Effects of weather conditions on drinking water distribution pipe failures in the Netherlands

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2D partial dependence of two explanatory variables in the statistical model for PVC pipes: temperature and year of install (left), temperature and diameter (middle), temperature and soil type (right). The grey color shows the partial dependence between the two explanatory variables and the predicted target (failure rate): a darker area shows a larger dependence.

Effect of maximum pressure at an average day demand on pipe failure for different pipe materials. Per pipe material, three cohorts of maximum pressures were defined.
FIG. 1. Location of weather stations in the Netherlands.
FIG. 2. Relation between weather variable and failure rate for temperature (left), rain deficit (middle) and wind (right) for different soil types (peat, sand, clay and urban) in AC pipes. The error bars show the 80% uncertainty bounds.
FIG. 3. Relation between weather variable and failure rate for temperature (left), rain deficit (middle) and wind (right) for different soil types (peat, sand, clay and urban) in PVC pipes. The error bars show the 80% uncertainty bounds.
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FIG. 8. 2D partial dependence of two explanatory variables in the statistical model for AC pipes: temperature and year of install (left), temperature and soil type (middle), temperature and diameter (right). The grey color shows the partial dependence between the two explanatory variables and the predicted target (failure rate): a darker area shows a larger dependence.
FIG. 9. 2D partial dependence of two explanatory variables in the statistical model for PVC pipes: temperature and year of install (left), temperature and diameter (middle), temperature and soil type (right). The grey color shows the partial dependence between the two explanatory variables and the predicted target (failure rate): a darker area shows a larger dependence.
FIG. 10. Effect of maximum pressure at an average day demand on pipe failure for different pipe materials. Per pipe material, three cohorts of maximum pressures were defined.
FIG. 11. Effect of maximum pressure difference at an average day demand on pipe failure for different pipe materials. Per pipe material, three cohorts of maximum pressure differences were defined.