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Precipitation Chemistry in the Bulgaria-Turkey Cross – Border Region for Different Synoptic Situations

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The first joint study on chemical composition of precipitation in the cross border area Bulgaria –Turkey, was carried out in 2014 in the framework of the EU co-funded project SAAP4FUTURE (saap4future.ecobg.org). The area is known for its natural parks and protected areas. Project's activities included field campaigns for collection of dry, wet and bulk deposition at four sites (Burgas, Ahtopol, Kirklareli and Kaynarca), pH-analysis of precipitations, chemical analysis for main anions, cations and heavy metals, and air pollution modelling with WRF-CMAQ.

Typical for the area weather conditions were classified in view of their potential for air pollution. Favourable meteorological situations occur when the region is in the rear part of a vast mature anticyclone with low baric gradient; the situation lasts several days and is typical for November.

The precipitations' acidity is from alkaline at Kirklareli and Kaynarca towards neutral in Burgas, and slightly acidic in Ahtopol. An analysis of selected periods with precipitation of various pH values is made using synoptic maps, local observations, satellite images and back trajectory calculations. For the periods of 'dry samples' at the coastal site of Ahtopol wind profile sodar data were also used. The processes determining the flows and the precipitation chemistry in the cross border region are complex –result of the interaction of atmospheric processes at different horizontal scales taking place over a highly variable landscape. Our preliminary analysis indicates that the alkaline character of precipitations at the Bulgarian sites is related to flows from East, while acid precipitations occur mainly with northerly and westerly flows.

The chemical analysis of 226 samples shows that there are no deviations in the content of heavy metals from commonly reported values in Europe. For Kirklareli and Kaynarca dominant in wet samples are Mn, Fe and Cu; for Burgas and Ahtopol – Fe, Cu and Zn.