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Validation of dispersions models using Cabauw field experiments

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The purpose of revisiting the classical dispersion experiment in Cabauw is a better understanding of dispersion from elevated (buoyant) accidental releases, such as 2011 in the Netherlands, and preparation for fast response.

A fire at a chemical plant close to the main port Rotterdam in the Netherlands in 2011 resulted in a large-scale accident with the release of many different hazardous materials. The accident lasted almost a day. The hazardous material was advected towards the densely populated western parts of the Netherlands. The evaluation of the accident showed the need for high-resolution dispersion models using numerical weather forecasts up to a distance of several tens of kilometers. A project to implement such a system has since been launched, called Pluimradar.

The dispersion model is evaluated using the Cabauw Field experiments. Cabauw is a village close to Rotterdam. The 213 meter tall KNMI meteo tower has been used for dispersion experiments with releases from 80 meter and higher. Dispersion experiments were carried out on 15 different days during a one-year measurement campaign, thus providing a wide range of different weather situations. The high resolution weather model HARMONIE is used to reconstruct the weather and provide the dispersion model with information such as wind, temperature and stability. Validation is based on correlation, fractional bias, etcetera, applying these statistics to maximal arc-wise, near-centreline and cross-wind integrated concentrations.