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A generalized tagging method

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Abstract. The understanding of causes of changes in climate-chemistry simulations is an important, but often challenging task. In atmospheric chemistry, one approach is to tag species according to their origin (e.g. emission categories) and to inherit these tags to other species during subsequent reactions. This concept was recently employed to calculate the contribution of atmospheric processes to temperature. Here a new concept for tagging any state variable is presented. This generalized tagging method results from a sensitivity analysis of the individual forcing terms of the right hand side of the governing differential equations. In a couple of examples, the consistency with previous approaches and the synergy by using different analysis techniques are shown. Since the method is based on a ratio describing relative sensitivities, singularities occur where the method is not applicable. For some applications, such as in atmospheric chemistry, these singularities can easily be removed. However, one theoretical example is given, where this method is not applicable at all.

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