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The relation between potential fog water collection and meteorological variables

Carlos M. Regalado (1) and Axel Ritter (2)

(1) Instituto Canario de Investigaciones Agrarias (ICIA), Dep. Soils and Irrigation, Tenerife, Spain (cregalad@icia.es), (2) Universidad de La Laguna, Área de Ingeniería Agroforestal, Ctra. Geneto, 2, La Laguna, 38200 Tenerife

Among the many techniques available for characterizing the dynamics of wind-driven fogs and their associated water contribution, fog gauges remain as one of the simplest instruments extensively used. However, one of their limitations is the dependence of fog water yields on the specific design of the artificial collector (geometry, textile characteristics, topology of the fabric), which are not standardized, and thus comparisons between different studies are problematic. One way to circumvent the above discussed shortcomings may be to relate the gauge's water yields with some of the atmospheric variables they presumably depend on, and thus make estimates of fog water collection independent of the particularities of the type of artificial device used. We provide here a method for estimating potential fog water collection (FWCp) from concomitant continuous records of visibility (v) and wind speed (u), at two fog-affected sites in Tenerife (Canary Islands, Spain). One is located within the Anaga Massif forest Park, UNESCO Biosphere Reserve, and vegetation is typical of windy crests hyperhumic laurisilva ecosystems. A second site, located at 1093 m a.s.l., is surrounded by wax myrtle-tree heath autochthonous vegetation. Various passive artificial fog catcher assemblies, wire-harps and screens with cylindrical geometry and uni- or omni-directional square flat gauges, were used for calibrating an empirical model of FWCp vs. u-v with good fitting performance ($0.762 \leq \text{NSE} \leq 0.921$; 0.063 l m-2 $\leq \text{RMSE} \leq 0.247$ l m-2). The method may be useful for characterization of locations for fog water exploitation, forest fog interception or potential cloud forest distribution. The proposed technique may be promising at predicting potential fog water yields both locally, from records provided by ground meteorological stations, but also at larger scales, using data retrieved from satellites, displayed networks of microwave wireless communication systems.