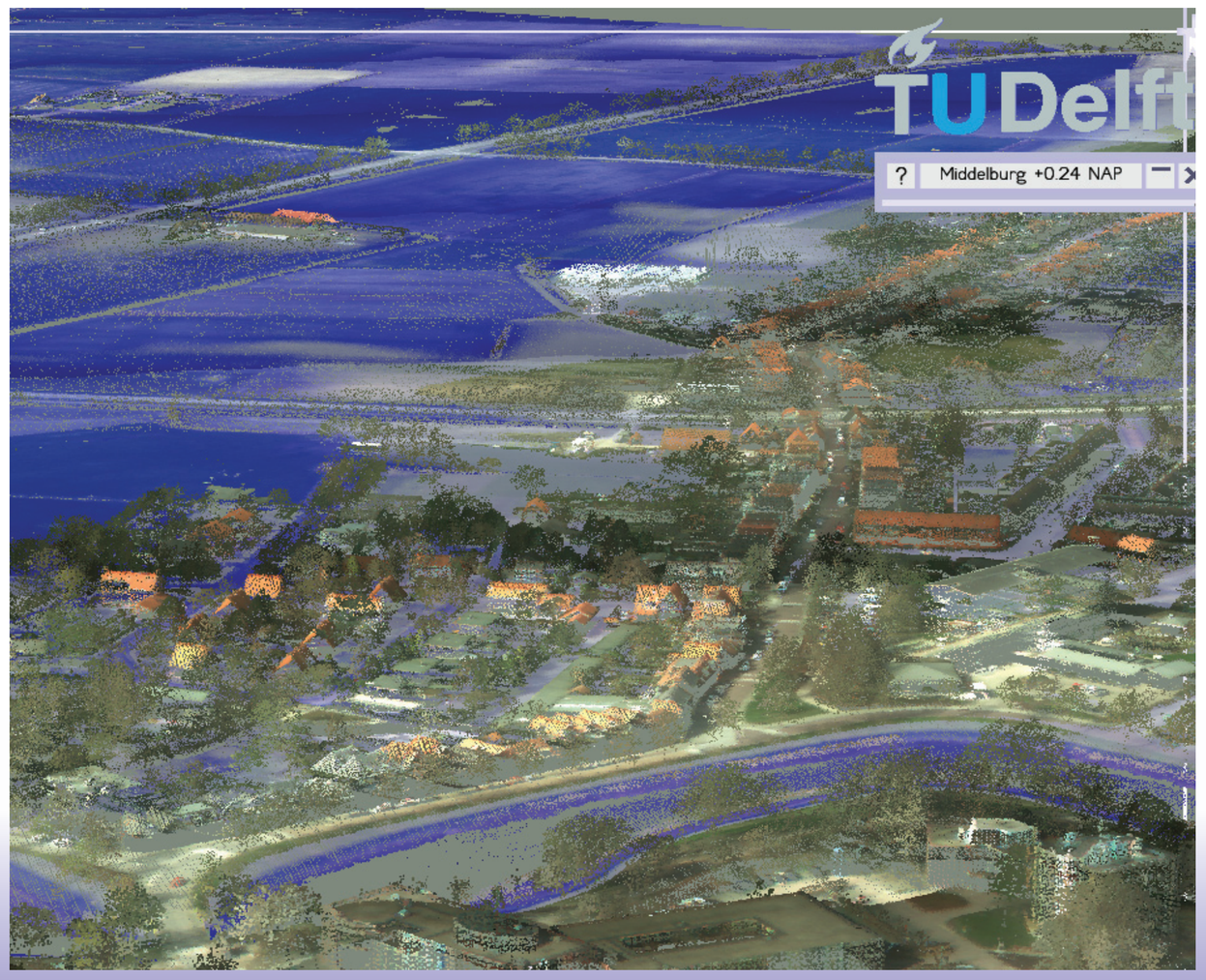
Real-time 3D Visualization of Massive Point Clouds and Flooding Simulations

Aerial LiDAR technology is invaluable in the high-quality 3D measurements of natural and man-made features. This process involves enormous quantities of data in large, unstructured 3D point clouds.

Before this raw data can be further analysed, the first step in the workflow of practitioners is often to perform visual inspection. A smooth and interactive stereo 3D visualization should empower the human visual perception by providing recognisable, and intuitive spatial context and is essential for the presentation of the 3D data to a non-expert audience.
However, many current geo-software only support slow and simplistic rendering of 3D point clouds, and they are often limited to a few million points. In this case, the shear size of point clouds as currently acquired surpasses the capacity of modern graphics workstations.



In this demonstration, we show our approach to visualize in 3D massive point clouds with interactive frame rates, in stereo. Our system is built upon OpenSceneGraph (OSG), a popular open source rendering framework. We developed out-of-core data structures and algorithms (tiling and filtering preprocessing) to be able to achieve ``smooth'' frame rates. We present visualization results of parts of a massive LiDAR dataset covering the whole of country of the Netherlands. Also, we demonstrate the integration of SOBEK flooding simulations results that will serve as a decision support tool in planning and crisis management.

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