

Interactive comment on “Numerical uncertainty at mesoscale in a Lagrangian model in complex terrain” by J. Brioude et al.

Anonymous Referee #2

Received and published: 30 July 2012

General comments

I would recommend final publication of the paper subject to a few minor clarifications. The topic fits to the scope of GMD. The paper presents a statistical assessment of transport modeling errors with a focus on mass conservation based on a regional case study. Although such case studies might imply a certain risk of bias, the region used for this study seems to be appropriate in my opinion, as it includes complex terrain, flat terrain and sea surface.

The evaluation of the influence of the vertical wind scheme on mass conservation errors is very interesting. Also the correlation between the mean gradient of orography and the bias error. The relation between spatial- or temporal resolution and the magnitude of errors supplements the picture, albeit being less surprising. It would

C476

be helpful, if the authors could complement a few words of interpretation, whether these resolution-dependent errors can be attributed more to the numerical integration scheme of FLEXPART or more to the sub-grid variations of the wind, which are missing with the coarser spatial grid or the longer output periods.

The abstract is complete, maybe a little bit long in relation to the main text; however this is not critical. The discussion and conclusions section is concise and adequate in length. Overall, the paper at hand is well-written and logically structured. The language is fluent, precisely verbalized and easily understandable.

Specific comments

page 969, line 13: “. . . ensembles of independent elements”: it is not quite clear, what the authors mean by “elements”, at least not without reading the reference.

page 972, line 24 to p.973, line 8 : at first glance, the description of the model's setup is a bit confusing to me: is “time step” the WRF output interval of 30 (60, 120) minutes or FLEXPART's internal integration time step or the 24-h simulation interval ? Are the 15 million trajectories homogeneously distributed over the whole simulation domain? What were the exact criteria for the selection of the 108 geographic locations (line 6). From the text it sounds as if these were the only grid cells populated by the endpoints of the forward trajectories, but when the forward trajectory start points were homogeneously distributed all over the computational domain I would the endpoints expect to cover most of the domain area, too? Why is the number of particles in the forward/backward calculation so much different (15 million versus 108*5000)? Did you mean the following: every 30 (60, 120) minutes within the period from 16 to 20 May 2010, 15 million particles were released, homogeneously spread over the surface of the computational domain, and tracked for 24 hours each ?

page 986, figure 1.: please add units to the x- and y- axis (seems to be a grid index ?)

Technical corrections

C477

Page 971, line 20: missing space between the words 'dot' and 'vertical'

Interactive comment on Geosci. Model Dev. Discuss., 5, 967, 2012.