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Landslide early warning based on failure forecast models: the example of the Mt. de La Saxe rockslide, northern Italy

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Supplementary Information

Table S1: Scheme of the contingency table used

Event Forecast	Event Observed											
	Yes				No				Marginal Total			
Computation Time Windows	*12-hr*	*24-hr*	*48-hr*	*7-days*	*12-hr*	*24-hr*	*48-hr*	*7-days*	*12-hr*	*24-hr*	*48-hr*	*7-days*
Yes	a=True positive				b=False alarms				a+b			
No	c=Missed alarms				d=True negatives				c+d			
Marginal Total	a+c				b+d				a+b+c+d			

Table S2: Event=21 April 2013, R>75%

Event Forecast	Event Observed											
	Yes				No				Marginal Total			
CTW	*12-hr*	*24-hr*	*48-hr*	*7-days*	*12-hr*	*24-hr*	*48-hr*	*7-days*	*12-hr*	*24-hr*	*48-hr*	*7-days*
Yes	16	5	4	0	76	69	43	7	92	74	47	7
No	2	1	1	0	152	163	164	168	154	164	165	168
Marginal Total	18	6	5	0	228	232	207	175	246	238	212	175

Table S3: Event= 21 April 2013, R>90%

Event Forecast	Event Observed											
	Yes				No				Marginal Total			
CTW	*12-hr*	*24-hr*	*48-hr*	*7-days*	*12-hr*	*24-hr*	*48-hr*	*7-days*	*12-hr*	*24-hr*	*48-hr*	*7-days*
Yes	11	2	1	0	49	32	29	0	60	34	30	0
No	0	0	0	0	157	166	167	168	157	166	167	168
Marginal Total	11	2	1	0	206	198	196	168	217	200	197	168

Table S3: Event=17 April 2014, R>75%

Event Forecast	Event Observed											
	Yes				No				Marginal Total			
CTW	*12-hr*	*24-hr*	*48-hr*	*7-days*	*12-hr*	*24-hr*	*48-hr*	*7-days*	*12-hr*	*24-hr*	*48-hr*	*7-days*
Yes	79	44	26	7	29	56	52	97	108	100	78	104
No	44	52	49	65	89	124	142	161	133	176	191	226
Marginal Total	123	96	75	72	118	180	194	258	241	276	269	330

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10 Table S4: Event=17 April 2014, R>90%

Event Forecast	Event Observed											
	Yes				No				Marginal Total			
CTW	*12-hr*	*24-hr*	*48-hr*	*7-days*	*12-hr*	*24-hr*	*48-hr*	*7-days*	*12-hr*	*24-hr*	*48-hr*	*7-days*
Yes	79	44	26	7	25	45	48	97	104	89	74	104
No	32	49	48	65	89	124	142	161	121	173	190	226
Marginal Total	111	93	74	72	114	169	190	258	225	262	264	330

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12 Table S5: Event=21 April 2014, R>75%

Event Forecast	Event Observed											
	Yes				No				Marginal Total			
CTW	*12-hr*	*24-hr*	*48-hr*	*7-days*	*12-hr*	*24-hr*	*48-hr*	*7-days*	*12-hr*	*24-hr*	*48-hr*	*7-days*
Yes	26	4	1	0	123	138	119	171	149	142	120	171
No	18	8	0	0	157	179	182	183	175	187	182	183
Marginal Total	44	12	1	0	280	317	301	354	324	329	302	354

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18 Table S6: Event=21 April 2014, R>90%

Event Forecast	Event Observed											
	Yes				No				Marginal Total			
CTW	*12-hr*	*24-hr*	*48-hr*	*7-days*	*12-hr*	*24-hr*	*48-hr*	*7-days*	*12-hr*	*24-hr*	*48-hr*	*7-days*
Yes	16	4	0	0	112	125	106	143	128	129	106	143
No	10	0	0	0	167	179	183	183	177	179	183	183
Marginal Total	26	4	0	0	279	304	289	326	305	308	289	326

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20 Table S7: Contingency estimators, event 21 April 2013

CTW	*12-hr*		*24-hr*		*48-hr*		*7-days*	
R	>75%	>90%	>75%	>90%	>75%	>90%	>75%	>90%
Accuracy *(a+d)/n*	0.68	0.77	0.7	0.84	0.79	0.85	0.96	1
Hit rate *a/(a+c)*	0.88	1	0.8	1	0.83	1	-	-
False alarm ratio *b/(a+b)*	0.82	0.81	0.93	0.94	0.91	0.96	1	-
Bias *(a+b)/(a+c)*	5.1	5.4	12.3	17	9.4	30	-	-
CSI *a/(a+b+c)*	0.17	0.18	0.06	0.05	0.08	0.03	0	-

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22 Table S8: Contingency estimators, event 17 April 2014

CTW	*12-hr*		*24-hr*		*48-hr*		*7-days*	
R	>75%	>90%	>75%	>90%	>75%	>90%	>75%	>90%
Accuracy *(a+d)/n*	0.69	0.74	0.60	0.64	0.62	0.63	0.50	0.50
Hit rate *a/(a+c)*	0.64	0.71	0.45	0.47	0.34	0.35	0.09	0.09
False alarm ratio *b/(a+b)*	0.26	0.24	0.56	0.50	0.66	0.64	0.93	0.93
Bias *(a+b)/(a+c)*	0.87	0.93	1.04	0.95	1.04	1	1.40	1.44
CSI *a/(a+b+c)*	0.51	0.58	0.28	0.31	0.20	0.21	0.04	0.04

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Table S9: Contingency estimators, event 21 April 2014

CTW	*12-hr*		*24-hr*		*48-hr*		*7-days*	
R	>75%	>90%	>75%	>90%	>75%	>90%	>75%	>90%
Accuracy *(a+d)/n*	0.56	0.6	0.55	0.59	0.6	0.62	0.51	0.56
Hit rate *a/(a+c)*	0.59	0.65	0.33	1	1	-	-	-
False alarm ratio *b/(a+b)*	0.82	0.87	0.97	0.96	0.99	1	1	1
Bias *(a+b)/(a+c)*	3.3	4.9	11.8	32.2	120	-	-	-
CSI *a/(a+b+c)*	0.15	0.11	0.02	0.03	0.008	0	0	0