Monitoring runoff and sediment production in forests affected by the Vaia Storm

Andrea Andreoli\*, Alessio Rozzoni, Enrico Tomelleri, Francesco Comiti

Free University of Bozen-Bolzano, Faculty of Science and Technology, Piazza Università 5, phone +39 0471 017171, andrea.andreoli@unibz.it

**Keywords.** Vaia Storm, runoff, sediment production, forest recovery.

**Abstract.** The Vaia Storm hit the northeast of Italy on October 28th, 2018, causing severe damage to mountain forest ecosystems, mainly in subalpine Norway spruce forests. As a result, about 42 million trees on an area of 41,000 hectares between Friuli Venezia Giulia, Lombardy, Trentino-Alto Adige and Veneto were blown down by wind with gust velocity above 200 km/h.

The current study was carried out in a damaged area and it aims to estimate the effects of management strategies after storm events on runoff and sediment production. The considered forest treatments were (1) salvage logging and natural regeneration, (2) no intervention, and (3) salvage logging and artificial regeneration.

The four experimental plots have an area of 27 m2 (4.5 m x 6 m) and are located on a 40% slope facing East, previously covered with subalpine spruce forest. The area of interest was affected by two windthrows in 2003 and 2018 (Vaia). The plots are located at about 1650 m asl. In these plots, we measured runoff and sediments from September 2020 to the present. Data collection season ranges from May to October depending on the course of the winter season, where snow cover and ice do not permit measurements. Water and sediments mobilized in the experimental plots are convoyed in a 1 m3 tank where the content is weighted by a load cell, and a pressure transducer records the water level. An in-situ radar rain gauge measures cumulative precipitation and intensity.

Sediments samples were collected twice a year, dried and sieved to obtain the percentage of organic material and the texture of the eroded soil.

The first results showed a contrasting behaviour in terms of runoff/sediment production between the four plots upon the occurrence of an intense precipitation event. The differences could be explained by the time passed after the windthrow, and the different forest treatments applied. However, we noticed that under certain conditions, such as high intensity and short precipitation duration or vice versa, runoff and sediment production tend to be equivalent in the four plots. We will keep monitoring the succession dynamics in the experimental plots and the effects on runoff and sediment production for the years to come to gain further insights into the involved processes.