



“MODELIZACIÓN HIDROGEOLÓGICA DEL LAGO MINERO FORMADO POR EL CIERRE DE LA MINA DE REOCIN. ANÁLISIS DE LA VIABILIDAD DE FUTUROS USOS DE LOS RECURSOS HÍDRICOS EN BASE A SU CALIDAD Y POTENCIAL APROVECHAMIENTO” [Versión con audio](#)

“HYDROGEOLOGICAL MODELLING OF THE MINING RESERVOIR FORMED BY THE CLOSURE OF THE REOCIN MINE. ANALYSIS OF THE FEASIBILITY OF THE FUTURE USES OF WATER RESOURCES BASED ON THEIR QUALITY AND PONTENTIAL USES”



BASIC SKILLS	2. Science & Technique	3. Technology	4. Educational activities	5. Results	6. Scientific Criticism	7. Work Plan	8. Mobility	9. Funding	10. Ethics
CB11- Systematic understanding of a field of study and command of the skills and research methods related to the field	X	X	X						
CB12- Skill to conceive, design or create, implement and adopt a substantial process of research or creation.				X		X	X		
CB13- Skill to contribute to the enlargement of the knowledge limits through an original research.									
CB14- Skill to carry out a critical analysis and assessment and synthesis of a new and complex ideas.					X				
CB15- Skill to communicate with the academic and scientific community and with society in general about the scope of knowledge in the ways and languages of common use in the international scientific community.									
CB16- Skill to encourage, in academic and professional context, the scientific, technological, social, artistic, or cultural progress in a society based on knowledge.				X					X



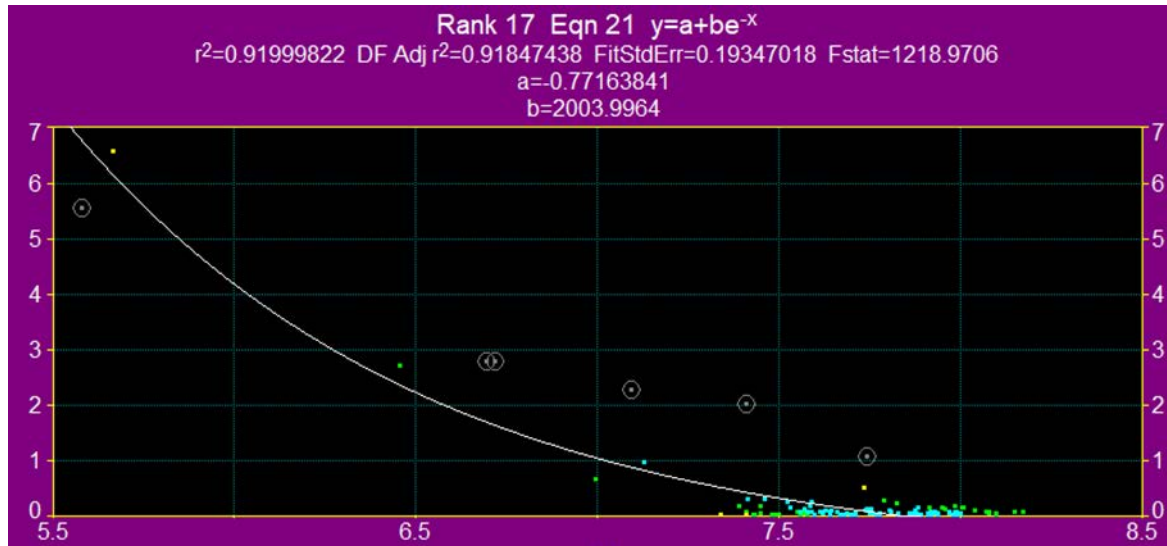
2.- Science and Technique:

- ✓ Analysis and search for scientific contributions in the field of the study of hydrogeological modelling of an aquifer.
- ✓ Geological and hydrological analysis of the study area.
- ✓ Analysis of data provided by the Consejería de Medio Ambiente of Cantabria during the flood process of the Reocin mine (water pumping data at the different phases of the holding, inputs to the aquifer, piezometric levels and water qualities).
- ✓ Volume of data processed \approx 45000.
- ✓ Documentation deposited at the Reocin Mine Fund at the Escuela Politécnica de Ingeniería de Minas y Energía.



3.- Technology:

- ✓ Software used:
- ✓ **Table Curve 2D/ Table curve 3D:** establish correlations between variables (pH, rainfall, conductivity, temperature, dissolved iron, dissolved manganese, dissolved zinc, dissolved sulfates) and analyze the degree of goodness of the adjustments obtained.





3.- Technology:

- ✓ Software used:
- ✓ **Ansys:** modelling of hydrodynamic flows within the rock mass, from the Reocín aquifer of the area's rainfall and surrounding refill zones such as the Saja and Besaya rivers.
- ✓ A model of hydrogeological behaviour will be generated with which the different estimates of filling of the mine are made and flowing flow on future horizons.
- ✓ Analysis of the behavioral conditions of the hydrodynamic system of the Reocín mine after its flooding.



4.- Educational activities:

- ✓ *Basic course on general aspects of the doctorate and techniques of presentation of scientific work* (School of Doctoral Studies of University of Cantabria).
- ✓ *Advanced course on the professional future of doctoral student* (School of Doctoral Studies of University of Cantabria).
- ✓ *Numerical modelling applied to geotechnical, mine and energy engineering* (University of Cantabria).



5.- Results:

- ✓ Thesis by compendium of articles.
- ✓ **CB12:** Paper 1: Feasibility study of possible uses of water stored in abandoned mines: case of Reocín Mine. Submit to “Environmental Monitoring and Assessment”. Current status: under review.
- ✓ **CB16:** Articles submit to different congresses, end-of-degree director and teaching at the University of Cantabria.



6.-Scientific criticism:

- ✓ Strengths: Lots of data, characteristics of the homogeneous study area.
- ✓ Weaknesses: Data takeover failed, non-representative data for the mine's global data variability based on the changing characteristics of the aquifer.
- ✓ Opportunities: Correlate rainfall and piezometry data with water chemical data, large amount of software for modelling.
- ✓ Threats: Complicated study development, unfeasible solution, change of characteristics in flooding process.



7.-Work plan:

- ✓ Article 2: Hydrochemical evolution of the filling water of the Reocín Mine (Spain). In progress. To be submitted in summer 2020.
- ✓ Article 3: Hydrogeological model. To be submitted at the beginning of 2021.
- ✓ Expected thesis submission date: depends largely on journal reply. March- April 2021.



8.-Mobility:

- ✓ International mobility: 3 months at “Universidad Tecnológica of Panamá”, (Panamá).



10.-Ethics:

- ✓ It would be interesting to submit articles to different congress and journals to contribute to the practical implementation of recommendations for environmental restoration of closed mines. In the planning stage, it would involve a better use of stored water resources, which would result in significant economic benefits for the mentioned area.



THANK YOU FOR YOUR ATTENTION