



High Performance Isosurface Extraction Implementations for Hydrometeorological Data Visualization

Daniele D'Agostino (1) and Frank Seinstra (2)

(1) Institute for Applied Mathematics and Information Technology, National Research Council of Italy, Genoa, Italy, (2) Department of Computer Science, Vrije Universiteit, Amsterdam, The Netherlands

For the scientific community, the interrogation and visualization of 3D data, produced by complex simulations or by data acquisition instruments, is of paramount importance. This is particularly true in the hydrometeorological science field: in the last few years new modeling tools, improved post-processing methodologies, and more sophisticated acquisition instruments have been made available, resulting in a huge amount of high-detailed data whose satisfactory management is still an open issue.

In particular, one of the most common data formats is based on a set of floating point numbers representing a volume of scalar or vector data in 3D space. Isosurface extraction is a basic operation that allows querying and visualization of these data. Depending on the volume-size, the operation may require a considerable amount of computing power. This can be provided by clusters of workstations or by many-core architectures such as those based on General Purpose Graphics Processing Units (GPGPUs). In this contribution, we compare two isosurface extraction implementations, one for clusters based on MPI and the other for NVIDIA cards using CUDA.