

Predicciones sobre CoViD-19

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DEPARTAMENTO DE ESTADÍSTICA,
ANÁLISE MATEMÁTICA E OPTIMIZACIÓN



- Predicciones

- Predicciones

Datos

Número de datos funcionales: 2136

Países/Regiones distintos incorporados: 100

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	0.022	0.03
H1	$\sigma_R^2(rob.)$	0.021	0.006	0.019
H1	r^2	0.2	0.613	0.298
H2	σ_R^2	0.138	0.092	0.118
H2	$\sigma_R^2(rob.)$	0.07	0.024	0.061
H2	r^2	0.232	0.619	0.342
H3	σ_R^2	0.408	0.305	0.354
H3	$\sigma_R^2(rob.)$	0.19	0.064	0.166
H3	r^2	0.218	0.564	0.319

Último dato: 2020-03-27 21:00 que se publica 2020-03-28 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	72248	72248	80960	93236	72248	90053	115199
Andalucía	4277	4296	4869	5441	4402	5591	6780
Aragón	1592	1609	1822	2035	1654	2097	2539
Asturias	1004	1004	1134	1268	1004	1280	1560
Baleares	862	888	1003	1119	931	1171	1410
Canarias	1025	1029	1167	1304	1053	1338	1623
Cantabria	937	984	1110	1235	1053	1313	1574
Cataluña	14263	14702	16636	18569	15467	19480	23494
Castilla.La.Mancha	4512	4576	5180	5785	4654	5910	7165
Castilla.y.León	4791	4939	5581	6223	5131	6464	7797
C..Valenciana	4034	4083	4630	5177	4313	5448	6584
Extremadura	1394	1425	1612	1798	1489	1876	2264
Euskadi	5136	5137	5824	6512	5238	6666	8093
Galicia	2772	2842	3213	3584	2978	3749	4520
Madrid	21520	21520	23921	26855	21520	26652	32739
Murcia	802	811	919	1026	842	1065	1288
Navarra	1829	1830	2074	2319	1847	2356	2864
La.Rioja	1436	1436	1595	1787	1436	1790	2189

Table: Previsión número de casos confirmados: Modelo lineal - 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	72248	75148	82307	89466	80265	94685	109106
Andalucía	4277	4484	4908	5333	4848	5703	6559
Aragón	1592	1712	1870	2029	1896	2215	2533
Asturias	1004	1024	1124	1225	1059	1261	1463
Baleares	862	914	1000	1086	985	1158	1331
Canarias	1025	1081	1183	1285	1169	1374	1578
Cantabria	937	1050	1145	1239	1193	1383	1573
Cataluña	14263	15276	16707	18139	16753	19634	22516
Castilla.La.Mancha	4512	4759	5213	5666	5101	6011	6920
Castilla.y.León	4791	5022	5503	5985	5275	6244	7213
C..Valenciana	4034	4297	4733	5169	4811	5686	6560
Extremadura	1394	1497	1636	1775	1664	1945	2225
Euskadi	5136	5455	5964	6472	5943	6967	7992
Galicia	2772	2974	3251	3528	3290	3847	4404
Madrid	21520	21906	24037	26169	22788	27079	31370
Murcia	802	849	929	1009	927	1088	1249
Navarra	1829	1880	2061	2242	1969	2334	2699
La.Rioja	1436	1491	1632	1773	1588	1873	2158

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	0.128	0.000	0.121	0.290	0.000	0.246	0.594
Andalucía	0.128	0.005	0.138	0.272	0.029	0.307	0.585
Aragón	0.190	0.011	0.144	0.278	0.039	0.317	0.594
Asturias	0.115	0.000	0.129	0.263	0.000	0.275	0.553
Baleares	0.142	0.030	0.164	0.298	0.080	0.358	0.635
Canarias	0.167	0.004	0.138	0.272	0.027	0.305	0.583
Cantabria	0.157	0.050	0.184	0.318	0.123	0.401	0.679
Cataluña	0.102	0.031	0.166	0.302	0.084	0.366	0.647
Castilla.La.Mancha	0.147	0.014	0.148	0.282	0.032	0.310	0.588
Castilla.y.León	0.159	0.031	0.165	0.299	0.071	0.349	0.627
C..Valenciana	0.142	0.012	0.148	0.283	0.069	0.351	0.632
Extremadura	0.132	0.022	0.156	0.290	0.068	0.346	0.624
Euskadi	0.116	0.000	0.134	0.268	0.020	0.298	0.576
Galicia	0.194	0.025	0.159	0.293	0.074	0.352	0.630
Madrid	0.118	0.000	0.112	0.248	0.000	0.238	0.521
Murcia	0.123	0.012	0.146	0.279	0.050	0.328	0.605
Navarra	0.114	0.000	0.134	0.268	0.010	0.288	0.565
La.Rioja	0.162	0.000	0.110	0.244	0.000	0.246	0.524

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	0.128	0.011	0.076	0.141	0.015	0.161	0.308
Andalucía	0.128	0.017	0.082	0.147	0.028	0.175	0.321
Aragón	0.190	0.021	0.086	0.151	0.037	0.183	0.330
Asturias	0.115	0.004	0.068	0.133	0.000	0.145	0.292
Baleares	0.142	0.050	0.115	0.180	0.091	0.237	0.384
Canarias	0.167	0.009	0.074	0.139	0.013	0.159	0.306
Cantabria	0.157	0.090	0.156	0.221	0.182	0.329	0.476
Cataluña	0.102	0.050	0.115	0.180	0.097	0.243	0.390
Castilla.La.Mancha	0.147	0.025	0.090	0.155	0.043	0.190	0.336
Castilla.y.León	0.159	0.044	0.109	0.174	0.086	0.232	0.379
C..Valenciana	0.142	0.085	0.150	0.215	0.254	0.401	0.548
Extremadura	0.132	0.041	0.106	0.171	0.081	0.228	0.375
Euskadi	0.116	0.006	0.071	0.136	0.007	0.154	0.301
Galicia	0.194	0.039	0.104	0.169	0.074	0.221	0.367
Madrid	0.118	0.000	0.059	0.124	0.000	0.127	0.274
Murcia	0.123	0.027	0.092	0.156	0.049	0.196	0.342
Navarra	0.114	0.010	0.075	0.140	0.012	0.159	0.305
La.Rioja	0.162	0.000	0.050	0.115	0.000	0.110	0.256

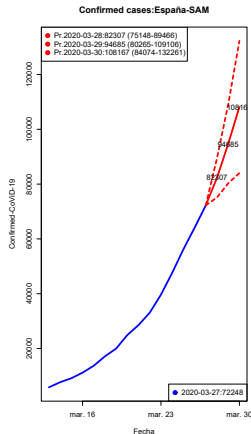
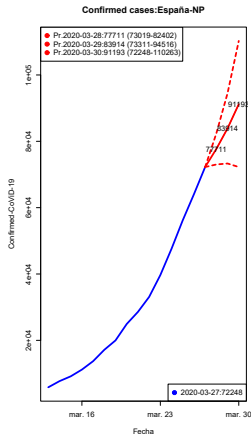
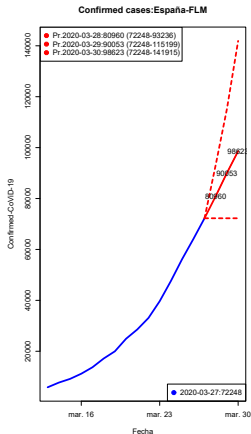
Table: Previsión Ratio incremento casos confirmados: Modelo No Paramétrico
- Horizonte 1 y 2 días.

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	0.128	0.040	0.139	0.238	0.111	0.311	0.510
Andalucía	0.128	0.048	0.148	0.247	0.133	0.333	0.533
Aragón	0.190	0.075	0.175	0.274	0.191	0.391	0.591
Asturias	0.115	0.020	0.120	0.220	0.055	0.256	0.457
Baleares	0.142	0.060	0.160	0.259	0.142	0.343	0.544
Canarias	0.167	0.055	0.154	0.253	0.140	0.340	0.539
Cantabria	0.157	0.121	0.221	0.322	0.272	0.475	0.678
Cataluña	0.102	0.071	0.171	0.272	0.175	0.377	0.579
Castilla.La.Mancha	0.147	0.055	0.155	0.256	0.131	0.332	0.534
Castilla.y.León	0.159	0.048	0.149	0.249	0.101	0.303	0.505
C..Valenciana	0.142	0.065	0.173	0.281	0.193	0.409	0.626
Extremadura	0.132	0.074	0.173	0.273	0.194	0.395	0.596
Euskadi	0.116	0.062	0.161	0.260	0.157	0.357	0.556
Galicia	0.194	0.073	0.173	0.273	0.187	0.388	0.588
Madrid	0.118	0.018	0.117	0.216	0.059	0.258	0.458
Murcia	0.123	0.059	0.158	0.258	0.156	0.356	0.556
Navarra	0.114	0.028	0.127	0.226	0.077	0.276	0.475
La.Rioja	0.162	0.038	0.137	0.235	0.106	0.304	0.502

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

Confirmed cases: España

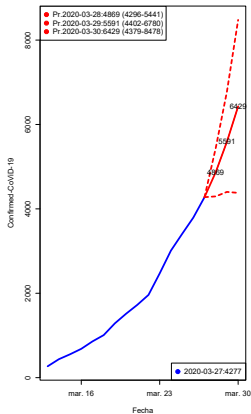


◀ Confirmados

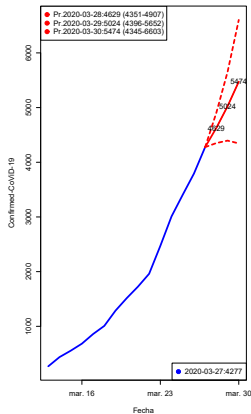
◀ Fallecidos

Confirmed cases: Andalucía

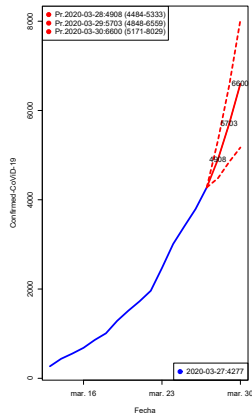
Confirmed cases:Andalucia-FLM



Confirmed cases:Andalucia-NP



Confirmed cases:Andalucia-SAM

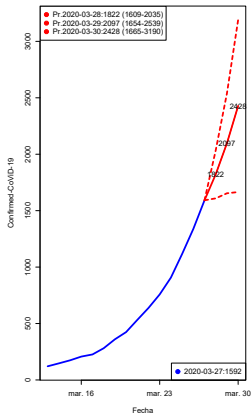


◀ Confirmados

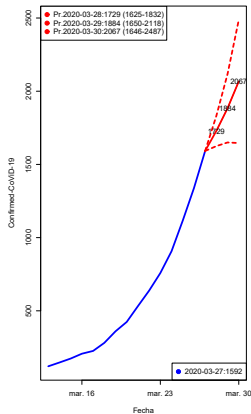
◀ Fallecidos

Confirmed cases: Aragón

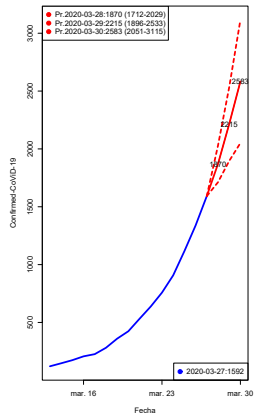
Confirmed cases:Aragón-FLM



Confirmed cases:Aragón-NP



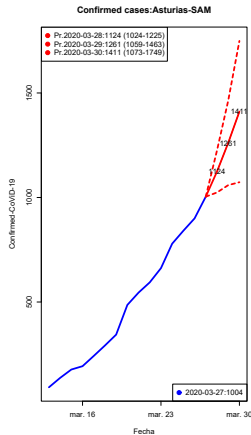
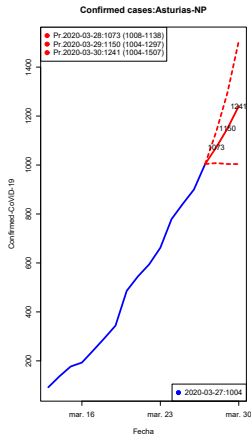
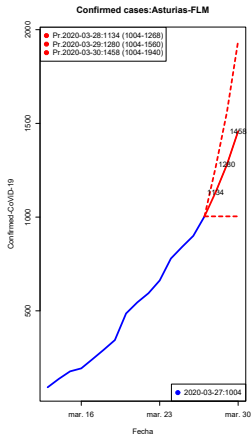
Confirmed cases:Aragón-SAM



◀ Confirmados

◀ Fallecidos

Confirmed cases: Asturias

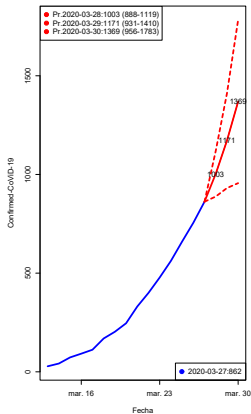


◀ Confirmados

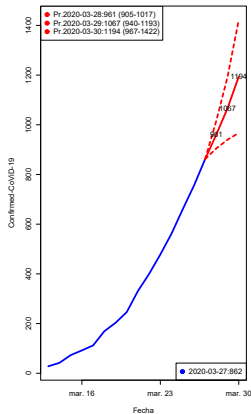
◀ Fallecidos

Confirmed cases: Baleares

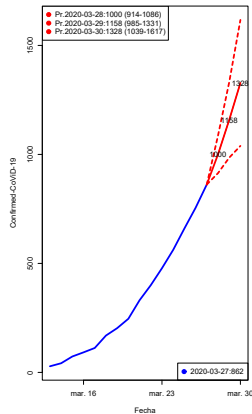
Confirmed cases:Baleares-FLM



Confirmed cases:Baleares-NP



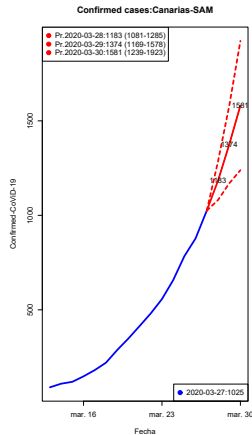
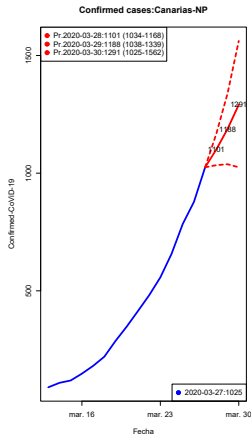
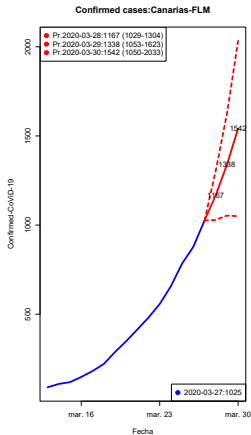
Confirmed cases:Baleares-SAM



◀ Confirmados

◀ Fallecidos

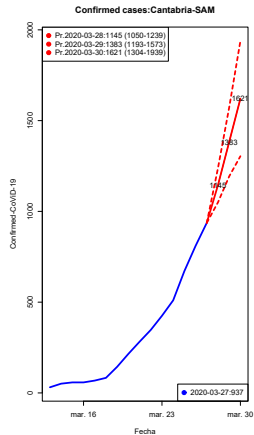
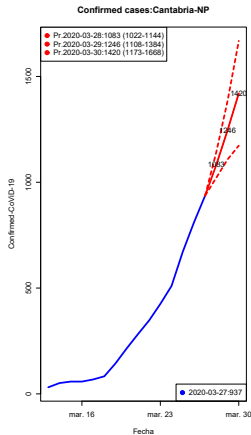
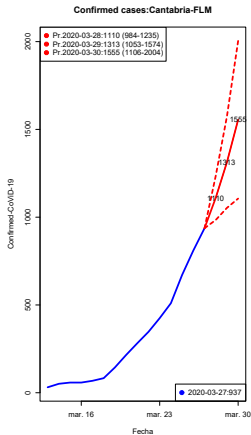
Confirmed cases: Canarias



◀ Confirmados

◀ Fallecidos

Confirmed cases: Cantabria

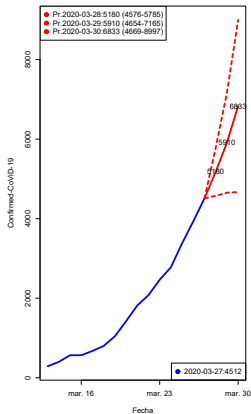


◀ Confirmados

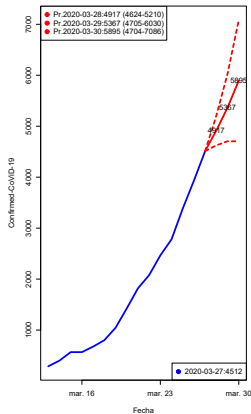
◀ Fallecidos

Confirmed cases: Castilla-La Mancha

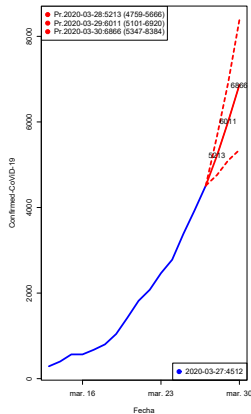
Confirmed cases:Castilla.La.Mancha-FLM



Confirmed cases:Castilla.La.Mancha-NP



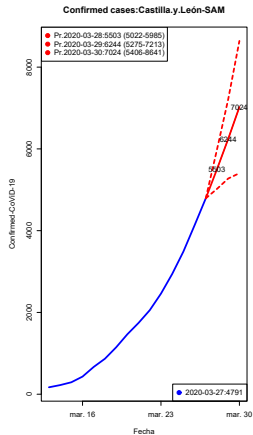
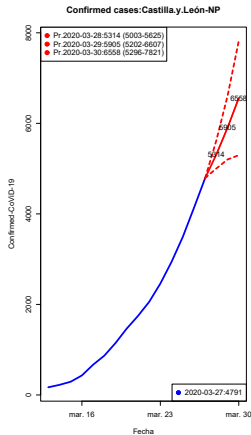
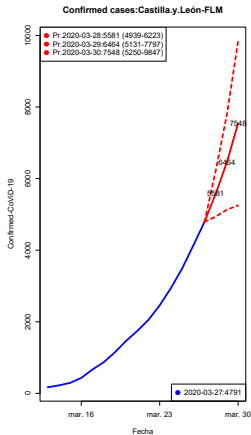
Confirmed cases:Castilla.La.Mancha-SAM



◀ Confirmados

◀ Fallecidos

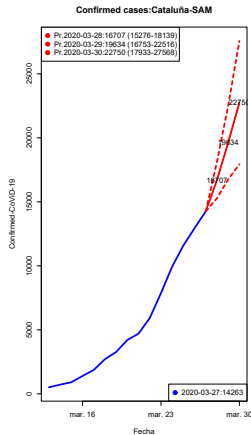
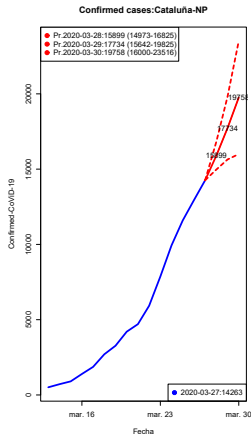
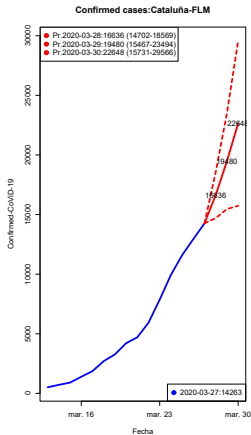
Confirmed cases: Castilla y León



◀ Confirmados

◀ Fallecidos

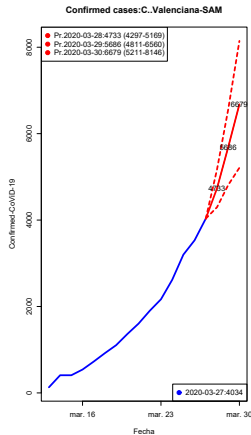
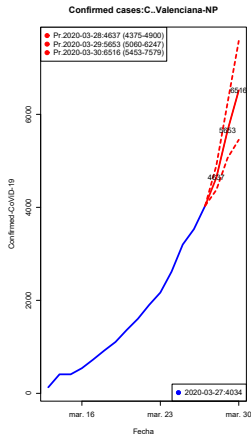
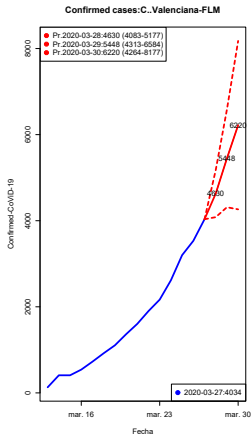
Confirmed cases: Cataluña



◀ Confirmados

◀ Fallecidos

Confirmed cases: C. Valenciana

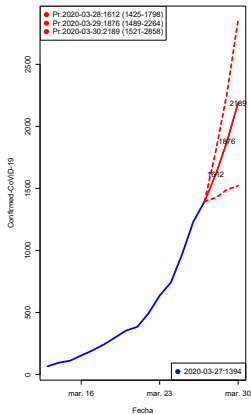


◀ Confirmados

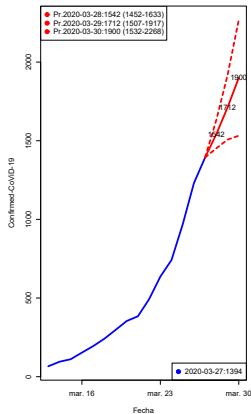
◀ Fallecidos

Confirmed cases: Extremadura

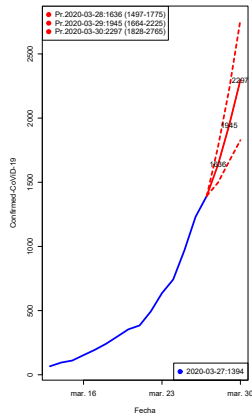
Confirmed cases:Extremadura-FLM



Confirmed cases:Extremadura-NP



Confirmed cases:Extremadura-SAM

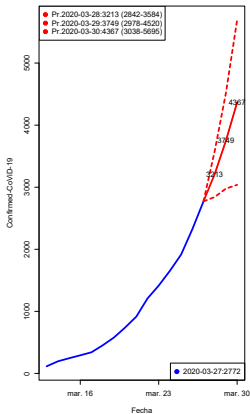


◀ Confirmados

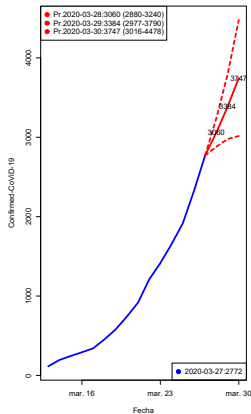
◀ Fallecidos

Confirmed cases: Galicia

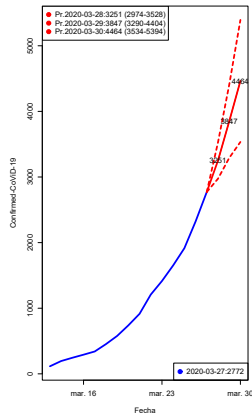
Confirmed cases:Galicia-FLM



Confirmed cases:Galicia-NP



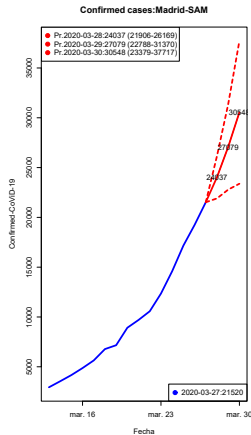
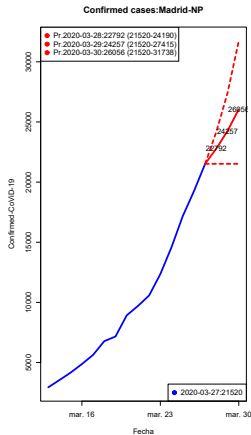
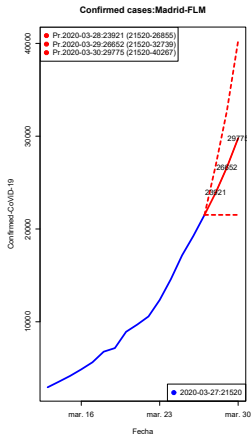
Confirmed cases:Galicia-SAM



◀ Confirmados

◀ Fallecidos

Confirmed cases: Madrid

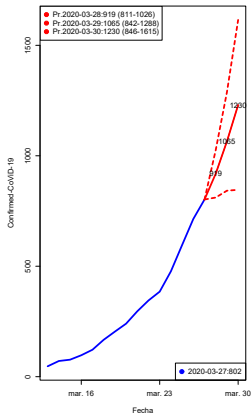


◀ Confirmados

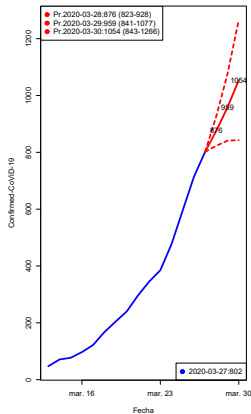
◀ Fallecidos

Confirmed cases: Murcia

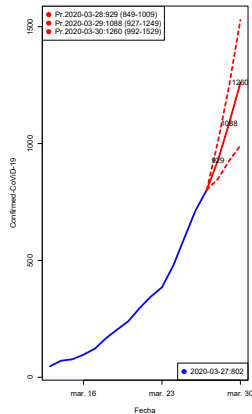
Confirmed cases:Murcia-FLM



Confirmed cases:Murcia-NP



Confirmed cases:Murcia-SAM

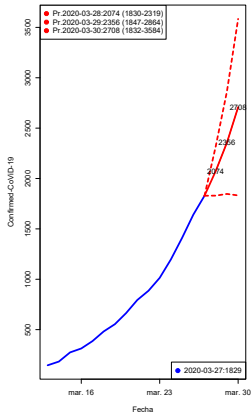


◀ Confirmados

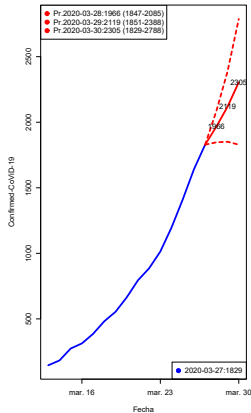
◀ Fallecidos

Confirmed cases: Navarra

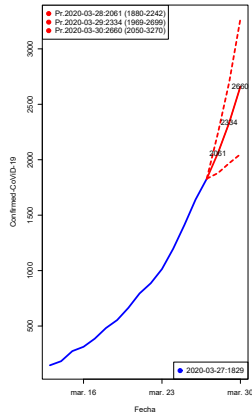
Confirmed cases:Navarra-FLM



Confirmed cases:Navarra-NP



Confirmed cases:Navarra-SAM

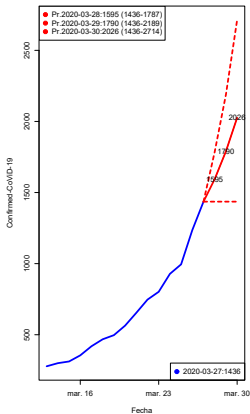


◀ Confirmados

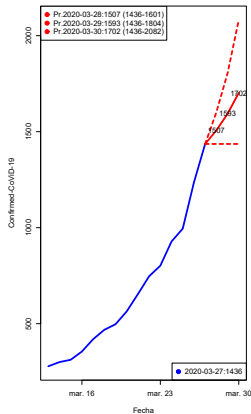
◀ Fallecidos

Confirmed cases: La Rioja

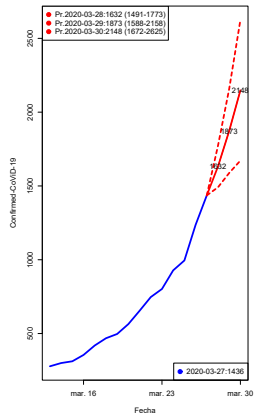
Confirmed cases:La.Rioja-FLM



Confirmed cases:La.Rioja-NP



Confirmed cases:La.Rioja-SAM



◀ Confirmados

◀ Fallecidos

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- Predicciones

2 Fallecidos

- Predicciones

Número de datos funcionales: 1440

Países/Regiones distintos incorporados: 30

Países/Regiones distintos incorporados: 30

▶ España

► Andalucía

► Aragón

► **Castilla-La Mancha**

► **Castilla y León**

► Catalunya

► Extremadura

► Galicia

► Euskadi

► Madrid

► **La Rioja**

► C. Valenciana

► Mod Lineal

► Mod NP

► Mod Aditivo

Horiz	Medida	FLM	NP	SAM
H1	σ_R^2	0.067	0.064	0.064
H1	$\sigma_R^2(rob.)$	0.041	0.011	0.038
H1	r^2	0.199	0.368	0.23
H2	σ_R^2	0.206	0.213	0.194
H2	$\sigma_R^2(rob.)$	0.152	0.093	0.141
H2	r^2	0.296	0.399	0.334
H3	σ_R^2	0.545	0.603	0.499
H3	$\sigma_R^2(rob.)$	0.389	0.146	0.341
H3	r^2	0.326	0.384	0.38

Tabla Fallecidos Ratio Incremento Modelo No Paramétrico.

	Last	R:H1-lw	R:H1-fit	R:H1-up	R:H2-lw	R:H2-fit	R:H2-up
España	0.171	0.113	0.156	0.199	0.223	0.364	0.506
Andalucía	0.214	0.146	0.188	0.231	0.479	0.620	0.761
Aragón	0.000	0.007	0.051	0.095	0.000	0.115	0.257
Castilla.La.Mancha	0.220	0.192	0.235	0.278	0.289	0.430	0.571
Castilla.y.León	0.273	0.142	0.184	0.227	0.432	0.573	0.714
Cataluña	0.216	0.214	0.257	0.300	0.435	0.576	0.717
Euskadi	0.067	0.034	0.077	0.121	0.029	0.171	0.312
Extremadura	0.271	0.172	0.216	0.260	0.269	0.411	0.552
Galicia	0.091	0.191	0.233	0.276	0.332	0.473	0.614
Madrid	0.143	0.094	0.136	0.179	0.135	0.276	0.417
C..Valenciana	0.181	0.158	0.200	0.242	0.456	0.597	0.739
La.Rioja	0.179	0.184	0.232	0.280	0.423	0.567	0.711

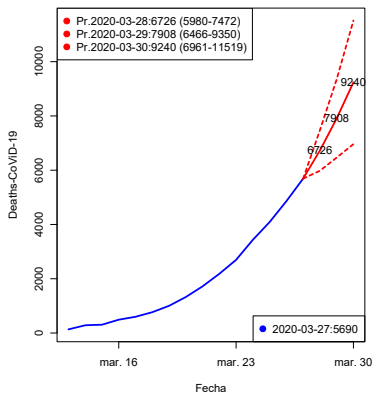
Table: Previsión Fallecidos Ratio incremento: Modelo No Paramétrico - Horizonte 1 y 2 días.

◀ Confirmados

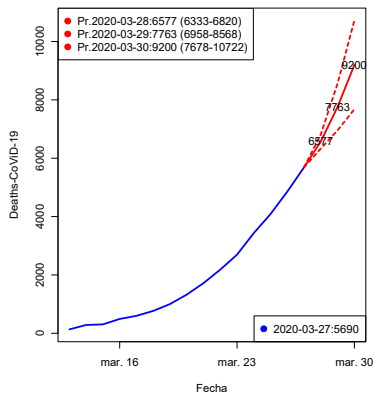
◀ Fallecidos

Fallecidos: España

Deaths cases:España-FLM



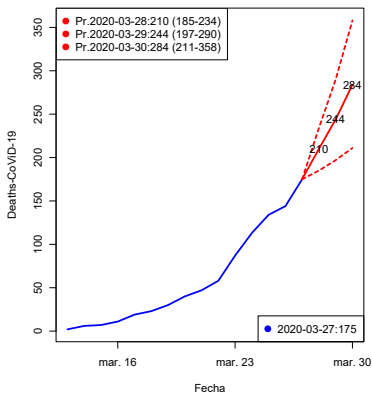
Deaths cases:España-NP



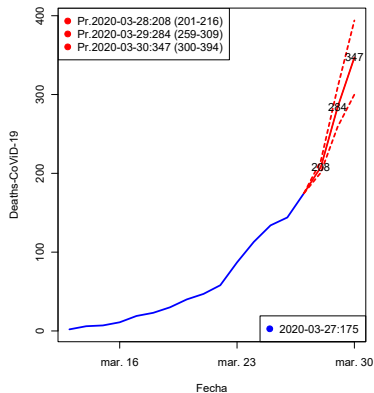
◀ Fallecidos

Fallecidos: Andalucía

Deaths cases:Andalucía-FLM



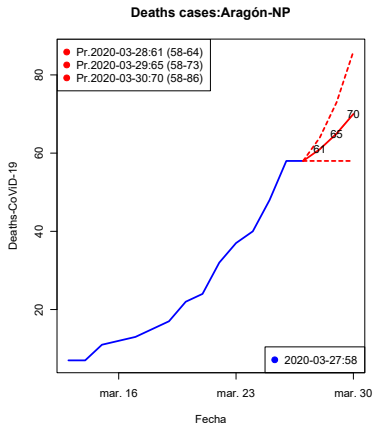
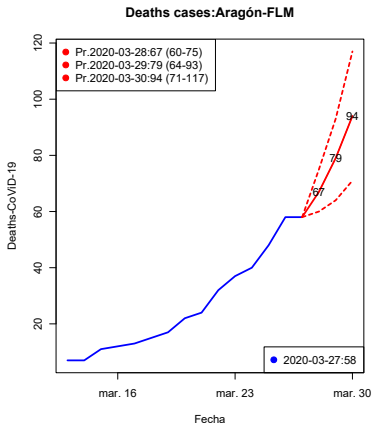
Deaths cases:Andalucía-NP



◀ Confirmados

◀ Fallecidos

Fallecidos: Aragón

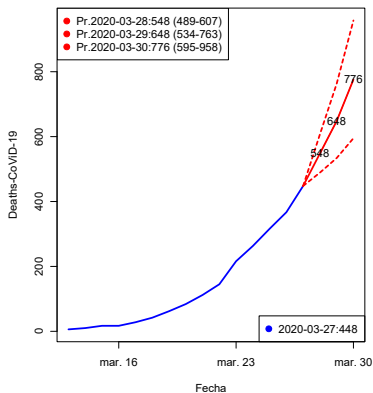


◀ Confirmados

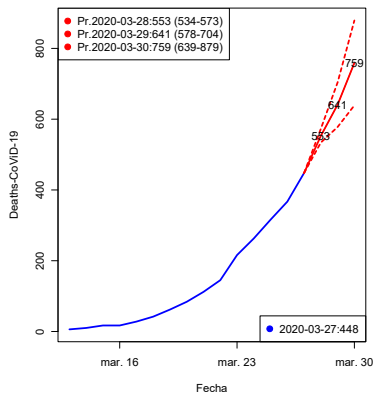
◀ Fallecidos

Fallecidos: Castilla-La Mancha

Deaths cases:Castilla.La.Mancha-FLM



Deaths cases:Castilla.La.Mancha-NP

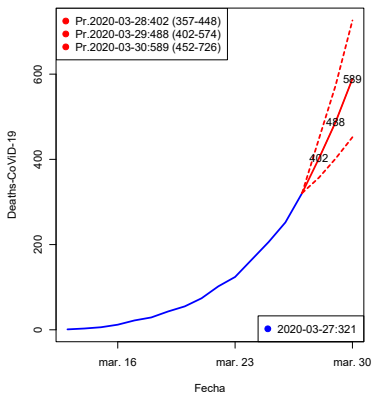


◀ Confirmados

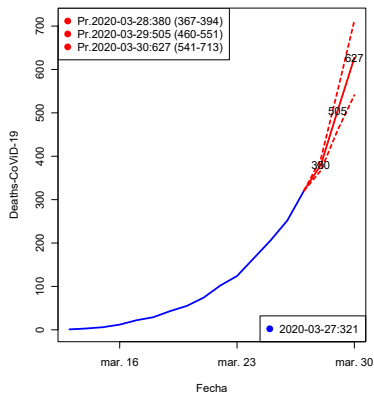
◀ Fallecidos

Fallecidos: Castilla y León

Deaths cases:Castilla.y.León-FLM



Deaths cases:Castilla.y.León-NP

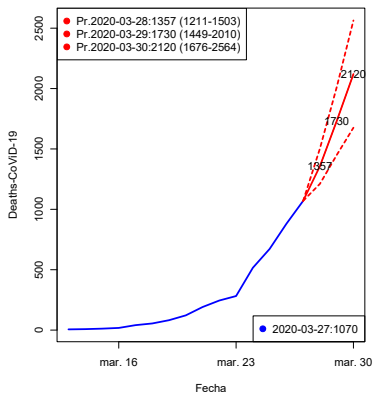


◀ Confirmados

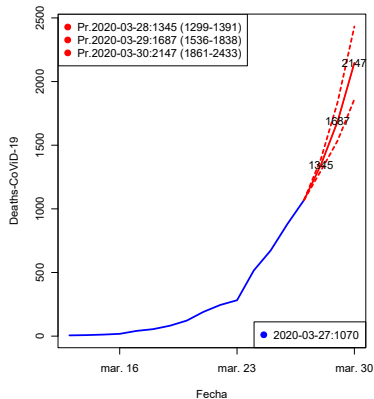
◀ Fallecidos

Fallecidos: Cataluña

Deaths cases:Cataluña-FLM



Deaths cases:Cataluña-NP

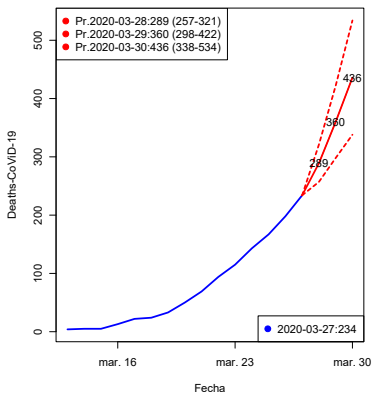


◀ Confirmados

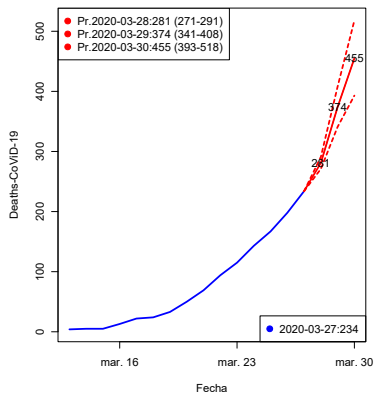
◀ Fallecidos

Fallecidos: C. Valenciana

Deaths cases:C..Valenciana-FLM



Deaths cases:C..Valenciana-NP

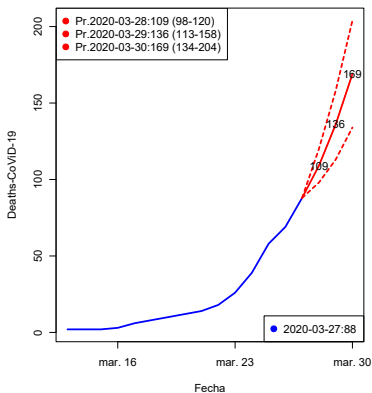


◀ Confirmados

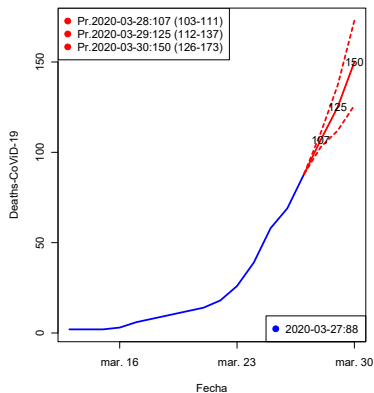
◀ Fallecidos

Fallecidos: Extremadura

Deaths cases:Extremadura-FLM



Deaths cases:Extremadura-NP

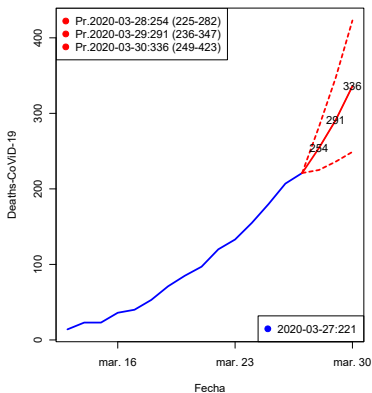


◀ Confirmados

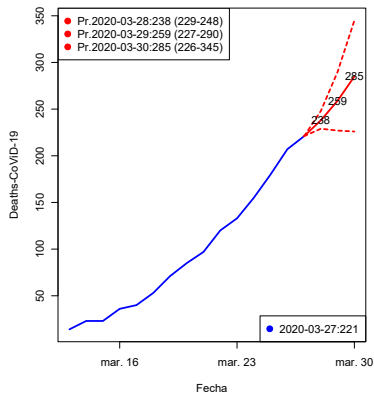
◀ Fallecidos

Fallecidos: Euskadi

Deaths cases:Euskadi-FLM



Deaths cases:Euskadi-NP

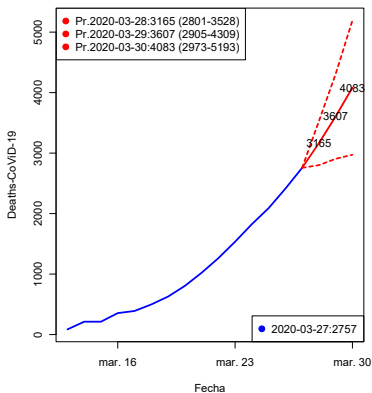


◀ Confirmados

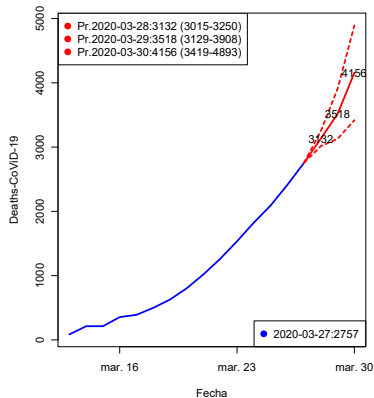
◀ Fallecidos

Fallecidos: Madrid

Deaths cases:Madrid-FLM

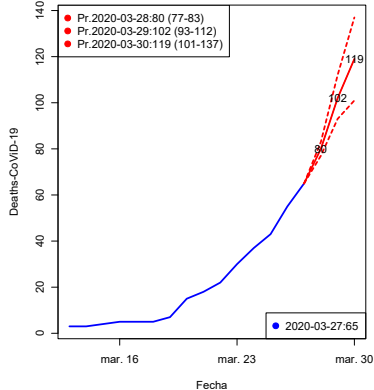
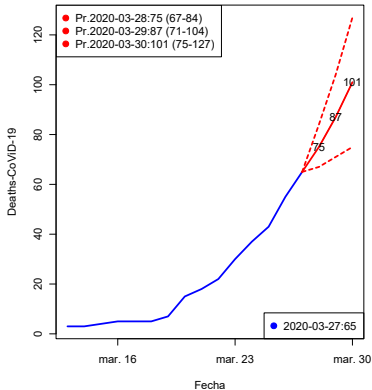


Deaths cases:Madrid-NP



◀ 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.