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Research Article

Could the magnitude of the last earthquake in Russia be estimated using the ROR methodology?

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Abstract
Advance knowledge of the occurrence of a major earthquake is an event that is predictable with a certain degree of error using the Backward Objective Regression (ROR) methodology. This allows environmental agencies responsible for human safety to take measures to prevent major damage to life and buildings. For this study, a database of the largest earthquakes that occurred on Earth from 1700 to 2025 was used, extracted from es.m.wikipedia.org, the free encyclopedia. The model explains 100% of the variance with small errors in the case of the Year variable. The behavior of the event magnitude in Russia was estimated with great precision. The year model depends on this magnitude regressed on six events. Only civil protection agencies are responsible for issuing warnings and taking preventive measures in the event of major earthquakes.

Keywords: Forecast/Earthquakes/Russia/ROR Regression.

Introduction

Since 2012, high-intensity earthquake forecasting has been carried out using mathematical modeling with good results (Oses R. et al., 2012)[1]. This work predicts a large number of variables such as the year, month, day, time, and magnitude of these phenomena. The modeling is carried out over a long period of time, and it is reiterated that only Civil Defense agencies are responsible for issuing alerts regarding the occurrence of these phenomena. In other works, earthquakes from 1990 to 2010 and the total number of deaths are modeled, in which it is said that in 2014 there would be an increase in earthquakes globally and that the trend was to rise (Oses R. et al, 2014) [2]. Also in 2018, a set of earthquakes were modeled at a global level between 2014-08-27 23.22.23 UTC to 2018-08-27 04.47.36 UTC, predicting the latitude and longitude of a total of the last 50 earthquakes, obtaining that the correlation between the actual value and the forecast was 0.716 for a model, in addition it was observed that these phenomena had a tendency to increase in longitude, in addition it depended on other factors of 2 steps back for a studied model (Oses R. et al, 2014). al,2018)[3,6]

In these works it is concluded that earthquakes at a Global Level are a regressive event throughout the planet and what happens in one place has repercussions in another not randomly or due to chance but it is a well-determined phenomenon, more recently, Oses R, et al, 2021[4], makes a forecast until the year 2050 of the number of earthquakes of magnitude 5 or more on the Richter scale whose tendency was to increase, showing how the 22-year cycle of the solar cycle impacts (Oses R, et al, 2022) [5], highlighting how the ROR methodology can be used for the prediction of cyclones and also earthquakes, as well as for viral and parasitic entities, the 11-year cycle of the sun and its impact are also presented, in these works it was possible to predict for Haiti in the year 2031 a possible earthquake on July 14 at 9:20 minutes latitude 36.60, longitude 133, at depth of 71.14 m of magnitude 6.7 on the Richter scale.

The objective of our work is to apply the ROR methodology (Ricardo Osés Rodríguez et al., 2022; Osés Rodriguez Ricardo and Fimia Duarte Rigoberto, 2021) to earthquakes recorded on the planet with magnitudes greater than 8.8 on the Richter scale. To determine the main statistical parameters of the models, using regressive objective regression (ROR)[7,8,] and to determine whether the magnitude is predictable, knowing that the last earthquake occurred in Russia in 2025.

Materials and Methods

For this work, a database of the largest earthquakes that occurred on planet Earth from 1700 to 2025 was used, extracted from es.m.wikipedia.org, the free encyclopedia.

Results and Discussion

Table 1 shows that, for the data studied, earthquake magnitudes on Earth range from 8.8 to 9.5 on the Richter scale, with a mean of 8.98 and a standard deviation of 0.22. The maximum and minimum values for these variables can be seen in Table 1.

Tabla 1. Estadísticos descriptivos

	N	Mínimum	Máximum	Mean	Estándard Deviatión
Year	12	1700	2025	1923,25	107,720
Magnitude	11	8,8	9,5	8,982	,2272
N válido (por lista)	11				

First, the magnitude was modeled, as shown in Table 2. The models explain 100% of the variance with zero error.

Table 2. Results of the mathematical model for magnitude

Variable	Explained Varince	Error of model	F de Fisher	Sig. F
Magnitude	100 %	0	78.325	0.00

Table 3 shows the model for the variable Year. The NoC trend is logically increasing, but not significant. The model depends on the events regressed in 6 events, the latter not significant. The error for the year is 10.84.

Table 3. Coeficientes[a,b]

Modelo		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Error estándar	Beta		
1	DS	1611,884	298,026	,571	5,409	,033
	DI	1610,108	294,652	,570	5,464	,032
	NoC	1,203	13,538	,006	,089	,937
	Lag6Year	,203	,228	,188	,889	,468

a. Dependent Variable: Year

b. Lineal Regressión throuh origen

Finally, a graph of the forecasts for the variable Year, Figure 1

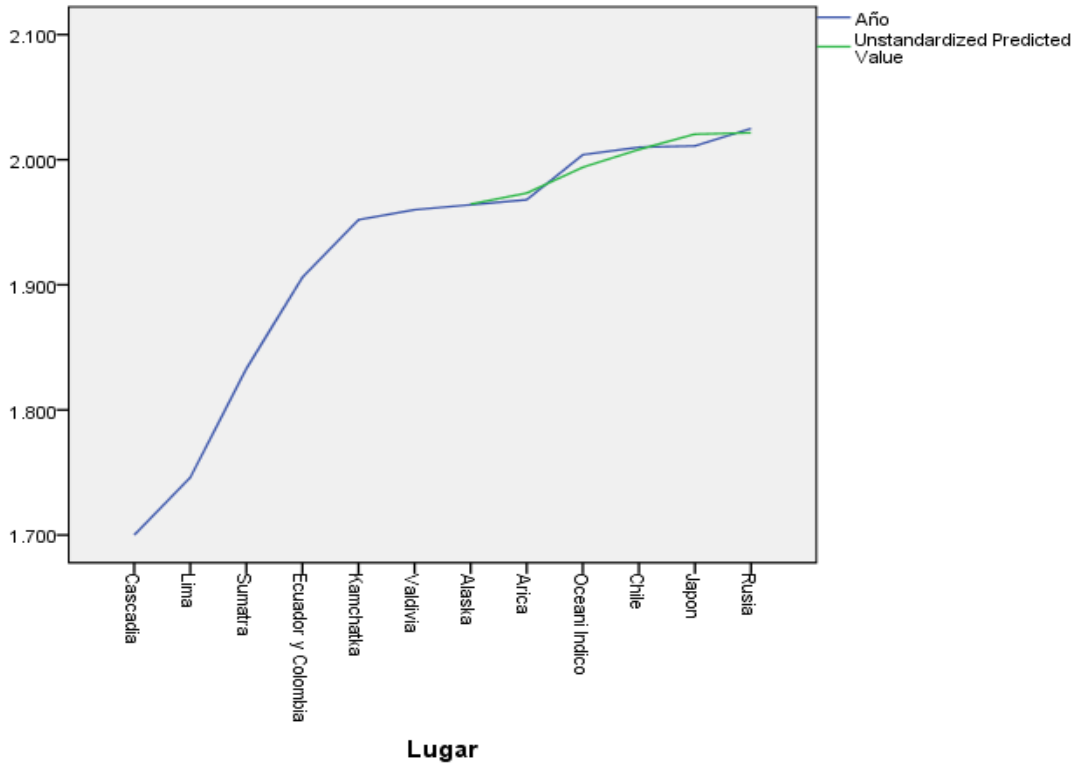

Figure 1. Forecast of the next earthquakes to be recorded on Planet Earth.

The forecast results are shown in Table 4. On the left, the actual value of the variable is shown, and on the right, the corresponding forecast for that variable. To make a more accurate forecast, the latitude and magnitude of all earthquakes occurring since the dates studied would be needed, but we did not have this data available. However, the magnitude of the earthquake in Russia can be estimated at 8.7 on the Richter scale, while the year can be estimated with an error of +/- 10.84 years.

Table 4. Resúme of cases[a]

	Place	Magnitude	Unstandardized Predicted Value	Year	Unstandardized Predicted Value
1	Cascadia	8,9	.	1700	.
2	Lima	8,9	.	1746	.
3	Sumatra	8,8	.	1833	.
4	Ecuador y Colombia	8,8	.	1906	.
5	Kamchatka	8,9	.	1952	.
6	Valdivia	9,5	.	1960	.
7	Alaska	9,1	.	1964	1964,60340
8	Arica	8,9	.	1968	1973,34601
9	Oceani Indico	9,3	.	2004	1993,94514
10	Chile	8,8	8,80000	2010	2008,15605
11	Japon	8,9	8,90000	2011	2020,45146
12	Rusia	.	8,70000	2025	2021,49794
Total N	12	11	3	12	6

a. Limit to first 120 cases.

In red, the predicted values for the event in Russia.

Conclusions

1. The models explain 100% of the variance with small errors. The trend (NoC) for the year is positive and insignificant, meaning that earthquakes are more likely to occur in the coming years.
2. The magnitude of the event in Russia could be estimated with great precision.
3. The model for the year depends on this magnitude, regressed on six events.
4. Only civil protection agencies are responsible for issuing warnings and taking preventive measures in the event of large-magnitude earthquakes.

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