Occult precipitation as an input to the small catchment: observation, evaluation and new technics of fog water collection in the Czech Republic

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The main objectives of the present contribution are to: (i) describe the monitoring network created in the mountainous regions in the Czech Republic; (ii) assess the input of water and pollutants from the wind driven low clouds and fogs onto the forest canopy; and (iii) introduce new ground-level cloud water sampler designs.

Montane ecosystems can receive considerable inputs of water and dissolved substances from ground-level cloud and fog events. In order to study the input of water and matter from wind driven low clouds and fogs on the water balance and chemistry of mountainous forested catchments, three experimental watersheds were established: (1) the Liz basin (Sumava Mts. – southern Bohemia; 0,99 km2, 828 – 1073 m a.s.l., prevailing type of tree: spruce aged up to 120 years); (2) the Uhlirska basin (the Jizerske hory Mts. – northern Bohemia; 1,87 km2, 774 – 870 m a.s.l., prevailing type of tree: spruce aged up to 80 years); (3) the Modry potok basin (the Giant Mts. – north-eastern Bohemia; 2,62 km2, 1010 – 1554 m a.s.l., prevailing type of tree: spruce and dwarf pine 62 % and meadow 38 % of the area). These experimental catchments are placed in the main massifs of the Bohemian border mountains. They differ especially in the level of anthropogenic impacts on vegetation cover.

The hydrological and ecological significance of occult precipitation will be demonstrated. The chemistry of falling bulk precipitation sampled at the open area will be compared with the throughfall and with surface water sampled at the closing profile of each watershed. For the whole observed time period analytical results of the chemical analyses will be summarized. Based on the model predictions and on the water balance of the forest canopy the annual occult precipitation totals were estimated by the 10 % of the annual falling precipitation total in the Sumava Mts., by 10 – 15 % in the Jizerske hory Mts., and even more than 20 – 25 % in the Giant Mts. A fog water study carried out over the 16-years period proved high acidity of fog water and high values of enrichment factors. The compounds NH_4^+, SO_4^{2-} and NO_3^- are the dominant species both in fog water and in precipitation.

In order to collect cloud water samples, the active and passive sample-taking devices were constructed. Besides the collectors, as described in literature, both passive and active fog water collectors of the new design were developed and installed at the selected localities.