

The Forecasting Model of Cuntan Flood Peak

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Abstract: By analyzing the Cuntan 08Z day flood peak stream volume in May-to-September 1991 to 2001 and analyzing relationship between the heavy rainfall in Sichuan Basin, the area rainfall volume of upper reach of Changjiang river and the Cuntan flood peak stream volume, we got that the strong signal of heavy rainfall before the Cuntan flood peak stream volume appearance and the meteorological forecasting model of Cuntan flood peak stream volume which is represented by various interval days of different Cuntan flood stream volume, different valley regional rainfall condition or represented by the different interval days around the first regional flood appearance and different valley regional rainfall condition. Combined with the meteorological numerical model we can forecast the occurrence time of the Cuntan flood peak.

1. Introduction

The upper reach of Yangzi River, complex in topography and rich in rivers, is often hit by floods and terrain disasters caused by torrential rain because of monsoon(Fig1). In order to predict floods earlier, a flood-peak-prediction model based on both meteorology and hydrology is necessary.**Strong signals of flood flow at Cuntan**

Large-scale torrential rain often causes a flood peak at Cuntan more than 30,000 cubic meters per second. the more-than-30,000 m³/s flow as the huge flood peak flow (HFPP) . Analysis of the locations of torrential rains in Sichuan and HFPP reveals the facts as follows:

(1) A large-scale torrential rain in Sichuan could pose a HFPP at Cuntan. That is to say, HFPP can be caused by a torrential rain over at least 2 parts (42/45) (Fig2) .

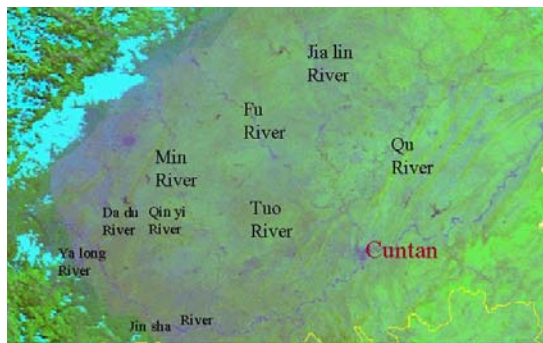


Fig 1 The river distribution in Sichuan Province

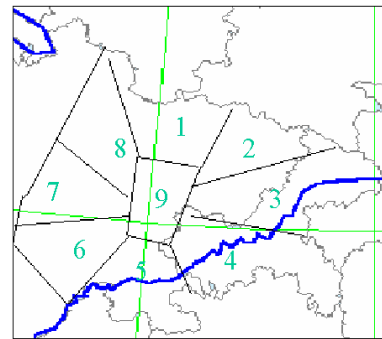


Fig 2 The divided parts in Sichuan basin

(2) The interval of two torrential rains leading to HFPP is normally less than 11 days.

(3) After a HFPP, even a small-scale torrential rain or a large-scale heavy rain could increase the flow at Cuntan.

(4) More than 13 days but less than 25 days after a HFPP, a large-scale torrential rain (at least dominating 4 parts), or at least 5 stations with day-rainfall over 100mm,

or two-days-on-end large-scale torrential rain could pose a HFPP at Cuntan. 25 days after, only a large-scale severe torrential rain or two comparable large-scale torrential rains can cause a huge flood flow at Cuntan.

(5) The torrential rain over the northwest-western-southwest of the Basin can pose a HFPP at Cuntan 3 or 4 days later (figure 3a), 2 days later over the west-southwest-central-south of the Basin (figure 3b), 3 days later in the northeast-central-east-north of the Basin (figure 3c) and 2 or 3 days in the area of northeast-southwest of the Basin (figure 3d).

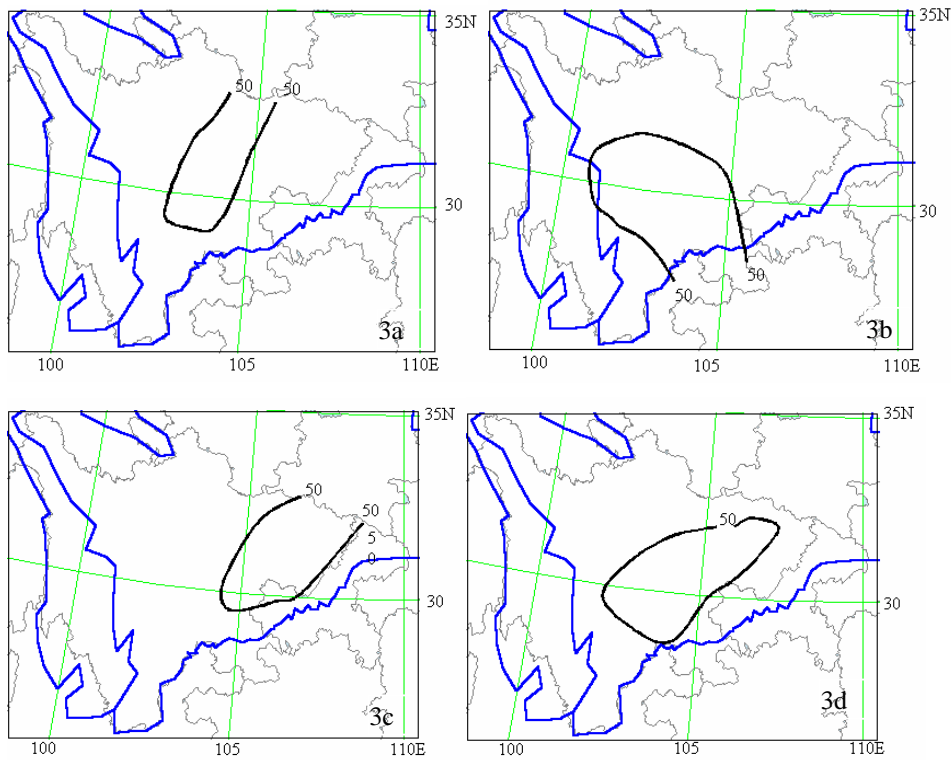
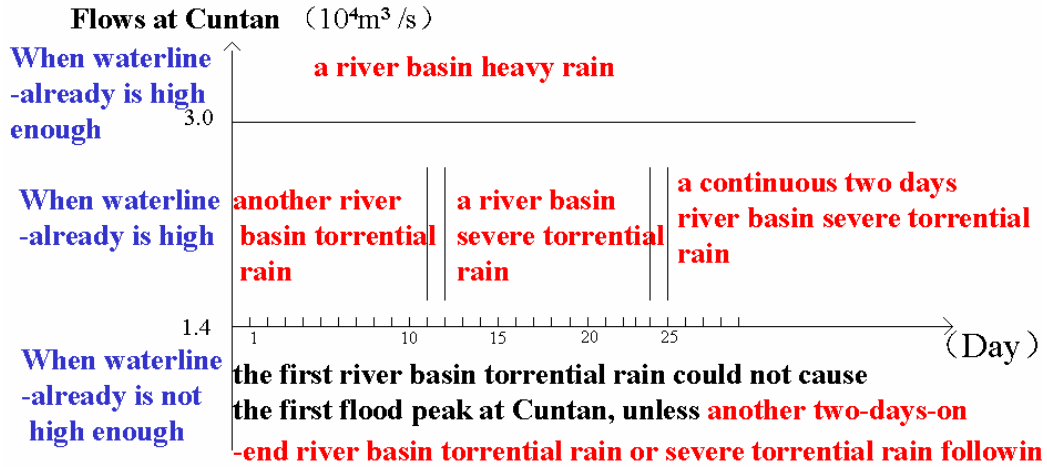


Fig 3 The different area of heavy storm rainfall distribution in Sichuan Province

3. Prediction model of flood peak flow at Cuntan

Analysis above demonstrates that both waterline-already in a river and river basin area rainfall are responsible for the flood peak flow at Cuntan. The HFPP at Cuntan prediction model are as follows:



4. Prediction of flood peak at Cuntan

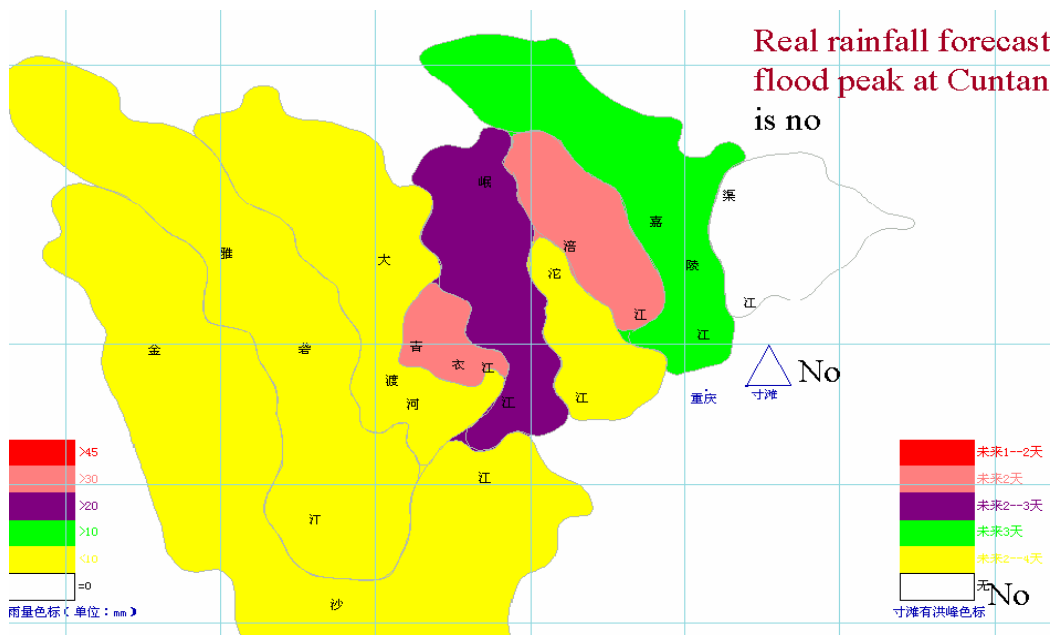
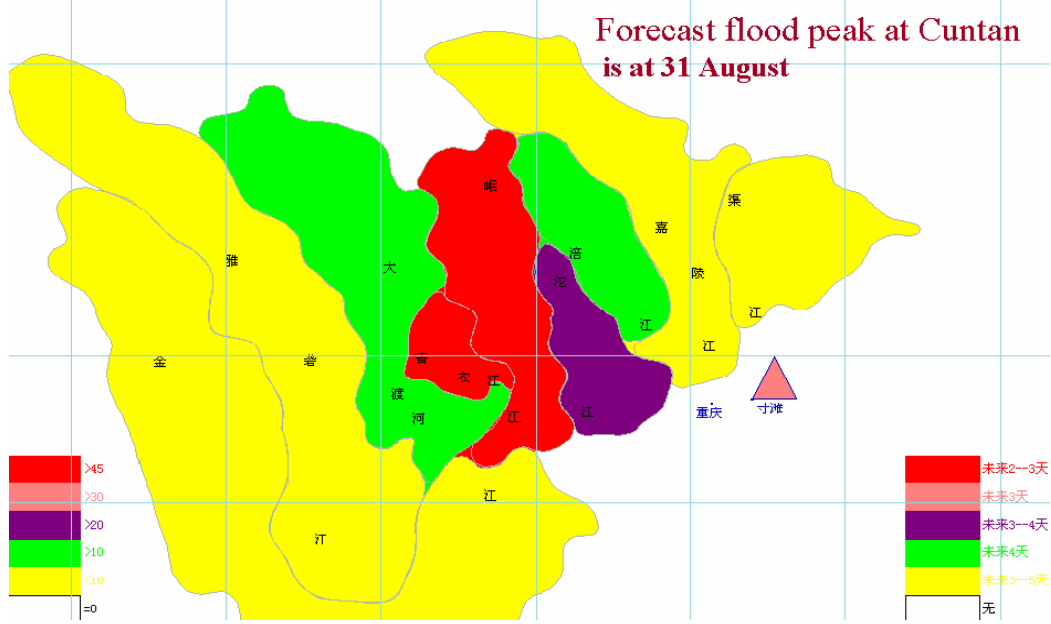
Combined with the ETA numerical model we can forecast the occurrence time of the Cuntan flood peak. Such as below

西南地区区域洪涝预报系统
查找资料与计算 面雨量计算 寸滩洪峰预测模型 实况流域洪涝、洪峰预警 预报流域洪涝、洪峰预警 清屏 说明 退出

Sample: 29 August 2003

寸滩洪峰03年08月29日预测模型		
洪峰及流域性暴雨	0—24小时预报	流量>=3.0万立方米/秒出现时
flood peak at Cuntan	Yes	Forecast at 31 August
流域性暴雨	有	

长江流域上游03年08月29日面雨量预报结果				
流域及站点代码	0-24小时预报	24-48小时预报	48-72小时预报	28-29日08时
金沙江	3	9999	9999	1
雅砻江	7	9999	9999	9
大渡河	19	9999	9999	7
青衣江	80	9999	9999	34
岷江	45	9999	9999	21
沱江	21	9999	9999	6
涪江	16	9999	9999	33
嘉陵江	4	9999	9999	17
渠江	8	9999	9999	0



5. Summary (1) Waterline-already in a river and torrential rain are two key factors to the flood in the upper reaches of Yangtze River, with any one indispensable.

(2) The location, size and intensity of torrential rain in Sichuan provide the prediction of flood peak at Cuntan with a strong signal.

(3) The prediction model of flood peak at Cuntan is presented by the flow at Cuntan, interval between two precipitation and river basin area rainfall. It can also describe with interval and river basin area rainfall about the first present of flood peak at Cuntan.