

European CH₄ inversions with ICON-ART coupled to CarbonTracker Data Assimilation Shell

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The manuscript is a revision of a paper describing experiments with inverse modelling of methane emissions over Europe using the ICON-ART model.

In the new version, the focus is more on the final application with real data, and less on the initial experiments with synthetic data. This makes the practical application more clear and is therefore certainly of added value.

A major change is that where the previous described experiments distinguish 3 different source categories (agriculture, waste, and remaining sources), the new experiments distinguish only 2 (anthropogenic and natural). As these two are spatially more disjunct than the previously distinguished sources, the results are more robust. The results give confidence that the described system is able to reduce at least part of the uncertainty in the total anthropogenic emissions. On the other hand, it is also illustrated that it is not yet possible yet to reduce the uncertainty in the natural emissions too.

Many minor corrections were made to the manuscript, for example in consequent description of the inversion system as a Kalman *smoother* rather than a *filter*.