IPCC Expert Meeting on assessing Regional Climate Information, 16 to 18 May, Trieste, Italy

Regional climate information needs for risk assessment in hydrology and water resources

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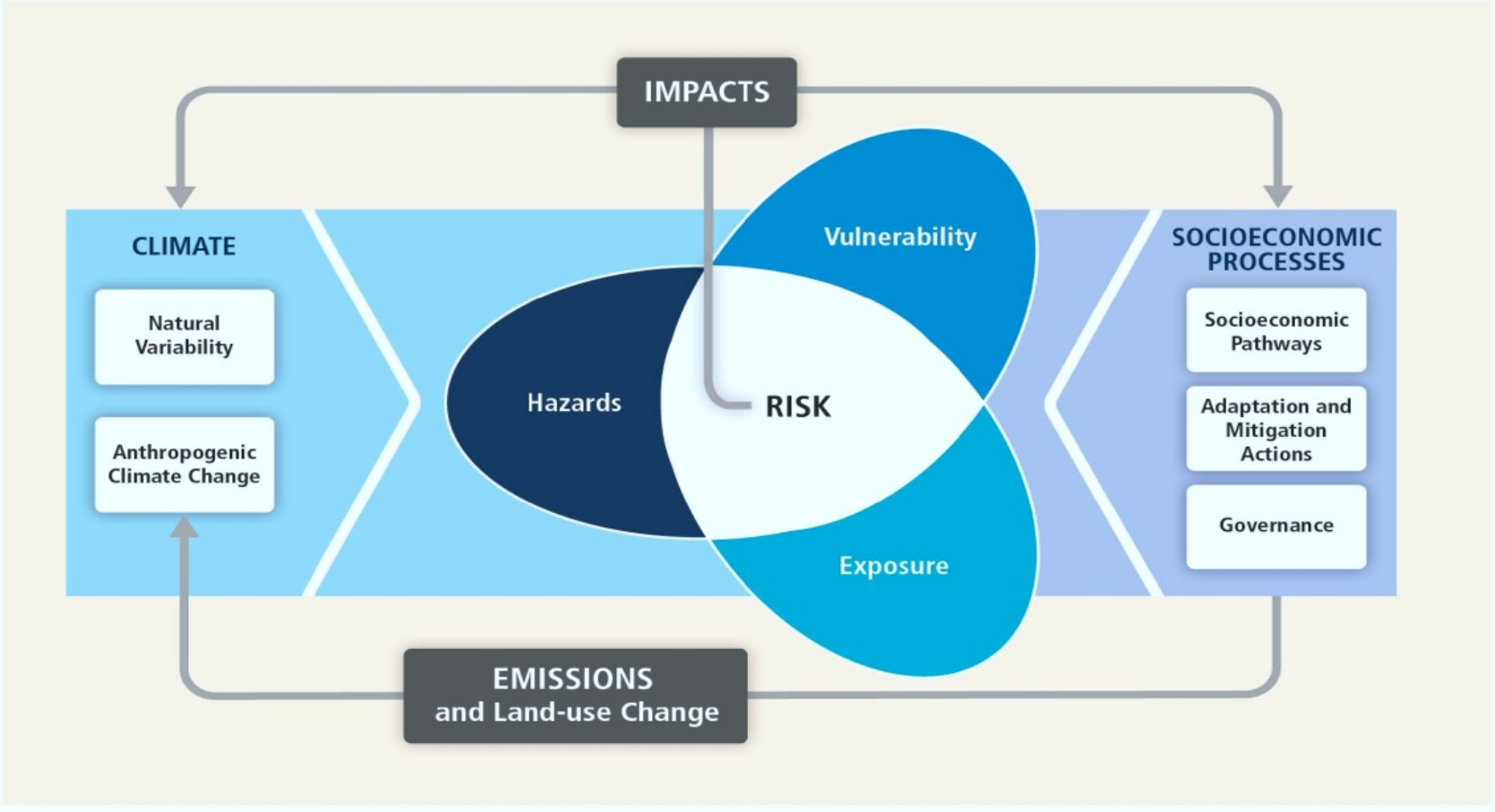
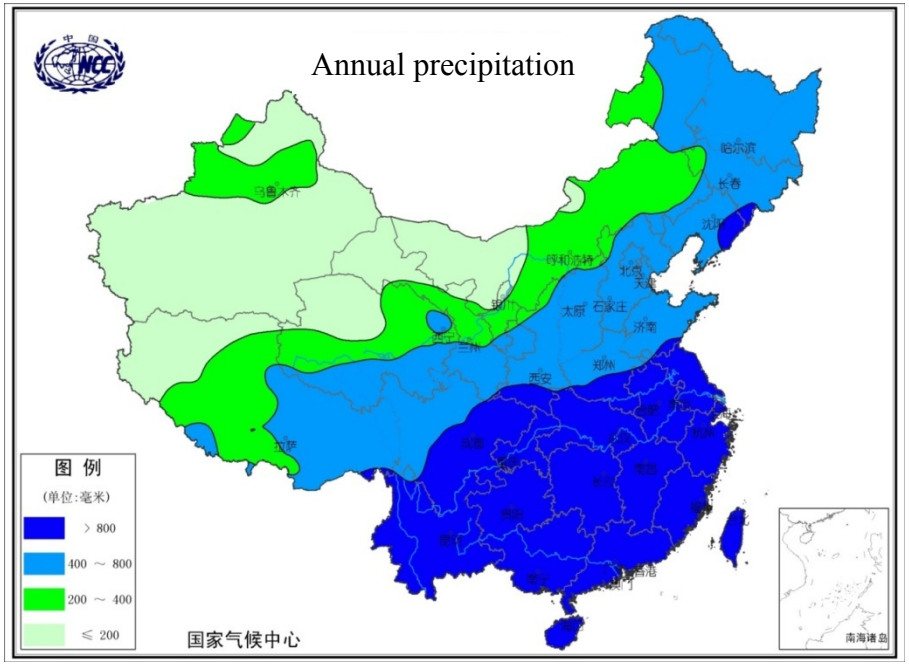
Risk: definition

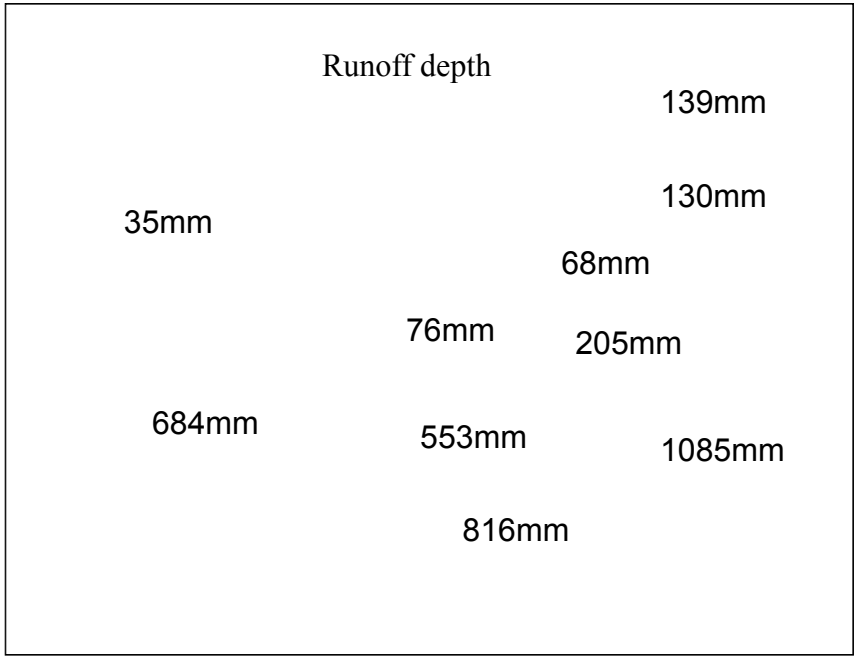


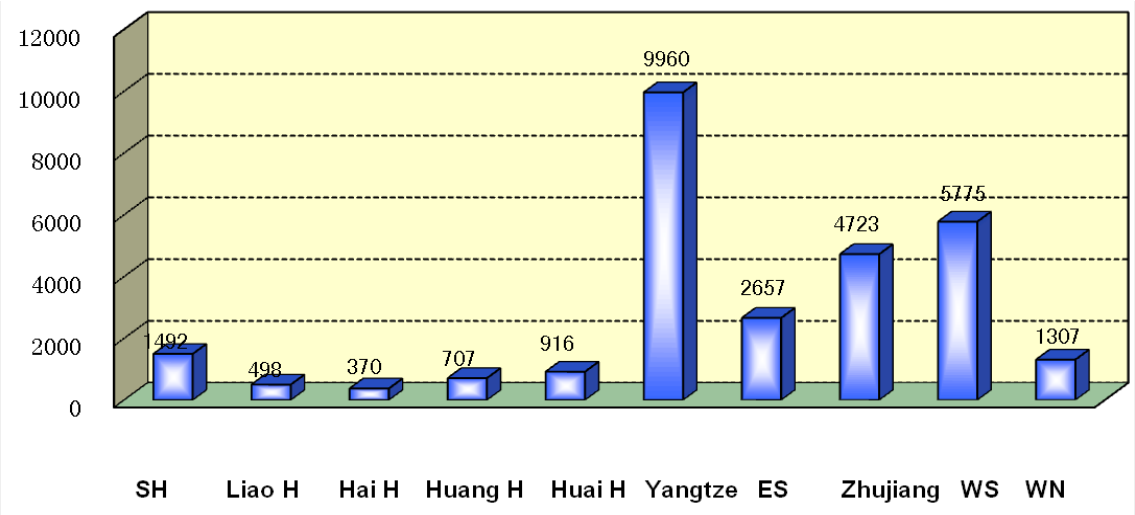
Impact or Risk = Hazards X Exposure X Vulnerability

IPCC AR5 WGII, 2014

Precipitation and water resources in China: current status

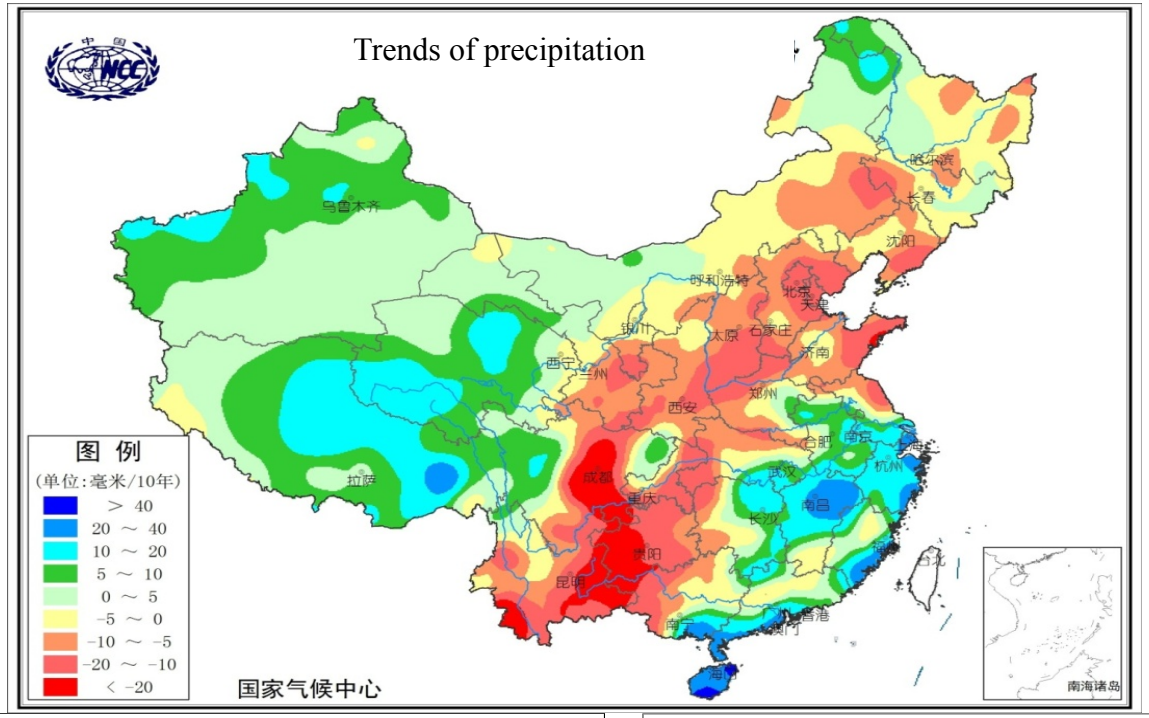


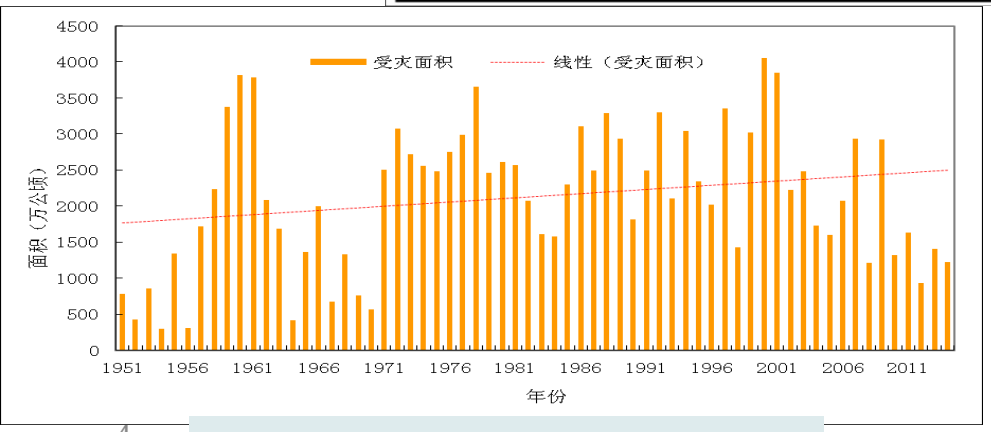




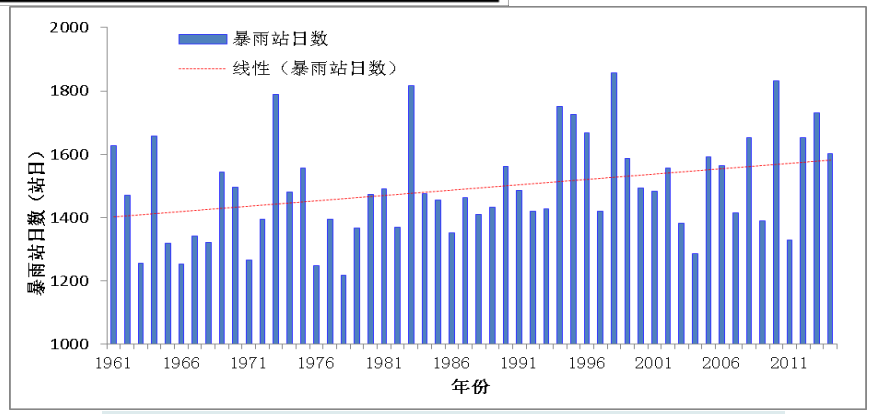
Water resources in Chinese river basins

Precipitation and related hazards in China: trends



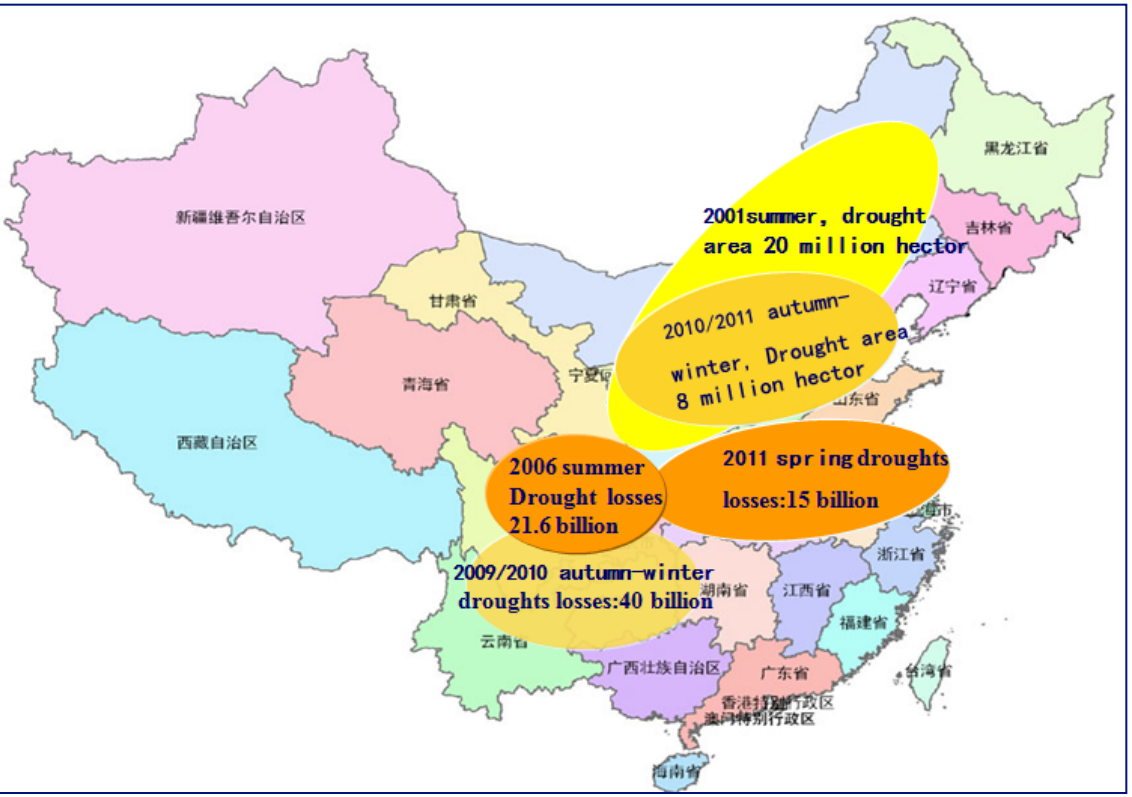


Drought stricken area



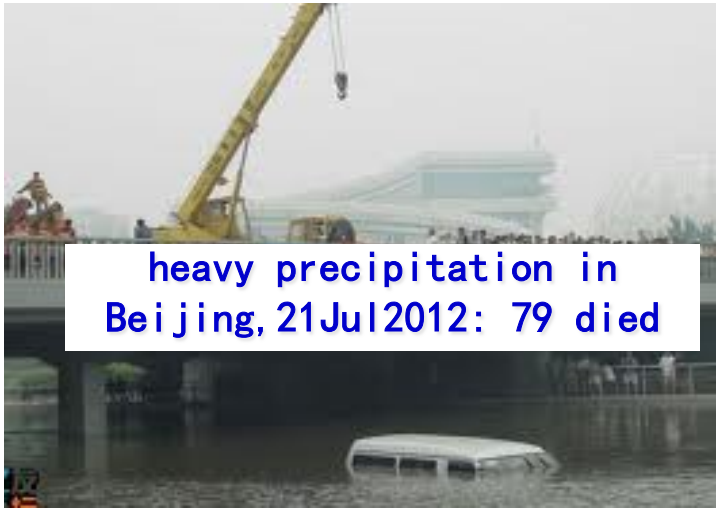
Frequency of rainstorm

Precipitation extremes and related hazards in China: cases



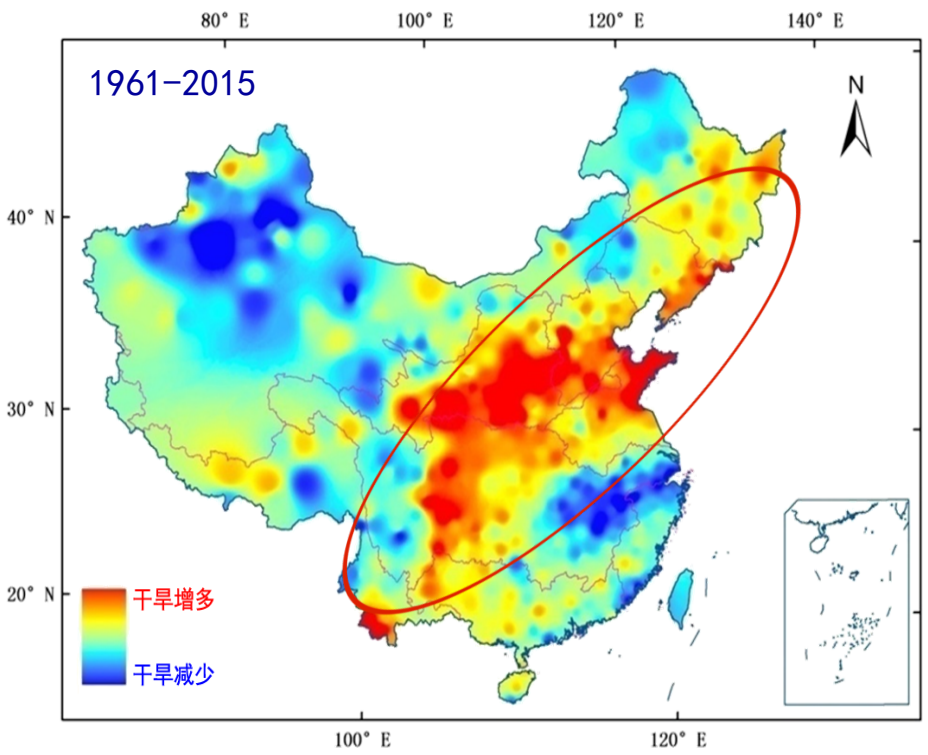
Severest droughts in recent years

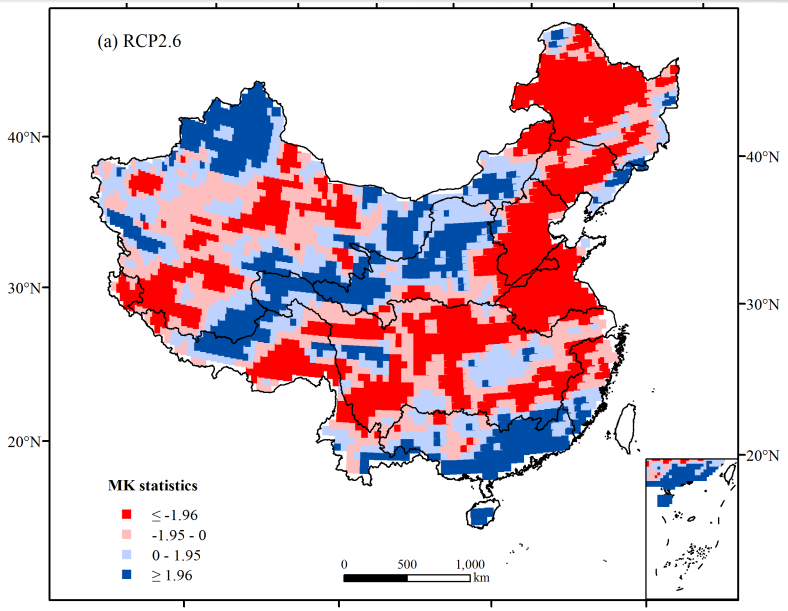
heavy precipitation in Jinan, 18Jul2007: 43 died

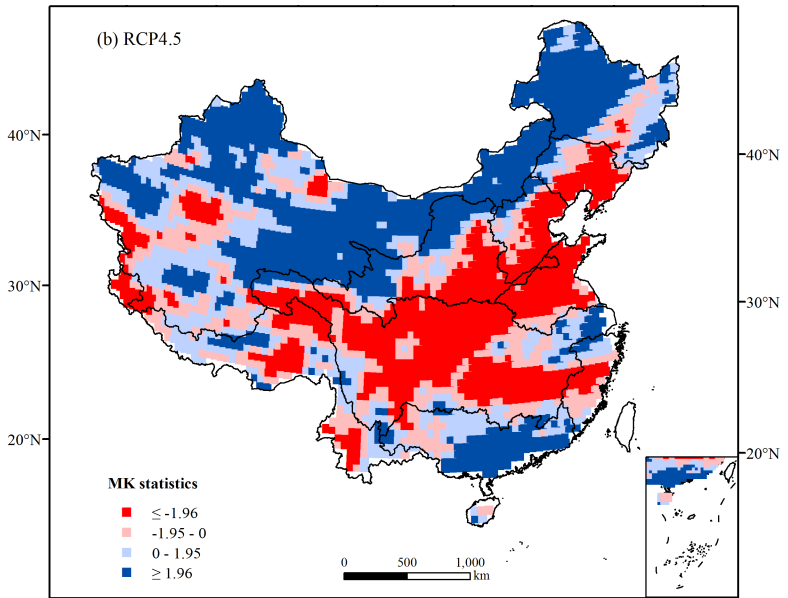


heavy precipitation in Beijing, 21Jul2012: 79 died

Risks in hydrology and water resources: droughts

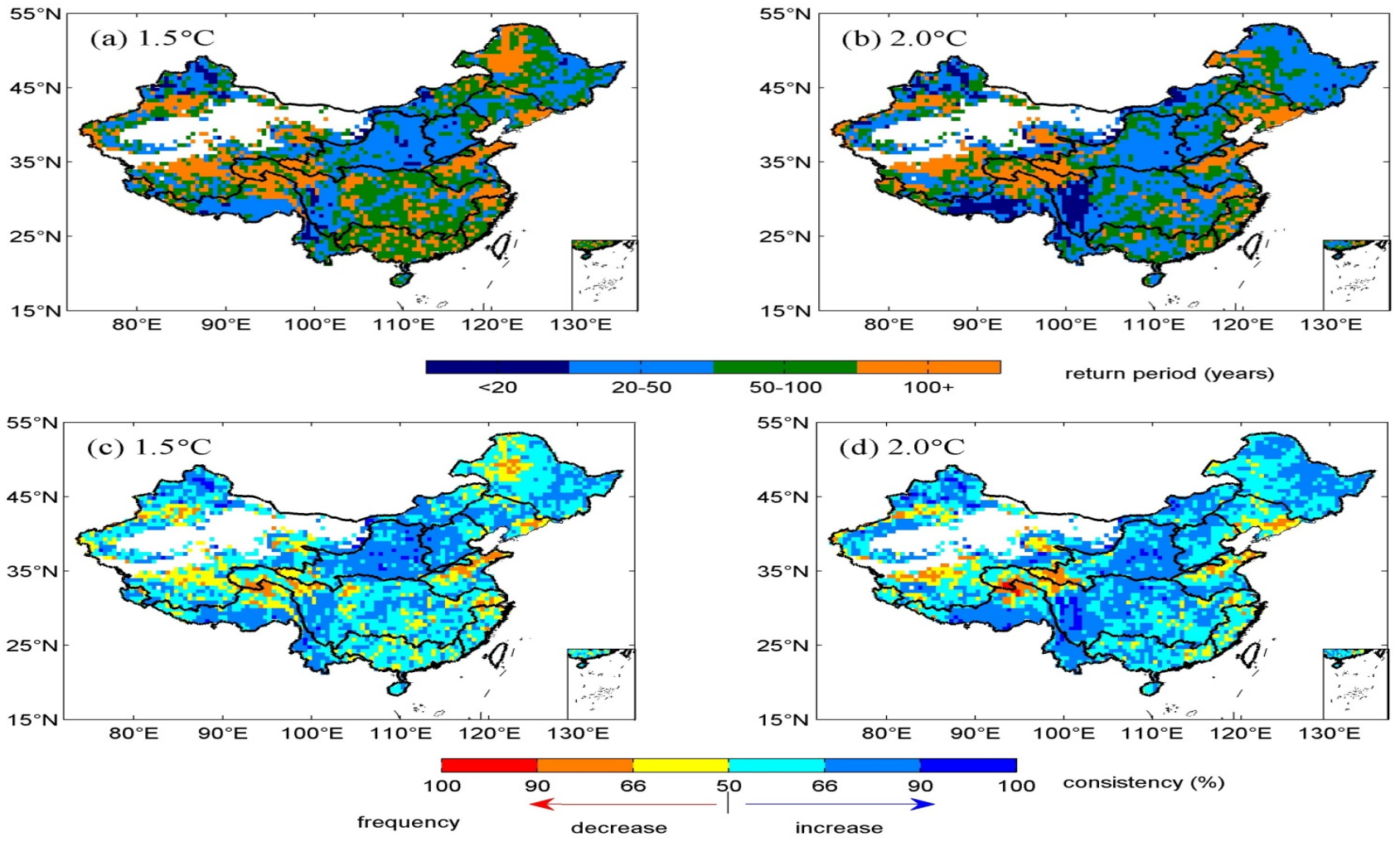






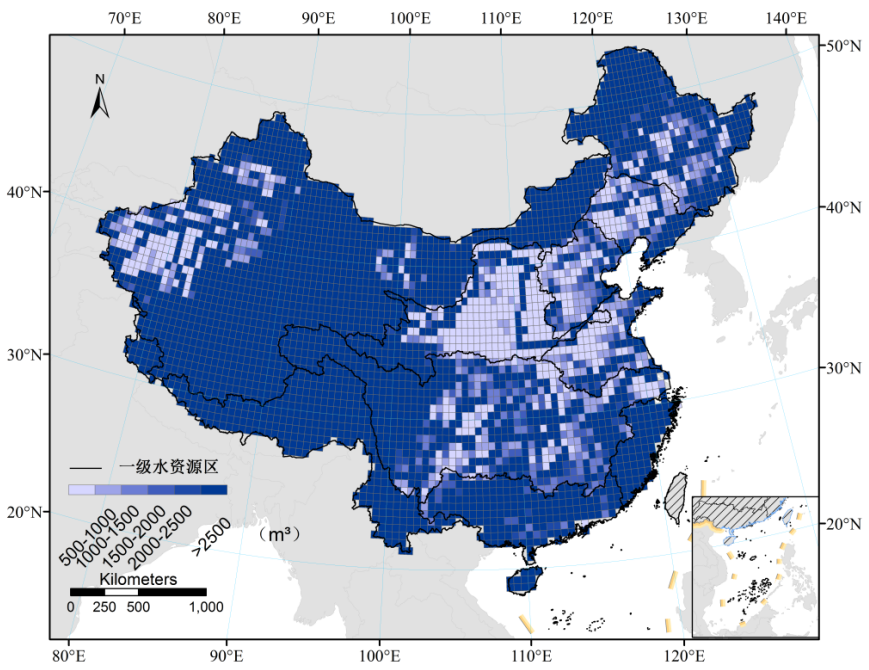
Drought trend: 1961-2015
Drought: risks: 2021-2050
(RCP 2.6 and RCP 4.5)

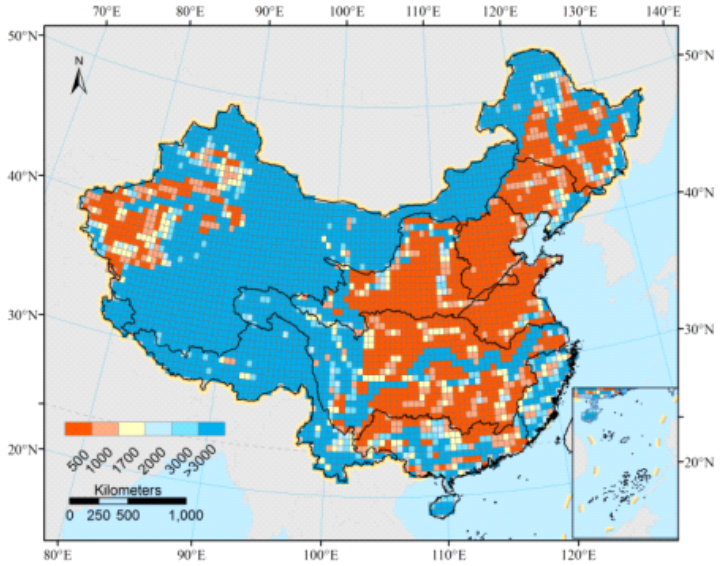
Risks in hydrology and water resources: heavy precipitation



Projected changes of return period for past 100-year floods at the 1.5°C and 2.0°C warming, and multi-model agreements on the direction of change

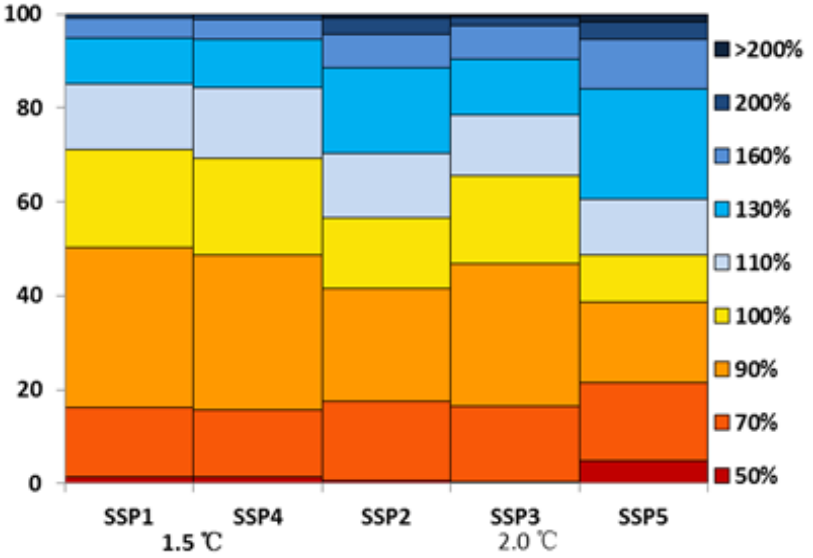
Risks in hydrology and water resources: water resources





Water resource per capita 1961-2015

Water resource per capita 2021-2050 and population exposed to decreasing water resources



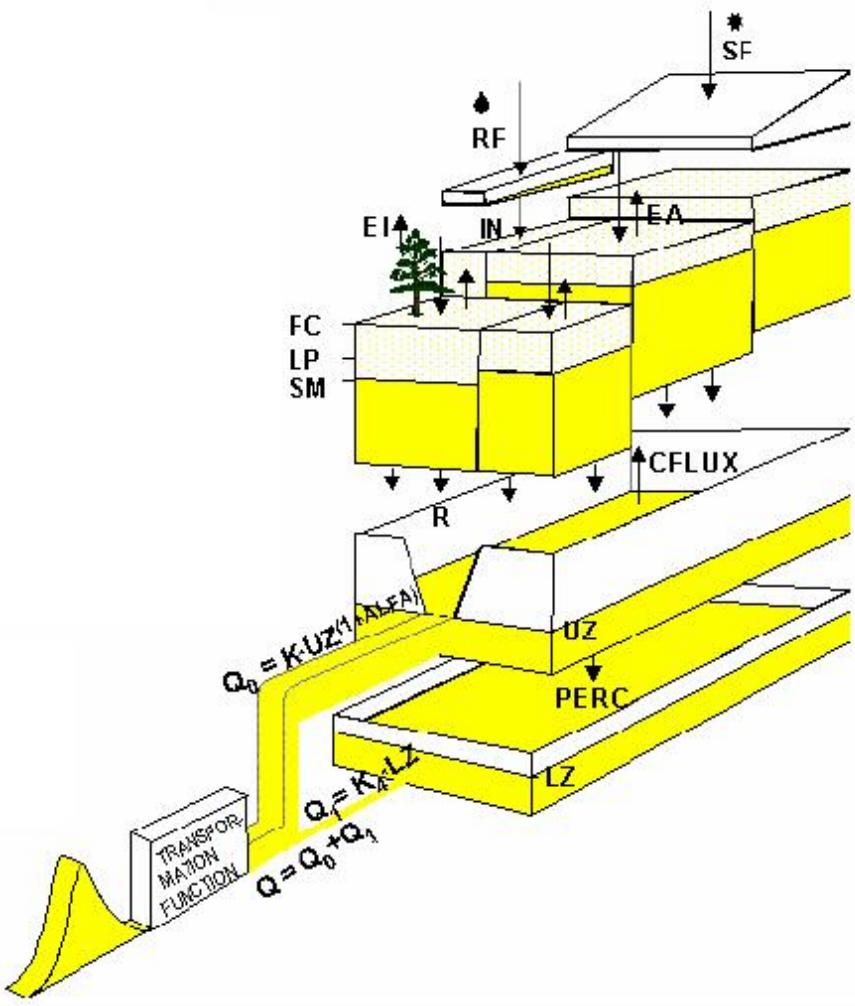
Needs of climate information: for drought risks assessment

$$SPI = norminv(CP\_P)$$
$$CP\_P = (1 - q0) * Gamcdf(P0) + q0$$

$$SPEI = norminv(CP\_D)$$
$$D_i = P_i - PET_i$$

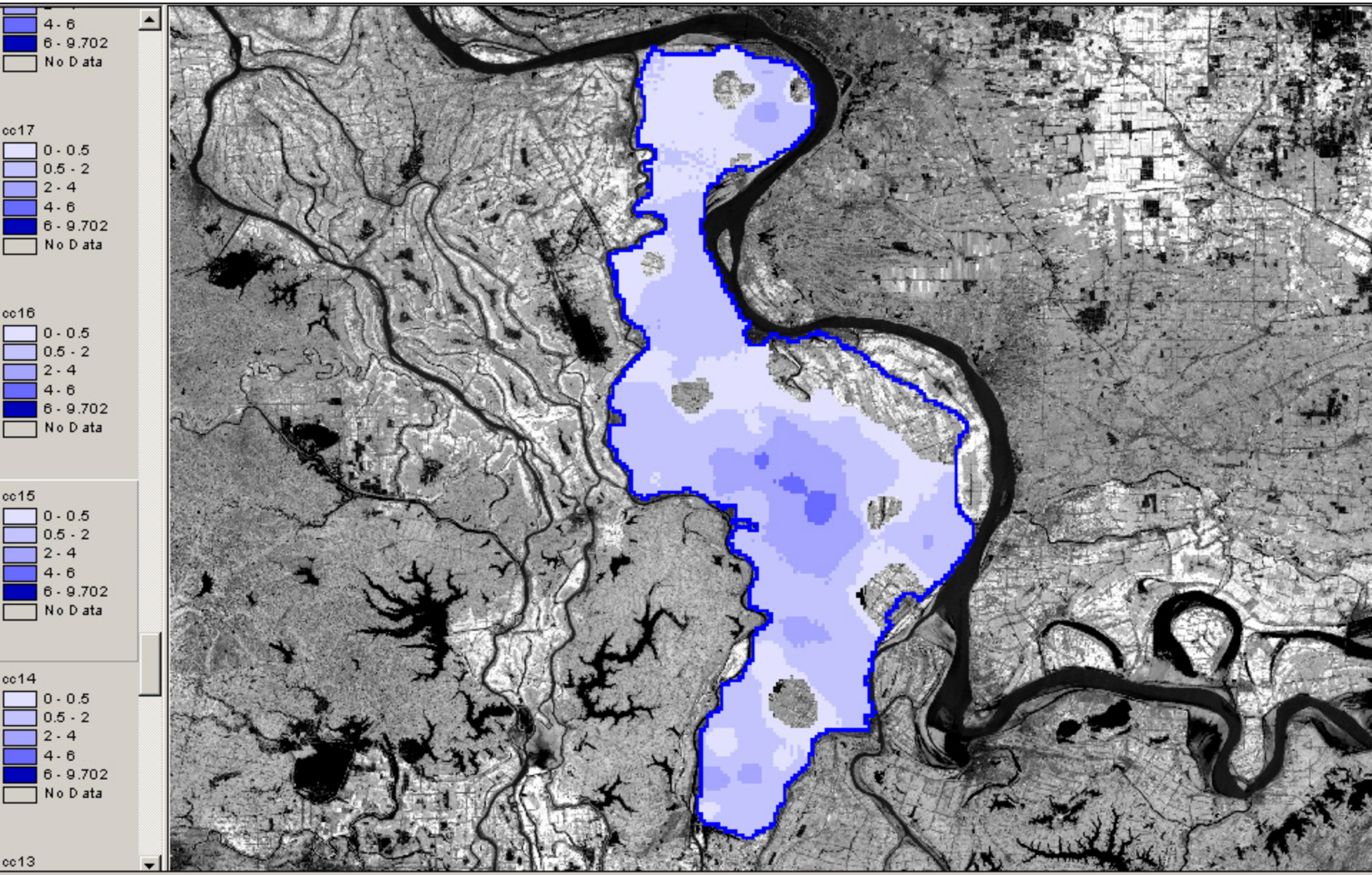
$$PDSI_i = p * PDSI_{i-1} + q * Z_i$$
$$Z = (P - Pc) * K$$
$$Pc = \alpha_i * PE + \beta_i * PRE + \gamma_i * PRO - \delta_i * PL$$
$$\alpha_i = \frac{\overline{ET_l}}{\overline{PET_l}},\ \beta_i = \frac{\overline{R_l}}{\overline{PR_l}},\ \gamma_i = \frac{\overline{RO_l}}{\overline{PRO_l}},\ \delta_i = \frac{\overline{L_l}}{\overline{PL_l}}$$

Needs of climate information: for water scarcity assessment



P	Zone Precipitation	LP	Limit for potential evapotranspiration
T	Zone Temperature	BETA	Parameter in soil routine
SF	Zone Snowfall	R	Runoff from soil
RF	Zone Rainfall	CFLUX	Maximum value of CF
Z	Zone elevation	UZ	Storage in upper response box
PCALTL	Elevation correction factor	LZ	Storage in lower response box
TTI	Temperature interval with a mixture of snow and rain	PERC	Percolation from upper to lower response box
IN	Infiltration to soil	K_1	Recession coefficient
EP	Zone potential evapotranapiration	ALFA	Response box parameter
EA	Actual evapotranspiration	Q_0	Outflow from upper response box
EI	Interception evaporation	Q_1	Outflow from lower response box
SM	Soil moisture	FC	Maximum soil moisture content

Needs of climate information: for flooding risks assessment



Summary

- **The climate information needed for drought risk assessment are:** daily or at least monthly precipitation, temperature (including mean, maximum and minimum), actual evapotranspiration and other variables needed for deducing the potential evapotranspiration, including air pressure, relative humidity, wind speed, radiation(or sunshine duration), etc.

- **In terms of water scarcity assessment**, daily or monthly scale temperature, precipitation and evapotranspiration input are enough. Fine scale spatial resolution of input data is needed to set up hydrological model, the basic requirement is :at least 0.25 degree.

- **For regional flood forecast**. 1,we need fine resolution hourly climatic information, or at least daily climatic information for flood risk assessment; 2, we need fine resolution daily or monthly climatic input for water resource assessment and drought assessment.

Thank you !