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## EXTREME RAINFALL IN COASTAL METROPOLITAN AREAS OF CENTRAL ITALY: ROME AND PESCARA CASE STUDIES

**ABSTRACT:** BRAMATI M.C., TARRAGONI C., DAVOLI L. & RAFFI R., *Extreme rainfall in coastal metropolitan areas of Central Italy: Rome and Pescara case studies*. (IT ISSN 0391-9838, 2014).

This study analyzes the historical series of precipitation fallen along Latian coast and Abruzzo coast, and extreme rainfall in the context of climate change. Daily precipitation data cover the years ranging from 1922 to 2009 for one meteorological station, and from 1951 to 2010 for five stations. We focus on the extreme values following two approaches: the first one is based on the maximum annual daily rainfall series (1-day, 2-day and 3-day) for which suitable probability distributions are fitted. The second one is based on the series of peaks over annual thresholds (POT) for which the best fitting distribution is identified. The aim of this analysis is to estimate rainfall return levels for various return periods. This is particularly helpful to the Local Administration for the urban planning and for alerting residents in metropolitan areas.

**KEY WORDS:** Extreme rainfall, Homogeneity test, Return level, Long-Term climatic time series, Metropolitan area.

**RIASSUNTO:** BRAMATI M.C., TARRAGONI C., DAVOLI L. & RAFFI R., *Pioggie intense in aree costiere metropolitane dell'Italia centrale: i casi di studio di Roma e Pescara*. (IT ISSN 0391-9838, 2014).

Nel presente lavoro sono state analizzate serie storiche di precipitazione verificatesi lungo la costa del Lazio e dell'Abruzzo e valutate le precipitazioni intense, alla luce dei cambiamenti climatici in atto. I dati giornalieri sono relativi ad un intervallo compreso tra il 1922 e il 2009 per la stazione del Collegio Romano (Roma) e tra il 1951 e il 2010 per altre cinque stazioni meteorologiche (Civitavecchia, Ostia, Ardea, Pescara, Ortona). Le indagini hanno riguardato i valori estremi di precipitazione articolati secondo due metodologie. Il primo metodo è basato sulla serie delle piogge giornaliere massime annuali di durata da uno a tre giorni consecutivi. Il secondo metodo è basato sulla serie dei valori che superano il li-

mite annuale del 95° percentile. Scopo del lavoro è stato quello di verificare la presenza di un *trend* delle piogge intense, di stimarne i tempi di ritorno a breve e medio termine, di stimare la diversa intensità delle piogge sulle aree metropolitane di Roma e Pescara e di fornire un utile strumento di allerta e pianificazione per le amministrazioni locali.

**PAROLE CHIAVE:** Pioggie intense, Test di omogeneità, Tempi di ritorno, Serie climatiche di lungo periodo, Area metropolitana.

### 1. INTRODUCTION

The relationship between extreme rainfall, climate changes and the damaging effects that such events can produce, is a problem not yet completely clarified by scientists. Societal impacts from weather and climate extremes, and trends in those impacts are a function of both climate and society (Chagnon & alii, 2000). In particular damages induced by floods and the increase in damage is strongly associated with the increased of heavy precipitation, population and wealth (Peterson & alii, 1998).

Other studies have concluded that over many large regions (eastern parts of north and south America, northern Europe, northern and central Asia), precipitation increased significantly. Drought has been evidenced in Sahel, the Mediterranean basin, southern Africa, and parts of southern Asia (Hess & alii, 1995; Regione Lazio, 2011; Hamilton & alii, 2001; Boyles & Raman, 2003; Liu & alii, 2009; Lebel & Ali, 2009).

The Mediterranean area is on the whole not particularly rainy with semi-arid southern parts. It is dominated by a regular aridity during summer and recurrent periods of drought or extreme precipitation during the rainy season (Droguedroit & Norrant, 2003). Several studies have contributed to the analysis of precipitation variability over the Mediterranean basin. Results from these studies show a precipitation decrease, not always significant, or the lack of linear trend (Brunetti & alii, 2006; Gonzales & alii, 2011). In particular, precipitation decrease is evident dur-

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