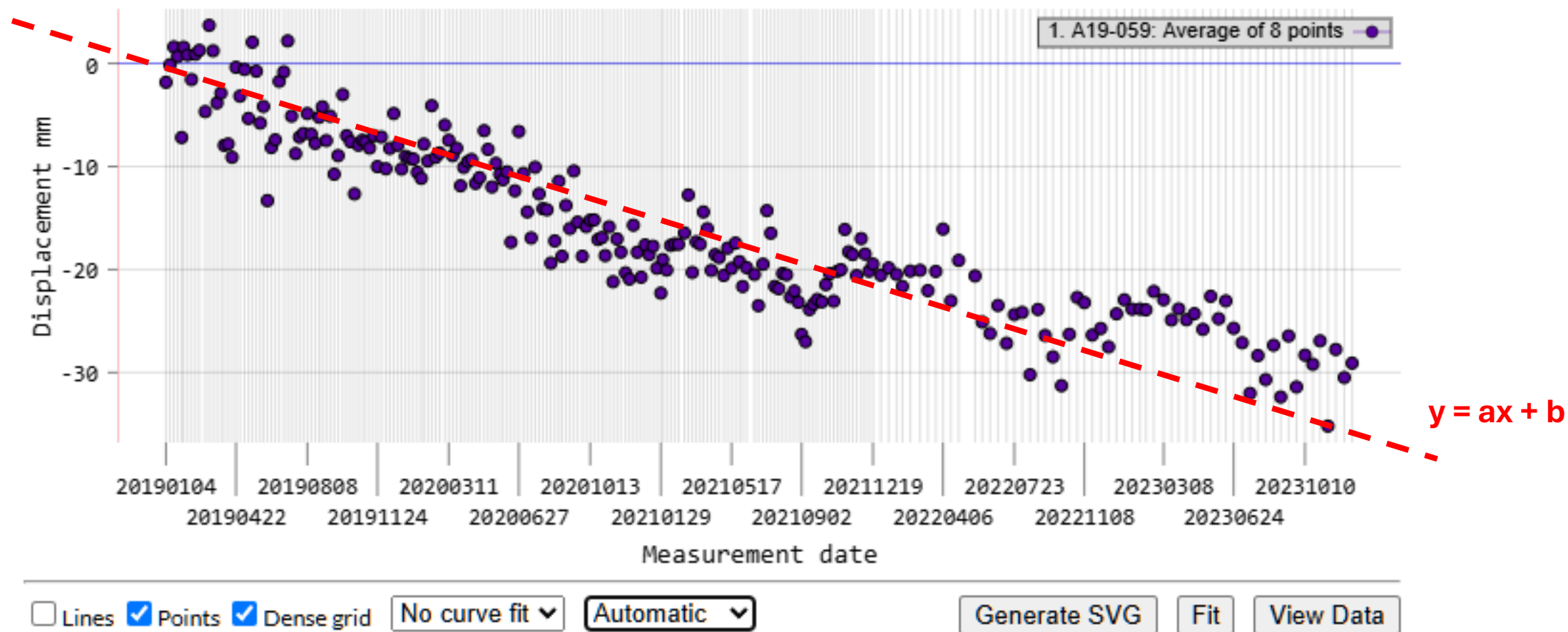
Sentinel-1 data are open access and can be
downloaded using the ASF Data Search portal
[<https://search.asf.alaska.edu>]

Données temporelles



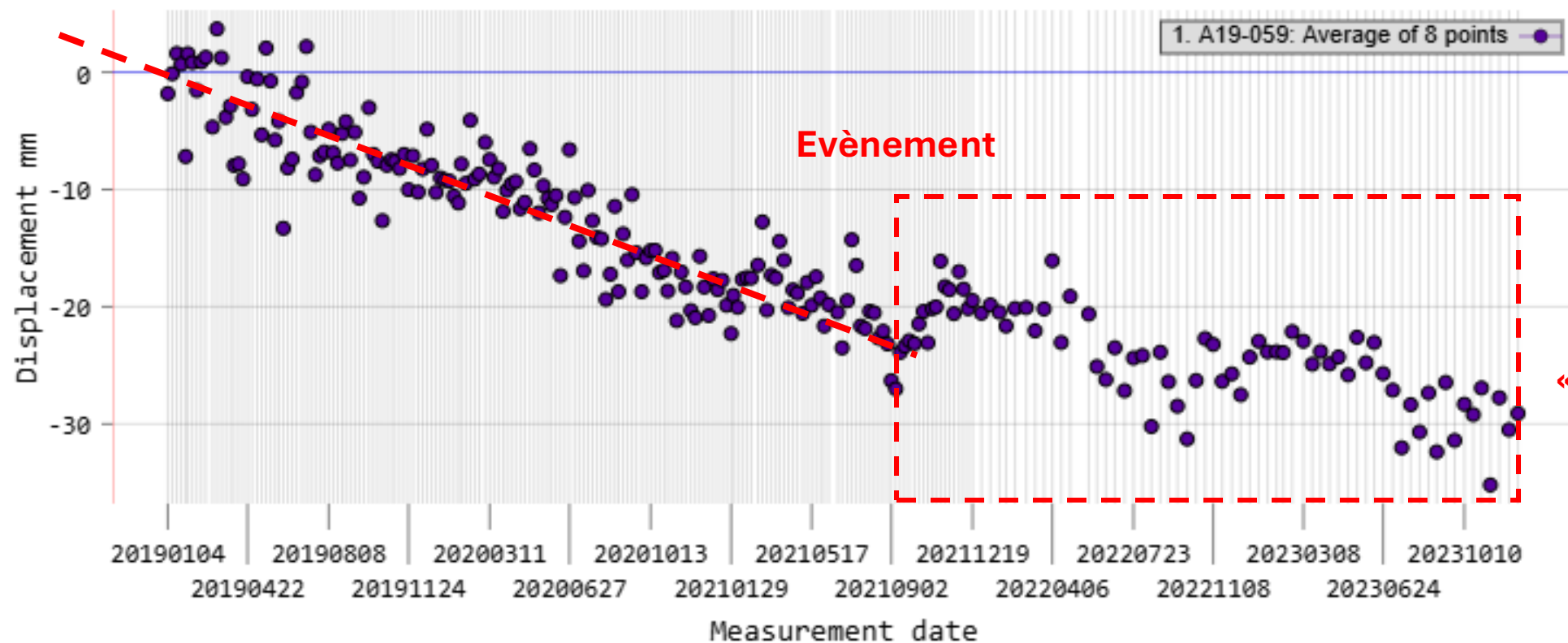
Tendance pluriannuelle

Régression linéaire



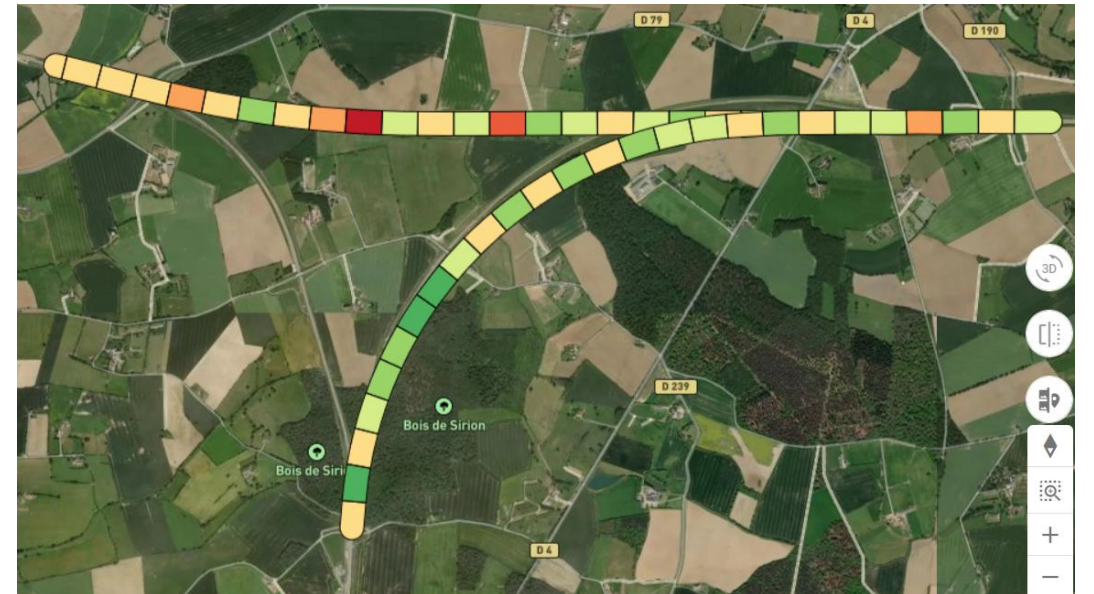
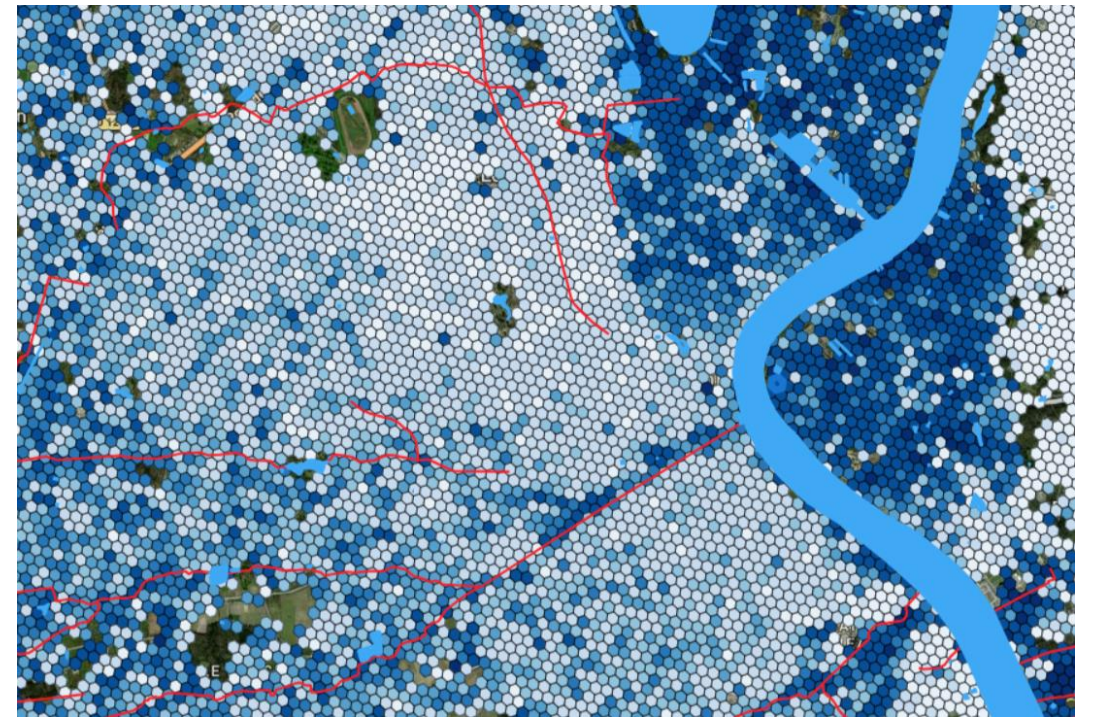
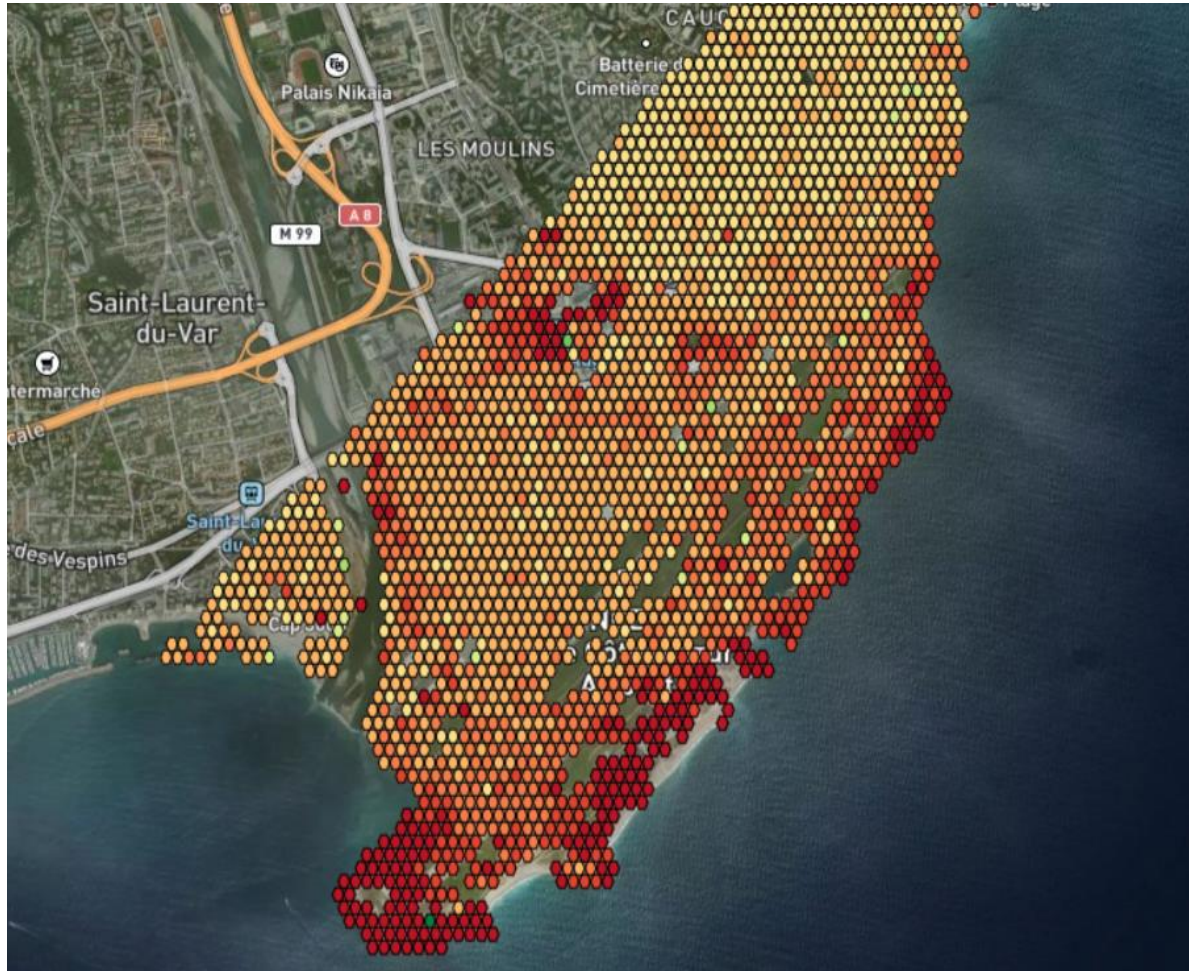
Tendance pluriannuelle

Régression linéaire

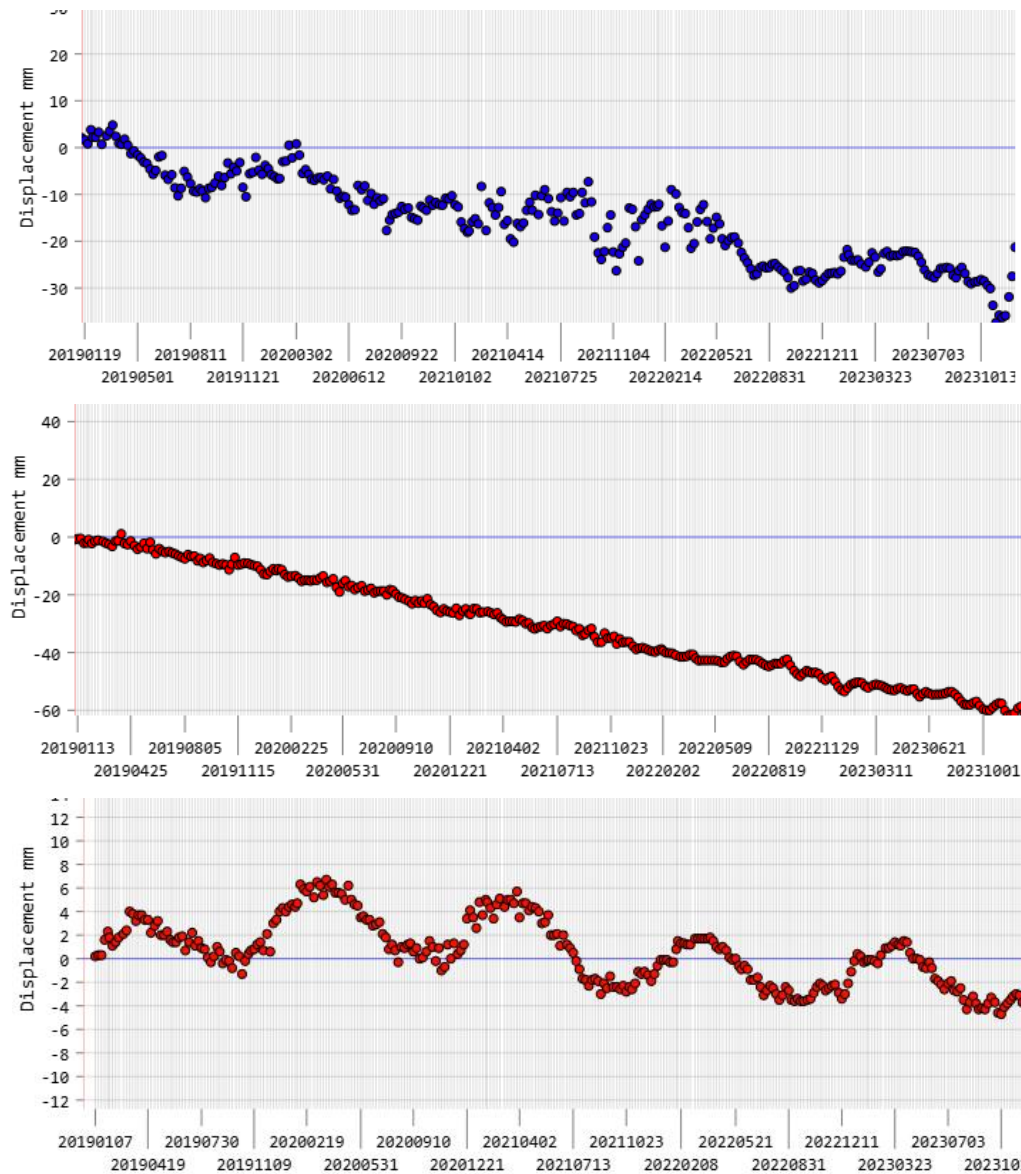


☐ Lines ☒ Points ☒ Dense grid

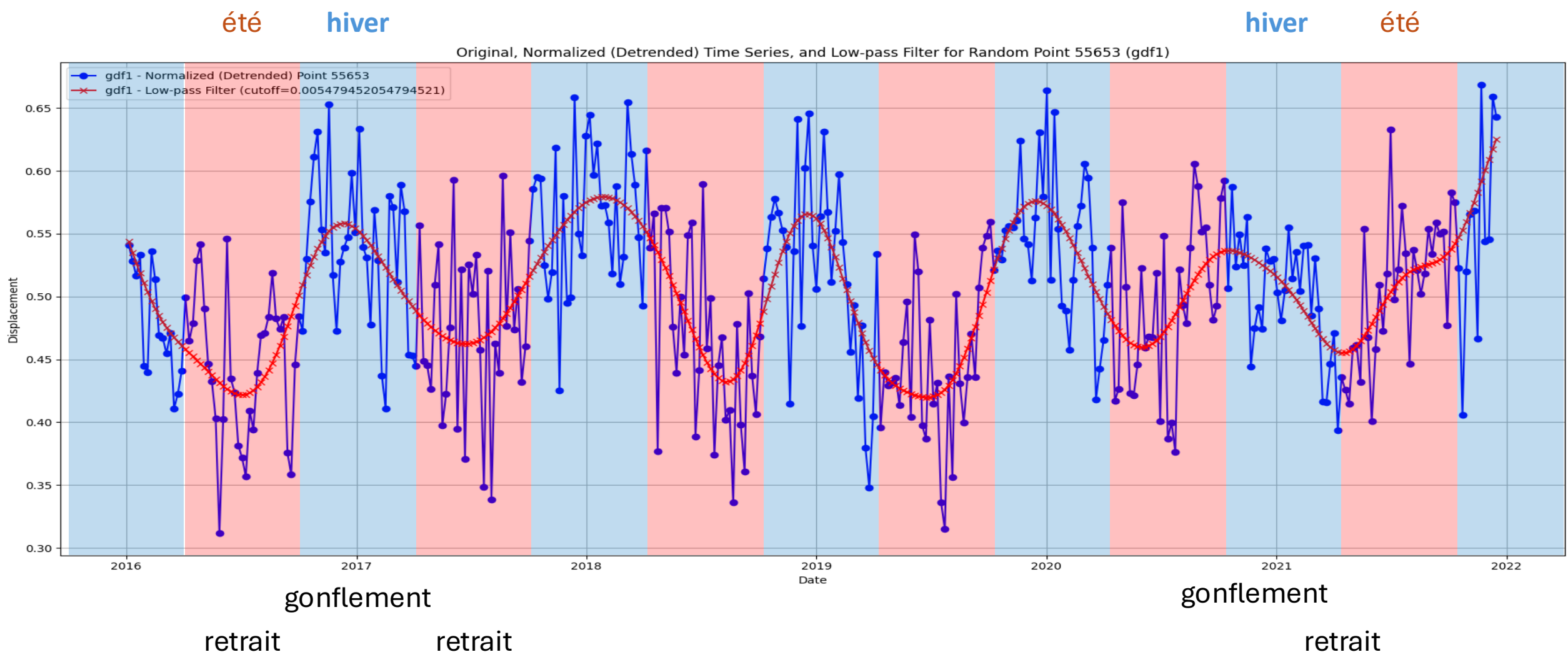
Mouvements pluriannuels



Mouvements saisonniers

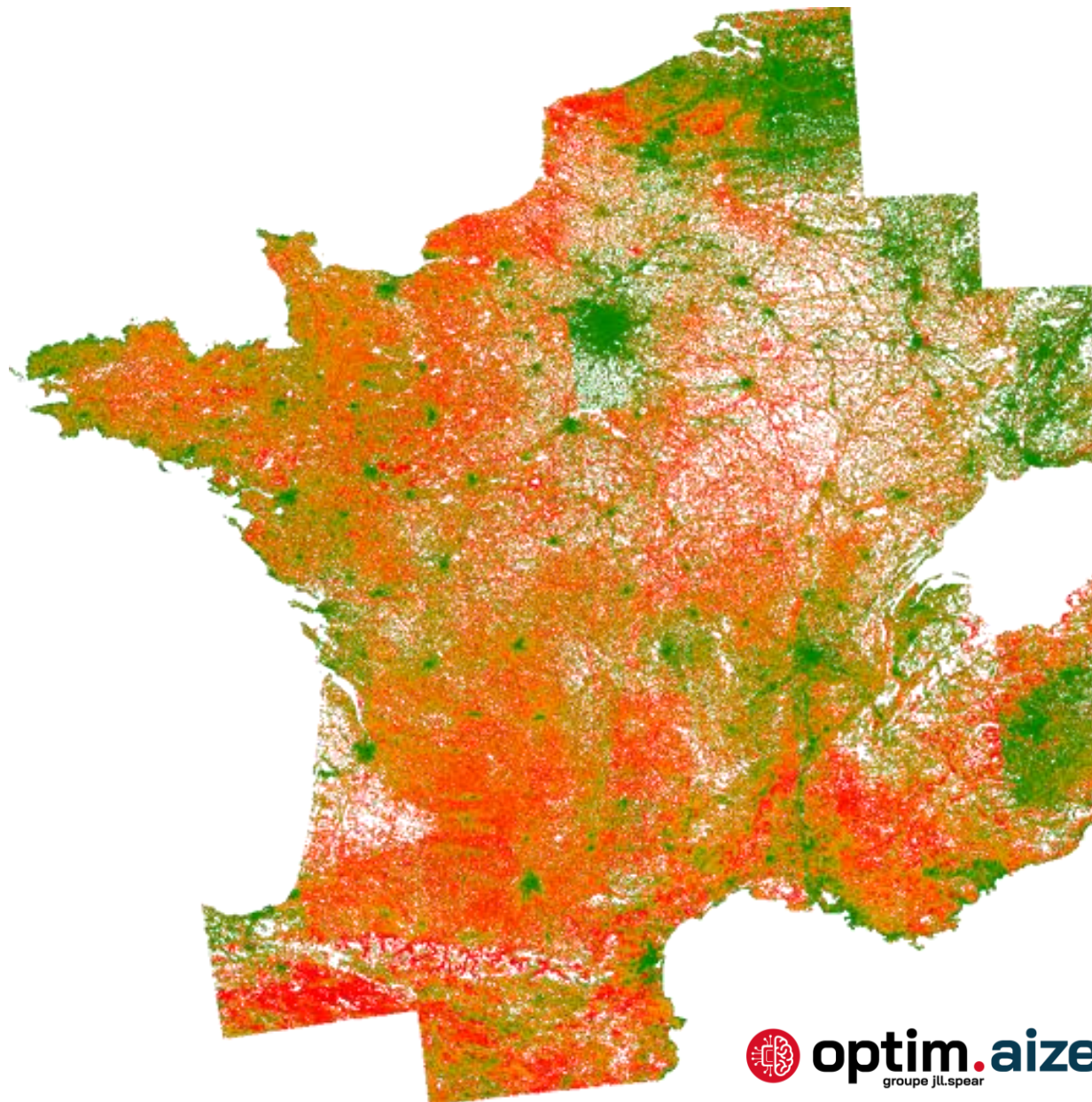
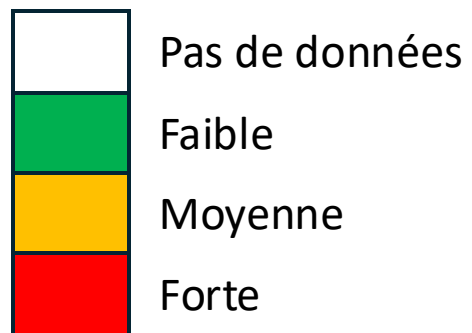


Mouvements saisonniers

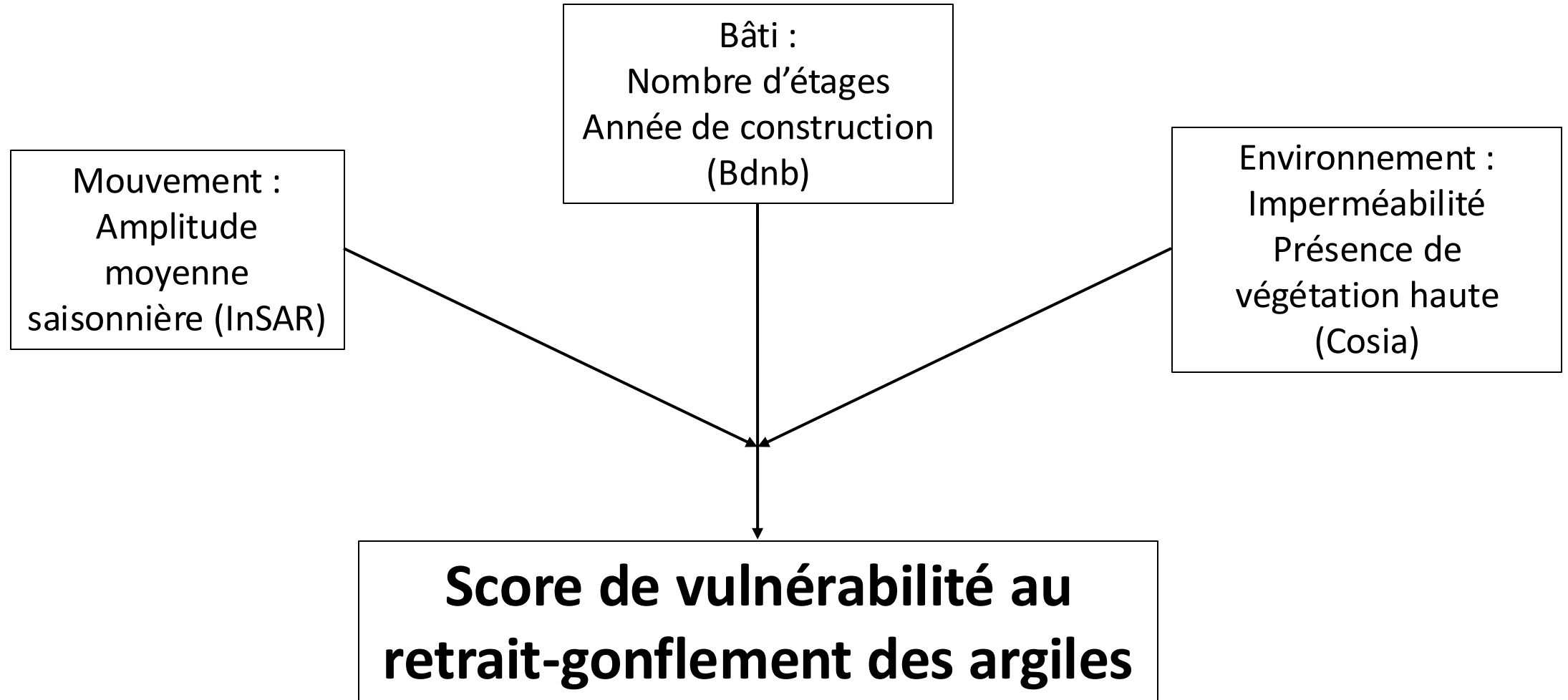


Variation saisonnière moyenne du sol détectée par InSAR (2015–2021)

Amplitude



Démonstration cette après-midi



Saint-Martin-de-Londres

