



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Eidgenössisches Departement für
Umwelt, Verkehr, Energie und Kommunikation UVEK

Bundesamt für Umwelt BAFU
Abteilung Hydrologie

La gestion des eaux en Chine en situation de crue – l'exemple du Yangtzé

Bruno Schädler
Association Vaud – Shaanxi/Chine
6 juin 2007, Lausanne





Plan

- Ressources en eau en Chine
- Les crues du Yangtzé
- Mesures contre les inondations
- Le projet sino – suisse



Yuliang barrage au Lianjiang (6ème siècle)





Ressources en eau

	Chine	Suisse
Précipitations	600 mm/a	1500 mm/a
Ressources en eau par habitant	295 mm/a 2830 km ³ /a 2175 m ³ /h/a	990 mm/a 40 km ³ /a 5333 m ³ /h/a

Limite de pénurie en eau: 2000 m³/h/a

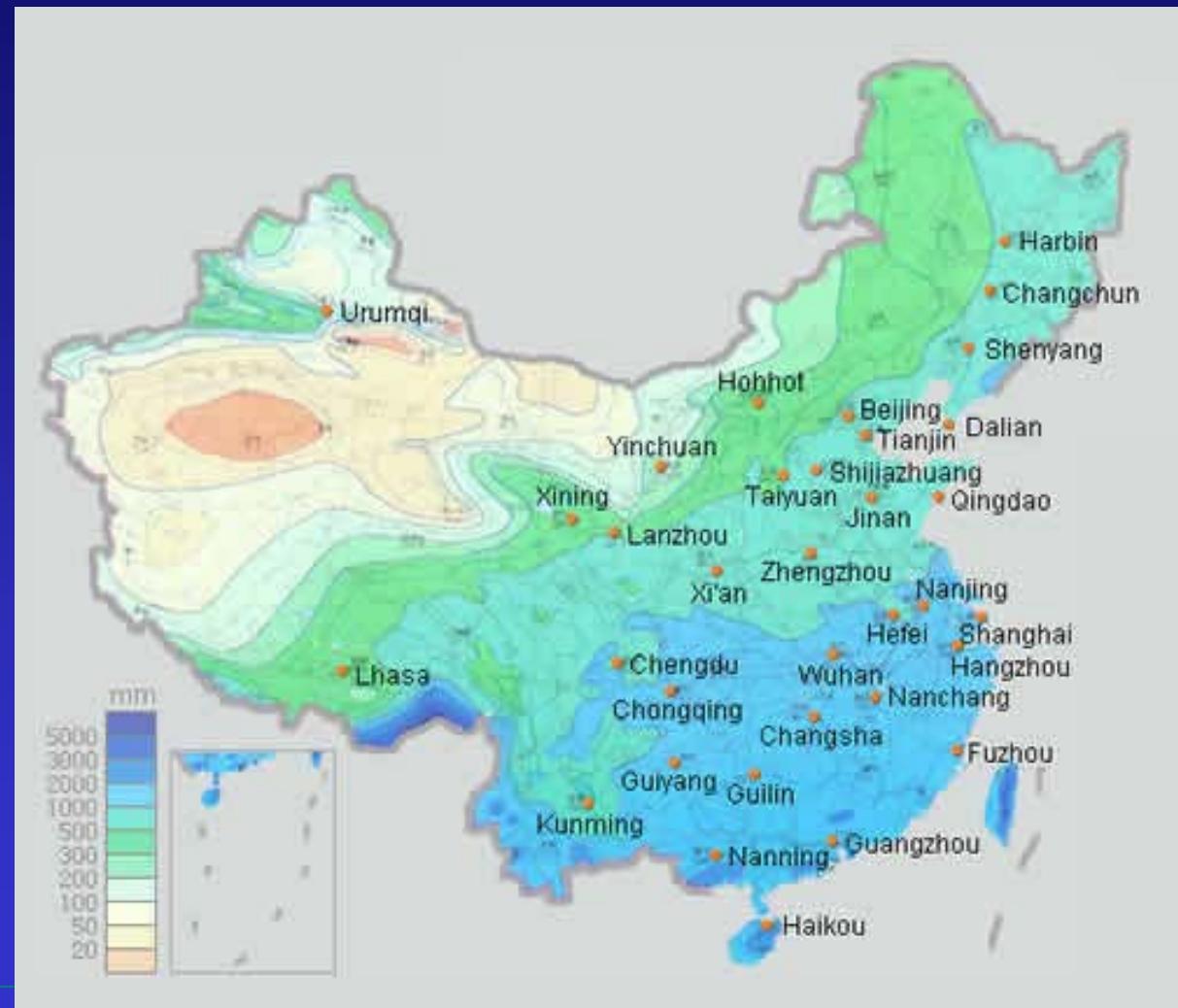


Floods and droughts in China

The Monsoon location
+ Topography result
in dry winter & wet
summer over the
mainland of China.

Floods caused by
- storms 80%
- Typhoons 20%

**7-8 Typhoons landing
per year, max 12.**



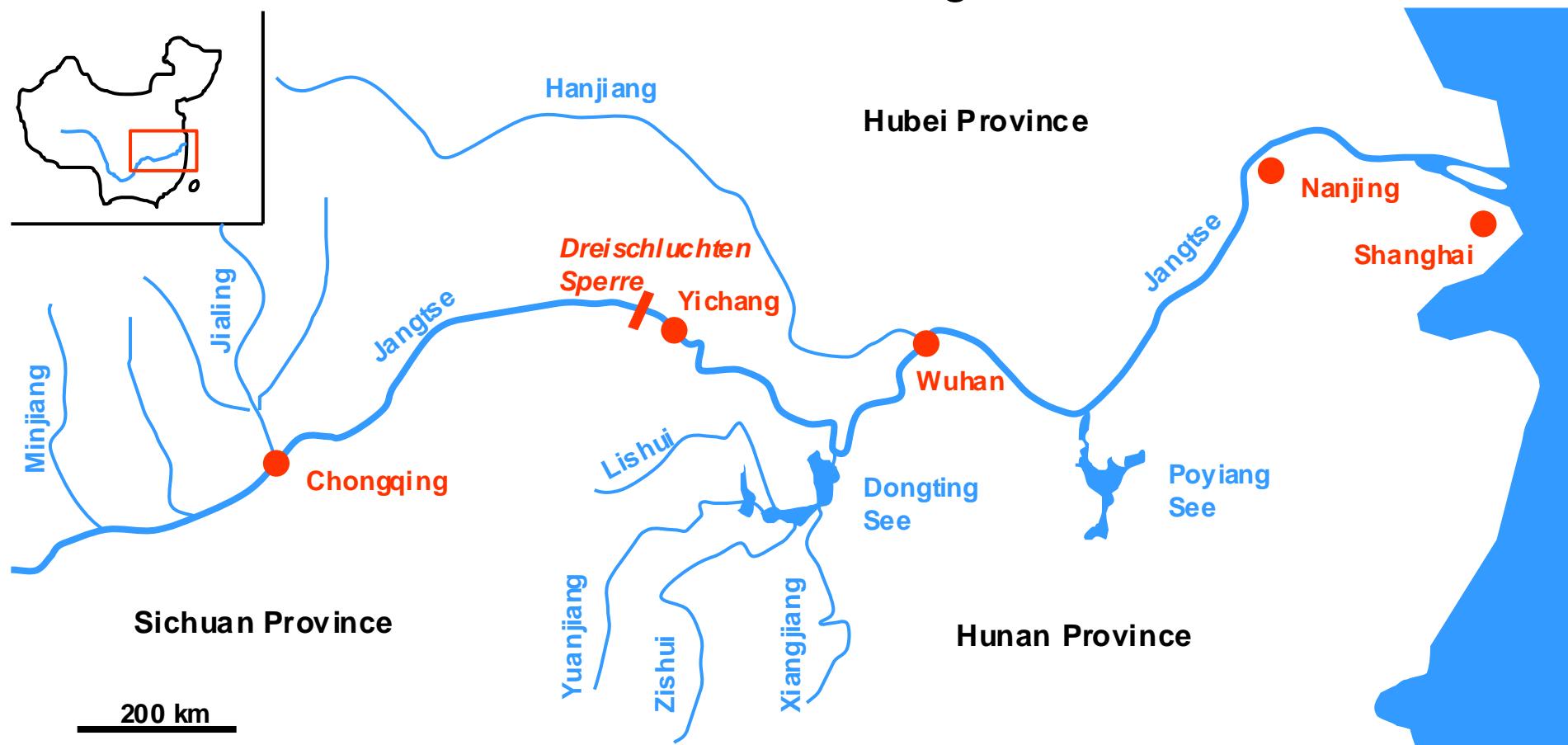






Bassin versant du Yangtze

Bassin versant: 1'800'000 km², longueur: 6300 km,
MQ 31'000 m³/s, (été: env. 50'000, hiver: env. 3'000)
HHQ env. 130'000 m³/s,
habitants: 400 Mio., surfaces agricoles 25 Mio. ha





septembre 2003

mars 2004



Niveau d'eau mars 2004: env. 13.5 m s. m

Niveau d'eau automne 2003: env. 20.5 m

Niveau d'eau crue 1998: 29.43 m

Niveau d'eau crue 1954: 29.73 m

Digue actuelle: 29.93 m

Flood in China

Wuhan



大船若蛙半浮水面，小船如蚁漂流四海

1931 Flood in Yangtze River: 51 million people disastrous affected,
More than 400 thousands died, and 28% of national plowland was flooded.



Mesures contre les inondations

1. Mesures structurelles

- Endiguement
- Bassin de rétentions naturel ou artificiel

2. Mesures non structurelles

- Espace suffisant réservé aux cours d'eaux
- Aménagement du territoire: éviter de construire dans les zones de danger potentiel
- Gestion des crues
- Alertes
- Prévisions
- Préparer les moyens d'intervention



FLOOD CONTROL LAW OF THE PEOPLE'S REPUBLIC OF CHINA

Article 2 The work for flood control shall observe the principles of unified planning, overall consideration, focusing on prevention, integrated measures for treatment and subordinating local interests to general interests.

Article 22 The use of land and shore lines within the scope of control for any river course or lake should conform to the requirements for flood discharge and water flow.

Within the scope of control for any river course or lake it is prohibited to construct buildings or structures impeding flood discharge, dump garbage and waste residues or engage in activities affecting the stability of river flows, harming the safety of banks and embankments or other activities impeding flood discharge in river courses.

It is prohibited to plant trees or long-stalk crops impeding flood discharge in river courses used for flood discharge.

...



首届长江论坛

The First Yangtze Forum

Sponsors:

下江与洞庭
The Yangtze River and Dongting Lake

维护健康长江 促进人水和谐

第二届长江论坛

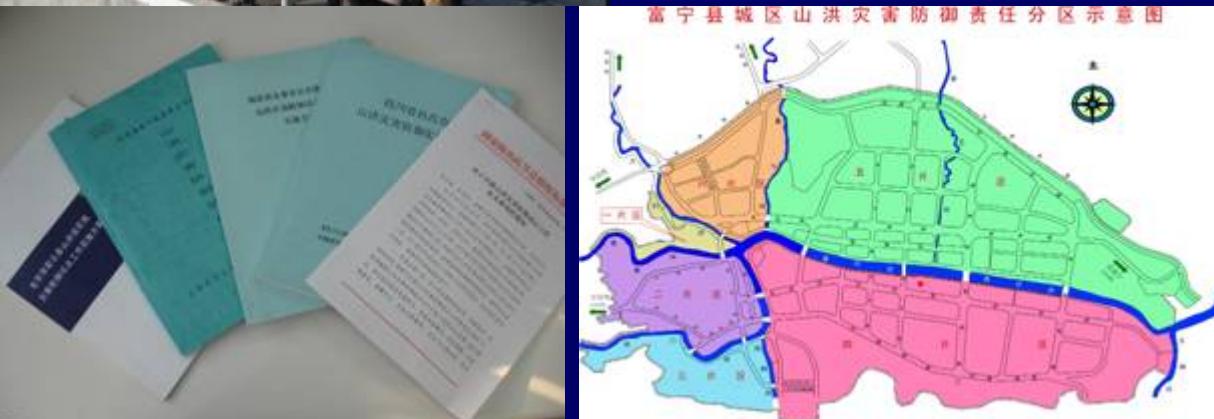
The Second Yangtze Forum

主办单位: 湖南省人民政府
Organizer: Hunan Provincial People's Government

协办单位: 长江水利委员会
Co-organizer: Changjiang Water Resources Commission

中国·长沙 二〇〇七年四月
Changsha, China, April 2007







Le barrage des Trois Gorges - un réservoir à fins multiples

- Contrôle des crues (réception, 10 ans → 100 ans)
- Production d'électricité (85 TWh/ans)
- Augmentation des eaux basses (navigation bateaux de 10'000 tonnes, irrigation)
- BV: 1'000'000 km², MQ: 14'500 m³/s
- Longueur: 2300 m
- Hauteur: 120 m (altitude 185/175 resp. env. 64 m s.m.)
- Réservoir: 600 km, 1084 km²
- Volume: 39 km³ (inclus 22 km³ volume de rétention en été)
- Évacuateur de crue: 110'000 m³/s







平移大业 唐山第一

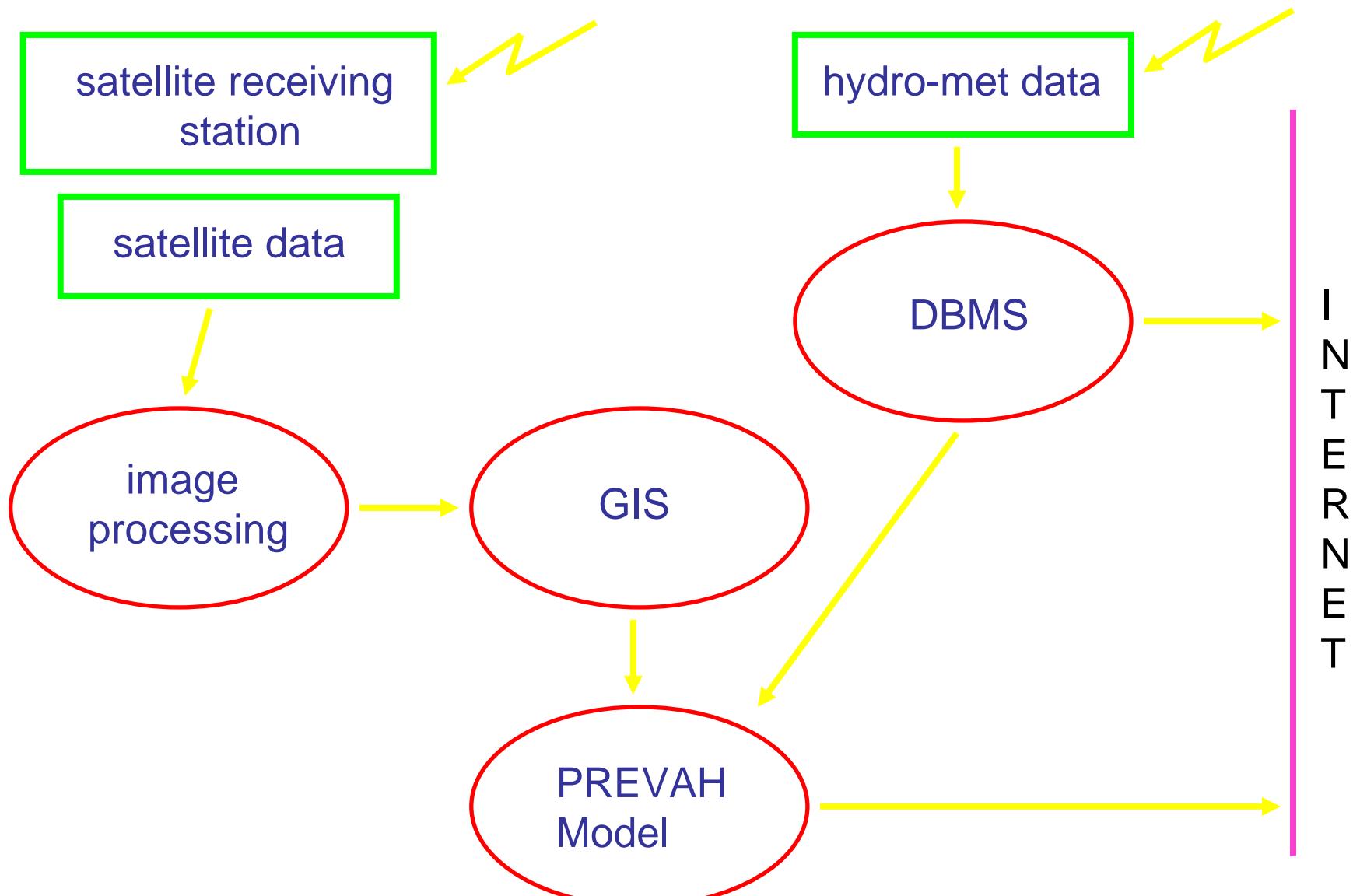
平移大业

DFEN





Forecasting Work Flow

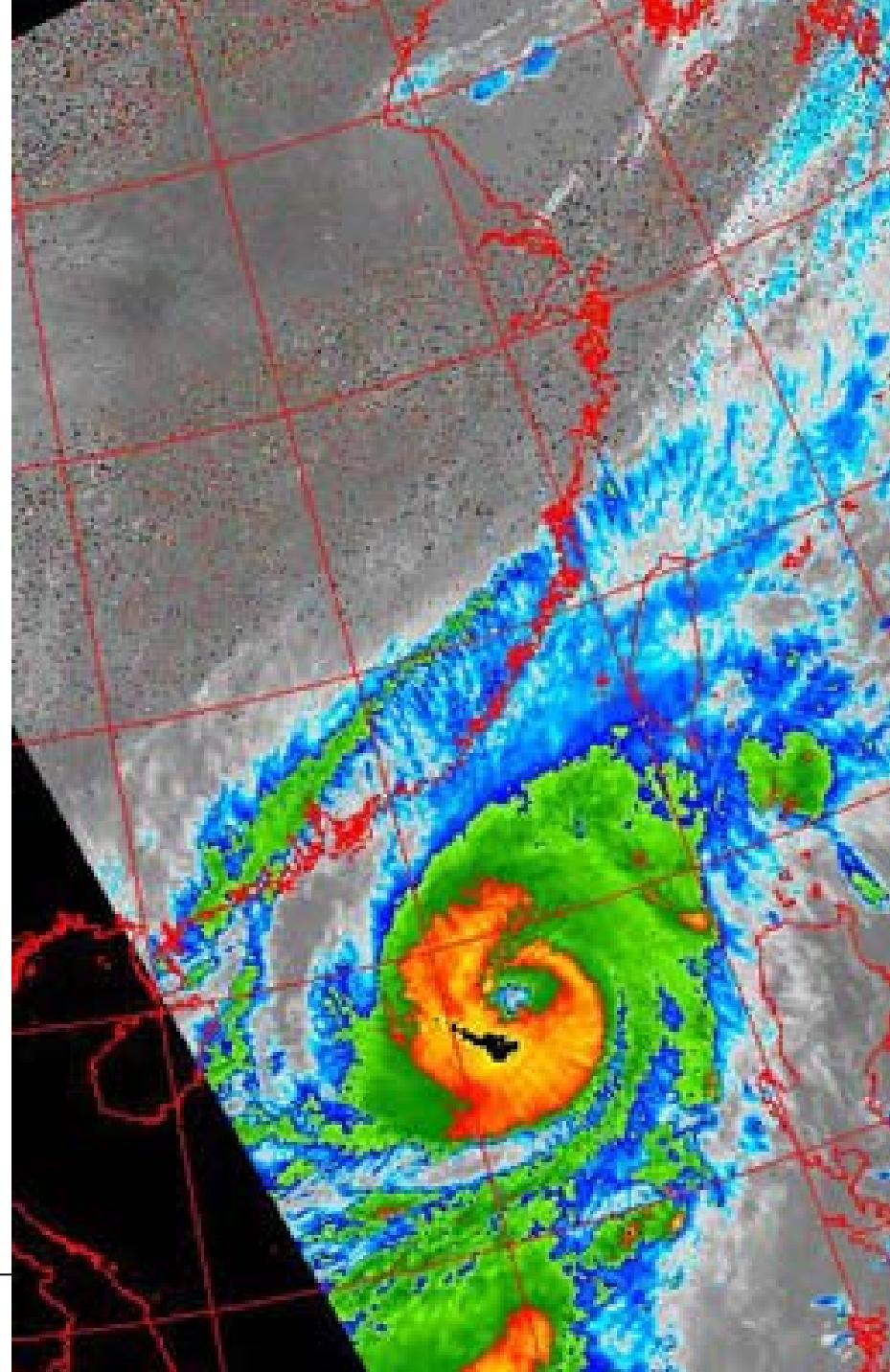


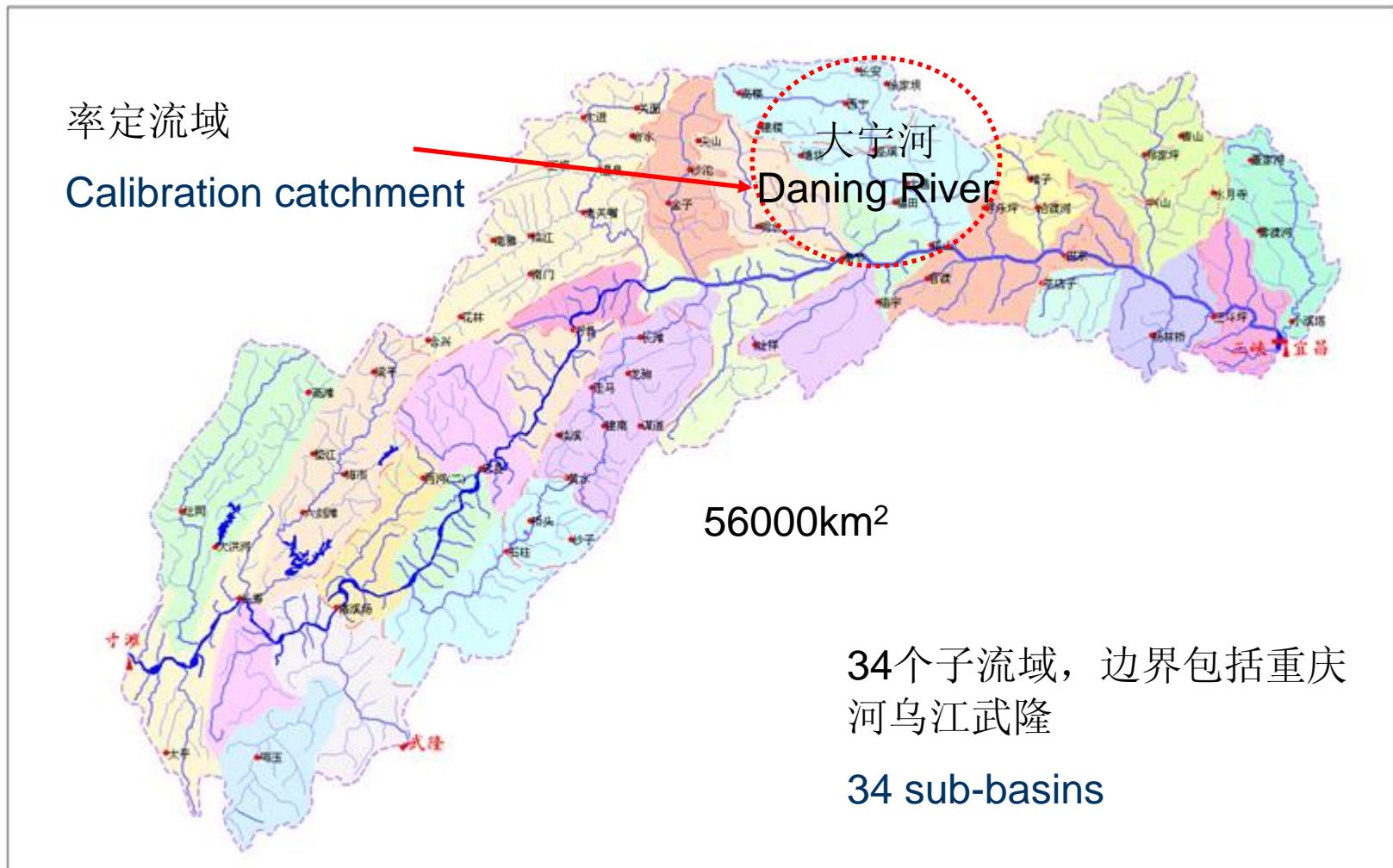




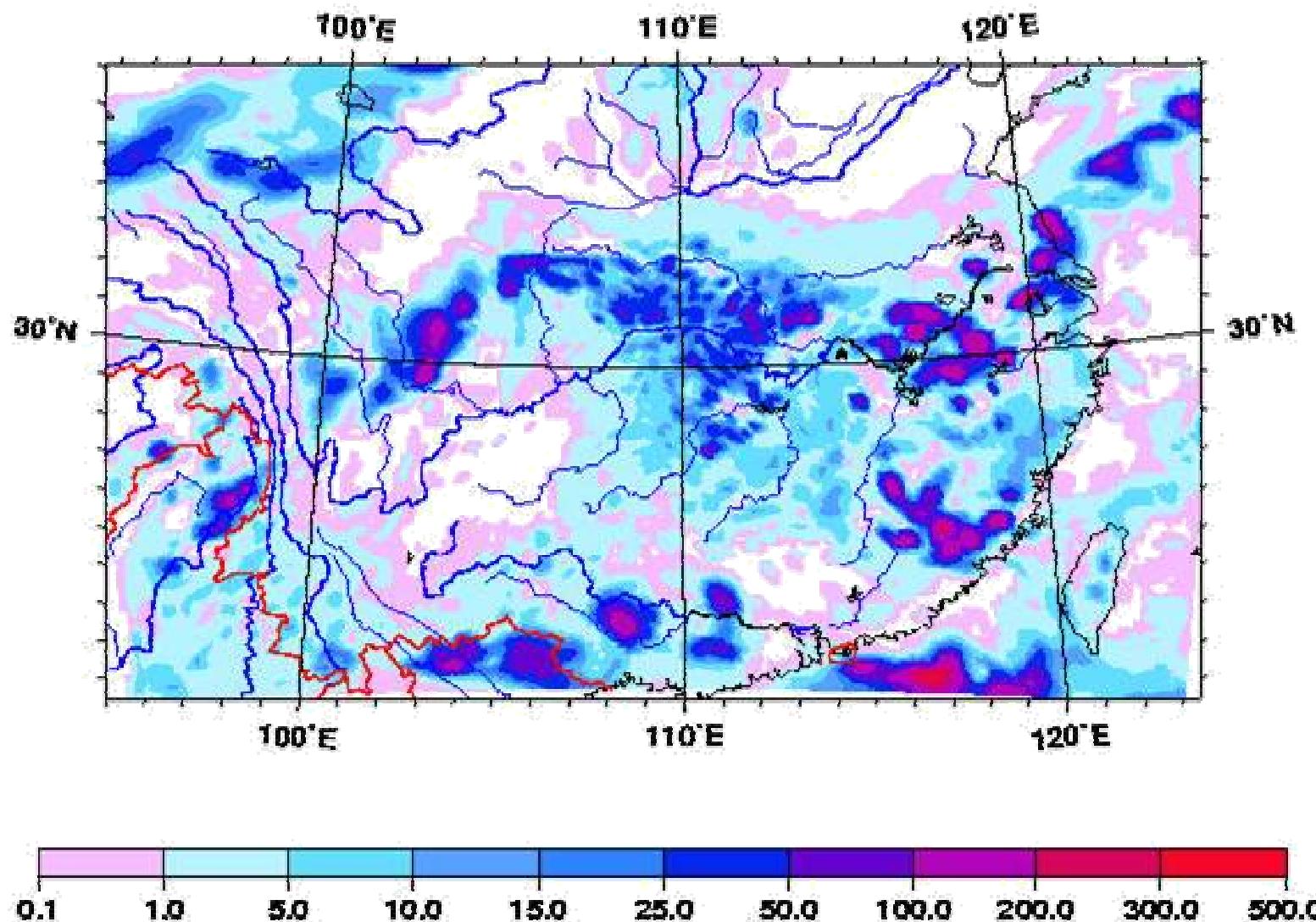


**1.11.2006
NOAA-18**





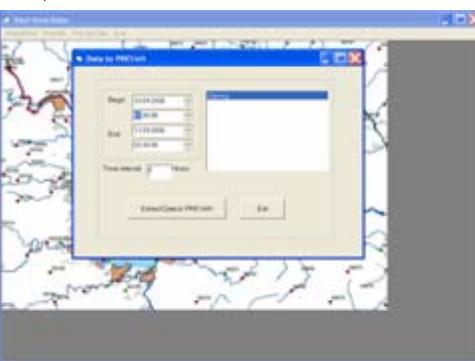
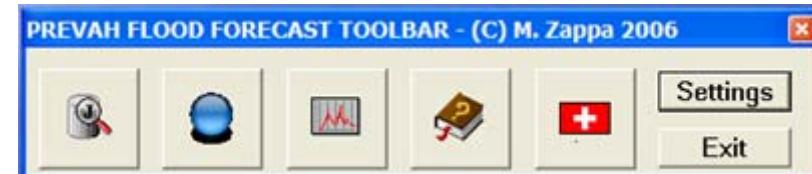
定量降雨旋预 Quantitative Precipitation Forecast



模型构架 Model structure

三峡水文模型PREVAH 界面

Three Gorges Area - Operational application of PREVAH



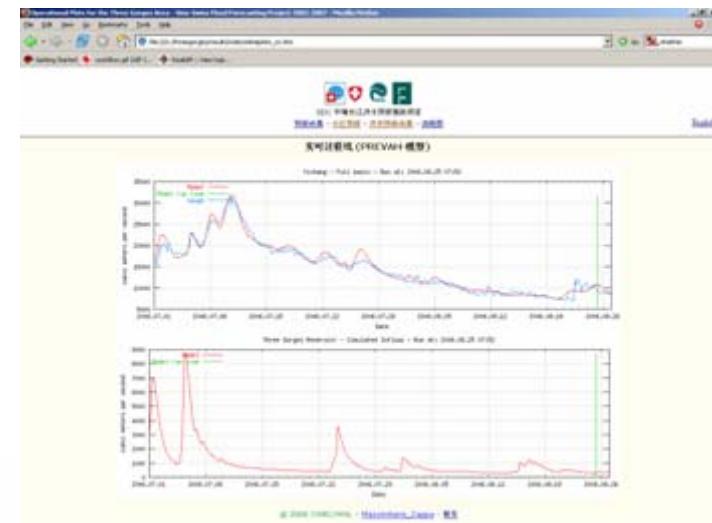
从长江委数据库取数据

Data extraction from CWRC Database & hourly precipitation and runoff data

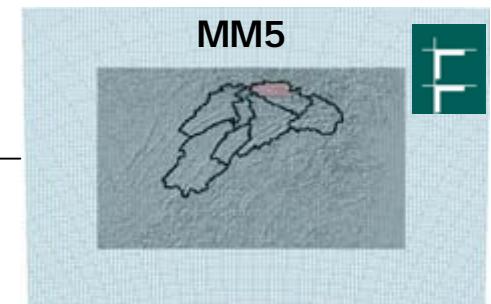


34个子流域水文模拟

Operational simulation for the 34 sub-basins and automatic coupling with MM5



结果显示 Visualization



MM5 72小时降雨数值预报 ASCII formatted 72 hour forecasts on ftp-server



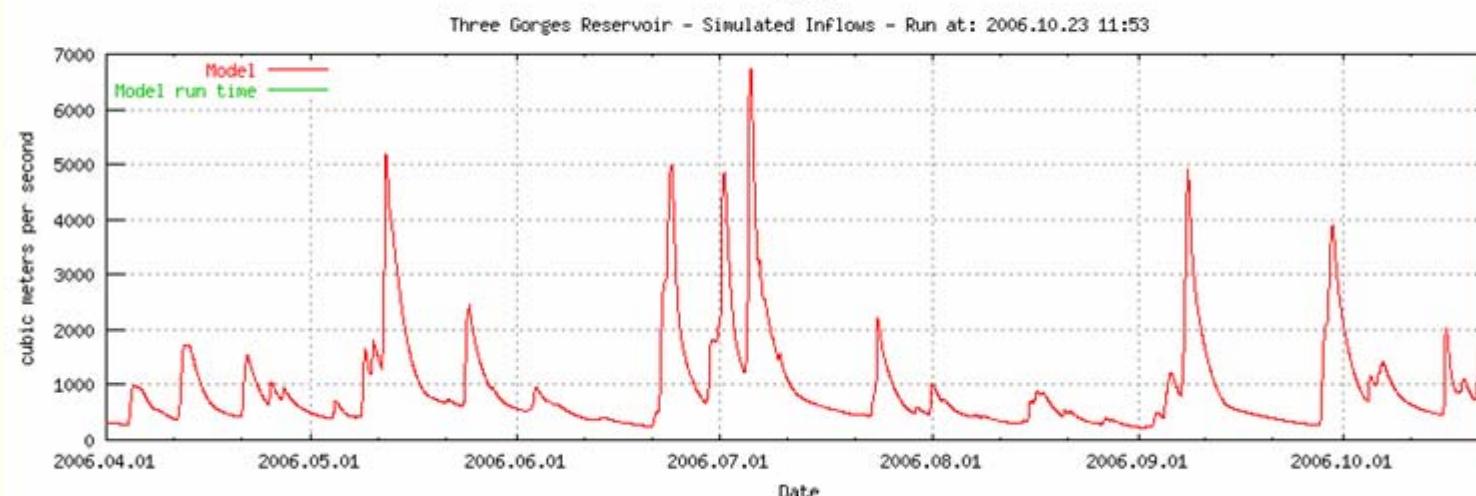
ETH
Eidgenössische Technische Hochschule
Swiss Federal Institute of Technology



SDC Swiss Flood Forecasting Assistance Project

[Main forecasting plots](#) - [All basins](#) - [Spaghetti Plots](#) - [Sub-basins workflow](#)

Realtime Plots from the PREVAH-Modelling System





Decision Making

Consultation meeting

Weather will be...

Rainfall & Flood Forecasting

Suggestion

If ... Then ... analysis

Discussion

Decision



Jian Yun Zhang, BoH, MWR



Flood Controlling System

Central Level

State Flood Prevention & Drought Relief Headquarters
Flood Controlling Office / Flood Forecasting Center

BOH

HQ in Beijing (180)

River Basin Office (7)

Provincial Office (31)

City Office (224)

Gauging stations (34,000)

Total Staff: about 40,000

General Office

Finance Office

Program and Plan Office

Div. Gauging Network Manage.

Div. Surface water monitoring

Div. Surface water monitoring

Div. Ground-water monitoring

Div. Water quality monitoring

Division Meteorology

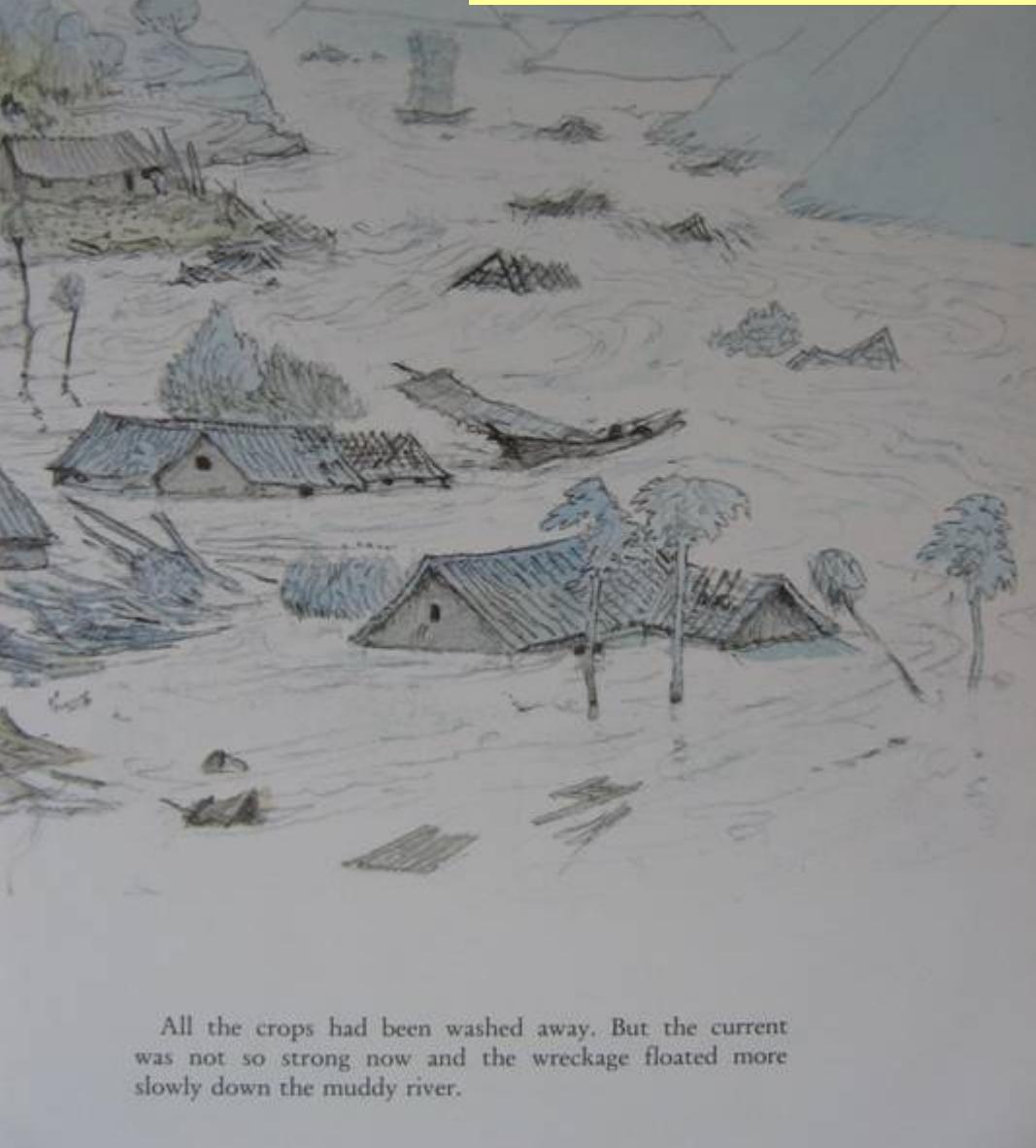
Div. Flood forecasting & warning

Div. Science & technology develop.



Svend Otto S Children of the Yangtze River

Pelham Books Ltd (1982)



All the crops had been washed away. But the current was not so strong now and the wreckage floated more slowly down the muddy river.

谢谢！

Xie xie !
(merci)