Table S1 Interaction detector results of SOCD.

		Natural factors						Human activities				
		elevation	GD	soil type	clay content	MAT	MAP	initial SOCD	CS	irrigation	fertilization	straw return
Natural factors	elevation	0.117										
	GD	0.585	0.312									
	soil type	**0.725**	0.553	0.357								
	clay content	0.439	0.621	**0.702**	0.286							
	MAT	0.612	0.617	**0.748**	0.542	0.403						
	MAP	0.519	0.430	0.544	0.549	0.492	0.264					
Human activities	initial SOCD	0.397	0.518	**0.602**	0.475	**0.630**	0.536	0.290				
	CS	0.320	0.349	0.419	0.374	**0.614**	0.474	**0.451**	0.102			
	irrigation	0.198	0.438	0.386	0.465	0.585	0.465	**0.358**	0.130	0.049		
	fertilization	0.193	0.398	0.445	0.372	0.472	0.337	**0.366**	0.183	0.107	0.047	
	straw return	0.138	0.350	0.375	0.304	0.449	0.284	0.347	0.129	0.086	0.067	0.014

Note: GD: groundwater depth; MAT: mean annual temperature; MAP: mean annual precipitation; CS: cropping system. Bold and underlined numbers are dominant interaction effects of pairs of natural factors, human activities and natural and human factors on SOCD.

Table S2 Interaction detector results of SOCDSR.

		Natural factors						Human activities				
		elevation	GD	soil type	clay content	MAT	MAP	CD	CS	irrigation	fertilization	straw return
Natural factors	elevation	0.007										
	GD	0.218	0.182									
	soil type	0.281	**0.304**	0.084								
	clay content	0.111	0.216	0.274	0.060							
	MAT	0.232	**0.279**	**0.287**	0.248	0.164						
	MAP	0.127	0.247	0.203	0.215	0.182	0.078					
Human activities	CD	0.202	0.268	0.288	0.248	0.210	0.135	0.077				
	CS	0.221	0.290	0.143	0.236	**0.311**	0.226	**0.312**	0.080			
	irrigation	0.062	0.210	0.115	0.113	0.231	0.148	0.122	0.097	0.019		
	fertilization	0.175	**0.424**	0.331	0.254	**0.389**	0.278	**0.293**	**0.374**	0.198	0.142	
	straw return	0.029	0.214	0.109	0.083	0.201	0.105	0.129	0.117	0.035	0.181	0.001

Note: GD: groundwater depth; MAT: mean annual temperature; MAP: mean annual precipitation; CD: cropping duration; CS: cropping system. Bold and underlined numbers are dominant interaction effects of pairs of natural factors, human activities and natural and human factors on SOCDSR.