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A Basin-scale Spatial Distribution of Probable Maximum Precipitation for the Yodo River Basin, Japan.

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Probable maximum precipitation (PMP) is one of the keys for the designing of probable maximum flood (PMF) and flood disaster management. The objective of this paper is to present the PMP spatial distribution of the Yodo river basin. Rainfall data includes annual maximum 24-hour rainfall of 62 stations from 1881 to 2011. Return periods of possible extreme rainfalls are also presented for comparison. The Hershfield statistical method was used for the point PMP estimation, while spline interpolation method for the spatial distribution. The return periods of possible extreme rainfalls are based on the General extreme value (GEV) distribution function. The methodology is illustrated in Fig.1.

The PMP spatial distribution and 40-mm interval isohyetal lines for the Yodo river basin is presented in Fig.2(a). The highest PMP observed is around the Hikone and Shimogahara stations while the lowest is at the north side of Lake Biwa around Yanagase and Torahime. Generally these PMP distributions agrees with previous historical flood events. During flood events the Kizu river frequently has the largest maximum flow compared to Katsura and Uji rivers agreeing with the higher PMP estimates in areas near the upstream of Kizu river.

Soni, Shimogahara, Nabari, Ueno and Hikone have PMP values around 1000 mm. Fig.2(e) and Table 1 show the PMPs for Soni, Shimogahara and Nabari are close to the extreme rainfall with 4000 years return period estimated by the GEV distribution. However, Ueno and Hikone are closer to an extreme rainfall with much higher return periods (near to 18000 years). This is probably due to longer period of the data observed in both stations.

Generally, PMP spatial distribution will be useful as a background material in identifying areas with the highest possibility of extreme rainfall. Considering extreme rainfalls' return periods with PMP, decisions on management related to water related natural disasters on extreme cases can be made easier. Such studies are crucial for basins with high population which have significant impacts from extreme rainfall.

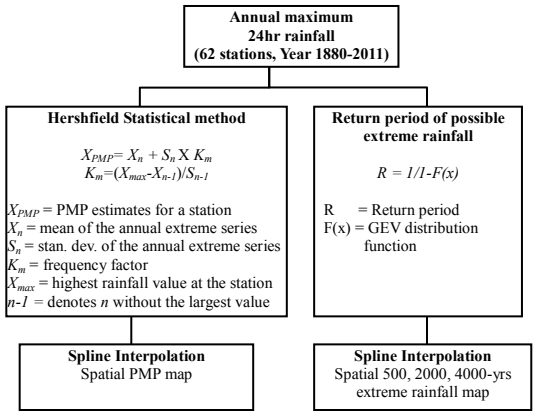

Fig.1

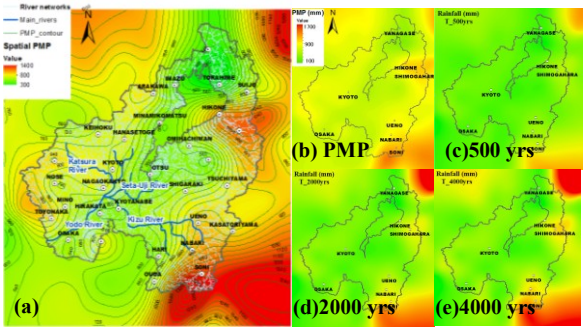

Fig.2

Table 1

Stations (Observed years)	Rainfall (mm) PMP	Xmax	Return Period (Years) Xmax	400 mm	800mm	1000mm
Soni (36)	1140	370	40	55	1237	3722
Shimogahara (32)	1060	341	61	109	1636	4048
Nabari (36)	910	295	71	194	1973	4180
Ueno (74)	881	286.7	76	302	6430	17886
Hikone (118)	1007	596.9	2282	464	7407	18247