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# An overview of the use of Twitter in National Weather Services

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**Abstract.** Twitter is a service that enables users to post messages ("tweets") of up to 140 characters supporting a variety of communicative practices. In this paper we analyze different aspects related to the use of Twitter in different National Meteorological Services (NMS) worldwide. Firstly, we will review the general position of NMS worldwide regarding the use of Twitter technology. Secondly, we will focus on different practices of some selected meteorological services. Thirdly, we will deal specifically with the Basque Meteorology Agency (Euskalmet) case. Finally some conclusions are presented.

## 1 Introduction

National Meteorological Services use different "classical" tools for meteorological information dissemination, including television, radio, newspaper, phone, e-mail and public/private web (WMO, 2001, 2007, 2010). In recent years, new technologies, and in particular the rapid expansion of Twitter, have caused that the transmission of information can be virtually instantaneous and accessible to large segments of population (Orbe, 2012; Weller et al., 2013).

We can consider Twitter as the perfect place for quick and efficient communication with audience (Boyd et al., 2010; Rodríguez, 2011). As a consequence many NMS have developed new communication strategies and incorporated this tool for different purposes. Some NMS do not only provide forecast and other remarkable information routinely, but gives real-time observed data, forecast and relevant information continuously before and during severe-weather episodes, as in the Basque Meteorology Service (Euskalmet) case (Gaztelumendi et al., 2013a).

A simple methodology is used during this study. Firstly the general position regarding the use of Twitter technology of National Meteorological Services worldwide (WMO members) and some local/regional non-members, are analyzed checking general available accounts information. On the other hand, usual practices are examined during six month, from February to August 2014, analyzing the daily Twitter activity of every NMS in their publicly available tweets. During this period the accounts evolution is followed and information from their public timelines is collected. A Twitter analytics tool (twitonomy.com) is used to extract information, including followers, tweets, retweets, replies, mentions, hashtags, etc. Excel is used to compare all the information collected and to analyze the evolution of specific features from accounts of different NMS.

## 2 Twitter and meteorological services

In the last years, most of the meteorological services have joined social networks as YouTube, Facebook, Twitter, etc. The increasing availability of mobile phones with access to these networks is an opportunity not only to spread messages, but to real time interaction. More than 40 % of global NMS have an account on Twitter, although this percentage is reduced in Africa, Asia and Oceania, as shown in Fig. 1, due to the low diffusion of mobile technologies and the limited access to internet in these areas, among other factors (Palacio et al., 2014).

The first centre to join Twitter (in an active way) was the New Zealand Meteorological National Service, on 28 December 2008. The following years, the number of meteorological centres who joined Twitter progressively increased
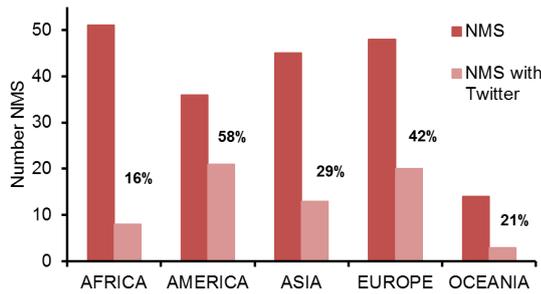
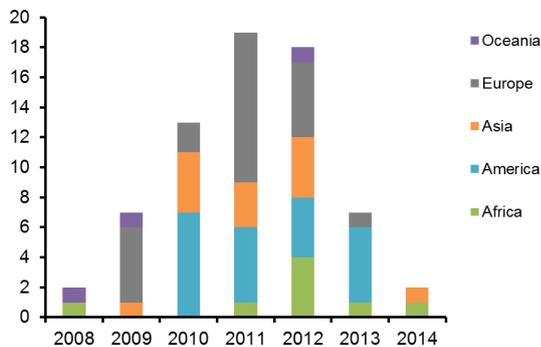**Figure 1.** Percentages of NMS who have accounts on Twitter by continents (January 2015).



**Figure 2.** Yearly distribution of NMS incorporation on Twitter.



**Figure 3.** Average number of tweets posted per day by NMS (from beginning to 30 August 2014).
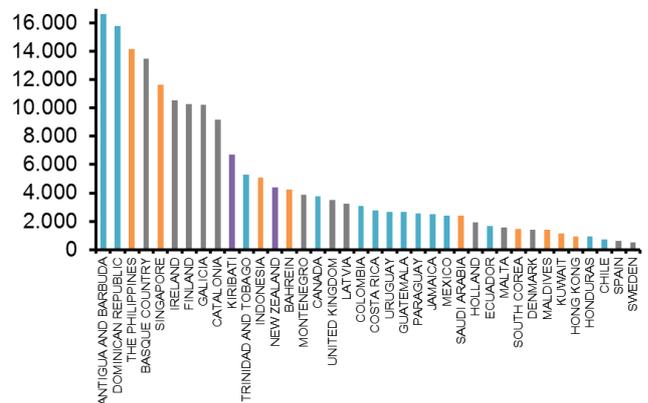


**Figure 4.** Followers by million inhabitants of NMS's Twitter accounts (from beginning to 30 August 2014).

until the end of 2013, when it almost stopped, as can be seen in Fig. 2.

In Africa, there are five active accounts. It is worth noting South Africa case because of its number of followers, the number of tweets sent and the degree of influence. In Oceania, the most active account is the one of New Zealand. In Asia, there are thirteen active accounts. Indonesia and Philippines are remarkable because of its high activity and the number of followers. In the American continent, it is relevant the NOAA's activity, with 150 active accounts (the main one, the National Weather Service of USA, is the most influential one). On the other hand, the Mexican service has almost 300 000 followers (2.4 per thousand inhabitants), whereas the Venezuelan centre has the largest number of tweets. In Europe, most of relevant centres have accounts on Twitter. MetOffice (UK) stands out for the large number of followers, its great activity and interaction with followers. In Fig. 3, we show the number of tweets sent per day for different meteorological services. In Fig. 4, we represent the number of followers considering the potential influence (millions of inhabitants for the concerned country).

## 3 Usual practices

In this section, we analyze different Twitter practices, focusing on a selection of NMS, which are representative of general situation worldwid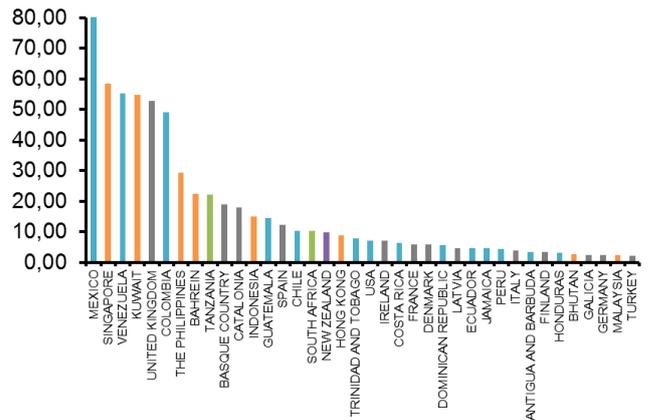e (see Table 1) (Twitonomy, 2015). In general, NMS use Twitter for fast and efficient communication with users, including different kind of information, as routine weather forecast and observations, general weather, climate and scientific information, events communications and others. In some cases, this platform is used for real time severe weather data dissemination and warnings. At the end, NMS look for bidirectional communication and users fidelization, in some cases with a relatively high interaction with users (not usually).

Regarding sent tweets and followers, it is worth to mention the account of Mexico, with 91 tweets daily and 291 000 followers (2.4 per thousand inhabitants), well above the next one which is UK, with 55 tweets per day and 221 000 followers (3.5 per thousand inhabitants). Nonetheless, the Mexican account barely interacts with users, while the UK service is the one that more does it. The 85 % of sent tweets mention another user (they usually answer questions or doubts of the users by direct mentions to them). They receive a mention of some user for almost every tweet (90 %). Instead, most of tweets sent by the account of Mexico do not have any specific

**Table 1.** Relevant data about Twitter usage in different NMS (considering, at 30 August 2014, last 3200 tweets).

| Date | USA | Canada | Mexico | Germany | Spain | UK | France | Hong Kong | Basque Country | Catalonia |
|---|---|---|---|---|---|---|---|---|---|---|
| Followers | 139 000 | 131 000 | 291 000 | 4625 | 30 000 | 221 000 | 6062 | 6768 | 29 500 | 69 400 |
| Tweets/day | 7.2 | 1.1 | 91.4 | 0.8 | 8.4 | 55.2 | 2.3 | 6.1 | 18.8 | 17.9 |
| Mention/tweet | 0.1 | 0.2 | 0.0 | 0.2 | 0.1 | 0.9 | 0.5 | 0.0 | 0.1 | 0.1 |
| Link/tweet | 0.2 | 0.6 | 0.3 | 0.8 | 0.4 | 0.6 | 0.6 | 0.9 | 0.1 | 0.5 |
| Retweets | 76 % | 16 % | 2 % | 3 % | 26 % | 0 % | 8 % | 0 % | 15 % | 1 % |
| Replies | 2 % | 5 % | 0 % | 17 % | 5 % | 85 % | 8 % | 0 % | 0 % | 3 % |
| Hashtag/tweet | 0.2 | 1.6 | 0.6 | 2.6 | 0.4 | 0.1 | 1.1 | 0.0 | 0.3 | 1.1 |
| Tweets retweeted | 24 % | 75 % | 96 % | 66 % | 72 % | 20 % | 67 % | 55 % | 68 % | 81 % |
| Tweets favorited | 23 % | 52 % | 93 % | 51 % | 48 % | 25 % | 45 % | 8 % | 48 % | 64 % |
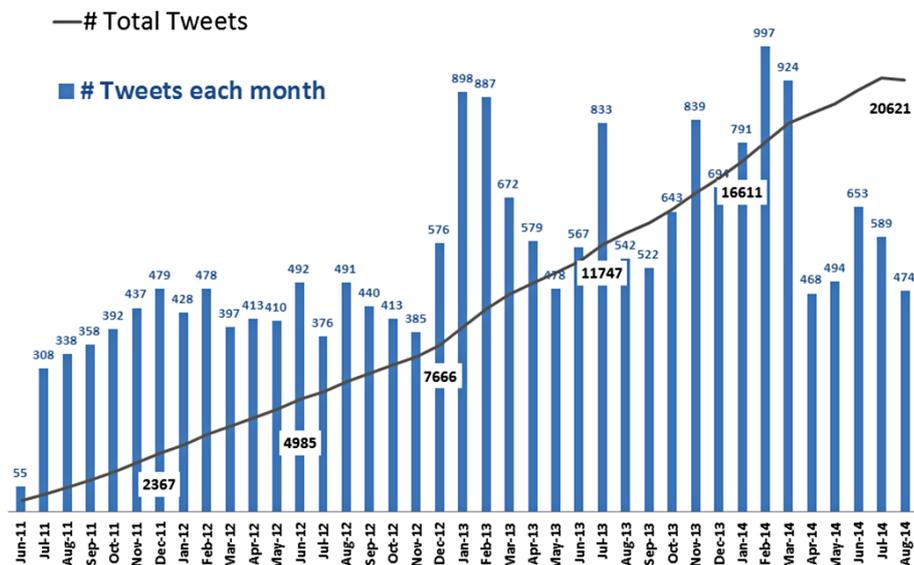


**Figure 5.** Evolution of tweets posted by Euskalmet.

mention to any of its followers, they rarely receive mentions or mention other users.

Concerning the ratio of NWS information vs non-own content of posted tweets, users' tweets are not usually retweeted. It is important to mention the NWS of USA, because it is the one that retweets more (75 % of sent tweets are retweeted of other users); however, in this case they do it of their own regional accounts (they have more than 140).

Talking about the hashtags (they ease the organization and the access to the information), most of the centres make a limited use of them, apart from German DWD (2.6 hashtags per tweet).

In relation to the use of links, most of the meteorological services use them. In the case of Hong Kong, most of the tweets (90 %) have a link to their own webpage, where there is more detailed information.

In relation to the awaken interest among users by retweeted and favorited tweets (we suppose that the higher number of them, the more relevance of the tweet), it is note-

worthy the Mexican account with a 96 % of retweeted tweets and a 93 % of favorited tweets. On the other hand, MetOffice has a 20 and 25 %, respectively.

## 4 Euskalmet case

In the case of Basque Meteorology Agency (Euskalmet), one of the most powerful reason to use Twitter is the fast and efficient communication in high impact weather scenarios (Gaztelumendi et al., 2012; Martija et al., 2014), and especially in those associated with rapid development processes that occur in less than an hour such as storms, coastal trapped disturbances or flash floods case (Gaztelumendi et al., 2013b).

The first tweet was sent by Euskalmet on 24 June 2011 dealing with a yellow warning due to a heat wave, since that time, more than 22 200 tweets have been sent (see Fig. 5). The number of followers is over 30 800 for a total Basque Population of 2.2 million (see Fig. 6). During months with
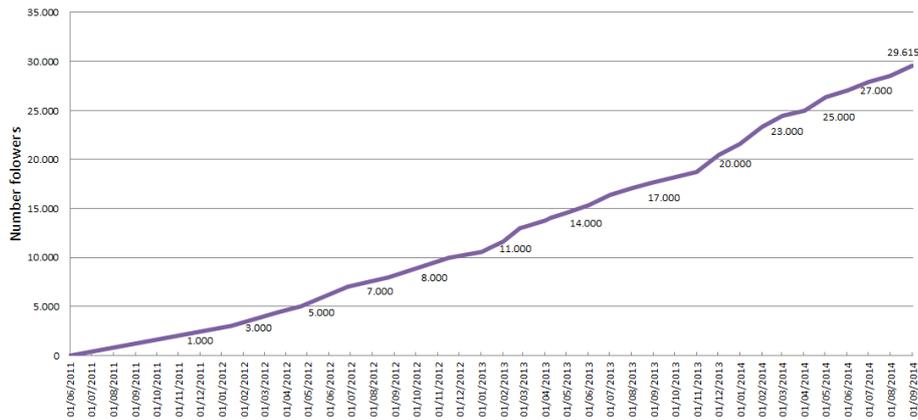
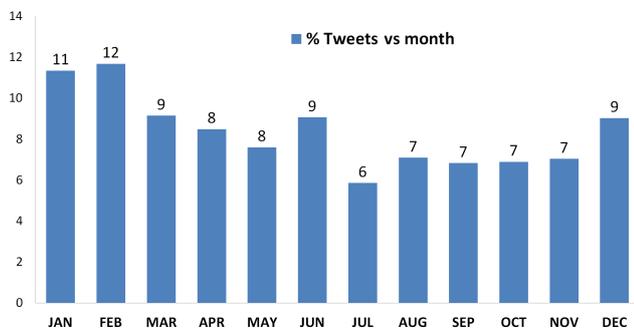**Figure 6.** Time evolution of total followers of Euskalmet's Twitter account.



**Figure 7.** Monthly distribution of tweets posted by Euskalmet (from July 2011 to August 2014).
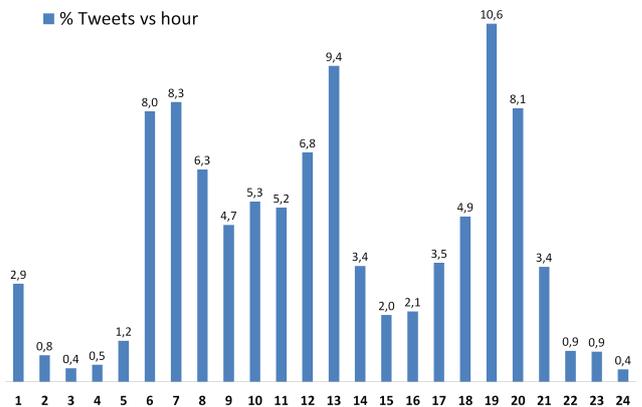


**Figure 8.** Hourly distribution of tweets posted by Euskalmet (from July 2011 to August 2014).

more severe weather events an increase of tweets are produced (see Fig. 7). The effect of routinely information emission at fixed times logically affect the hourly distribution (see Fig. 8).

In Euskalmet case, the number of tweets per day is around 20. Retweets (15 %) are used only for relevant and reliable information, especially if it is accompanied with photos or videos. One third of messages contain "attached" extra information, using links (graphs, maps, radar images, pdf documents, photos, web path, etc). The 24 % of tweets are accompanied with photos or videos. The 63 % of tweets deal with forecast aspects, the 31 % with observations and the 5 % with other subjects. We have done the 43 % of communications related to high impact weather and the 52 % related to routine weather. Direct messages suppose less than 2 %, this private messages to followers are restricted to technical clarifications and to thank followers for providing useful information (more details in Gaztelumendi et al., 2013a).

## 5    Conclusions

New technologies and social networks have increased the available meteorological information and the opportunities to share it. In particular, Twitter is one of the most used social network and communication tool. For that reason, most of the leading meteorological centres have an active account.

The most influential Twitter accounts of NWS are in Europe and North America, but the most followed in Asia. However, Twitter is not very widespread in Africa, the still low mobiles presence in this continent could be one of the main reasons.

The use of this tool is not homogenous in the different NWS. The operational routines are very different, with a variety of information content and different relationships with followers.

Attracting followers and maintaining them is a very complex task, considering that there is no direct relation between the number of sent tweets (effort) and the number of followers of an account (award).

This communication tool has a personal and direct character; therefore, locality character has a great importance, as we can see by the fact that big centres use regional accounts and the high number of followers that small centres with more local character have (Euskalmet, Meteocat, etc.).

Twitter is one of the most promising tool for information transmission in situations of severe weather both for its rapid expansion and for its collaborative nature (Hughes and Palen, 2009). Euskalmet is a good example at regional level, due to its high transmission capacity in severe weather situations, among other factors, because of the dense instrumentation present in Basque Country and its operational integration in the emergency department of the Basque Government.

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