



Weather types during large forest fires in Croatia

Tomislava Hojsak (1), Marija Mokoric (2), and Tomislav Kozaric (3)

(1) Meteorological and Hydrological Service, Zagreb, Croatia (hojsak@cirus.dhz.hr), (2) Meteorological and Hydrological Service, Zagreb, Croatia (mokoric@cirus.dhz.hr), (3) Meteorological and Hydrological Service, Zagreb, Croatia (kozaric@cirus.dhz.hr)

Forest fires on Croatian coast are frequent during the warm part of the year. Their frequency depends on climatic and meteorological conditions, favoring low precipitation, high temperature and strong wind.

Fires can become very large during dry weather with strong winds accompanied by shear or the instability in a dry air mass (e.g. increased turbulence in the planetary boundary layer). Such weather conditions are associated with certain synoptic situations. Considering the size of Croatia, as well as relatively dense urban areas in proximity of forest, fires with a burned area of 400 ha or greater are considered to be large and dangerous.

In the fire seasons (from June to September) between 1996 and 2017, 80 large forest fires with burnt areas exceeding 400 ha were recorded.

An analysis of meteorological fire danger classes, calculated according to the Canadian method has shown that in the event of large fires the fire danger was mostly large or very large.

Also the relation of synoptic situations and large fires has been sought, and five most common weather types were detected. The types are: passing of the cold front with the strengthening of the ridge (Type 1), the passing of the cold front (Type 2), the non-gradient field with the presence of instability in dry air (Type 3), dry jugo wind situation (Type 4), and strengthening of the anticyclone from the north and northeast of Europe (Type 5). Types 1 and 5 are characterized by increased wind, wind shear and dynamically generated turbulence, while type 3 is characterized by thermally generated air turbulence.

In the analyzed period, the most frequent types were: Type 5 in 23% of the situations, Type 1 also in 23% of the situations and Type 3 in 26% of situations with large fires.

Most of the fires detected (24) occurred during Type 1, and relative to the frequency of the weather types most of the major fires occurred during Type 2 (3 fires per situation).

According to the classes of burnt surface most of the fires (50%) belong to a class of up to 1000 ha burned surface, followed by a class with burned surface greater than 2000 ha (30%), the remaining 20% belong to the classes 1000 to 2000 ha of burned surface. During all fires Types 1, 3 and 5 were most common. Types 3 and 5 dominate the class of the smaller fires, and type 1 the class of the larger fires.

The goal of these analyses was to identify hazardous weather conditions that can cause unpredictable fire behavior. The determination of weather types will enable faster identification of danger and ensure the issuing of differentiated warnings for extreme fire behavior.

Key words: forest fires, meteorological conditions, weather type