

Regional porosity and permeability prediction

17 Maps of Cretaceous, Triassic and Permian reservoir zones

This study shows the strength and benefits of publicly available large datasets by creating predictive models of subsurface properties.

Regional screening of areas for exploration and production purposes (for both hydrocarbon, geothermal or storage) requires an overview of average reservoir properties.

Porosity and permeability maps of 17 Cretaceous, Triassic and Permian reservoir zones within the Dutch on- and offshore are generated for this purpose. These maps are based on an extensive database (+3000 wells) of averaged reservoir properties. The data consists of core analysis data, wireline log data and well test data and their interpretations. These property maps can be used for high level screening of opportunities.

A generic and reproducible workflow to generate reservoir property maps is created and applied. An example of those maps for the Triassic Lower Detfurth Sandstone formation is included here (fig. 1 & 2).

Online available

The maps and underlying data will become available on NLOG (www.nlog.nl) as GIS raster files. Earlier versions of these maps are available through www.thermogis.nl, whereas the reservoir property database is available through NLOG.

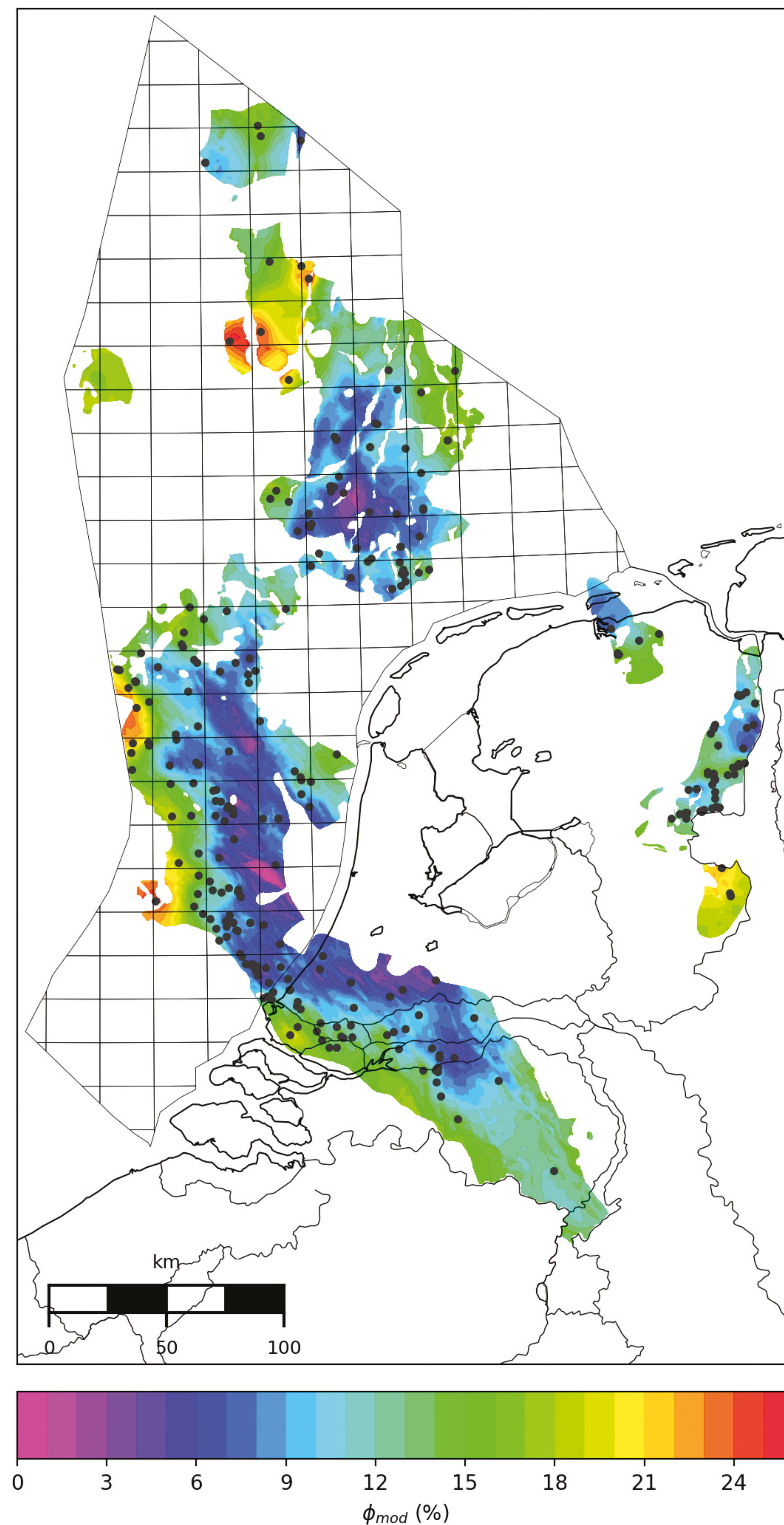


Figure 1. Porosity map of the Triassic Lower Detfurth Sandstone formation (RBMDL).

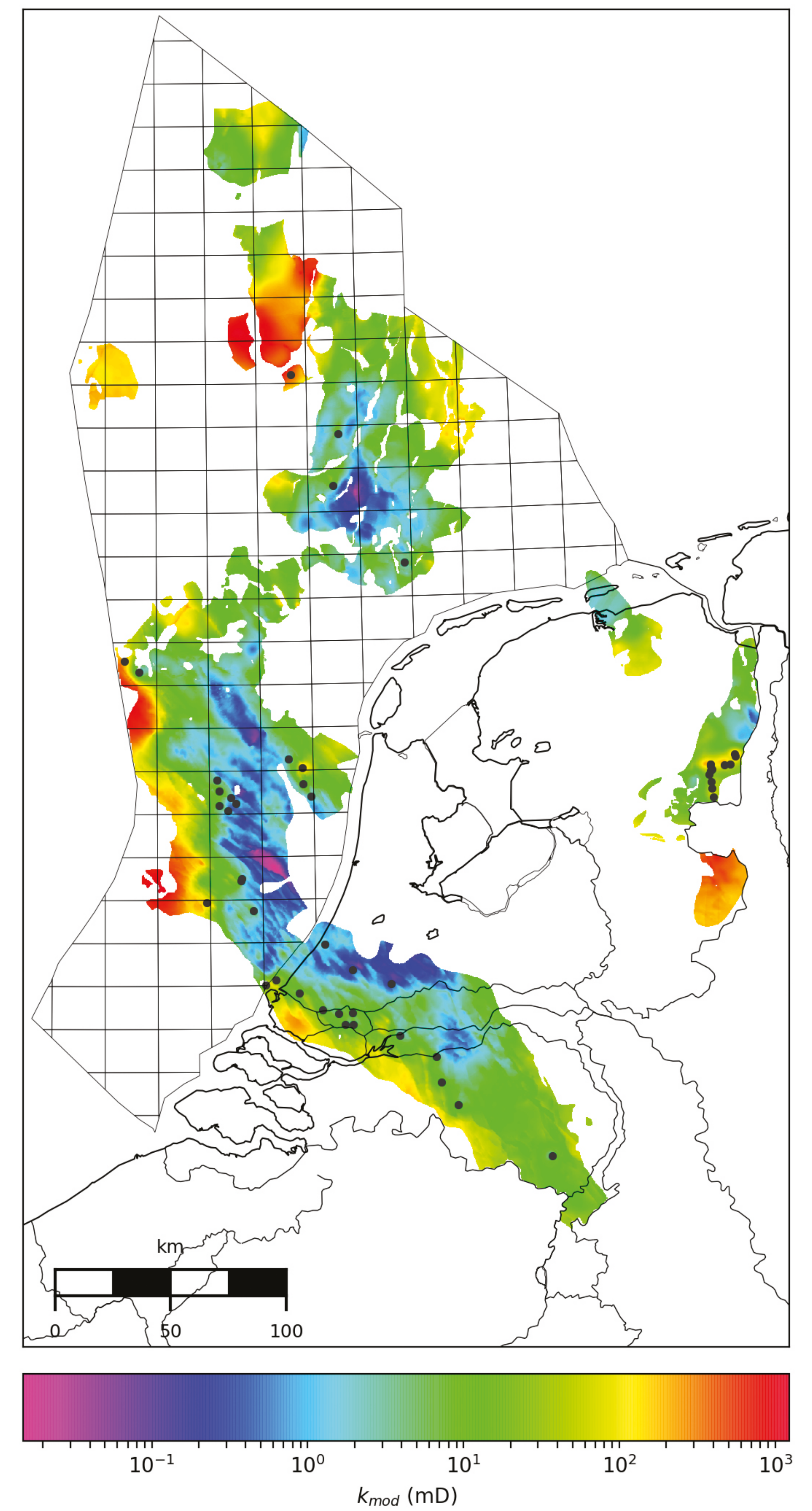


Figure 2. Permeability map of the Triassic Lower Detfurth Sandstone formation (RBMDL).

Workflow

The porosity estimates are based on porosity data guided by their reconstructed maximum burial depth (fig. 4).

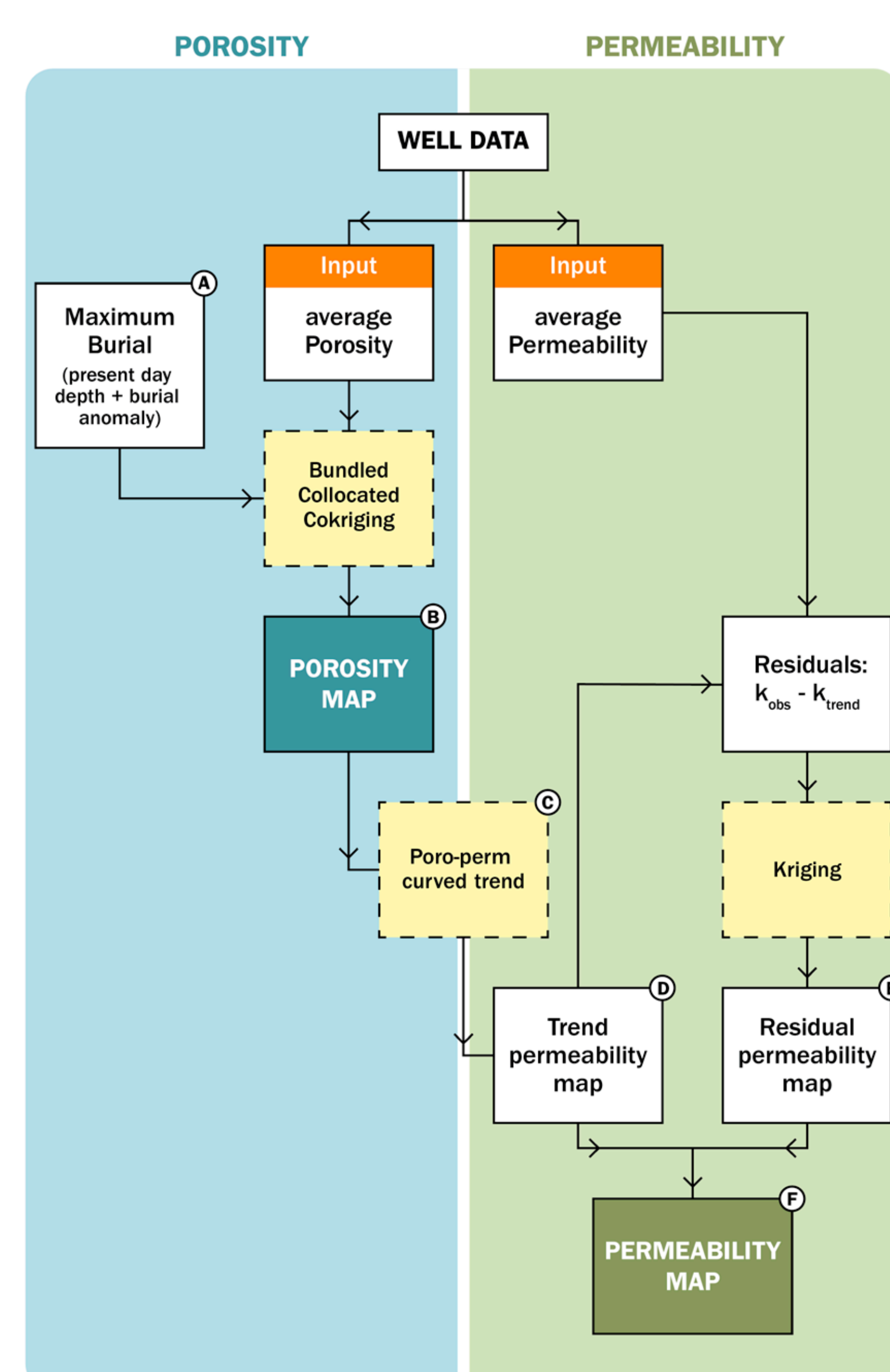


Figure 3. Workflow for calculating the reservoir property maps.

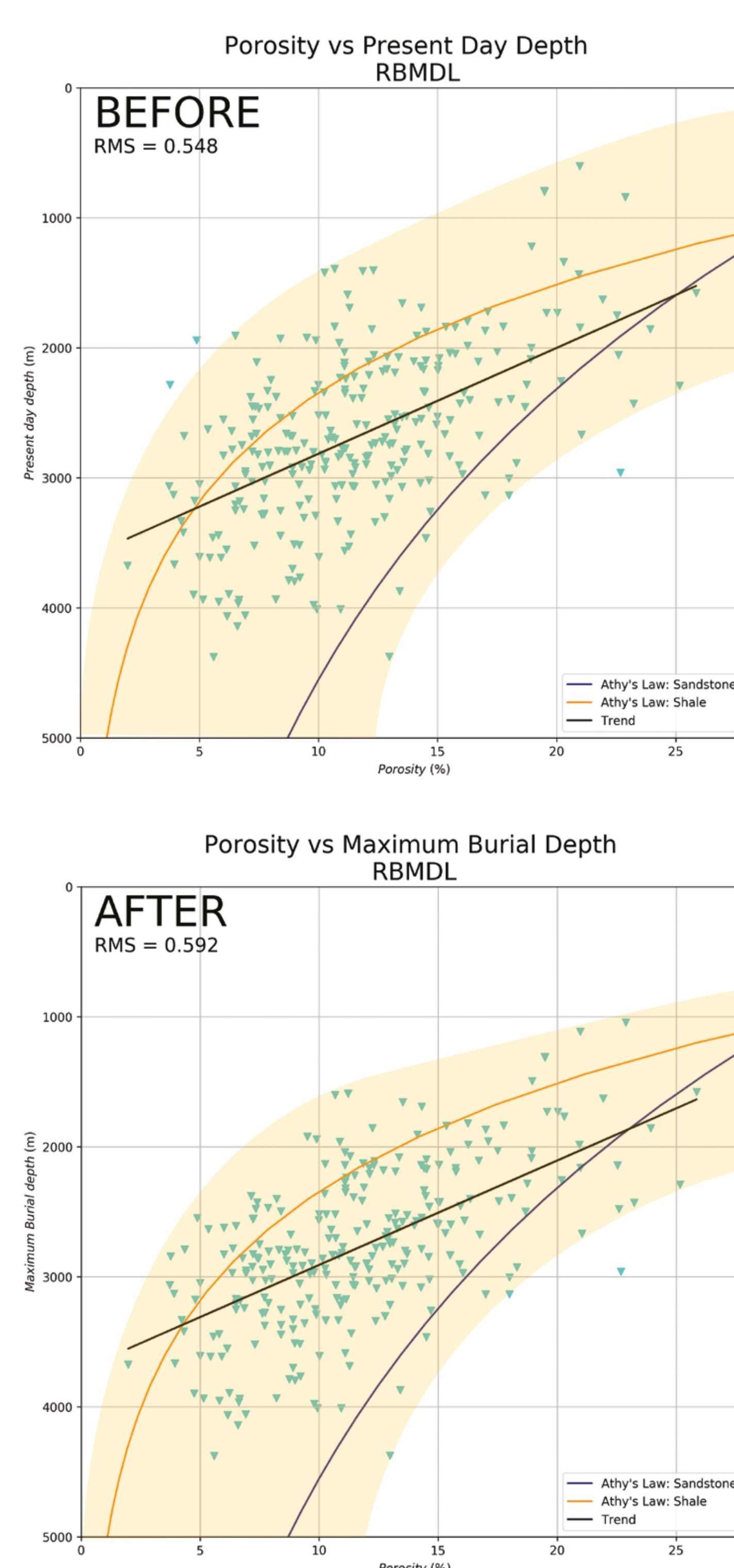


Figure 4. Porosity-depth relation of the Lower Detfurth Sandstone formation before (upper) and after (lower) correction for burial anomaly.

Based on the relationship between core derived porosity and permeability values, a transformation function is established. Based on this function a permeability map has been created combining regional trends (fig. 5) and variations corrected for local deviations (fig. 6).

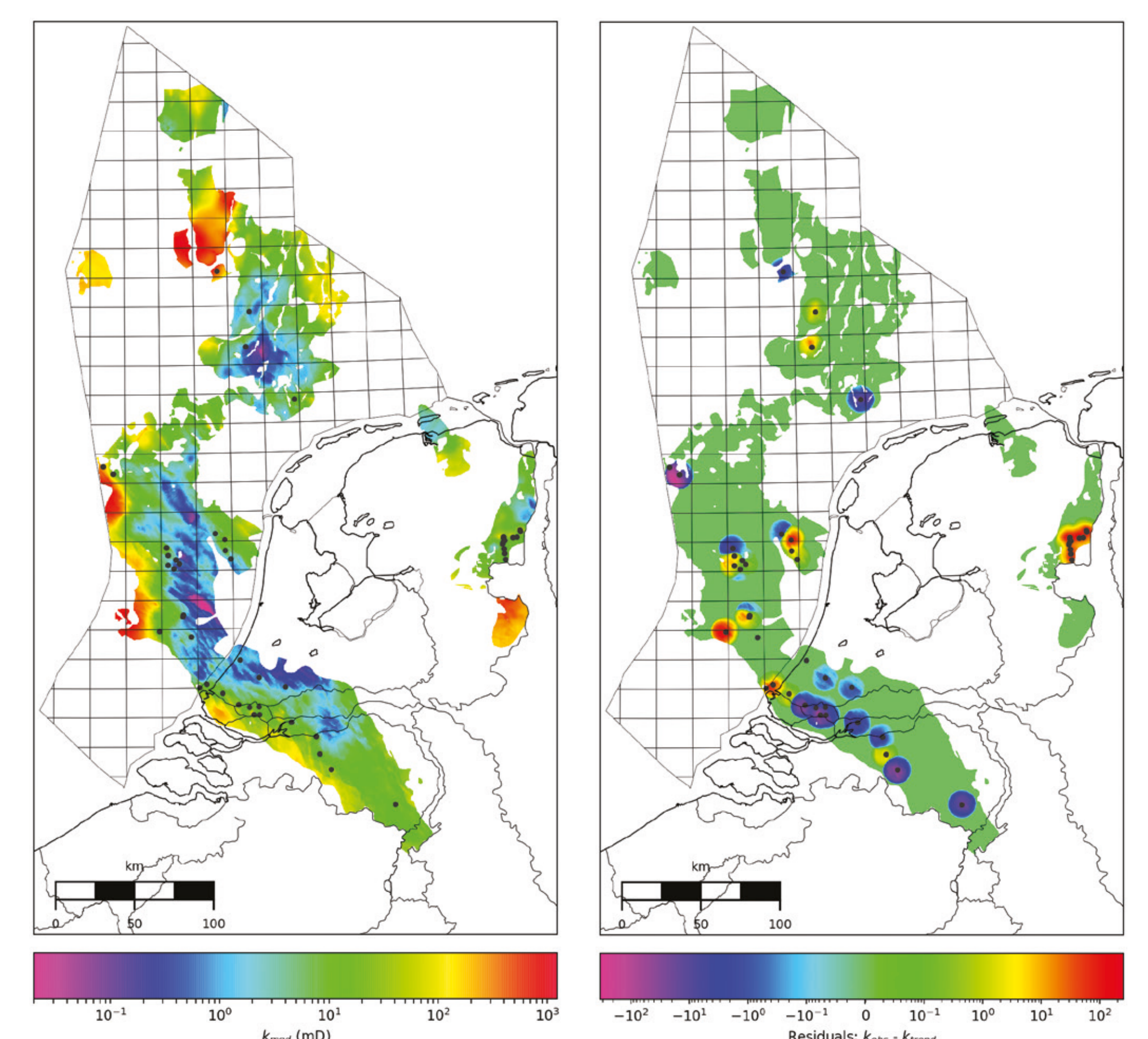


Figure 5. Trend permeability map for the Lower Detfurth Sandstone formation.

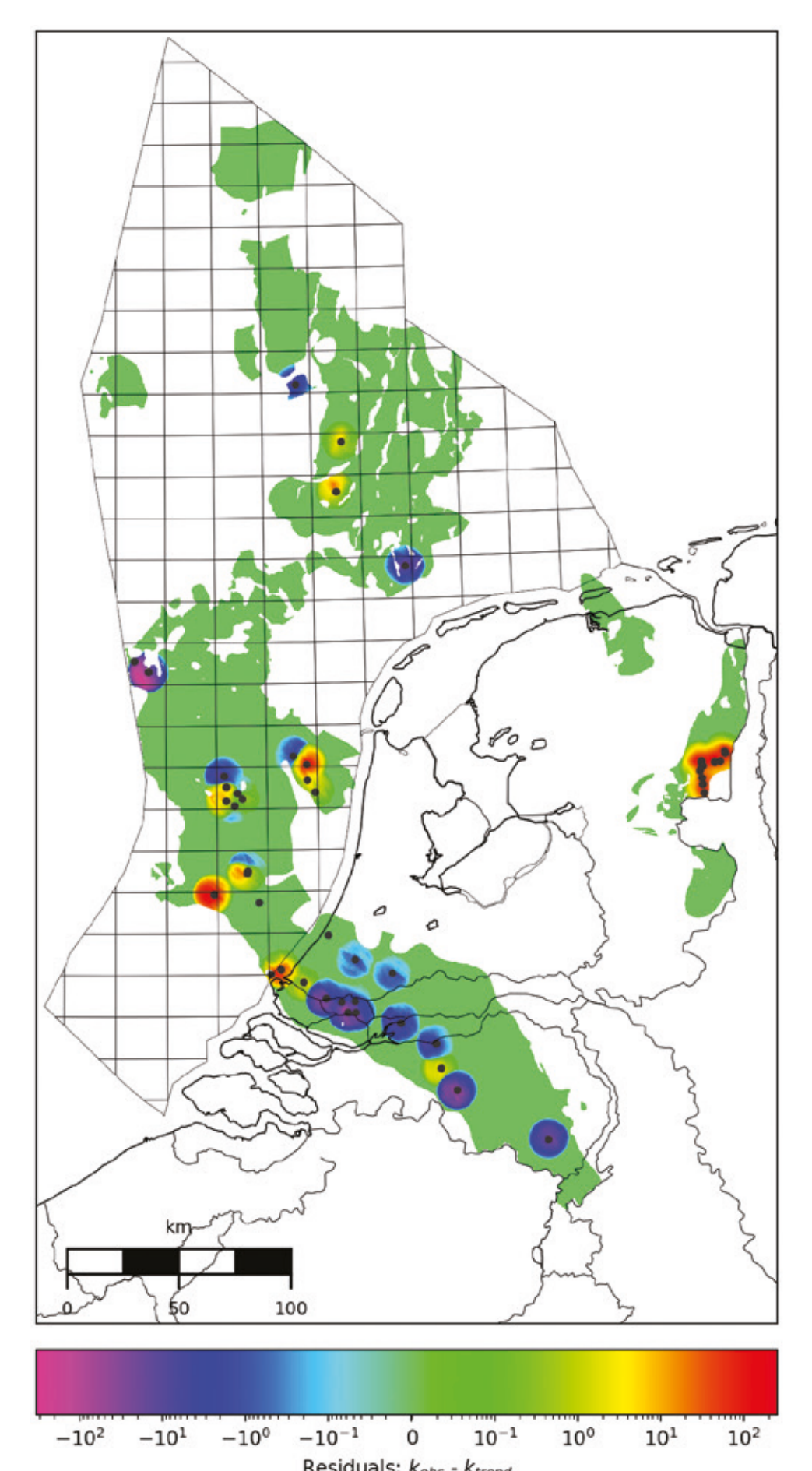


Figure 6. Residual permeability map for the Lower Detfurth Sandstone formation.