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Toponymy and Geology in the Landscape

Abstract

The elements of the physical environment have long been the object of naming. Indeed, an area's first inhabitants would have given names to places to satisfy their social need to locate themselves spatially and many of these names have been preserved until the present day. As such, place names reveal aspects of the landscape observed in the distant past by our ancestors. One such element of the physical environment is its geological features.

Toponymy, in the case of the study of transparent place names in relation to aspects of the immediate terrain, is a useful tool in geology both for producing thematic maps and for locating and studying such features as caves, landslides and metal ores.

At the same time, geology can help understand and clarify less transparent toponymic meanings and shed light on etymological hypotheses based on linguistic interpretations. This approach, supported by the compilation of background and comparative physiographic analyses of the geological characteristics of locations with similar place names, has considerable potential for identifying, recognizing and unravelling the origins of the names of many places.

This paper presents a number of reciprocities identified between place names and their geology and assesses them as a tool for the recognition of physical features of the landscape.

Keywords
toponymy, geology, physiography, landscape

1. Introduction

The study of place names not only provides information of interest to linguists, but it is also one of the sub-disciplines that contributes most data to other fields of knowledge (Molina 2008). Indeed, the interdisciplinary nature of toponymy has often been highlighted (Darby, 1957; Poirier, 1965; Dauzat, 1971; Querol, 1995; Tort, 2001) and in fulfilling this role, it acts as a "bridge" between the different disciplines (Tort, 2003a, p. 2); that is, "it uses, complements, and is interdependent with the services afforded by other sciences" (Moreu-Rey, 1999, p. 11).

In general, when we speak of the interdisciplinary nature of toponymy, we should not forget that more than one author has already identified the three major auxiliary sciences of toponymy as being history, linguistics, and geography (Poirier, 1965; Moreu-Rey, 1999). Yet, it should also be noted that other researchers have tended to stress the more psychological and social aspects of toponymic studies (Dauzat, 1971). Likewise, the intrinsic knowledge contained within place names, in addition to the very wide-ranging nature of their insights, can be highly transparent and of great use in very specific areas of knowledge (Querol, 1995).

Although in its origin onomastics concerned itself primarily with the publication of exhaustive, yet general, lexicographic-toponymic studies and collections, in more recent times more specific studies have emerged that seek to use toponymy as a working tool to characterize the physical environment. Examples include studies of the evolution of the landscape (Sousa & García-Murillo, 2001; Spens, 2007; Sousa et al., 2010, etc.), of the use of flora (Carracedo et al., 2006; Navaza, 2006; Sanz & Allende, 2006; Benítez et al., 2009, Carrillo et al., 2010; García-Villaraco et al., 2011; Gómez et al., 2012; Molina, 2012, etc.), and of the characterization of relief features, geomorphology and geology (Mensua & Ibáñez, 1979; Garcés, 1987; Domingo, 1997; Tort, 1999; Beltrán, 2001; García Aguilar & Salcedo de Lara, 2008; Planas et al., 2008, 2013, 2014, 2016, 2017, 2018; Planas & Gascón, 2012; Ordinas & Binimelis, 2013; Planas, 2013; Tort & Sancho, 2014; Fidalgo & González, 2015, among others).

The elements of the physical environment have long been the object of naming. In prehistory, significant natural places were usually the first to be given a name (Ainiala et al., 2012), however, in the course of history, landscapes have been subject to constant change: forests – or a given tree or plant species – might disappear; a species of animal might become extinct in a given territory – naturally or by human hand – and trails, villages, even cities, might be abandoned, razed or forgotten. Yet, there are certain elements of the landscape that, while also subject to change, evolve on a much larger time scale – at least compared to human life – and which means they can be considered virtually the same today as 5,000 years ago or more. The elements to which we refer are the geological features of the landscape.

2. The toponymy-geology binomial

2.1. Linguistically transparent geological place names

The names of the physical environment, apart from being ancient, respond to the need of our ancestors to locate themselves spatially in their territory. As such, these names – at least in their origin – served to describe the landscape and, consequently, they have semantic content (Ainiala et al., 2012), a content that might vary in terms of its transparency in relation to our current understanding and/or linguistic interpretations.

Thus, if these names do indeed describe the landscape, linguistically transparent geological place names should be a highly useful tool in the undertaking of geological studies. Moreover, such names are verifiable when preparing thematic maps (lithological, geomorphological, hydrogeological, etc.) and can provide obvious clues to the location of metal ores, caves, geological hazards, etc.

2.1.1. Some examples from Andorra and Catalonia

Montaup, for example, is a linguistically transparent geological place name (a dialectal evolution of the Catalan *mont* + *alb*, meaning 'white mountain'). This toponym originated in the Casamanya massif, but it is preserved today only as the name of one of its local valleys, that is, the *Vall de Montaup* (in the parish of Canillo, Principality of Andorra) (see Figure 1). The name *Montaup* describes a distinct geological feature of the Casamanya peak: the 'white (whitish)' chromatic hue of its lithology (Devonian limestone and calc-schist). This physical characteristic of the environment (lithology) is the same today as when the name *Montaup* was first coined.

Figure 1. General view of *Vall de Montaup* with the Casamanya peak in the background, seen from Canillo (Principality of Andorra). Notice the white (whitish) chromatic hue of its lithology (Devonian limestones and calc-schist)

Source: photograph by the authors.

The place name *Vallferrera* (Pallars Sobirà, Catalonia) provides a second highly illustrative example of the toponymy-geology binomial (formed by the Catalan words *vall* + *ferrera*, meaning 'iron valley'), reflecting the presence of this mineral (iron) in the Paleozoic rocks that outcrop in the valley (see Figure 2).

Figure 2. ***Vallferrera*** **as seen from the Sotllo peak (Catalonia). Note, in the rock debris in the foreground, the red (rusty) colour attributable to the presence of oxidized iron ore in the bedrock**

Source: photograph by the authors.

An interesting hydrogeological feature is reflected in the place name of *Aiguatèbia* (Conflent, North Catalonia), formed by the Catalan words *aigua* + *tèbia*, meaning 'warm water', and which is attributable to the presence in this location of a hot spring (see Figure 3).

Figure 3. *Aiguatèbia* (North Catalonia). Note the French spelling used on the road sign. Small village with a thermal spring (sodium sulphurous water) located on the eastern border of the Montlluís granitic batholith

Source: photograph by the authors.

Campcardós (Cerdanya, Catalonia) is an example of a compound geologic-morphological term, made up of the ancient Catalan words *calm* + *querdós*, meaning 'stony plateau' (Figuera, 2005), used in naming a high-altitude stony plateau (see Figure 4). Interestingly, the toponym illustrates the evolution of the term *calm* 'plateau' to *camp* 'field', possibly attributable to a false etymological attribution resulting from the loss of the original meaning of the word among the population. The place name also illustrates a more normal evolution of the old Catalan adjective *quer* (variant *car*) to *cardós* 'abundant in stones'. In this massif, the presence of numerous stony blocks also gave rise to such place names as *Puigpedrós* (the summit of Campcardós) formed by the Catalan words *puig* + *pedrós*, meaning 'stony hill', and *Malniu* and *Mal* (both lakes) where *mal* can be interpreted as being synonymous with 'rock, stone, stony terrain and, therefore, arid, rough' (Badia, 1949).

Figure 4. *Campcardós* and the summit of Puigpedrós (Catalonia). Observe the presence of numerous stone blocks across the high plateau of the massif

Source: photograph by the authors.

One branch of geology is concerned with the study of hazardous phenomena (that is, avalanches, landslides, rockfalls, floods, debris flows, etc.) and although the footprint of these natural processes changes over time, their occurrence results in specific morphologies that stand out clearly in the landscape. Such morphologies attract the attention of the human eye and, in line with the toponymic principle of exceptionality (Tort, 2003b), they have often been the object of naming. Some of these processes can be associated with place names that are both geologically and linguistically transparent, such as *bosc de les Llaus* (in the parish of Encamp, Principality of Andorra) a Catalan toponym that means 'avalanche forest', in this case, earth or rock avalanches (see Figure 5).

Figure 5. ***Bosc de les Llaus*** **(Principality of Andorra). Note the rupture scar in the glacial deposits, the result of a debris flow**

Source: photograph by the authors.

A second example, in this case associated with erosive processes, is provided by *els Esterregalls* (All-Isòvol, Catalonia) a dialectal Catalan noun meaning 'badlands' (see Figure 6).

Figure 6. ***Els Esterregalls*** **(Catalonia). Soft sedimentary rocks that have been extensively eroded and which present a dense drainage network**

Source: photograph by the authors.

Finally, *font dels Llacs* (in the parish of la Massana, Principality of Andorra), which is a dialectal Catalan name meaning 'landslide', describes the presence of lobular-slope instability (see Figure 7). Interestingly, the term *llac*, in modern Catalan describes an isolated body of water or "lake", yet Figure 7 does not show any body of water. Rather, the place name refers to a mass that has been transported.

Figure 7. *Font dels Llacs* (Principality of Andorra). Note the lobular and fluidized shape of the ground – displacing some trees with curved trunks and boulder-shaped masses of grass – sliding downhill (to the left)

Source: photograph by the authors.

2.2. Linguistically opaque geological place names

In the cases described above, a direct (visual) relationship can be established between the geology and its corresponding place name. The question arises though as to whether it is sufficient to examine these relationships solely from the perspective afforded by philology. To date, most landscape studies have been approached directly from the linguistic information inherent in place names. In the specific case of geological place names, such an approach might be valid for transparent place names (direct names); however, given that these toponyms of the physical environment are very old, they are often linguistically opaque and even for lay citizen unrecognizable as being descriptive of some element or physical process in the terrain (Planas et al., 2018).

It should be stressed that the detection and recognition of opaque physical place names is a complex process as, *a priori*, their etymology is far from obvious or direct and is likely to give rise to ambivalences. In such instances, an approach based solely on linguistics can result in contradictory – even illogical – etymological propositions when faced with evidence and well-documented arguments from other fields of knowledge (Moreu-Rey, 1999), such as geography, but also geology.

It is our contention that if we wish to advance in our knowledge and characterization of the relationships between toponymy and the physical environment, the classical linguistic approach is insufficient. In this sense, in recent years, a number of studies have been published that use place names to visualize and recreate the evolution of the landscape, but they use place names as a point of support and as a means to test physical and historical verifications that are observable using scientific methodology (Sousa & García-Murillo, 2001; Spens, 2007; Sousa et al., 2010, etc.). This procedure can also be applied in studying and identifying place names that are indicative of the geological characteristics of the landscape.

An alternative approach to the study of opaque geological place names can be conducted, at least initially, from a perspective that is well removed from that afforded by linguistics – thus seeking to avoid any preconceived concepts or ideas – and which is centered on what can be learned from the observation of the landscape, that is, from the physiography of the place designated by each place name. Here, a good working tool is that of **comparative physiographic-toponymic analysis** (Planas et al., 2018), a technique that, in turn, is based on the toponymic **principle of territorial significance** (Tort, 2003b), according to which place names frequently make specific reference to actual features of the landscape they designate (relief morphology, processes, chromatism, etc.).

Comparative physiographic-toponymic analysis involves the undertaking of systematic landscape examinations and comparisons of multiple places presenting toponymic coincidences or similarities, with the aim of detecting the existence of coincident common landscape features and/or processes in places with the same, or practically the same, names. In this way, hypotheses can be made regarding the possible values of significance of their place names. This methodology, which requires sufficiently representative series – four or more place names per group – requires expert field surveys, comparisons with other places of similar morphology, and testing on data from other areas. The relationship between the place name and the landscape feature or process must be verified without the detection of cases that contradict the proposition. Ultimately, the greater the number of place names in a given series with a common correspondence to a given geological feature, the stronger the relationship obtained and, hence, the greater the weight that can be attached to its significance.

2.2.1. Some examples from Andorra and Catalonia

At the geological level, for example, **comparative physiographic-toponymic analysis** has been used to develop the series *Andorra*, *Dorres*, *Dòrria*, *Font de Dorra*, *Cal Norra*, *Anorra*, *Lladorre-Lladrós*, *Durro*, *Lladurs* (Planas et al. 2017, 2018, 2019) (see Table 1). None of these place names can be interpreted semantically in modern Catalan and, as such, they denote no more than a specific geographical place. However, using the technique outlined above, these toponyms are found to have in common the coincident presence of a significant spring of water – be it thermal/medicinal, abundant in flow, or of marked quality (taste) – revealing an hydronymic meaning associated with the pre-Latin root *dorr-/durr-*.

Table 1. Example of comparative physiographic-toponymic analysis for the series *Dorr-/Durr-*

Toponymic series: "Dorr- / Durr-"	**Technical recognition of coincident landscape features across a series of place names**	**Interpretation of the toponymic series**
1- Andorra la Vella (Principality of Andorra) -Presence of a thermal anomaly along the whole shaded area of Andorra la Vella. The hot springs of Escaldes constituting the best example-		
2- Dorres (Alta Cerdanya, North Catalonia) -Presence of thermal baths. The village is located near les Escaldes and Vilanova de les Escaldes-		"Dorr- / Durr-": Water spring (hydronym)
3- Dòrria (Ripollès, Catalonia) -Presence of the 'Font Calenta', Catalan for 'hot water spring'-		

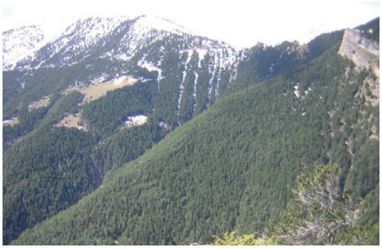
Toponymic series: **“Dorr- / Durr-”**	**Technical recognition of coincident landscape features across a series of place names**	**Interpretation of the toponymic series**
4- Durro (Vall de Boí, Catalonia -In the past, the village had laundries with ‘hot water’, according that is to the testimony of the oldest villagers-		
5- Lladorre - Lladrós (Vall de Cardós, Catalonia) -Presence of the ‘Font del Sofre’, Catalan for ‘sulfur water spring’ (near ‘les Escaules’). Presence of an old thermal spring in the lower part of Lladorre-		
6- Font de Dorra (Taüll, Catalonia) -Presence of an old thermal spring near the church of Saint Climent’s-		“Dorr- / Durr-”: Water spring (hydronym)
7- Anorra (Gresolet, Catalonia) -Presence of a water spring highly appreciated for its taste-		
8- Cal Norra (Saldes, Catalonia) -Presence of a karstic spring-		
9- Fonts de Lladurs (Solsonès, Catalonia -Currently the Font de Lladurs is one of the main water supplies in the town of Solsona-		

Source: photographs by authors.

Similarly, the series *Boavi*, *Boet*, *Boès*, *Boí*, *Boatella*, *Botella* (see Table 2) also emerges from a **comparative physiographic-toponymic analysis**. For these place names, the technique detects a coincidence in terms of the presence of slope instabilities – sometimes referring to instabilities of snow cover – with the marked presence of mud (mire, silt; in short: dirt), which provides a *geokindynonymic* meaning (from the Greek *geo* 'earth' + *kindyn* 'risk, hazard' + *onoma* 'name'; Planas, 2017) associated with a possible pre-Latin root *boa-*/*boe-* with such variants as /*bouí*/, /*boue*/: *Bo(u)í*, *Bo(u)er*. Frequently, some of these place names have been interpreted as having a connection with the presence of herds of cows or oxen (from the Catalan *bou*), while some have been given other interpretations for example *Boavi* 'under the border', *Botella* or *Gotella* 'drop of water', *Boet* 'place with the presence of reeds'. However, this meaning can be disregarded because, in the Pyrenees, historical analyses show that the abundance of bovine herds is a relatively recent phenomena which makes any zoological filiation unconvincing (Planas et al. 2016). Moreover, the existence of terms with a Celtic root – *bawa* – (Larousse 1989, p. 147), such as the French *boue* 'earth or dust soaked in water, fine tank impregnated with water, silt', or the northern Italian *boa* 'slippery, muddy, especially clayey soils', also seems to confirm – at least for the Pyrenees – an alternative *geokindynonymic* value for this series.

Table 2. Example of comparative physiographic-toponymic analysis for the series *Boa-/Boe-*

Toponymic series: "Boa- / Boe-"	Technical recognition of coincident landscape features across place names	Interpretation of the toponymic series
1- Pla de Boavi (Pallars Sobirà, Catalonia) -The plateau is an area of large avalanches, floods and debris flows-		"Boa- / Boe-": Landslide, mud wash, especially in clay soils (geokindynonym)
2- Boí (Alta Ribagorça, Catalonia) -Both the village of Boí and the whole valley of the same name are characterized by a large concentration of landslides, such as Basco-Erill la Vall-		

Toponymic series: “Boa- / Boe-”	Technical recognition of coincident landscape features across place names	Interpretation of the toponymic series
3- Coll de la Botella (Principality of Andorra) -Coinciding with the presence of avalanche channels and debris flows-		“Boa- / Boe-”: Landslide, mud wash, especially in clay soils (geokindynonym)
4- Boa Cinque Torri (Near Cortina d’Ampezzo, Italy). -Large landslide, triggered by heavy rains on 16th September 1976-		

Source: photograph 1: David Soler; photographs 2, 3 and 4: Xavier Planas.

Thus, it is evident that for these two series of linguistically opaque place names – or, at least which present ambivalent meanings – the geological study of the landscape can help shed light on the possible value of their meaning.

3. Conclusions

The fact that the place names of the physical environment, including those that refer to geological features, describe the landscape at the time of its formation – undoubtedly, as a consequence of the need our ancestors felt to describe the territory – endows them with considerable interest. As such, they form an extensive historical (even prehistoric) record of the observations made by our ancestors since time immemorial and, moreover, they constitute a reflection of the language used at the time they were conceived and became established.

This formative feature, made tangible in the semantic description of the landscape, is precisely what allows **geological place names** to be recognized, studied and understood from two perspectives: that of linguistics and that of geology. This peculiarity also ensures that the sciences that study these fields (i.e. toponymy and geology) are able to propose a series of insightful "information connections". In this sense, these two areas of knowledge are clearly complementary: that is, they are interdependent. And it should be emphasized that without this quality of "reciprocity", the analysis of the question in hand would be far from complete.

Thus, as we have shown, it is essential that geologists learn to use the information connections provided by toponymy, both for producing maps, and for locating mineralizations, water springs, landslides, etc. Likewise, it is equally critical that linguists consider the theories that geology makes based on the verification of physical facts, especially those that at the outset present a more ambivalent appearance from a linguistic perspective. Because, as Moreu-Rey (1999) notes, if one of the famous 'laws' (which are not in fact laws) of phonetic evolution leads to a conclusion that can be rejected on the basis of sound historical and geographical arguments, the latter will have the last word on the hypothesis –however logical it may be – of an etymologist whose reasoning is based merely on general trends (pp. 11–12).

References

Ainiala, T. (2012). *Names in Focus*. Helsinki: Finnish Literature Society. https://doi.org/10.21435/sflin.17

Badia Margarit, A. (1949). Mal, roca en la toponímia pirenaica. In *Actas de la Primera Reunión de Toponimia Pirenaica* (pp. 35–58). Zaragoza: Consejo Superior de Investigaciones Científicas.

Beltrán, F. (2001). La geología en la toponimia del Pirineo Aragonés. *Naturaleza aragonesa: Revista de la Sociedad de Amigos del Museo Paleontológico de la Universidad de Zaragoza*, *8*, 27–38.

Benítez, G., González-Tejero, M. R., & Molero, J. (2009). Fitotopónimos y sinfitopónimos del poniente granadino. *Revista de Dialectología y Tradiciones Populares*, *64*(2), 169–192. https://doi.org/10.3989/rdtp.2009.019

Carracedo, V., Campo, L., & García, J. C. (2006). La distribución de las especies forestales en Cantabria según la fitotoponimia: un ensayo metodológico. In J. A. Cadiñanos, A. Ibabe, P. Lozano, G. Meaza & M. Onaindia (Eds.), *III Congreso Español de Biogeografía* (pp. 55–62). Bilbao: Universidad del País Vasco.

Carrillo, A. F., Carrión, J., Fernández, S., & Román del Cerro, J. L. (2010). *Toponimía y Biogeografía histórica de plantas leñosas ibéricas*. Múrcia: Universitat de Murcia.

Darby, H. C. (1957). Place-names and geography [Review of *English Place-Name Elements*, by A. H. Smith]. *The Geographical Journal*, *123*(3), 387–392. https://doi.org/10.2307/1791427

Dauzat, A. (1971). *La toponymie française*. Paris: Payot.

Domingo, C. (1997). *El nom de les formes del relleu.* Barcelona: Societat d'Onomàstica & Institut Cartogràfic de Catalunya.

Fidalgo, C., & González, J. A. (2015). La evolución del paisaje natural a traves de la toponimia: Lillo (La Mancha, Toledo). *Cuadernos Geográficos*, *54*(2), 220–244. https://revistaseug.ugr.es/index.php/cuadgeo/article/view/2948

Figuera, M. (2005). *Excursions escollides per a raquetes de neu. 20 itineraris pel Berguedà, l'Alt Urgell i la Cerdanya.* Valls: Cossetània Edicions.

Garcés, M. P. (1987). Vocablos dialectales relacionados con la naturaleza del terreno. *Epos: Revista de filologia*, *3*, 139–154.

García Aguilar, J. M., & Salcedo de Lara, M. C. (2008). Topónimos: una propuesta didàctica sobre el conocimiento del patrimonio geológico. *Enseñanza de las Ciencias de la Tierra*, *16*(2), 167–172. https://raco.cat/index.php/ECT/article/view/127773/191457

García-Villaraco, A., Pardo de Santayana, M., & Morales, R. (2011). Aportaciones a la fitotoponimia de la provincia de Ciudad Real. *Revista Folklore*, *357*, 4–23. https://www.cervantesvirtual.com/nd/ark:/59851/bmc0p2v7

Gómez, A., Fernández, R., & Luengo, M. Á. (2012). La fitotoponimia como indicador de la distribución actual de las formaciones vegetales en la provincia de Salamanca. In R. Cunill, A. Pèlachs, R. Pérez-Obiols, & J. M. Soriano (Eds.), *Las zonas de montaña: gestión y biodiversidad. VII Congreso Español de Biogeografía, Pirineo 2012* (pp. 213–218). Sant Pere de Ribes: Falcó. https://digibuo.uniovi.es/dspace/bitstream/handle/10651/30560/Aramo_cambios_paisaje_vegetal.pdf

Larousse. 1989. *Petit Laurousse Illustré.* Paris: Librairie Larousse.

Mensua, S., & Ibáñez M. J. (1979). Toponimia y formas de relieve en el centro del valle del Ebro. *Acta Geológica Hispánica*, *14*, 576–579. https://raco.cat/index.php/ActaGeologica/article/view/148763

Molina, F. (2008). La toponomàstica: Métodos y términos. In A. Calzón, B. Camblor, M. Cuevas, N. Fernández, M. Fernández, C. Lamar, M. Melendi, V. Hernández, & R. S. Fernández-Combarro (Eds.), *Actas del I Congreso Internacional de Filología Hispánica, Jóvenes Investigadores* (pp. 199–210). Oviedo: Ediciones de la Universidad de Oviedo.

Molina, F. (2012). La toponimia como medio de información geográfica: el caso de los fitotopónimos. *Biblio 3W, Revista bibliográfica de geografía y ciencias sociales*, *17*. https://raco.cat/index.php/Biblio3w/article/view/256814

Moreu-Rey, E. (1999). *Els nostres noms de lloc* (2nd ed.). Mallorca: Moll.

Navaza, G. (2006). *Fitotoponimia galega*. Coruña: Fundación Pedro Barrié de la Maza.

Ordinas, A., & Binimelis, J. (2013). La caracterización del paisaje de Menorca a través de la toponimia. *Investigaciones Geográficas*, *60*, 155–169. https://doi.org/10.14198/INGEO2013.60.09

Planas, X. (2013). Toponimia en laderas inestables. El caso de los Pirineos y zonas próximas. In E. Alonso, J. Corominas, & M. Hürlimann (Eds.), *VIII Simposio Nacional sobre Taludes y Laderas Inestables* (pp. 219–230). Barcelona: Centre Internacional de Mètodes Numèrics en Enginyeria. http://congress2.cimne.com/simposiotaludes2013/frontal/doc/Vol_01.pdf

Planas, X. (2017). Topònims: orònims, hidrònims, talassònims..., i els cindinònims? *Noms, 6*, 25–27. https://www.onomastica.cat/wp-content/uploads/Noms-6-2017.pdf

Planas, X., & Ponsa, À. (2007). Etimologia de la toponímia andorrana relacionada amb riscos geològics naturals. *Llengua Nacional*, *61*, 25–30. https://llenguanacional.cat/pdf/LN61_16.pdf

Planas, X., & Ponsa, À. (2008). Etimologia de la toponímia andorrana relacionada amb riscos geològics naturals. *La revista del CENMA*, *1*, 20–31. https://www.iea.ad/images/CENMA/revista/01/07.pdf

Planas, X., & Ponsa, À. (2011). L'herència toponímica preromana en el camp de les inestabilitats de vessant al Principal d'Andorra. In V. Turu & A. Constante (Eds.), *XIII Reunión Nacional del Cuaternario* (Andorra la Vella, 4–7 July 2011) (pp. 221–225). Andorra la Vella: AEQUA / Fundació M. Chevalier / Col. Ciències de la Terra d'Andorra.

Planas, X., Ponsa, À., & Belmonte, À. (2008). El substrat preromà en la toponímia relacionada amb inestabilitats de vessant en l'àmbit geogràfic nord-oriental de la península Ibèrica i zones properes. *Fontes Linguae Vasconum*, *109*, 481–509. http://www.culturanavarra.es/uploads/files/04_Planas_FLV109.pdf

Planas, X., & Gascón, C. (2012). Esllavissades prehistòriques: evidències a partir de la toponímia preromana a la comarca de l'Alt Urgell. *Interpontes*, *2*, 251–276.

Planas, X., Gascón, C., & Rull, X. (2013). La fisiografía en el estudio de topónimos prerromanos. El caso de las laderas inestables en Andorra (Pirineos Orientales) y zonas próximas. *Oihenart*, *28*, 131–157. https://www.eusko-ikaskuntza.eus/PDFAnlt/literatura/28/28131157.pdf

Planas, X., Gascón, C., & Rull, X. (2014). Breu repàs toponímic de vessants pirinencs amb inestabilitats del terreny. Perspectives de futur mitjançant anàlisi fisiogràfica interdisciplinària. In *L'Onomàstica del Pirineu català. Actes de la III Jornada de la Societat d'Onomàstica* (pp. 93–106). Esterri d'Àneu: Consell Cultural de les Valls d'Àneu.

Planas, X., Gascón, C., & Oller, P. (2016). Vacades o allaus. El cas dels topònims en boa- i boe- a l'alt Pirineu català. *Nabius*, *14*, 33–36. https://aneu.cat/llibres/documents/publicacions_00020.pdf

Planas, X., Viñas, J., Soler, D., Ponsa, À., & Gascón, C. (2017). Apunts toponímics i geològics a l'entorn del termalisme de la falla de Lladorre. *Nabius*, *15*, 29–31. http://www.aneu.cat/activit/documents/activitats_00015.pdf

Planas, X., Gascón, C., Lopez-Mugartza J. K., & Belasko, M. (2018). *Anàlisi fisiogràfica de topònims andorrans d'arrel preromana. Una visió propera i tècnica del territori a través dels noms de lloc*. Andorra la Vella: Govern d'Andorra. https://www.cultura.ad/images/stories/Llengua/Documents/2013_Analisi_toponims_AND.pdf

Planas, X., Tort, J., & Corominas, J. (2019). Reciprocitats entre la Toponímia i la Geologia en el reconeixement del territori. In J. Bernat, & F. Guardiola (Eds.), *Noms de lloc i de persona* *de les terres de Penyagolosa i altres estudis d'onomàstica*, *Actes del 45è Col·loqui de la Societat d'Onomàstica (*pp. 365–380). Barcelona: Societat d'Onomàstica. https://www.onomastica.cat/wp-content/uploads/Noms-lloc-persona-terres-Penyagolosa.pdf

Poirier, J. (1965). *Toponymie. Méthode d'enquête*. Québec: Presses de l'Université Laval.

Querol, E. (1995). La metodologia en els estudis de toponímia. In E. Casanova i V. M. Rosselló (Eds.), *Materials de toponímia*-1 (pp. 61–74). Valencia: Generalitat Valenciana – Universitat de València.

Sanz, C., & Allende, F. (2006). Fitotoponimia de la Comunidad de Madrid. In *III Congreso Español de Biogeografía* (pp. 154–164). Bilbao: Universidad del País Vasco.

Sousa, A., & García-Murillo, P. (2001). Can place names be used as indicators of landscape changes? Application to the Doñana Natural Park (Spain). *Landscape Ecology*, *16*, 391–406. https://doi.org/10.1023/A:1017585101389

Sousa, A., García-Murillo, P., Sükran, S., Morales, J., & García-Barrón, L. (2010). Wetland place names as indicators of manifestations of recent climate change in SW Spain (Doñana N.P.). *Climatic Change*, *100*(3), 525–557. https://doi.org/10.1007/s10584-009-9794-9

Spens, J. (2007). Can historical names and fishers' knowledge help to reconstruct the distribution of fish populations in lakes? In N. Haggan, B. Neis, & I. Baird (Eds.), *Fishers' knowledge in fisheries science and management* (pp. 329–349). Paris: UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000152509

Tort, J. (1999). *Els noms de lloc i el territori. Una interpretació geogràfica de la toponímia del Baix Camp* [Doctoral thesis, Universitat de Barcelona]. TDX. https://www.tdx.cat/handle/10803/37355

Tort, J. (2001). Toponímia com a camp de coneixement interdisciplinari. Algunes bases teòriques i epistemològiques per a l'estudi dels noms de lloc. *Scripta Nova*, *86*. http://www.ub.edu/geocrit/sn-86.htm

Tort, J. (2003a). Toponimia y marginalidad geogràfica. Los nombres de lugar como reflejo de una interpretación del espacio. *Scripta Nova*, *138*. http://www.ub.edu/geocrit/sn/sn-138.htm

Tort, J. (2003b). A propòsit de la relació entre toponímia i geografia: el principi de 'significativitat territorial'. In E. Casanova & Ll. Valero (Eds.), *XXIX Colloqui de la Societat d'Onomàstica* (pp. 675–688). Teulada: Denes.

Tort, J., & Sancho, A. (2014). Toponyms as 'landscape indicators'. In J. Tort & M. Montagut (Eds.), *Els noms en la vida quotidiana. Actes del XXIV Congrés Internacional d'ICOS* (pp. 1987–2016). http://www.gencat.cat/llengua/BTPL/ICOS2011/200.pdf