



FOCUS surface water scenarios: updates on the repair action

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9th European Modelling Workshop
Copenhagen, 9-11 October 2018

BACKGROUND

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- Within the authorisation procedure of PPPs in the EU, exposure concentrations in edge-of field surface waters are obtained using **FOCUS surface water models** which predict environmental concentrations (PEC) of pesticides in water and sediment
 - **1997-2001**: FOCUS surface water scenarios developed
 - **2003**: release FOCUS models (SWASH with FOCUS drift calculator, PRZM-sw, MACRO-sw, TOXSWA)
 - **FOCUS Version Control**

MAJOR FLAWS OF FOCUS SW SCENARIOS (2001)

FOCUS concept questioned in the years

- Selection of application window often subjective, may influence the credibility of the PEC
- Time intervals of 12 and 16 months for calculating PEC too short to cover the full range of (temporal) PEC variability
- For some combinations of application/runoff scenarios, no runoff events might occur
- ...

The current **FOCUS SW** scenarios do not always produce a reliable definition of a “realistic worst case” necessitating their “**repair**”

CURRENT MANDATE

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- The “repair action” is limited to specific elements aiming at a **short-term repair**
 - EFSA accepted the mandate request and terms of reference for the “**repair**” of the **FOCUS surface water scenarios** on the 1st February 2017
 - Working group was set

WORKING GROUP MEMBERS

■ Experts:

- Paulien Adriaanse (Wageningen Environmental Research)
- Arnaud Boivin (ANSES)
- Nick Jarvis (Swedish University of Agricultural Sciences)
- Michael Klein (Fraunhofer Institute for Molecular Biology and Applied Ecology)
- Michael Stemmer (AGES)

■ Hearing experts:

- Stefan Reichenberger (Dr. Knoell Consult GmbH)
- Gerald Reinken (Bayer AG)
- Fredrik Stenemo (Sweco Environment AB)

■ EFSA staff:

- Mark Egsmose
- Gabriella Fait

TIMEFRAME

- draft scientific report ready
- 24th September 2018: open consultation launched
<https://www.efsa.europa.eu/en/consultations/call/180924>
- **5th November 2018:** deadline for submitting written comments
- **July 2019:** “repair action” of the FOCUS surface water scenarios to be finished



AIMS OF THE “REPAIR ACTION”

1. Introduction of **20-year assessment** period
2. Review **PAT** (pesticide application timing calculator)
3. Addition of **substance parameter selection guidance** when correlated with soil properties
4. Review of the process of **foliar wash-off**, equations and coefficients
5. Consideration of **rotational crops** over the 20-year assessment period
6. Ensuring **processing time** for the 20-year period are **not excessive** and **results** are **easily (re-)produced**
7. Consideration of **how the results are used in the risk assessment**

1. 20-YEAR ASSESSMENT PERIOD

Replacing the current 12-16 month assessment period for both drainflow and runoff

Issues considered:

- a. Weather data
- b. Warming up period
- c. Irrigation
- d. Crop interception
- e. Reassessment of the drift percentile approach

1. 20-YEAR ASSESSMENT PERIOD

a) Weather data

Runoff: 20-year MARS50 weather data already implemented in FOCUS (2001), still appropriate without changes

Drainage: close to the original MARS50 weather (FOCUS, 2001), however for scenarios D1 and D6 data from the new MARS25 used

Scenario	Selected weather dataset	Time period available (MARS50)	Time period added (MARS25)	Additional processing
D1	Lanna (S)	1980 - 1993	1995 - 2000 ^(a)	Precipitation from 1980 to 1993 (MARS50) scaled by a factor of 1.077
D2	Brimstone (UK)	1975 - 1994	None	None
D3	Vredepeel (NL)	1975 - 1994	None	None
D4	Skousbo (DK)	1975 - 1994	None	None
D5	La Jaillière (F)	1975 - 1994	None	None
D6	Thiva (GR)	1977 - 1994	1995 - 1996	None
R1	Weiherbach (D)	1975 - 1994	None	None
R2	Porto (P)	1975 - 1994	None	None
R3	Bologna (I)	1975 - 1994	None	None
R4	Roujan (F)	1975 - 1994	None	None

1. 20-YEAR ASSESSMENT PERIOD

b) Warming up period

- Relevant for PEC_{sed} , not for the water layer
- **Run-off:** 6 'average' years (no extreme runoff events, no extremely dry, selection based on n° of runoff and eroded soil events occurring from March to September)
- **Drainage:** 6 years with the total annual precipitation closest to the median value of the 20 year
- For each scenario **6 years warming-up period added in front of the 20 years** assessment period

1. 20-YEAR ASSESSMENT PERIOD

c) Irrigation

■ Current approach:

- irrigation added to the weather files as rainfall, calculated externally with ISAREG

■ New approach:

- use internal irrigation routines of PRZM and adapt MACRO
- selected PRZM option: sprinkler irrigation over the crop canopy for annual crops and under the crop canopy for permanent crops, without surface runoff
- sensitivity analyses showed that revised options prevent generation of surface runoff during irrigation
- calibration exercise showed cumulative irrigation amounts similar to FOCUS (2001)

1. 20-YEAR ASSESSMENT PERIOD

d) Crop interception

■ Current approach:

- internally calculated by MACRO and PRZM on basis of crop development subroutines, different in both models, and then different crop interceptions

■ New approach:

- to not allow MACRO and PRZM to internally calculate crop interception
- apply predefined default crop interception values based on BBCH code as in EFSA (2014) (ground water scenarios and surface water Step 2 (for olives only))

1. 20-YEAR ASSESSMENT PERIOD

e) Reassessment of the drift percentile approach

■ Current approach:

- cumulative drift probability of 90th percentile to determine the PEC_{max}

■ New approach:

- spray drift deposition events considered as separate events
- perform simulations for multiple applications calculating PEC_{max} at each application using 90th percentile spray drift deposition for each individual application
- 90th percentile deposition evaluated at each application, not only at the first application

2. REVIEW THE PAT

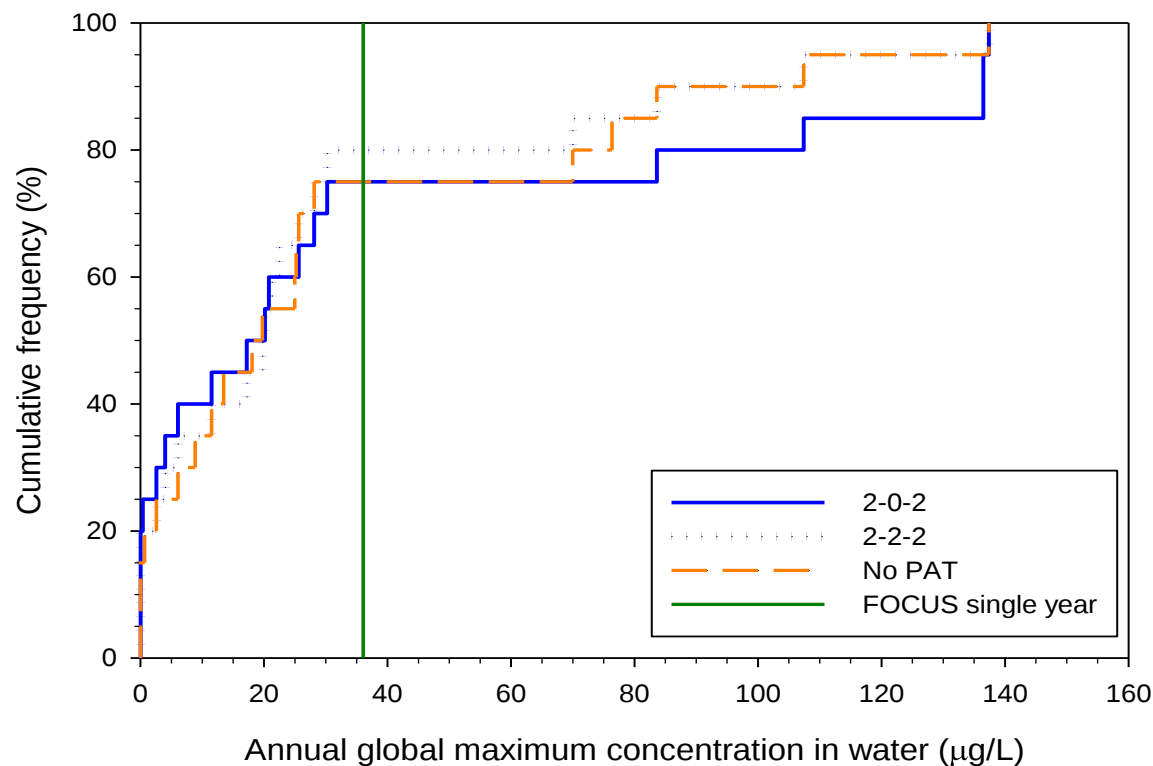
■ **Current approach:**

- pesticide application defined by the user via 'application window'
- Limitations: max 8 applications, not irregular intervals, exact date governed by PAT



2. REVIEW THE PAT

- Preliminary runs for scenario R1 applying the 20-yr assessment in comparison to the standard single year simulations to investigate the impact of different PAT rules on results



2. REVIEW THE PAT

■ **Current approach:**

- pesticide application defined by the user via 'application window'
- Limitations: max 8 applications, not irregular intervals, exact date governed by PAT

■ **New approach:**

- overall impact of PAT on the cumulative frequency distribution of annual PEC_{max} values minor based on preliminary runs
- ignore the occurrence of rainfall close to application
- always apply at the same calendar days in a year, as in FOCUS GW
- **not using PAT**

3. SUBSTANCE PARAMETER SELECTION GUIDANCE

■ **soil *pH* dependence**

- significant change in substance properties within a soil *pH* from 5.1 to 8.0
- correlation between substance properties/soil *pH* statistically proven
- two calculations for two contrasting soil *pH* values

■ **clay content**

- part of the scenario definition and linked to the scenario vulnerability
- no need to use clay content different from the scenario

4. REVIEW OF FOLIAR WASH-OFF

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- foliar wash-off in MACRO and PRZM investigated considering different half-lives on the crop canopy (5, 10 and 20 days) and wash-off coefficients (0.05 , 0.1 and 0.2 mm^{-1})
 - overall no systematic difference in wash-off predicted by the models, **no need to further harmonize foliar wash-off in MACRO and PRZM**
 - propose to replace wash-off coefficient 0.05 mm^{-1} with 0.1 mm^{-1} , harmonisation with groundwater and soil exposure



5. ROTATIONAL CROPS IN THE 20-YEAR PERIOD

- in FOCUS surface water (2001), scenarios for streams and ditches already accounts that not all the catchment is sprayed via the introduction of a virtual upstream catchment area that supplies water to the inlet section of streams and ditches modelled by TOXSWA
- this approach is equivalent to assuming that only a certain fraction of the catchment is sprayed with the active substance during the assessment (i.e. 33 % for ditches and 20 % for streams)



6. PROCESSING TIME AND RESULTS

Ensuring that processing times for the 20-year assessment period are not excessive and results are easily (re-)produced

Issues considered:

- a. Processing time
- b. Single vs multiple application
- c. Revised application time in SWASH
- d. Different spray drift curves

6. PROCESSING TIME AND RESULTS

a) Processing time

- PRZM: not change (already runs for 20 years)
- MACRO: similar to FOCUS groundwater
- TOXSWA: improved by enabling the shell to distribute runs between available processors of the computer, thus lowering the project run time
 - For stream around 1 h, for pond approx. 5 min, for ditch around 15-20 min

6. PROCESSING TIME AND RESULTS

b) Single vs multiple application

■ Current approach:

- if the GAP indicates multiple applications, simulations considering single and multiple applications to be provided

■ New approach:

- ignore 'single application approach', simulations only in line with the GAP
- always apply 90th spray drift value independent of the n° of applications, thus excluding different drift loadings with respect to single vs. multiple application

6. PROCESSING TIME AND RESULTS

c) Revised application time in SWASH

■ Current approach:

- user defines application window based on n° of applications and interval, PAT defines suitable dates, crop interception calculated by MACRO and PRZM

■ New approach:

- application timing linked to BBCH stage (as in the GAP) and date at which BBCH stage is reached in each scenario, based on the approach used in AppDate (Klein, 2006)
- implement a complete set of BBCH stage/dates for each crop/scenario and predefined crop interception
- applications at the first calendar date irrespective of rainfall (irregular application intervals)
- number of possible applications from 8 to 20

6. PROCESSING TIME AND RESULTS

d) Different spray drift curves

■ **Current approach:**

- Spray drift rates include two drift curves ('early' and 'late' application) for vines and pome/stone fruits

■ **New approach for vines:**

- exclude drift values for 'vines early', consider only 'vines late'

■ **New approach for pome/stone fruits:**

- use the more conservative drift data for 'early' up to BBCH 69 and the less conservative for 'late' from BBCH 71 onwards.

7. USING THE RESULTS IN THE RISK ASSESSMENT

Reconsideration of the temporal percentile approach

- alternatives in the selection of an adequate temporal percentile for exposure assessment will be presented to Risk Managers

Consistency of the tiered approach

- In order to keep the tiered approach consistent, the run-off/drainage percentages applied at Step 2 may need revision



RELEVANT POINTS

- 20-year assessment period
- Irrigation calculated by PRZM
- Harmonization of crop interception in MACRO and PRZM
- 90th percentile deposition evaluated at each application, thus excluding different drift loadings with respect to single vs. multiple application
- No PAT, ignore the occurrence of rainfall close to application
- Revised application time in SWASH
- Number of applications from 8 to 20
- Consider impact on aquatic RA combining exposure and effect assessments

ACKNOWLEDGEMENTS

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Thank you!

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