

Atmospheric Transport Modelling and its Applications

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This talk will present various applications of the atmospheric transport model FLEXPART (<https://www.flexpart.eu/>), ranging from purely meteorological topics, inverse modelling of greenhouse gas emissions, to the interpretation of ice cores.

With respect to meteorology, we will present source diagnostics of water vapour falling as precipitation as well as ideas for a future Lagrangian re-analysis. Inverse modelling of trace substances has seen past applications from volcanic emissions to nuclear accidents but most recent applications have concentrated on inverse modelling of greenhouse gas and aerosol emissions. For this, a dedicated software package, FLEXINVERT (<https://flexinvert.nilu.no/>) has been developed. Use of FLEXINVERT includes studies of halocarbon and methane emissions but also investigation of the changes of the emissions of black carbon in Europe and China during the COVID-19 pandemic. Recent runs of the model over century-long periods were used for the interpretation of ice cores. This has supported spectacular discoveries such as the relationship of the deposition of lead in Arctic ice cores with historical events such as wars, pandemics or periods of prosperity in Europe during antiquity and the medieval period, thus enabling the quantitative interpretation of historical events.