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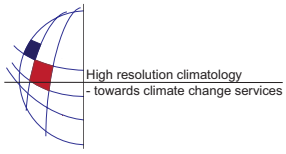

Improving the time-splitting errors of one-dimensional advection schemes in multidimensional applications

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A method is presented to reduce the time-splitting errors
of one-dimensional flux form advection schemes.
In multidimensional applications deformational correction terms
are included in each one-dimensional advection step whereby
all correction terms add up to zero.
With the correction terms a consistent form of a given
one-dimensional advection scheme is achieved when time-splitting is performed.
Positive definiteness and shape preservation of the
scheme are obtained by nonlinear limitation of the advective fluxes
and the deformational correction terms.
Large Courant numbers are treated by applying local timestep
reduction. The resulting
scheme is strictly one-dimensional, mass conservative and positive
definite. Shape preservation of the method is nearly achieved.

Two- and three-dimensional test runs are presented demonstrating
that the method yields satisfactory results.
The horizontal flow in a terrain with a steep mountain ridge is
investigated by utilizing a terrain following vertical coordinate.
It is shown that even in steep orographical terrain the method
works quite well, however, small errors occur in the shape preservation of
the scheme. These errors increase with increasing spatial variation
of the vertical grid mesh.