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Presence of phytosanitary products from industrial origin in the Rhône upstream from Lake Geneva : observation and results of a reduction strategy

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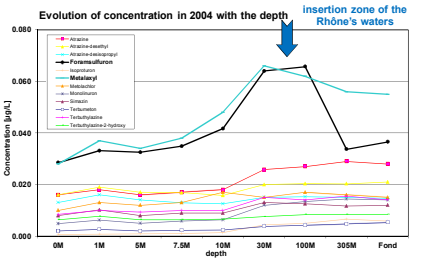
Monitoring of pesticides in lake Geneva

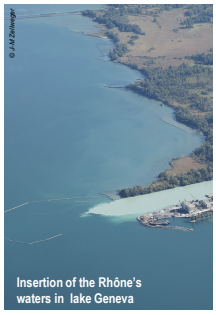
Situation before 2004
- Monitoring ~15 pesticides / 4 detected

From 2004
- New technology (LC-MS/MS)
- Simultaneous analysis of 250+ pesticides / 30 substances detected
- Faster, more sensitive and safer!
- **Peak of foramsulfuron (herbicide) and metalaxyl (fungicide)** concentration detected in the lake in 2006, between 30 and 100 m deep, **corresponding to the insertion zone of the Rhône's waters** upstream from the lake

2015
- 400 pesticides et 58 pharmaceutical products investigated
- CIPEL monitoring 273 pesticides + 63 Pharma. products

0.01 µg/L = ~1 tonne of active ingredient foramsulfuron / metalaxyl = **6 tonnes in lake !**





Industries and monitoring of pesticides in the Rhône and lake Geneva

Location of the main chemical industries in Valais

Location of the station Porte du Scex station on the Rhône

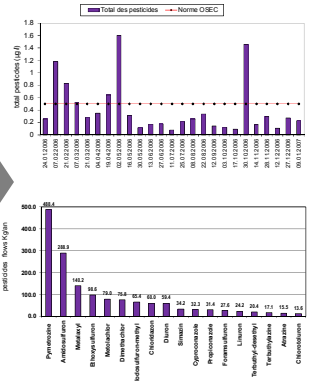
Origin of micropollutants

Industries (Syngenta, Lonza, Siegfried)
- Producers of plant protection products and medicines

Others
- Viticulture, arboriculture, market gardening
- Communication routes and cities
- Private use: Gardening, sports fields

Causes of micropollutant losses in industry
- Washing at the end of the production campaign
- Failed operations
- Errors in handling
- Staff turnover
- Cleaning of chemical water pits and pipes

Concentrations and flows in the Rhône in 2006



Procedures, guidelines and measures adopted

2006 Creation of a "VS Micropollutant Strategy" Group : Industry and Environmental Service (SEN)

Objectives :
- Proactive and not reactive response to the problem of micropollutants
- Definition of priority substances
- Examination of technical measures to limit releases in a preventive manner (state of the art / benchmarking)
- Monitoring of industry actions
- Development of criteria for setting release thresholds for micropollutants

Results
- The most effective measures are taken at the production level and not at the "end of pipe".
- Solution to be found for the specificities of each synthesis
- Consensus of the Industry Working Group - SEN, for a 200 g/d standard for syntheses
- Allows to guarantee concentrations ≤ 0.1 µg/L, even on the upstream part of the Rhône at low water level
- **Guideline published on June 24, 2008**
- Threshold to be reached by the end of 2010 (2012 for API)

Reduction strategy by industry
- Process control, characterization of the different types of wastewater
- Organizational measures: staff training
- Technical measures at source : vacuum cleaners, cleaning room with water recovery, lock the outlet to the sewer, activated carbon filters at the exit of the building
- Close analytical follow-up (weekly or even daily)
- Possible end of pipe treatment (Siegfried end 2017) active carbon filter

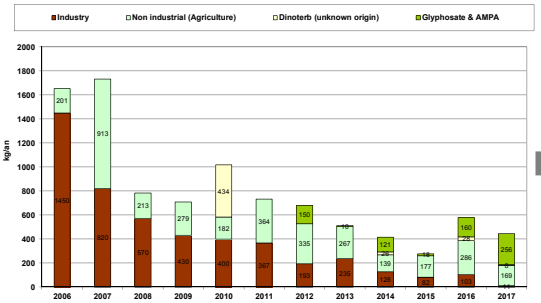
Monitoring of the water quality in the Rhône and lake Geneva

Monitoring in the Rhône waters in 2017 :
- 117 phytosanitary products (PPS),
- 30 active pharmaceutical ingredients,
- 2 anti-corrosion agents
- 1 solvent (1,4-dioxane)

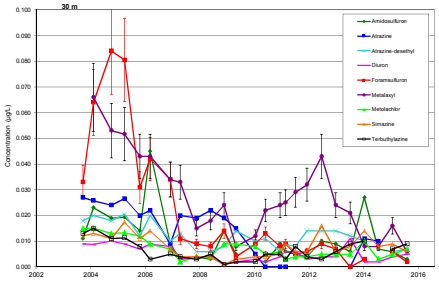
- In 2017, no pesticide exceeded the requirements of the Waters Protection Ordinance (0.1 µg/L).
- At the same time, self-checking values are provided by the industry

- Out of 117 substances sought, the loads of PPS from the industry transiting through the Rhône have been greatly reduced from 1450 kg in 2006 to less than 50 kg in 2017 with the effect of reducing the sum of PPS concentrations in the Lake Geneva

Total loads of phytosanitary products (kg / year) in Rhône river



Evolution of pesticide concentration at 30 m in lake Geneva



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[2] BERNARD M., FAUQUET L., MANGE P. et ROSSIER J., (2018) : Micropolluants dans les eaux du Rhône. Rapp. Comm. Int. Prot. Eaux Léman contre pollut., Campagne 2017, 127-132.

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