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Procedure for automatic, online presentation of spatial interpolated groundwater heads.

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Groundwater heads are monitored at many locations throughout the Netherlands and elsewhere in the world. The database of the Geological Survey of the Netherlands contains thousands of groundwater head time series with various measurement frequencies. Although a time series reflects the dynamic behavior at a specific point in space, often water managers need the spatial pattern of the groundwater head. Therefore a spatial interpolation of the groundwater head is required. Here we present a completely automatic procedure for the online generation and presentation of the spatial pattern of the groundwater head at any arbitrary date and aquifer.

A water manager specifies the desired area, aquifer and date. Groundwater heads around the specified date are automatically selected from the database and interpolated in time to a single date. Spatial interpolation of groundwater heads can be done in several ways. A deterministic groundwater model is well equipped to present the large scale variation, but it tends to be smooth and might underestimate local extremes at particular dates. Moreover, for online use driving forces of the dynamic model (like precipitation) should be available online and the response time is likely to be too long for online use. Geostatistical interpolation doesn't require external information, but due to the large scale pattern in groundwater head often statistical stationarity (intrinsic hypothesis) is not met and the uncertainty of the interpolation might be quite large. Therefore we choose to use the existing the steady state solution of the Dutch National Hydrological model (NHI) as reference and interpolate the residuals at a particular date using Kriging interpolation. Residual Kriging is not new, but the use of the steady state solution of the NHI as reference surface and the link with the national database DINO allows a fully automatic procedure which produces an adequate groundwater head surface within an acceptable response time. With this procedure deviations from the average head and unexpected spatial outliers at any date can be examined in a few seconds.