3D Exploration of Meteorological Data: Facing the challenges of operational forecasters

Michal Koutek, Frans Debie, and Ian van der Neut
KNMI, De Bilt, Netherlands (koutek@knmi.nl)

In the past years the Royal Netherlands Meteorological Institute (KNMI) has been working on innovation in the field of meteorological data visualization. We are dealing with Numerical Weather Prediction (NWP) model data and observational data, i.e. satellite images, precipitation radar, ground and air-borne measurements. These multidimensional multivariate data are geo-referenced and can be combined in 3D space to provide more intuitive views on the atmospheric phenomena. We developed the Weather3DeXplorer (W3DX), a visualization framework for processing and interactive exploration and visualization using Virtual Reality (VR) technology. We managed to have great successes with research studies on extreme weather situations.

In this paper we will elaborate what we have learned from application of interactive 3D visualization in the operational weather room. We will explain how important it is to control the degrees-of-freedom during interaction that are given to the users: forecasters/scientists; (3D camera and 3D slicing-plane navigation appear to be rather difficult for the users, when not implemented properly).

We will present a novel approach of operational 3D visualization user interfaces (UI) that for a great deal eliminates the obstacle and the time it usually takes to set up the visualization parameters and an appropriate camera view on a certain atmospheric phenomenon. We have found our inspiration in the way our operational forecasters work in the weather room. We decided to form a bridge between 2D visualization images and interactive 3D exploration. Our method combines WEB-based 2D UI's, pre-rendered 3D visualization catalog for the latest NWP model runs, with immediate entry into interactive 3D session for selected visualization setting. Finally, we would like to present the first user experiences with this approach.