



Influence of uncertainty on decision-making for reduction of pharmaceuticals in rivers



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In a nutshell

Existing uncertainty in Microcontaminant Fate and Transport (MFT) models biases decision-making towards the installation of tertiary treatments.

We show that secondary treatment upgrades only become a suitable alternative when parameter uncertainties decrease.

The problem stated

High levels of uncertainty in MFT model parameters (Pharmaceutical consumption and excretion, removal rate in WWTPs and decay rate in rivers) compromises the usability of simulated concentrations for decision-making.

Changes in parameter uncertainties can influence the selection of WWTP interventions but has never proved

The Llobregat case study

Diclofenac was measured in 9 points in the river and in the influents and effluents of 2 WWTPs in September 2010.

A MFT model was developed and calibrated for the Llobregat catchment

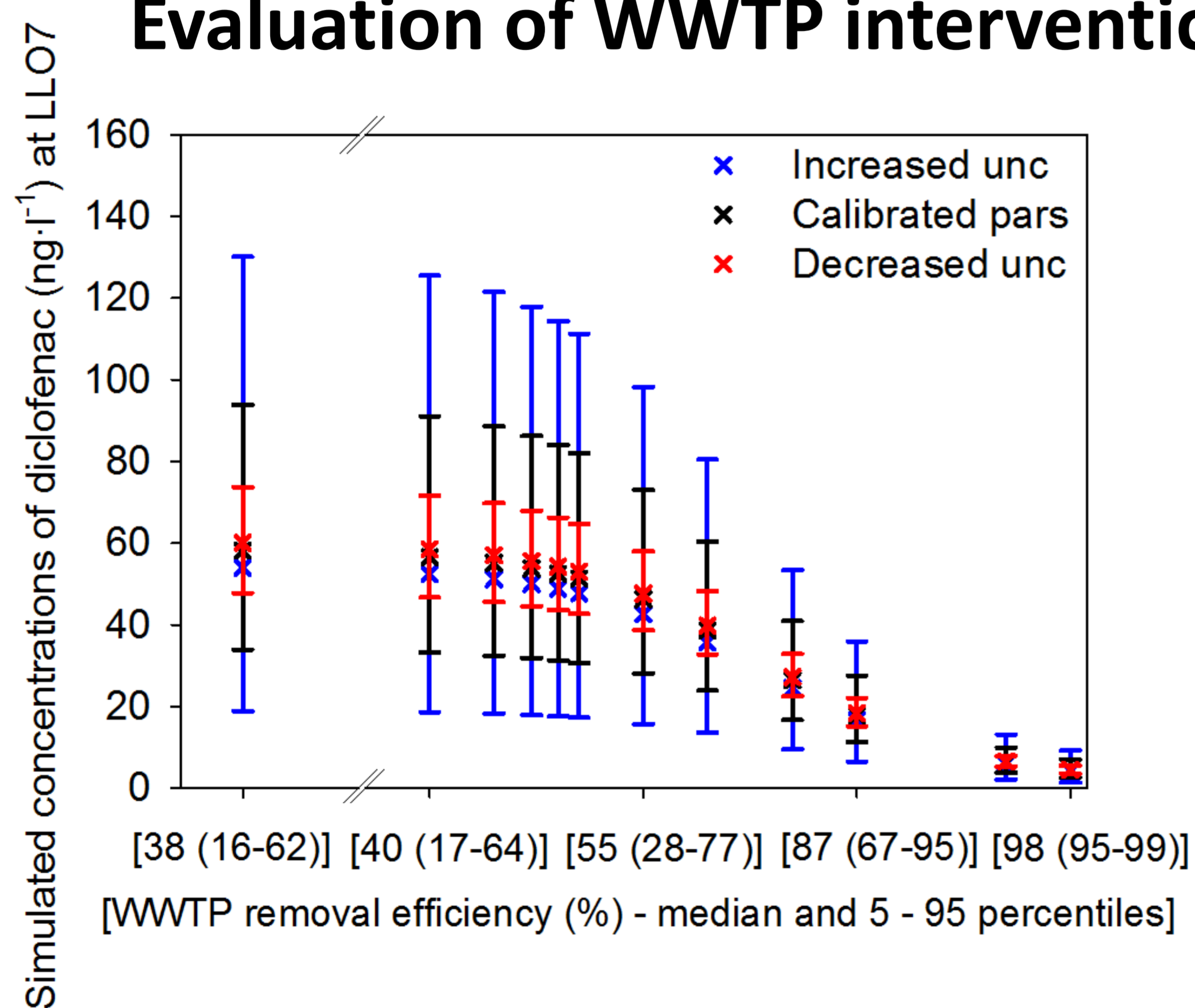


Our approach

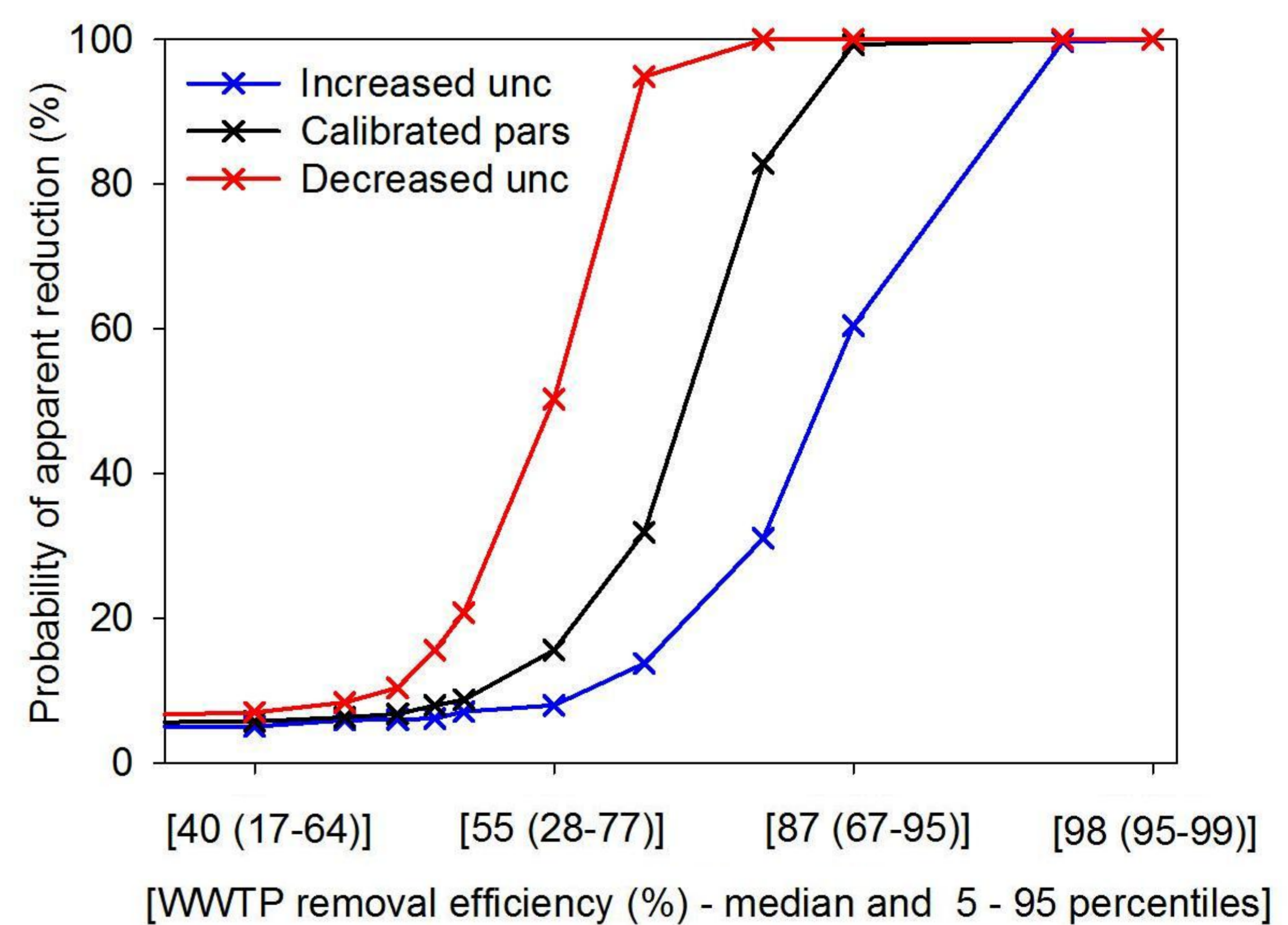
We generated 36 scenarios: 3 levels of parameter uncertainties (calibrated, increased and decreased) combined with 12 levels of diclofenac removal rates in WWTPs (from 38% to 98%). Removal rates up to 75% are achieved with secondary treatment upgrades. Beyond 75%, a tertiary treatment is needed.

We evaluated the probability of each intervention achieving *apparent reduction* of diclofenac concentrations in LLO7.

Evaluation of WWTP interventions under scenarios of uncertainty



Diclofenac concentrations at LLO7 decrease as the removal in WWTPs increases.



Only increases in WWTP removal > 90% cause high probability of apparent reduction regardless uncertainty.

If parameter uncertainties decrease, we obtain high probability of apparent reduction for WWTP removal > 64%.

Conclusions

Different interventions would be selected depending on level of uncertainty. Installation of tertiary treatments leads to apparent reductions in diclofenac concentrations regardless of uncertainty and secondary treatment upgrades only when uncertainty is reduced

Further research is needed to reduce the uncertainty in MFT model parameters

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Model available at lcrominas@icra.cat