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Geosci. Model Dev., 6, 721-733, 2013
www.geosci-model-dev.net/6/721/2013/
doi: 10.5194/gmd-6-721-2013

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Source apportionment using LOTOS-EUROS: module description and evaluation

R. Kranenburg, A. J. Segers, C. Hendriks, and M. Schaap
TNO, P.O. Box 80015, 3508 TA, Utrecht, the Netherlands

Abstract. To design effective mitigation strategies, the origin of emissions which produce air pollutants needs to be known. Contributors to air pollutants can be emission sources, like road traffic or industry, but also be more specified to emission from one location or from a specified time. Chemistry transport models can be used to assess the origin of air pollution across a large domain. However, in traditional simulations the information on origin is lost and brute force scenario studies are performed to assess the origin. Alternatively, one can trace the origin of air pollutants throughout a simulation using a labeling approach. In this paper we document and demonstrate a newly developed labeling module for the chemistry transport model LOTOS-EUROS which tracks the source allocation for all particulate matter components and precursor gases. Dedicated simulations confirmed that the new module functions correctly. The new module provides more accurate information about the source contributions than using a brute force approach with scenario runs as the chemical regime remains unchanged. An important advantage of the new module is the reduction of computation costs and analysis work associated with the calculations. The new module was applied to assess the origin of particulate nitrate across the Netherlands. Averaged across the Dutch territory, the main contributions to nitrate are derived from road and non-road transport as well as power plants. Overall, only one-fifth of the concentration derived from sources located inside the country. The new technology enables new research directions as improved information on pollution origin is desired for policy support as well as scientific applications.

Citation: Kranenburg, R., Segers, A. J., Hendriks, C., and Schaap, M.: Source apportionment using LOTOS-EUROS: module description and evaluation, *Geosci. Model Dev.*, 6, 721-733, doi:10.5194/gmd-6-721-2013, 2013.

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