

Insurance

Data

Science

# Evolution of the Soil Wetness Index in France Analysis with Google Earth Engine

*Insurance Data Science Conference, London, 2023*

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# Economic consequences of drought events in France



## Water shortage & contaminations

**1.5 B€ per year**  
([EauFrance 2018](#))



## Agricultural losses

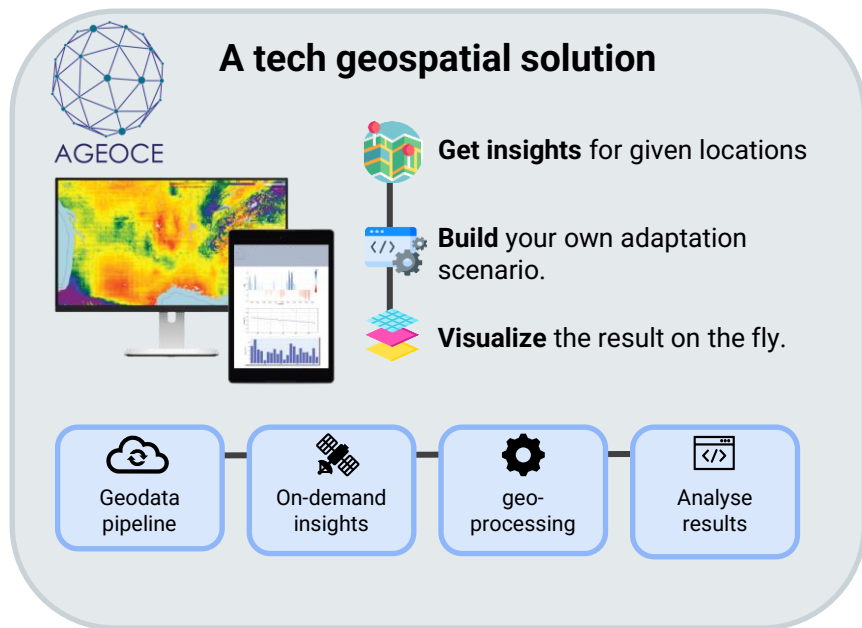
**8 B€ in 20 years**  
([FFA, 2020](#))



## Damages to constructions

**>15 B€ in 40 years**  
([France Assureurs 2022](#))

# A geospatial solution to analyse water stress and exposure to climate risks



## Based on the Google Earth Engine technology

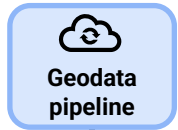
- ✓ **Accessibility:** all geodata accessible from the cloud
- ✓ **Adaptability & flexibility:** dynamic approach and continuous updates.
- ✓ **Intelligence:** Integrated processes with high added Value.



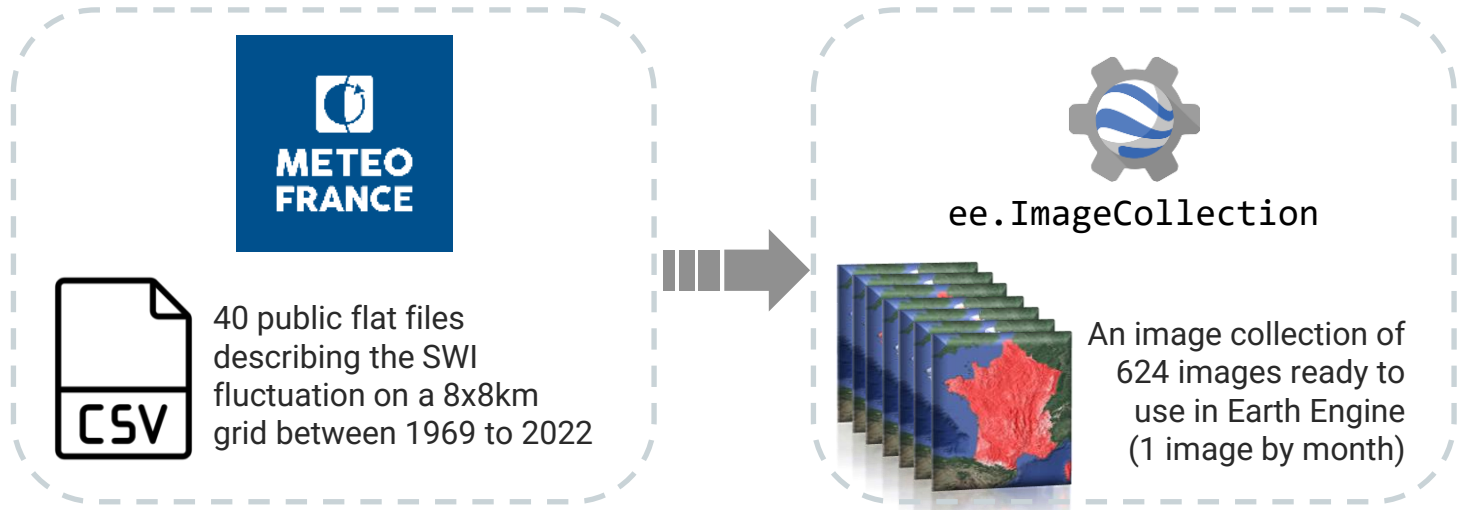
Landsat, Sentinel, MODIS, Terrain and Land Cover, Weather & Climate



# Application: Quantify the exposure to drought severity in France



Migration of SWI (Soil Wetness Index) dataset in the cloud







# Application: Quantify the exposure to drought severity in France



Geodata pipeline



On-demand insights



geo-processing



Analyse results

Get insight on a location given by:

lon, lat = 1.6563, 42.9624

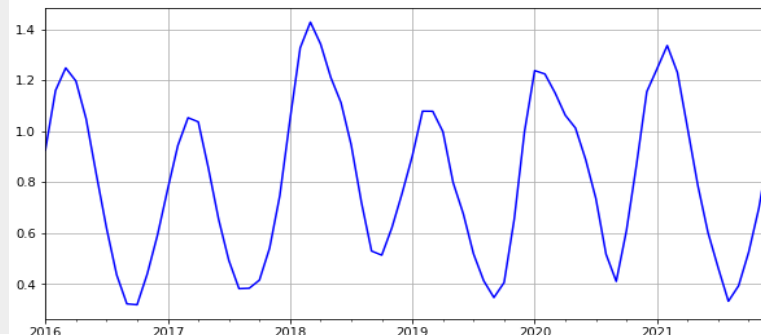
```
import ageoce.geoapi.ee as age
```

```
date_i = "2016-01-01"
```

```
date_f = "2022-01-01"
```

```
id = "METEOFR/SWI"
```

```
ts = age.get_ts_from_coll(  
    id,  
    lon, lat,  
    date_i, date_f)
```





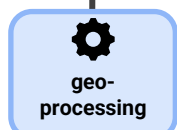
# Application: Quantify the exposure to drought severity in France

Analyse the climatic trend at scale

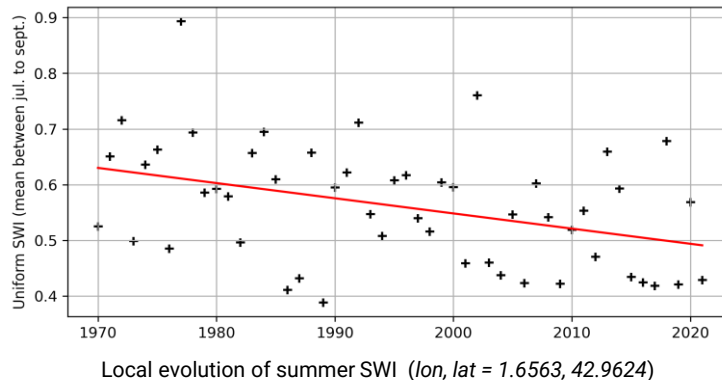
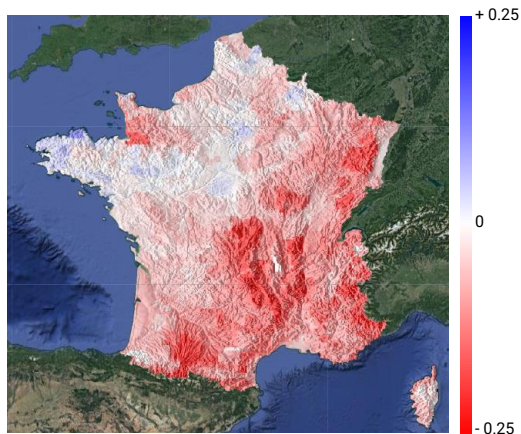
A linear fit reduction is applied to each seasonal collection to get the general trend.

```
trend_img = age.get_coll_trend(id, date_i, date_f)
```

```
trend= age.get_local_trend(id, lon, lat, date_i, date_f)
```

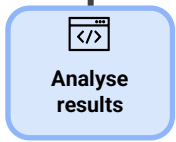
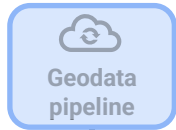


Summer SWI trend between 1970 - 2022



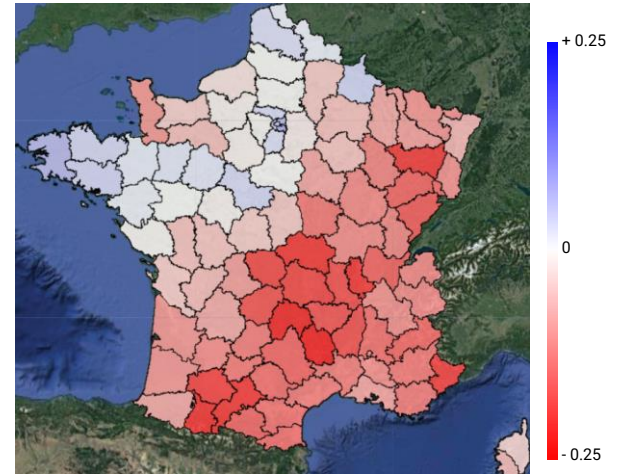
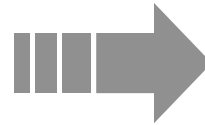
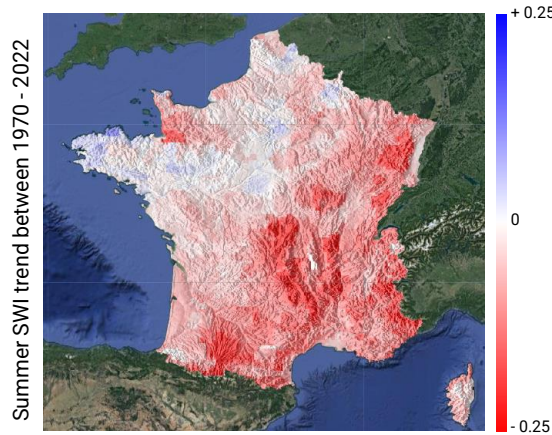


# Application: Quantify the exposure to drought severity in France



## Regional analysis at scale

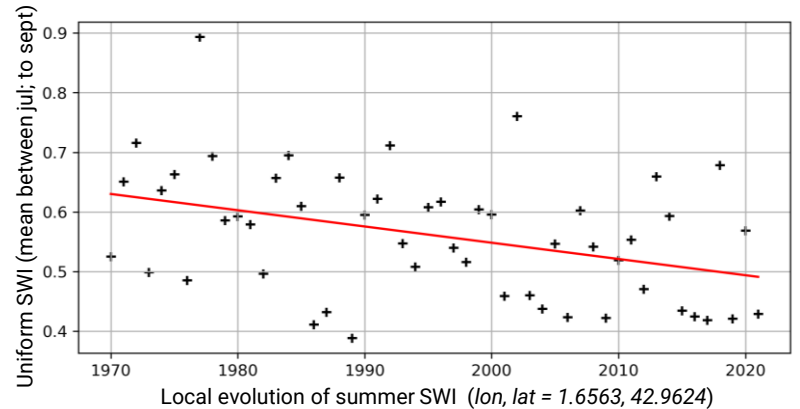
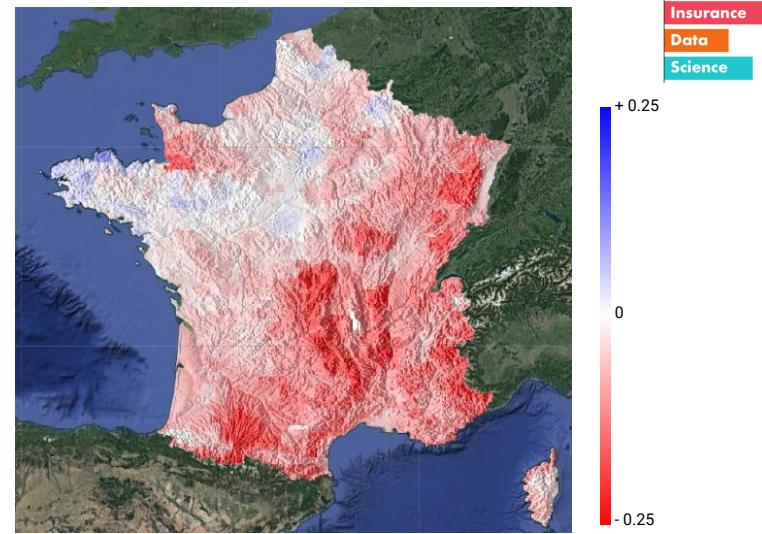
A regional analysis is performed to rank French departments according to their exposure



# Conclusion

- Leveraging the Earth Engine technology and our in-house toolbox for geodata processing and analysis allow us to address Climate Risk Analysis at scale.
- Regarding the SWI trend in France, the regional analysis illustrates:
  - The most exposed areas of the country to soil moisture stresses,
  - The lack of sustainability of the national compensation model,

Summer SWI trend between 1970 - 2022





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