

EGU2020-18741

<https://doi.org/10.5194/egusphere-egu2020-18741>

EGU General Assembly 2020

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## Towards an European operational monitoring capacity for CO<sub>2</sub> emissions: the CO<sub>2</sub> Human Emission project at ECMWF

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The CO<sub>2</sub> Human Emission (CHE) project is an European initiative bringing together a consortium of 22 European partners to build a prototype global CO<sub>2</sub> source inversion system that can provide policy-relevant information on the spatiotemporal characteristics of anthropogenic CO<sub>2</sub> emissions. This prototype shall evolve toward a new Copernicus CO<sub>2</sub> service, which will provide a Monitoring and Verification Support (MVS) capacity that can address the challenge of the global stocktake (GST) devised under the Paris Agreement. The global inversion system will build on existing operational infrastructures (CAMS, C3S) at the European Centre for Medium-range Weather Forecast (ECMWF) to exploit ground-based measurements as well as space-based observations from current and future satellite missions (e.g., Sentinel 5p and CO<sub>2</sub>M). We will present ongoing efforts at ECMWF to develop a source inversion capability in the current operational Integrated Forecasting System (IFS), which will serve as the basis for the future global CO<sub>2</sub> inversion prototype. Preliminary results will be discussed, that include model transport error estimations based on Monte-Carlo ensemble simulations as well as the first chemical source optimization experiments performed with the IFS 4D-Var system.