

Predicciones sobre CoViD-19

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DEPARTAMENTO DE ESTADÍSTICA,
ANÁLISE MATEMÁTICA E OPTIMIZACIÓN



- Predicciones

- Predicciones

Datos

Número de datos funcionales: 2024

Países/Regiones distintos incorporados: 97

Predicciones:

▶ España

► Andalucía

► Aragón

► Asturias

► **Baleares**

► **Canarias**

► Cantabria

▶ Catalunya

► Castilla-La Mancha

▶ Castilla y León

▶ C. Valenciana

► Extremadura

► Euskadi

► **Galicia**

► Madrid

► Murcia

► Navarra

► **La Rioja**

► Mod Lineal

► Mod NP

► Mod Aditivo

Horiz	Medida	FLM	NP	SAM
H1	σ_R^2	0.035	0.023	0.031
H1	$\sigma_R^2(rob.)$	0.022	0.006	0.02
H1	r^2	0.211	0.622	0.298
H2	σ_R^2	0.143	0.095	0.123
H2	$\sigma_R^2(rob.)$	0.073	0.024	0.065
H2	r^2	0.235	0.621	0.335
H3	σ_R^2	0.423	0.318	0.371
H3	$\sigma_R^2(rob.)$	0.204	0.067	0.181
H3	r^2	0.219	0.564	0.311

Último dato: 2020-03-26 21:00 que se publican 2020-03-27 12:00.

Tabla Modelo Lineal.

	Last	C:H1-lw	C:H1-fit	C:H1-up	C:H2-lw	C:H2-fit	C:H2-up
España	64059	64059	72098	82853	64059	80379	102424
Andalucía	3793	3896	4394	4892	3975	5005	6036
Aragón	1338	1349	1524	1699	1399	1761	2124
Asturias	900	904	1022	1140	921	1165	1409
Baleares	755	792	891	990	841	1046	1251
Canarias	878	889	1004	1118	914	1152	1389
Cantabria	810	870	976	1083	932	1152	1373
Cataluña	12940	13455	15176	16896	14248	17807	21366
Castilla.La.Mancha	3934	4013	4528	5044	4182	5249	6317
Castilla.y.León	4132	4276	4818	5360	4564	5686	6808
C..Valenciana	3532	3728	4198	4667	3800	4772	5744
Extremadura	1231	1270	1432	1593	1321	1656	1990
Euskadi	4601	4633	5235	5836	4740	5986	7231
Galicia	2322	2435	2742	3048	2525	3159	3793
Madrid	19243	19243	21308	23873	19243	23797	29101
Murcia	714	731	824	918	755	949	1142
Navarra	1641	1664	1879	2093	1701	2146	2590
La.Rioja	1236	1236	1369	1531	1236	1533	1868

Table: Previsión número de casos confirmados: Modelo lineal- Horizonte 1 y 2 días.

Tabla Modelo No Paramétrico.

	Last	C:H1-lw	C:H1-fit	C:H1-up	C:H2-lw	C:H2-fit	C:H2-up
España	64059	65219	69213	73207	66052	75024	83996
Andalucía	3793	3910	4147	4383	3987	4518	5049
Aragón	1338	1371	1454	1538	1402	1590	1778
Asturias	900	912	968	1025	917	1043	1169
Baleares	755	809	856	903	862	968	1074
Canarias	878	890	944	999	898	1021	1145
Cantabria	810	899	950	1000	990	1103	1217
Cataluña	12940	13778	14584	15391	14641	16453	18265
Castilla.La.Mancha	3934	4080	4325	4570	4199	4750	5301
Castilla.y.León	4132	4359	4616	4874	4578	5156	5734
C..Valenciana	3532	4041	4261	4481	4414	4908	5402
Extremadura	1231	1286	1363	1439	1331	1503	1676
Euskadi	4601	4643	4930	5217	4672	5317	5962
Galicia	2322	2452	2597	2742	2543	2867	3192
Madrid	19243	19279	20479	21679	19243	21900	24596
Murcia	714	738	783	827	759	859	959
Navarra	1641	1669	1771	1873	1687	1917	2146
La.Rioja	1236	1236	1294	1371	1236	1363	1537

Table: Previsión número de casos confirmados: Modelo No Paramétrico - Horizonte 1 y 2 días.

Tabla Modelo Aditivo.

	Last	C:H1-lw	C:H1-fit	C:H1-up	C:H2-lw	C:H2-fit	C:H2-up
España	64059	67155	73507	79860	72014	85058	98102
Andalucía	3793	4009	4390	4771	4252	5033	5814
Aragón	1338	1418	1551	1684	1569	1842	2116
Asturias	900	936	1026	1116	989	1173	1358
Baleares	755	821	896	972	908	1063	1218
Canarias	878	935	1022	1110	1018	1197	1376
Cantabria	810	929	1012	1094	1070	1239	1407
Cataluña	12940	13740	15038	16335	14964	17626	20289
Castilla.La.Mancha	3934	4225	4618	5011	4668	5475	6281
Castilla.y.León	4132	4374	4790	5206	4759	5612	6466
C..Valenciana	3532	3850	4229	4608	4061	4837	5613
Extremadura	1231	1308	1431	1555	1412	1666	1920
Euskadi	4601	4912	5368	5824	5379	6317	7254
Galicia	2322	2506	2742	2979	2716	3201	3686
Madrid	19243	19560	21469	23377	20377	24295	28213
Murcia	714	758	830	901	824	970	1116
Navarra	1641	1739	1901	2064	1854	2188	2522
La.Rioja	1236	1274	1396	1518	1347	1596	1846

Table: Previsión número de casos confirmados: Modelo Aditivo - Horizonte 1 y 2 días.

Tabla Ratio Incremento Modelo Lineal.

	Last	RI:H1-lw	RI:H1-fit	RI:H1-up	RI:H2-lw	RI:H2-fit	RI:H2-up
España	0.140	0.000	0.125	0.293	0.000	0.255	0.599
Andalucía	0.114	0.027	0.158	0.290	0.048	0.320	0.591
Aragón	0.199	0.008	0.139	0.269	0.045	0.316	0.587
Asturias	0.070	0.004	0.135	0.266	0.023	0.294	0.565
Baleares	0.144	0.049	0.180	0.310	0.114	0.385	0.655
Canarias	0.120	0.012	0.143	0.274	0.041	0.311	0.582
Cantabria	0.207	0.074	0.205	0.336	0.150	0.422	0.694
Cataluña	0.116	0.040	0.173	0.306	0.101	0.376	0.651
Castilla.La.Mancha	0.163	0.020	0.151	0.282	0.063	0.334	0.606
Castilla.y.León	0.185	0.035	0.166	0.297	0.105	0.376	0.647
C..Valenciana	0.104	0.055	0.188	0.321	0.076	0.351	0.626
Extremadura	0.270	0.032	0.163	0.294	0.073	0.345	0.616
Euskadi	0.166	0.007	0.138	0.268	0.030	0.301	0.572
Galicia	0.212	0.049	0.181	0.313	0.087	0.360	0.633
Madrid	0.121	0.000	0.107	0.241	0.000	0.237	0.512
Murcia	0.198	0.024	0.154	0.285	0.058	0.328	0.599
Navarra	0.163	0.014	0.145	0.276	0.037	0.308	0.578
La.Rioja	0.242	0.000	0.108	0.238	0.000	0.240	0.511

Table: Previsión Ratio incremento casos confirmados: Modelo lineal- Horizonte 1 y 2 días.

Tabla Ratio Incremento Modelo No Paramétrico.

	Last	RI:H1-lw	RI:H1-fit	RI:H1-up	RI:H2-lw	RI:H2-fit	RI:H2-up
España	0.140	0.018	0.080	0.143	0.031	0.171	0.311
Andalucía	0.114	0.031	0.093	0.156	0.051	0.191	0.331
Aragón	0.199	0.025	0.087	0.149	0.048	0.188	0.328
Asturias	0.070	0.014	0.076	0.138	0.019	0.159	0.299
Baleares	0.144	0.071	0.134	0.196	0.141	0.281	0.421
Canarias	0.120	0.013	0.076	0.138	0.023	0.163	0.303
Cantabria	0.207	0.109	0.172	0.235	0.222	0.362	0.502
Cataluña	0.116	0.065	0.127	0.189	0.131	0.271	0.411
Castilla.La.Mancha	0.163	0.037	0.099	0.162	0.067	0.207	0.347
Castilla.y.León	0.185	0.055	0.117	0.179	0.108	0.248	0.388
C..Valenciana	0.104	0.144	0.206	0.269	0.250	0.390	0.529
Extremadura	0.270	0.045	0.107	0.169	0.081	0.221	0.361
Euskadi	0.166	0.009	0.072	0.134	0.015	0.156	0.296
Galicia	0.212	0.056	0.118	0.181	0.095	0.235	0.375
Madrid	0.121	0.002	0.064	0.127	0.000	0.138	0.278
Murcia	0.198	0.034	0.096	0.158	0.063	0.203	0.343
Navarra	0.163	0.017	0.079	0.141	0.028	0.168	0.308
La.Rioja	0.242	0.000	0.047	0.109	0.000	0.103	0.243

Table: Previsión Ratio incremento casos confirmados: Modelo No Paramétrico
- Horizonte 1 y 2 días.

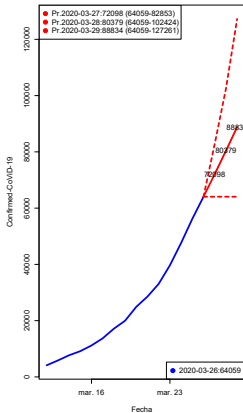
Tabla Ratio Incremento Modelo Aditivo.

	Last	RI:H1-lw	RI:H1-fit	RI:H1-up	RI:H2-lw	RI:H2-fit	RI:H2-up
España	0.140	0.048	0.147	0.247	0.124	0.328	0.531
Andalucía	0.114	0.057	0.157	0.258	0.121	0.327	0.533
Aragón	0.199	0.060	0.159	0.259	0.172	0.377	0.581
Asturias	0.070	0.040	0.139	0.239	0.098	0.303	0.508
Baleares	0.144	0.087	0.187	0.286	0.202	0.407	0.612
Canarias	0.120	0.065	0.164	0.263	0.159	0.363	0.566
Cantabria	0.207	0.147	0.249	0.351	0.320	0.528	0.737
Cataluña	0.116	0.062	0.162	0.262	0.156	0.362	0.568
Castilla.La.Mancha	0.163	0.074	0.174	0.274	0.187	0.392	0.597
Castilla.y.León	0.185	0.059	0.159	0.260	0.152	0.358	0.565
C..Valenciana	0.104	0.090	0.197	0.305	0.150	0.369	0.589
Extremadura	0.270	0.062	0.163	0.263	0.147	0.353	0.559
Euskadi	0.166	0.068	0.167	0.266	0.169	0.373	0.576
Galicia	0.212	0.079	0.181	0.283	0.170	0.379	0.587
Madrid	0.121	0.016	0.116	0.215	0.059	0.263	0.466
Murcia	0.198	0.062	0.162	0.261	0.154	0.358	0.562
Navarra	0.163	0.059	0.159	0.258	0.130	0.333	0.537
La.Rioja	0.242	0.031	0.129	0.228	0.089	0.291	0.493

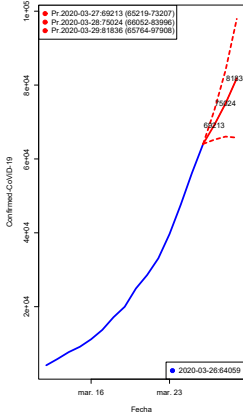
Table: Previsión Ratio incremento casos confirmados: Modelo Aditivo - Horizonte 1 y 2 días.

Confirmed cases: España

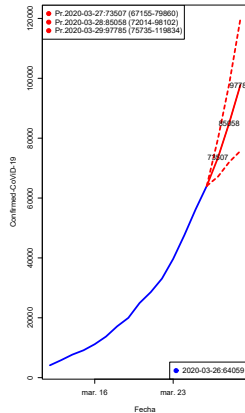
Confirmed cases:España-FLM



Confirmed cases:España-NP



Confirmed cases:España-SAM

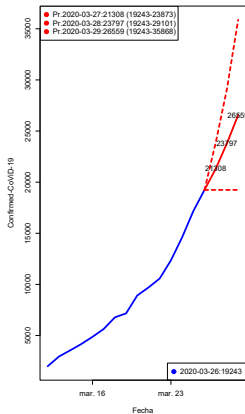


◀ Confirmados

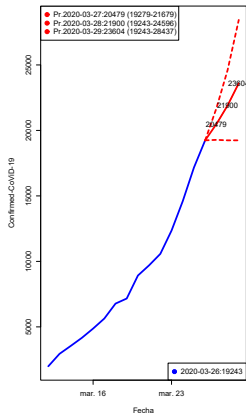
◀ Fallecidos

Confirmed cases: Madrid

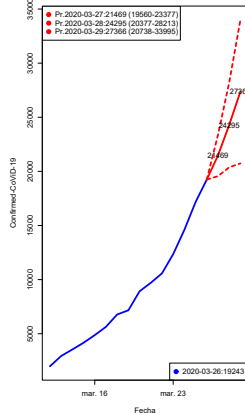
Confirmed cases:Madrid-FLM



Confirmed cases:Madrid-NP



Confirmed cases:Madrid-SAM

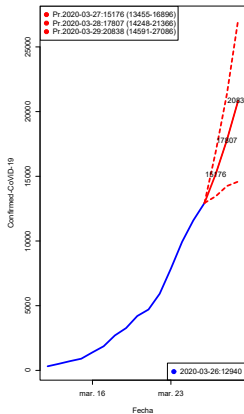


◀ Confirmados

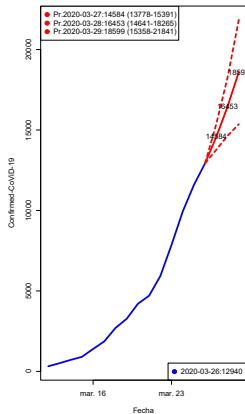
◀ Fallecidos

Confirmed cases: Cataluña

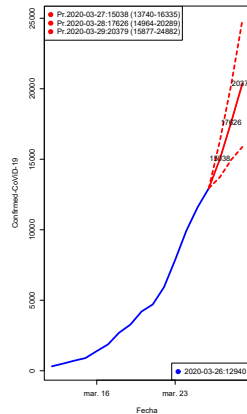
Confirmed cases:Cataluña-FLM



Confirmed cases:Cataluña-NP



Confirmed cases:Cataluña-SAM

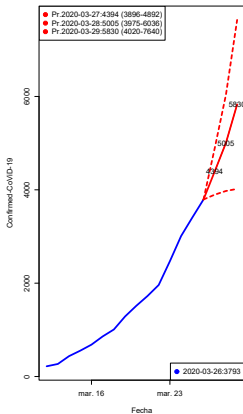


◀ Confirmados

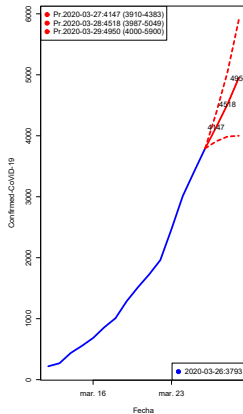
◀ Fallecidos

Confirmed cases: Andalucía

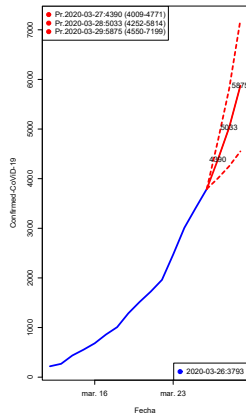
Confirmed cases:Andalucía-FLM



Confirmed cases:Andalucía-NP



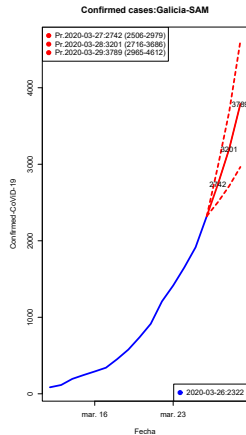
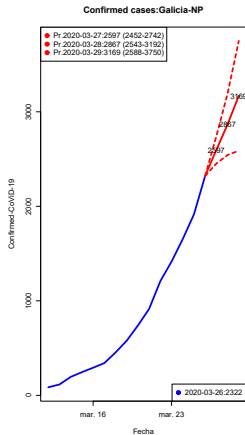
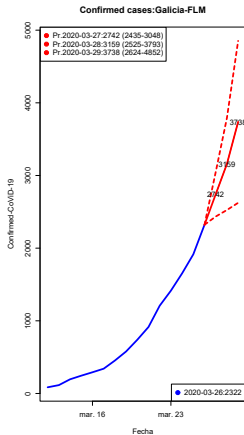
Confirmed cases:Andalucía-SAM



◀ Confirmados

◀ Fallecidos

Confirmed cases: Galicia

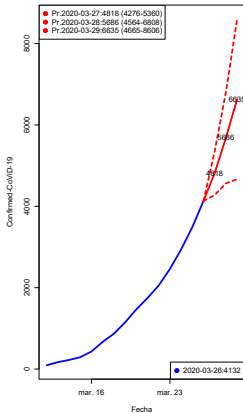


◀ Confirmados

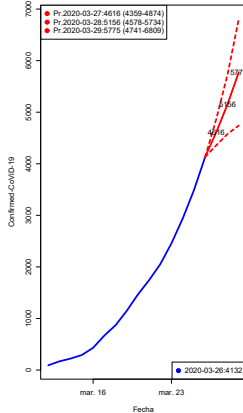
◀ Fallecidos

Confirmed cases: Castilla y León

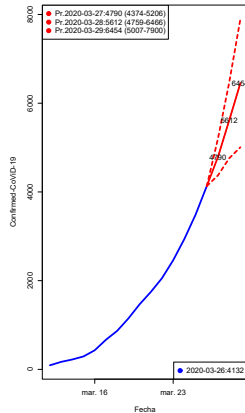
Confirmed cases:Castilla.y.León-FLM



Confirmed cases:Castilla.y.León-NP



Confirmed cases:Castilla.y.León-SAM

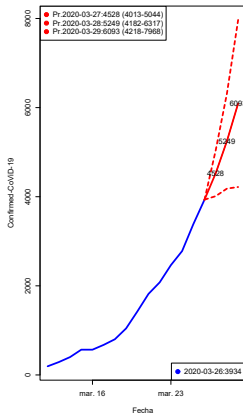


◀ Confirmados

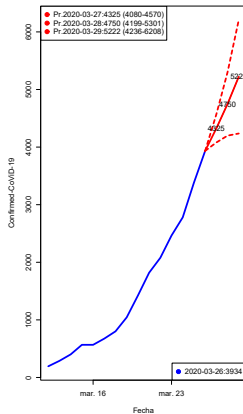
◀ Fallecidos

Confirmed cases: Castilla-La Mancha

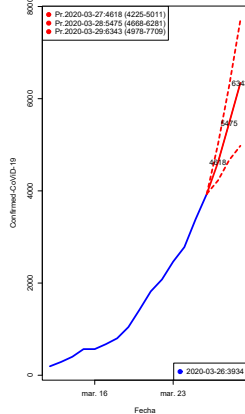
Confirmed cases:Castilla.La.Mancha-FLM



Confirmed cases:Castilla.La.Mancha-NP



Confirmed cases:Castilla.La.Mancha-SAM

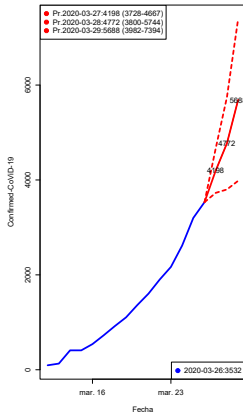


◀ Confirmados

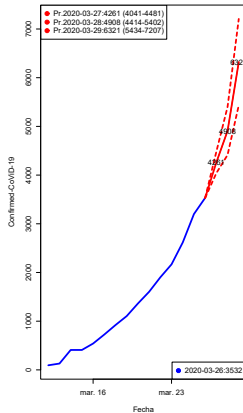
◀ Fallecidos

Confirmed cases: C. Valenciana

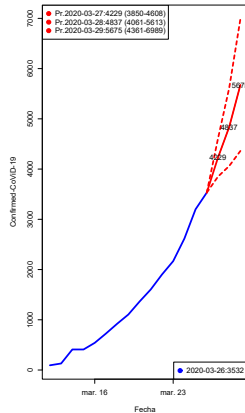
Confirmed cases:C..Valenciana-FLM



Confirmed cases:C..Valenciana-NP



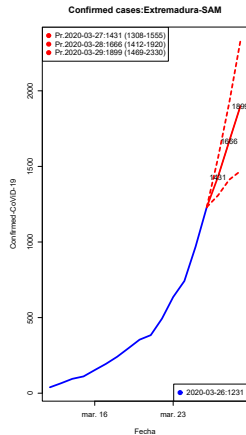
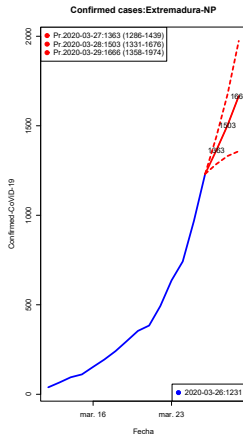
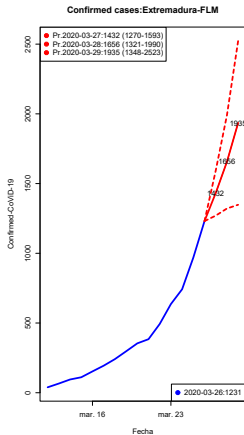
Confirmed cases:C..Valenciana-SAM



◀ Confirmados

◀ Fallecidos

Confirmed cases: Extremadura

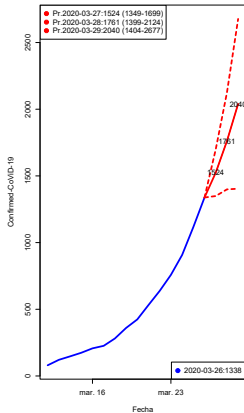


◀ Confirmados

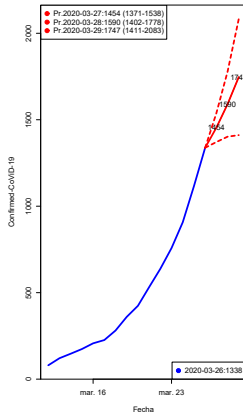
◀ Fallecidos

Confirmed cases: Aragón

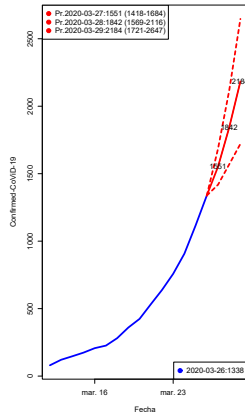
Confirmed cases:Aragón-FLM



Confirmed cases:Aragón-NP



Confirmed cases:Aragón-SAM

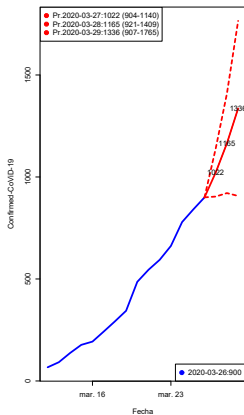


◀ Confirmados

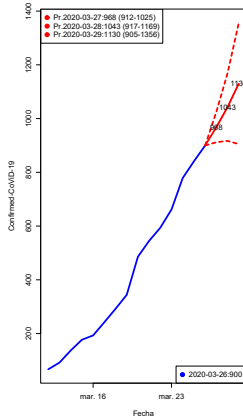
◀ Fallecidos

Confirmed cases: Asturias

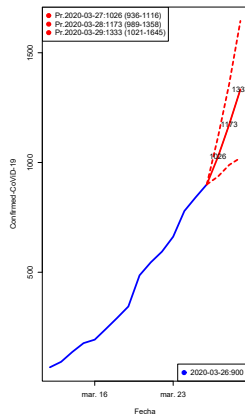
Confirmed cases:Asturias-FLM



Confirmed cases:Asturias-NP



Confirmed cases:Asturias-SAM

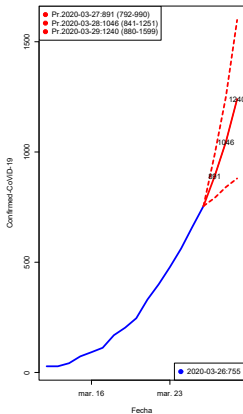


◀ Confirmados

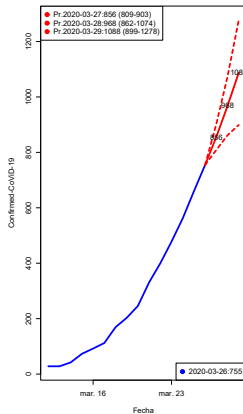
◀ Fallecidos

Confirmed cases: Baleares

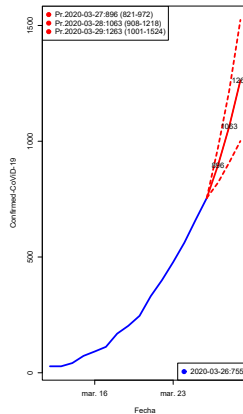
Confirmed cases:Baleares-FLM



Confirmed cases:Baleares-NP



Confirmed cases:Baleares-SAM

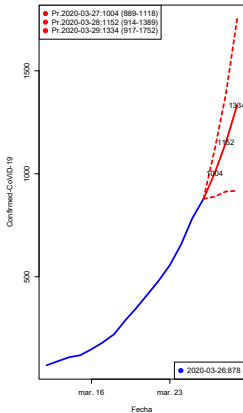


◀ Confirmados

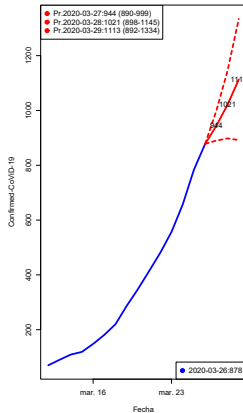
◀ Fallecidos

Confirmed cases: Canarias

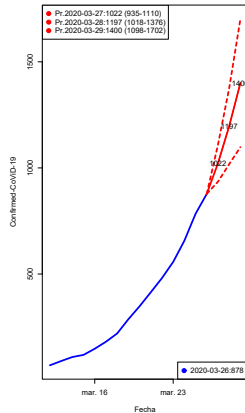
Confirmed cases:Canarias-FLM



Confirmed cases:Canarias-NP



Confirmed cases:Canarias-SAM

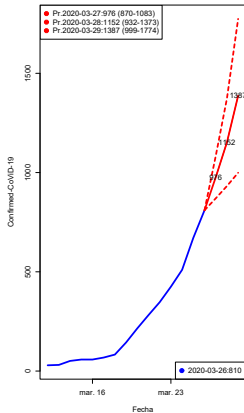


◀ Confirmados

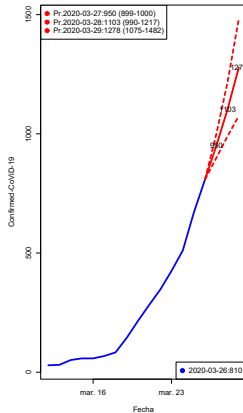
◀ Fallecidos

Confirmed cases: Cantabria

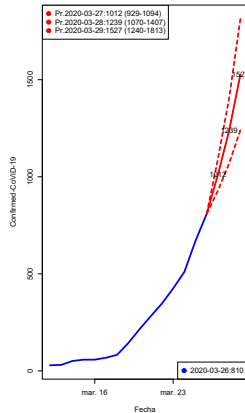
Confirmed cases:Cantabria-FLM



Confirmed cases:Cantabria-NP



Confirmed cases:Cantabria-SAM

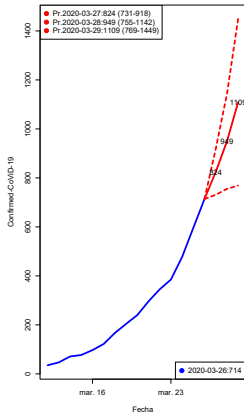


◀ Confirmados

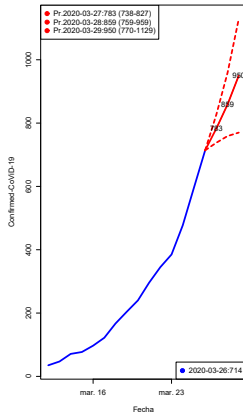
◀ Fallecidos

Confirmed cases: Murcia

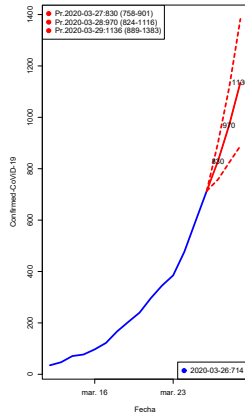
Confirmed cases:Murcia-FLM



Confirmed cases:Murcia-NP

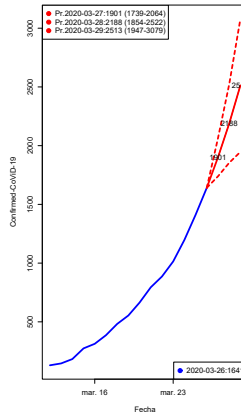


Confirmed cases:Murcia-SAM



◀ Confirmados

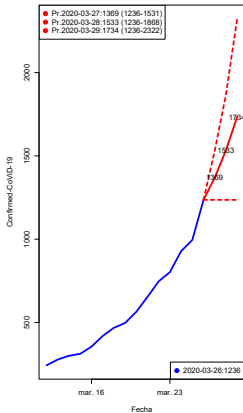
◀ Fallecidos



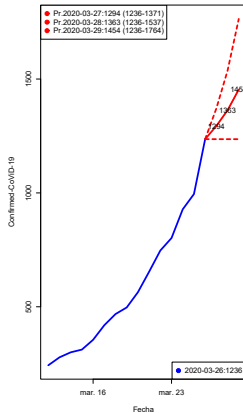
◀ Fallecidos

Confirmed cases: La Rioja

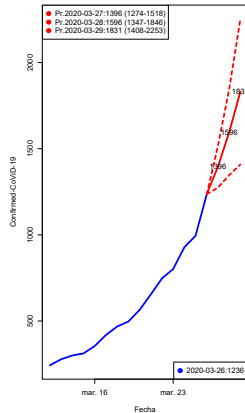
Confirmed cases:La.Rioja-FLM



Confirmed cases:La.Rioja-NP



Confirmed cases:La.Rioja-SAM



◀ Confirmados

◀ Fallecidos

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- Predicciones

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- Predicciones

Número de datos funcionales: 1316

Países/Regiones distintos incorporados: 28

Países/Regiones distintos incorporados: 28

▶ España

► Andalucía

► Aragón

► **Castilla-La Mancha**

► **Castilla y León**

► Catalunya

► Extremadura

► Euskadi

► Madrid

► **La Rioja**

► C. Valenciana

▶ Mod Lineal

- ▶ Mod NP

► **Mod Aditivo**

Horiz	Medida	FLM	NP	SAM
H1	σ_R^2	0.071	0.068	0.067
H1	$\sigma_R^2(rob.)$	0.042	0.011	0.04
H1	r^2	0.199	0.373	0.248
H2	σ_R^2	0.219	0.225	0.205
H2	$\sigma_R^2(rob.)$	0.16	0.093	0.148
H2	r^2	0.294	0.4	0.335
H3	σ_R^2	0.578	0.639	0.531
H3	$\sigma_R^2(rob.)$	0.405	0.169	0.384
H3	r^2	0.327	0.385	0.378

	Last	F:H1-lw	F:H1-fit	F:H1-up	F:H2-lw	F:H2-fit	F:H2-up
España	4858	5224	5891	6557	5650	6935	8219
Andalucía	144	156	178	200	166	207	249
Aragón	58	61	69	76	67	82	97
Castilla.La.Mancha	367	402	454	506	448	548	648
Castilla.y.León	252	286	324	362	323	395	467
Cataluña	880	1040	1165	1290	1230	1469	1709
Euskadi	207	214	242	269	225	279	332
Extremadura	69	79	88	98	93	111	130
Madrid	2412	2511	2844	3177	2604	3245	3887
C..Valenciana	198	230	259	288	259	314	369
La.Rioja	55	57	65	72	61	76	90

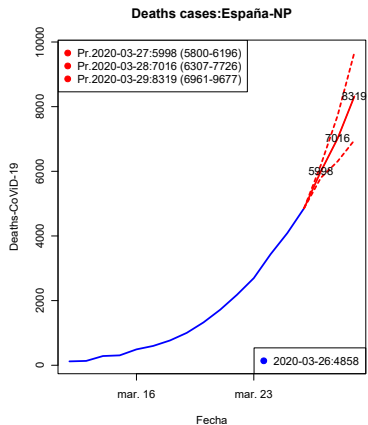
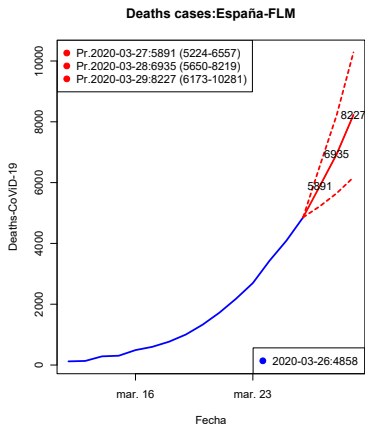
Table: Previsión fallecidos: Modelo lineal- Horizonte 1 y 2 días.

Table: Previsión fallecidos: Modelo No Paramétrico - Horizonte 1 y 2 días

Table: Previsión Fallecidos Ratio incremento: Modelo No Paramétrico - horizonte 1 y 2 días.

◀ Fallecidos

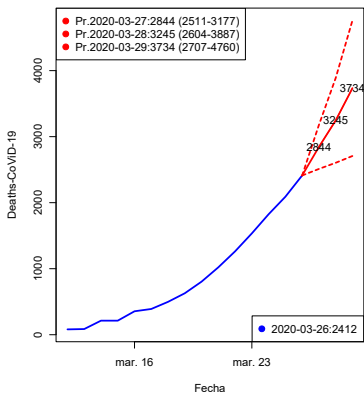
Fallecidos: España



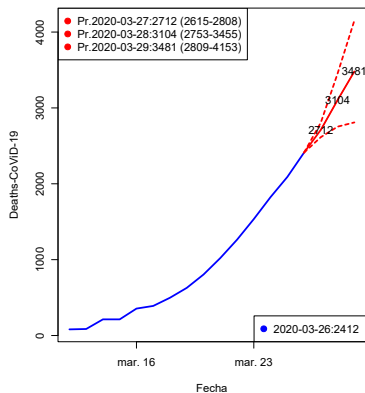
◀ Fallecidos

Fallecidos: Madrid

Deaths cases:Madrid-FLM



Deaths cases:Madrid-NP

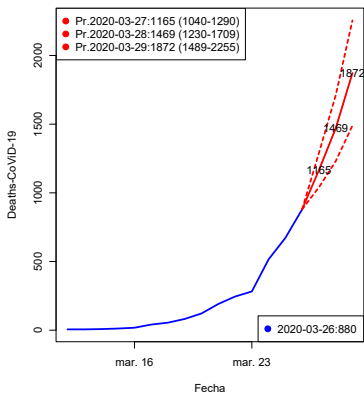


◀ Confirmados

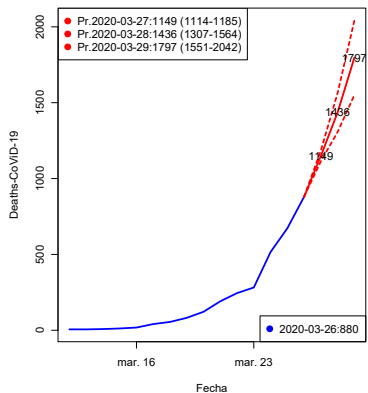
◀ Fallecidos

Fallecidos: Cataluña

Deaths cases:Cataluña-FLM



Deaths cases:Cataluña-NP

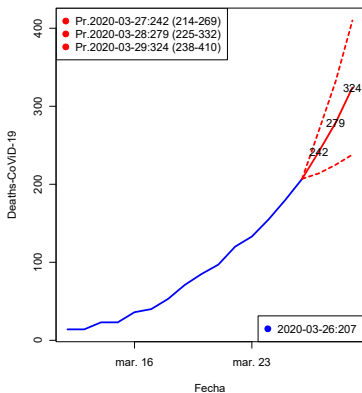


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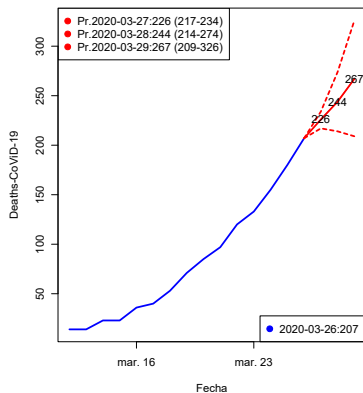
◀ Fallecidos

Fallecidos: Euskadi

Deaths cases:Euskadi-FLM

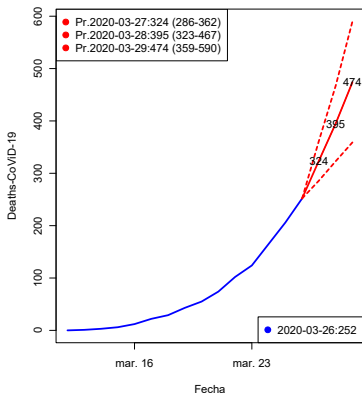


Deaths cases:Euskadi-NP

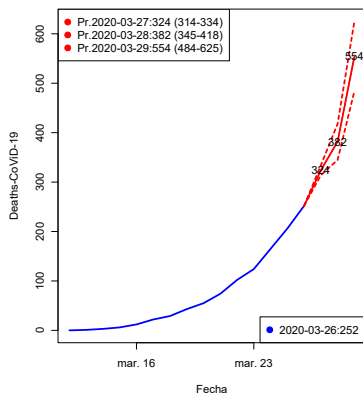


Fallecidos: Castilla y León

Deaths cases:Castilla.y.León-FLM



Deaths cases:Castilla.y.León-NP

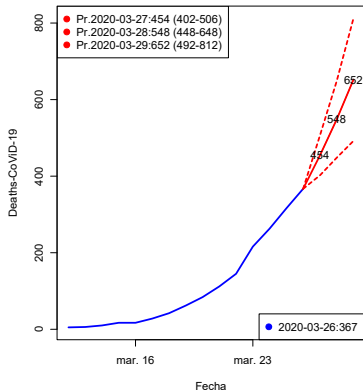


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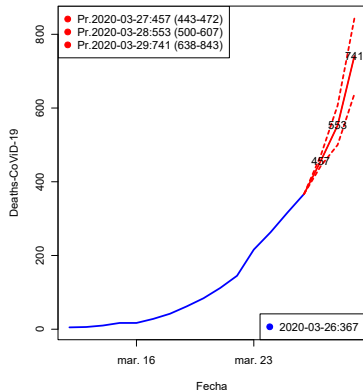
◀ Fallecidos

Fallecidos: Castilla-La Mancha

Deaths cases:Castilla.La.Mancha-FLM



Deaths cases:Castilla.La.Mancha-NP

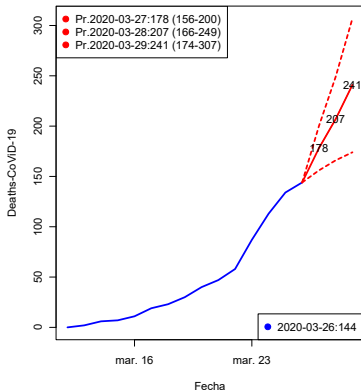


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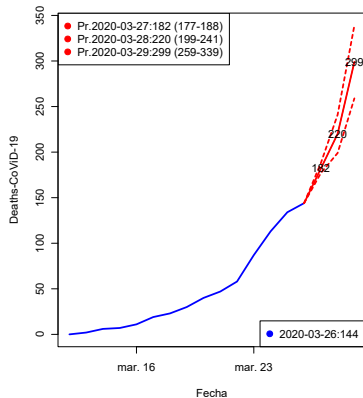
◀ Fallecidos

Fallecidos: Andalucía

Deaths cases:Andalucía-FLM



Deaths cases:Andalucía-NP

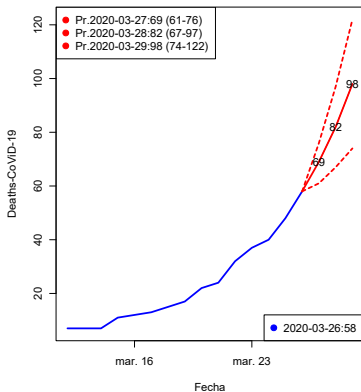


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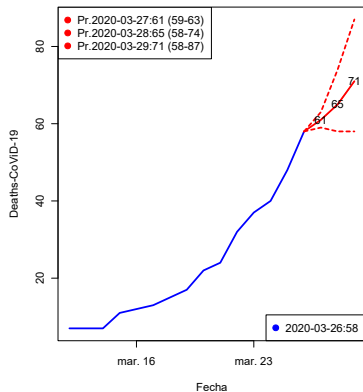
◀ Fallecidos

Fallecidos: Aragón

Deaths cases:Aragón-FLM



Deaths cases:Aragón-NP

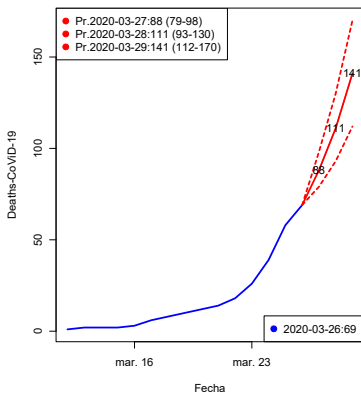


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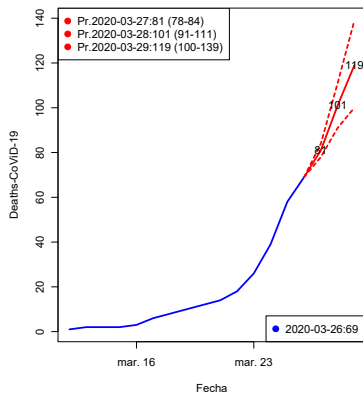
◀ Fallecidos

Fallecidos: Extremadura

Deaths cases:Extremadura-FLM



Deaths cases:Extremadura-NP

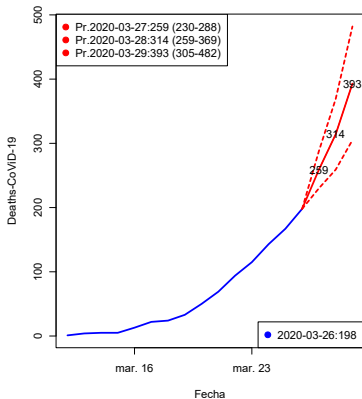


◀ Confirmados

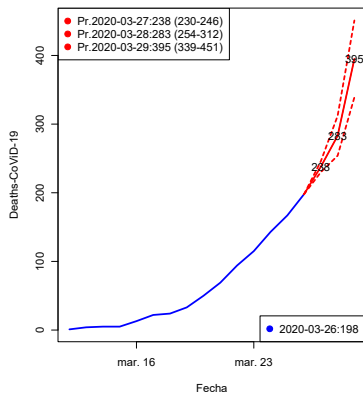
◀ Fallecidos

Fallecidos: C. Valenciana

Deaths cases:C..Valenciana-FLM



Deaths cases:C..Valenciana-NP

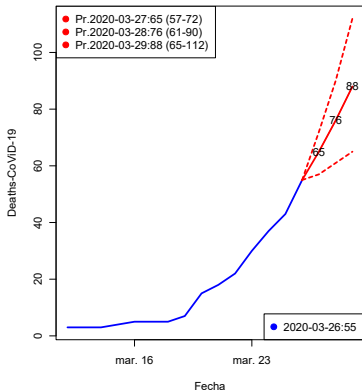


◀ Confirmados

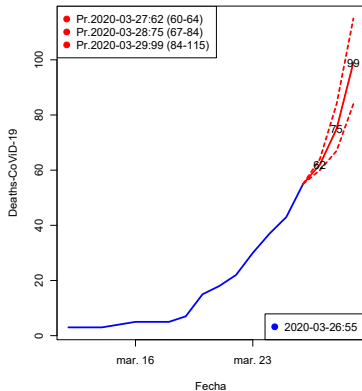
◀ Fallecidos

Fallecidos: La Rioja

Deaths cases:La.Rioja-FLM



Deaths cases:La.Rioja-NP



◀ Confirmados

◀ Fallecidos

Breve descripción del Modelo de predicción

Objetivo: Predecir ratio de incremento a 1, 2, o 3 días: $r^{(k)}(t) = \frac{x_{t+k} - x_t}{x_t + 1}$

Información usada: Pasado de esta variable a un retardo durante los últimos 15 días: $R^{(1)} = \{r^{(1)}(-14), \dots, r^{(1)}(0)\}$.

Datos para alimentar el modelo:

https://github.com/CSSEGISandData/COVID-19/tree/master/csse_covid_19_data/csse_covid_19_time_series/. Algunas series de tiempo (como el Cruise Ship) son filtrados por inconsistencia, presunta falta de veracidad o por valores bajos. En la predicción final se reconstruye el número de casos esperado.

Se construyen tres modelos funcionales de la regresión general: $r^{(k)}(0) = f(R^{(1)}) + \epsilon$ donde la diferencia radica en la forma de la función f

- Lineal: $f(R^{(1)}) = \int_{-14}^0 R^{(1)}(t) \beta(t) dt$
- NP: f es una estimación no paramétrica tipo núcleo.
- SAM: f es una combinación aditiva de funciones suaves de las componentes principales.