Europe's flash floods in a changing climate

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Flash floods

Definition

What is a Flash Flood?

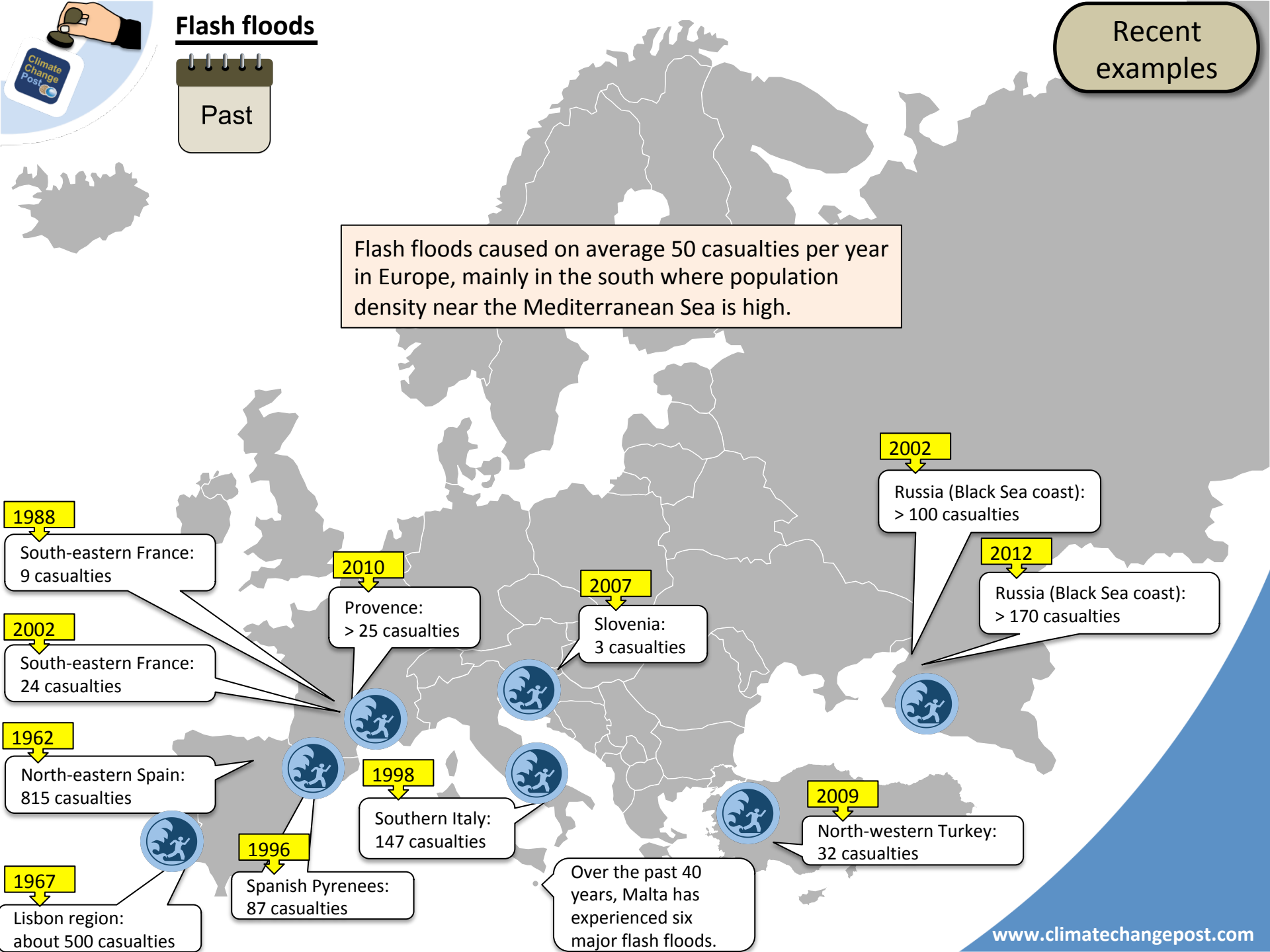
- A flash flood is usually defined as a sudden flood in a small catchment area (usually less than 1000 km^2), occurring within 6 hours or less of the causative event (heavy rain, dam break, levee failure, rapid snowmelt or glacier-outburst flood).
- Flash floods are usually caused by heavy rainfall and often occur within 2 hours of the start of high intensity rainfall.

Flash floods

Past

Recent examples

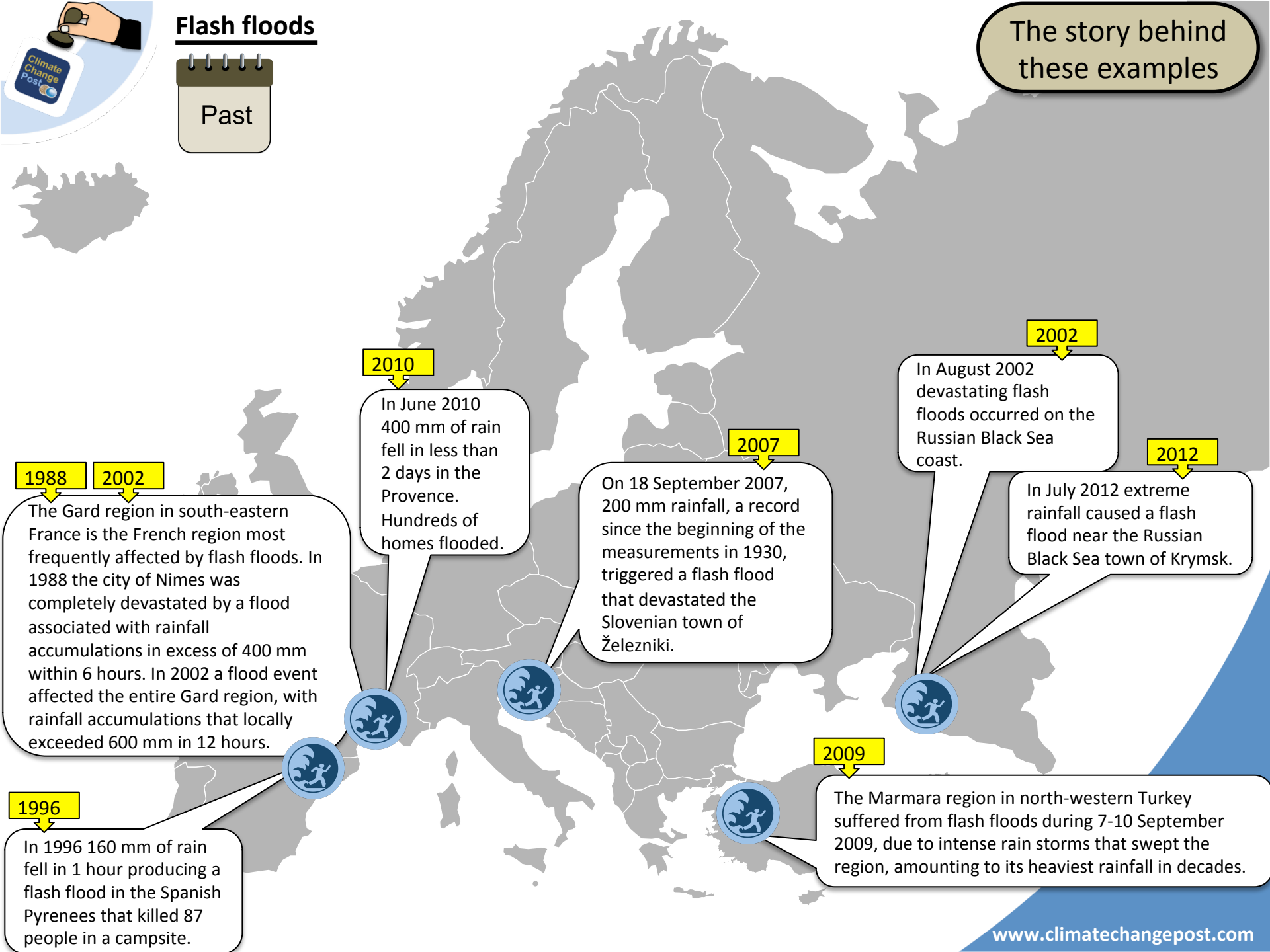
Flash floods caused on average 50 casualties per year in Europe, mainly in the south where population density near the Mediterranean Sea is high.



Flash floods

Past

The story behind these examples



Flash floods

Present

Mediterranean prone to flash floods

The Mediterranean region is prone to flash floods, especially in the northwest, where littoral and pre-littoral mountain chains favour not only torrential rain concentrated in small catchments, but also heavy rainfall. Rainfall during the summer-autumn period is the most important cause of flash floods in the Mediterranean region.

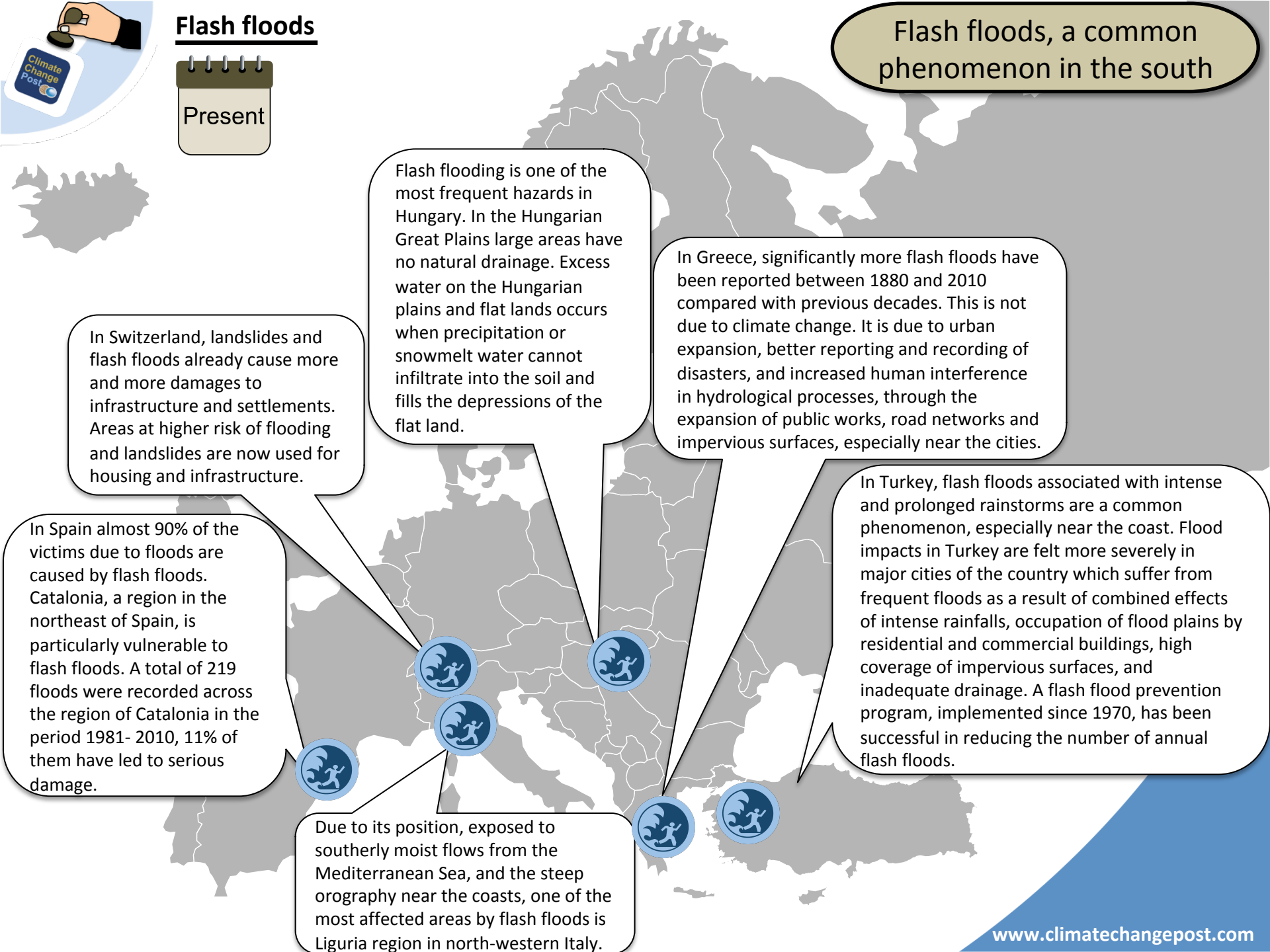
This problem is aggravated in the summer, when some villages near the sea can go from a population of less than 1000 inhabitants to over 100,000 inhabitants. The latter affects the character of these flash floods, turning them from ‘‘ordinary or small floods” into ‘‘extraordinary or intermediate floods”.

Catalonia, in the northeast of Spain, is particularly vulnerable. The number of extraordinary flash flood events in this region shows an increasing trend since 1900. This was related to an increase of heavy, more concentrated rainfall events, and an increase of exposition and vulnerability to flash floods, as the population density in flash flood prone areas has increased considerably.

Flash floods

Present

Flash floods, a common phenomenon in the south



Flash flooding is one of the most frequent hazards in Hungary. In the Hungarian Great Plains large areas have no natural drainage. Excess water on the Hungarian plains and flat lands occurs when precipitation or snowmelt water cannot infiltrate into the soil and fills the depressions of the flat land.

In Switzerland, landslides and flash floods already cause more and more damages to infrastructure and settlements. Areas at higher risk of flooding and landslides are now used for housing and infrastructure.

In Greece, significantly more flash floods have been reported between 1880 and 2010 compared with previous decades. This is not due to climate change. It is due to urban expansion, better reporting and recording of disasters, and increased human interference in hydrological processes, through the expansion of public works, road networks and impervious surfaces, especially near the cities.

In Spain almost 90% of the victims due to floods are caused by flash floods. Catalonia, a region in the northeast of Spain, is particularly vulnerable to flash floods. A total of 219 floods were recorded across the region of Catalonia in the period 1981- 2010, 11% of them have led to serious damage.

In Turkey, flash floods associated with intense and prolonged rainstorms are a common phenomenon, especially near the coast. Flood impacts in Turkey are felt more severely in major cities of the country which suffer from frequent floods as a result of combined effects of intense rainfalls, occupation of flood plains by residential and commercial buildings, high coverage of impervious surfaces, and inadequate drainage. A flash flood prevention program, implemented since 1970, has been successful in reducing the number of annual flash floods.

Due to its position, exposed to southerly moist flows from the Mediterranean Sea, and the steep orography near the coasts, one of the most affected areas by flash floods is Liguria region in north-western Italy.

Flash floods

2050

Flash floods, a common phenomenon in the south

Decrease flood magnitude

The impacts of a +2°C global warming on flash floods due to daily rainfall extremes indicate a clear North to South gradient: a strong increase in flood magnitudes in the South, except for some regions in Bulgaria, Czech Republic, Poland, the western Balkans, the Baltic countries, and southern Spain where no significant changes can be detected; a relatively strong decrease in flood magnitude in parts of Finland, NW Russia and North of Sweden with the exception of southern Sweden and some coastal areas in Norway where increases in floods are projected.

An increase in intensive short-term precipitation in most of Europe is likely to lead to an increased risk of flash floods, particularly in the Mediterranean and eastern Europe. The flood risk from climate change could be magnified by an increasing impermeable surface due to urbanization, and the destruction of the vegetation cover and the alteration of the soil by forest fire.

Increase flood magnitude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