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Air pollution changes over Switzerland due to COVID-19 corrected for meteorological influences

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Research related to COVID-19

- Impact of lockdown on air pollution in Switzerland and across Europe focusing on classical air pollutants NO_x , PM, O_3

Measurements:

- In situ data from Swiss & European air quality monitoring networks
- TROPOMI NO_2 satellite observations

Methods:

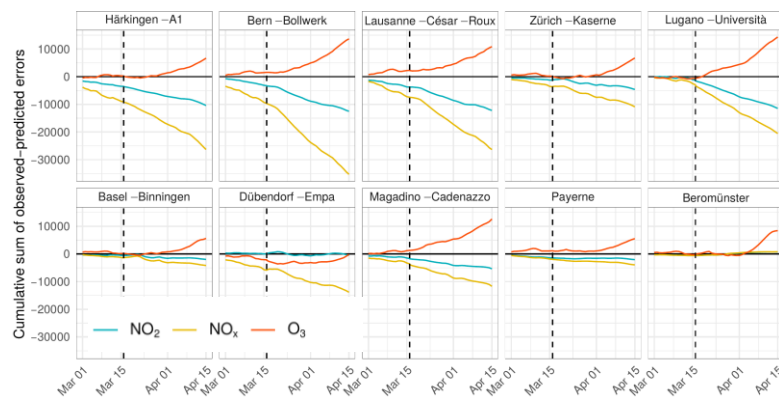
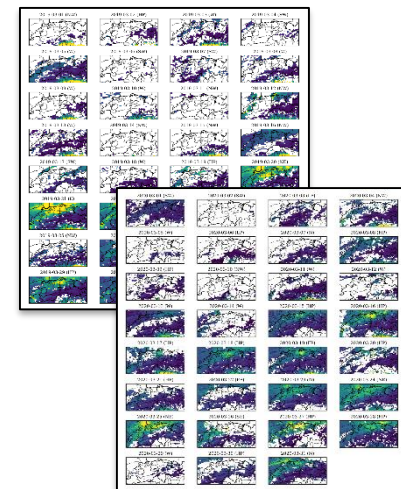
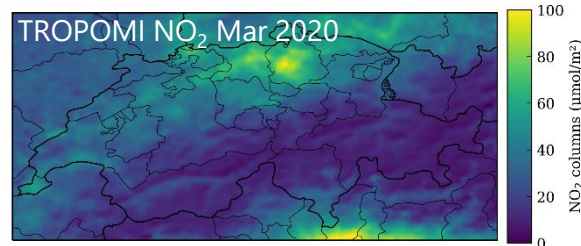
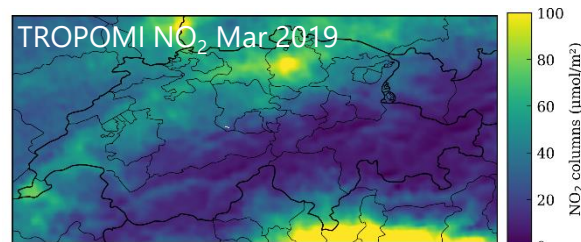
- Separate effects due to COVID-19/emissions from effects due to meteorology
 - Filtering satellite data for specific weather situations
 - Machine learning: train model with past data, predict current situation, analyze differences prediction – observations
- Mapping of satellite and in situ NO_2 data onto hourly 100 m x 100 m resolution maps using ML, spatial proxies and meteorological data

https://empa-interim.github.io/empa.interim/swiss_air_quality_and_covid_19.html

Grange et al., 2018 (<https://doi.org/10.5194/acp-18-6223-2018>)

Expected results and applications

- Temporal and spatial evolution of air pollution in relation to lockdown measures
- Rigorous correction for meteorological effects
- Assessing impact on air pollution exposure
- Assessing impact on CO₂ emissions
- Real-world «lab experiment» for atmospheric chemistry



Earth observations used and needed

Used:

- NO₂ vertical columns from TROPOMI

Not used:

- Other air pollutants such as CO, SO₂, AOD/PM

Needed:

- Better aerosol observations (multiangle, polarimetric)
- Better tropospheric O₃ observations
- Better spectral surface reflectance/BRDF data
- Spatial resolution!