

4.4 Quality Assessment

A major difficulty in the assembly process is the porting of the models to different platforms. This task is facilitated if the models meet a minimum of quality criteria.

One of them is that at least the newly written source code respects the coding rules described by Mangili et al. (2003). A component model should be written in F95 ISO/IEC 1539-1, which includes F77 as a subset. Code written in C should follow ANSI C. For interfacing C and Fortran, the use of the cfortran package is encouraged (see also URL⁵).

In addition, quality criteria have been defined which help to assess the correctness of the coding. This includes the performance of test runs with the models compiled with different compiler options. The compile scripts generated in the SCE provide several such options. These are default options, options for profiling, options for debugging, and, if possible, options for optimised performance. If available, the models should be run with additional MPI implementations on the same site, for instance MPICH or LAMMPI.

The PRISM standard environments also support standalone models. A standalone adaptation to the PRISM standards should be provided for each component of a coupled model. Each porting activity for a coupled model should start with the porting of the standalone component models if possible. This allows to run 'unity tests' as proposed by Mangili et al. (2003).

The SRE supports run time testing of the correct coding. This includes the easy and flexible change of number of processors used for each executable. Also, the way the experiments are set up allows for the parallel execution of multiple runs. An experiment can be created from an old experiment ensuring that just one aspect of the setup is changed. Flexible change of restart frequencies is enabled.

Last but not least, the coupling software allows for a flexible test of various aspects of the exchange algorithm. One of them is the frequency at which the fields are exchanged between the models. The quality of the interpolation of fields between grids can easily be assessed with the help of the OASIS control output, and the PRISM software I/O functionality. Exchange fields can be tagged to be saved before and after interpolation in PRISM file format. It is therefore possible to visualise these fields with the PRISM visualisation tools.

Specifications of criteria for quality assessment and the definition of a process to ensure that the models meet the criteria are considered essential for the successful establishment of a climate research network in Europe. The development of other tools to help model porting is also considered to be an important future activity.

A coupled model is said to be ported to a platform if it has been run there successfully for at least two consecutive (restarted) periods. The results should be the same as those on the old platform in the range of truncation errors, at least during the first time steps.

⁵<http://wwwinfo.cern.ch/asd/cernlib/cfortran.html>