Geophysical Research Abstracts
Vol. 14, EGU2012-3540, 2012
EGU General Assembly 2012

Hydrology in a Dutch polder catchment: natural processes in a man-made landscape

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Experimental catchments are traditionally located in areas with limited human influence, but the societal and financial losses due to hydrological extremes are often larger in more densely populated areas. In The Netherlands and other delta areas around the world, intensive drainage and water level regulation have made patches of originally swampy land between cities suitable for agriculture. The question is how the rainfall-runoff processes in these artificial catchments compare to those occurring in more natural catchments and whether conceptual hydrological models, which have been developed for natural landscapes, contain the appropriate hydrological processes for application to artificial catchments.

Our experimental “catchment” of 0.5 km^2 is part of a polder area located near the town of Cabauw in The Netherlands. This polder is completely flat and at an “elevation" of one meter below mean sea level. The catchment is drained by many small, man-made channels of which the water levels are regulated. Water is supplied upstream into the catchment by the local water authority.

The catchment is part of the Cabauw Experimental Site for Atmospheric Research (CESAR), which is well-known in the international meteorological community. In addition to the large amount of meteorlogical measurements, including precipitation and actual evapotranspiration, we measure discharge (both into and out of the catchment), ground water levels and soil moisture contents.

We will present a detailed development of the water balance terms over several years, an overview of the main hydrological processes during wet and dry conditions and differences between natural and polder catchments.