



RUSSIA SPUTNIK V SOCIAL STUDY

Russian Social Media Promotion of Sputnik V in Latin America

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In recent years, Russia has gained a reputation as a formidable player in the information domain, including in the Global South. But in the case of Sputnik V COVID-19 vaccine information operations, its track record of success is not clear. This suggests it is necessary to revisit the widely held assumptions about how Russian entities operate on social media to shape, create, promote, and profit from self-serving narratives.

INTRODUCTION

Over the past several years, Russian state media has developed a Spanish-language audience throughout Latin America geared toward bolstering Russia's image and unnerving the United States. Since fall 2020, Moscow viewed that growing audience as a key resource to drive the regional conversation on COVID-19 diplomacy, including promoting its Sputnik V vaccine. The vaccine's early backers in Russia viewed Latin America as a key [market](#) for the immunization due to Russia's ties with South and

Central American governments. Given that wealthier European, Middle Eastern, and North American states secured global supplies of cutting-edge mRNA vaccines, Moscow's efforts to promote Sputnik V fell on some sympathetic ears.

Russia's state-sponsored social media efforts to promote Sputnik V in Latin America complement its great power ambitions and traditional propaganda efforts to enhance its influence in the Western hemisphere. Yet, Moscow at times struggled to convey consistent and effective messages about the vaccine, particularly when it lacked opportunities to leverage local partners to help amplify its messaging about the shot. Moscow also had difficulty distributing positive messages of Sputnik V in places with robust media environments, like Mexico. An analysis of Twitter data from three diverse countries—Argentina, Mexico, and Venezuela—highlights the difficulties Moscow has faced in building momentum for and positive images of Sputnik V, especially as both regional elites and the public soured on it due to supply shortages.



BACKGROUND

Sputnik V has been a [polarizing topic](#) since it was launched in August 2020. Developed by the [Gamaleya National Center of Epidemiology and Microbiology](#) and funded by the state's Russian Direct Investment Fund (RDIF), it was the first COVID-19 vaccine approved by any nation. Some regulators and researchers outside Russia [expressed apprehension](#) about the transparency of the research data, giving rise to [concern](#) that the vaccine had been rushed to market. President Vladimir Putin responded to these critics by saying that Sputnik V was as “reliable as [Kalashnikovs](#),” a reference to the famously dependable Russian-made assault rifle.

Since its launch, there has been growing [evidence](#) that Sputnik V is both safe and relatively effective. While likely less effective than mRNA vaccines, it appears to increase survival rates among those infected. There are, however, [contradictory reports](#) about Sputnik V's efficacy against new [variants](#) of the virus, as is the case with other widely used vaccines.

Russian officials and scientists have frequently touted Sputnik V on [social media](#) and suggested that it could play an important role in helping slow the pandemic globally.

Sputnik V had yet to be approved for emergency use by the [European Medicines Agency](#) or the [World Health Organization](#) as of late February 2022. At the same time, its backers point to the [fact](#) that it has been “approved for use in more than 70 countries with a combined population of over 4 billion, making up more than 50 percent of the world population.” Moreover, from the start, Russian officials and state media have framed Sputnik V as a symbol of the country's technological achievement, as a source of national pride, and as a tool of Russian diplomacy and soft power. It is the only COVID-19 vaccine to have its own dedicated [social media presence](#). On Twitter and other platforms, its backers energetically promote Sputnik V and tout it as the most important illustration of Russia's impact in

the global fight against the pandemic, while frequently denigrating its [competitors](#).

Nowhere is this truer than in Latin America. Thirteen countries in the region have [approved](#) Sputnik V for use and Russia has harnessed the vaccine for propaganda and public relations purposes there. Its COVID-19 diplomacy in Latin America, which focuses primarily on [marketing](#) and [distributing](#) Sputnik V, highlights how Russia seeks to use soft power around the globe, often effectively utilizing local partners in disseminating and amplifying these messages.

Russia has a long [history](#) of engaging diplomatically in Latin America, where its great power aspirations have [become increasingly visible](#) of late and yielded some success. Politically, Russia has tried to boost its profile in the region as part of its long-standing vision of a multipolar world. It has [worked to protect](#) Venezuela's embattled dictator, Nicolás Maduro. Moscow also uses its engagement with countries like Cuba and Nicaragua to unnerve the United States and to gain backing in the United Nations for its priorities, such as the [annexation of Crimea](#) and [recognition](#) of the breakaway Georgian regions of Abkhazia and South Ossetia.

Russia's vaccine diplomacy during the pandemic has aligned with its great power ambitions and ongoing cultivation of local leaders. These efforts are amplified by Russian state media operating throughout the region. The RT state television network, formerly Russia Today, has been particularly prolific in Spanish. RT's Spanish-language broadcasting is available in almost every country in Latin America and the Caribbean. It has proven to be [more successful](#) in gaining market share among new viewers than any other foreign channel operating in this space. The success of Russian state media in Latin America is even more apparent if one examines social media engagement with RT's Spanish-language content. RT's Spanish-language Twitter account, [@ActualidadRT](#), had [3.5 million](#) followers in February 2022. By comparison, [@RT_com](#), RT's English-language account, had [2.9 million](#) followers at



In Caracas, young Venezuelans walk in front of graffiti that reads, “Together we will defeat COVID-19.” The graffiti also includes images of the Venezuelan and Russian flags. (Photo by YURI CORTEZI/AFP via Getty Images)

the same time, despite Twitter having far [more English-language](#) users. This disparity in social media reach is even larger on Facebook, where in February 2022 RT in Spanish had [18 million](#) followers, compared to only [7 million](#) for RT in English. Russian media’s Spanish-language content clearly has an audience in a part of the world critical for U.S. interests.

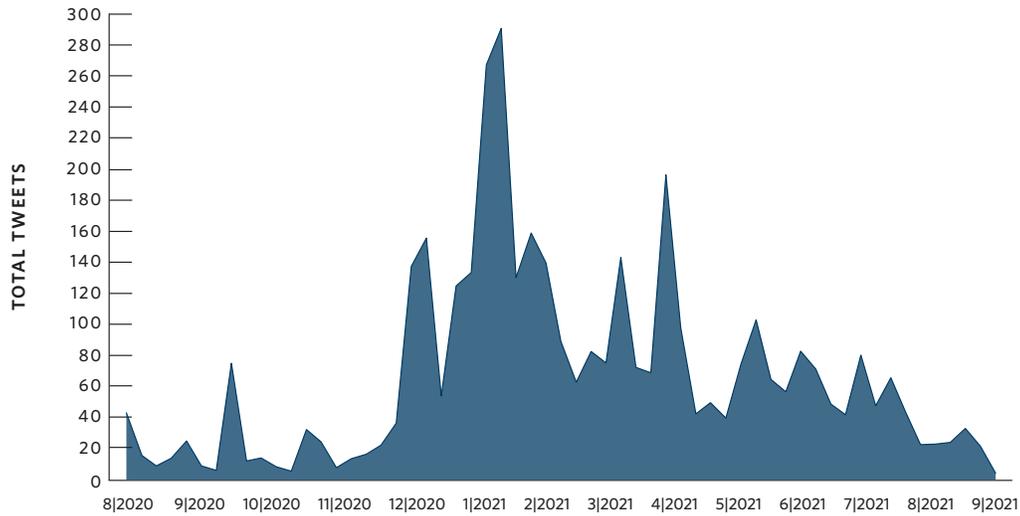
This article examines the efforts of Russian state media to advance Russian soft power to Spanish-speaking audiences through conversations around Sputnik V online. The goal is to understand Russia’s messaging strategy, the interplay between its social media propaganda and local actors, and how its messages were received in Latin America. First, the article shows

where and when conversations about Sputnik V have taken place between August 2020 and September 2021. It then explores how the conversation about Sputnik V differed between three Latin American countries whose relationships with Russia vary greatly: Argentina, Mexico, and Venezuela.

Overall, social media output about Sputnik V is greatest in Latin American countries where local partners—including authoritarian governments and top politicians—promote the vaccine for domestic political purposes. It is far less in countries like Mexico where there is a more varied and thriving media environment, a more contested social media space, and other vaccine options.



Figure 1. Spanish-Language Tweets Discussing Sputnik V



Source: Data were collected by the authors in November 2021 using the Twitter API for Academic Research, available at <https://developer.twitter.com/en/products/twitter-api/academic-research>.

Russia’s efforts to engage in Latin America are apparent in examining where Twitter conversations are happening regarding Sputnik V. Despite the common notion that Moscow’s COVID-19 diplomacy is conducted on a global scale, analysis of social media discourse suggests its propaganda approach is more targeted. For example, between August 2020 and September 2021 Sputnik V was mentioned on Twitter 733,000 times in English but 3.94 million times in Spanish.

Figure 1 shows the time line of the full Spanish-language conversation on Twitter around Sputnik V, by week. From a very low base, it began to rise steeply in December 2020, reaching almost 300,000 tweets a week in February 2021, when Sputnik V’s backers began signing multiple deals for exporting the vaccine. It decreased over the following months, to about 25,000 mentions a week by September, after Russia received bad press over delivery delays to multiple Latin American countries and many began looking elsewhere for vaccine options.

Tweets about Sputnik V were not evenly distributed throughout Latin America. Figure 2a displays their size in terms of the total number of tweets, and figure

2b shows tweets as a ratio of Twitter’s estimate of the size of its active user base in those countries. Three Latin American countries stand out in terms of having significant conversations about Sputnik V: Argentina, Mexico, and Venezuela.

That these three countries had a particularly high number of tweets about Sputnik V is unsurprising. Argentina and Mexico have been long seen by Russia as promising potential partners in the Western hemisphere. Venezuela developed extensive political and security ties with Russia during the rule of Hugo Chavez who took power in 1999. These three countries also received the most individual attention from Russian state media’s social media output. Actualidad RT tweets in the period contained sixty-one explicit mentions of Venezuela, 107 of Mexico, and 220 of Argentina.

Yet, the number of Sputnik V tweets does not tell the whole story. Looking at the tweets as a ratio of the number of active Twitter users in each country (that is, the number of tweets divided by the number of users), Argentina and Venezuela still had a significant number of conversations about Sputnik V whereas there was less in Mexico, which has a larger number of active Twitter users.

All three countries approved Sputnik V for use relatively early. [Argentina](#) was the first country outside the former Soviet Union to approve it on December 23, 2020, and a shipment of doses arrived in Buenos Aires the next day to great fanfare. [Venezuela](#) approved the vaccine in January 2021 while [Mexico](#) gave it a green light a few weeks later after signing a large purchase agreement. All three have since received numerous deliveries of the vaccine, often with delays. Yet, while they were all early proponents of Sputnik V, their engagement with Russia on promoting its use and ultimately their enthusiasm regarding the vaccine have varied in distinct ways. To better understand how Russia attempted to influence the conversation around Sputnik V in Latin America, the Twitter discourse in each of these countries is examined separately.

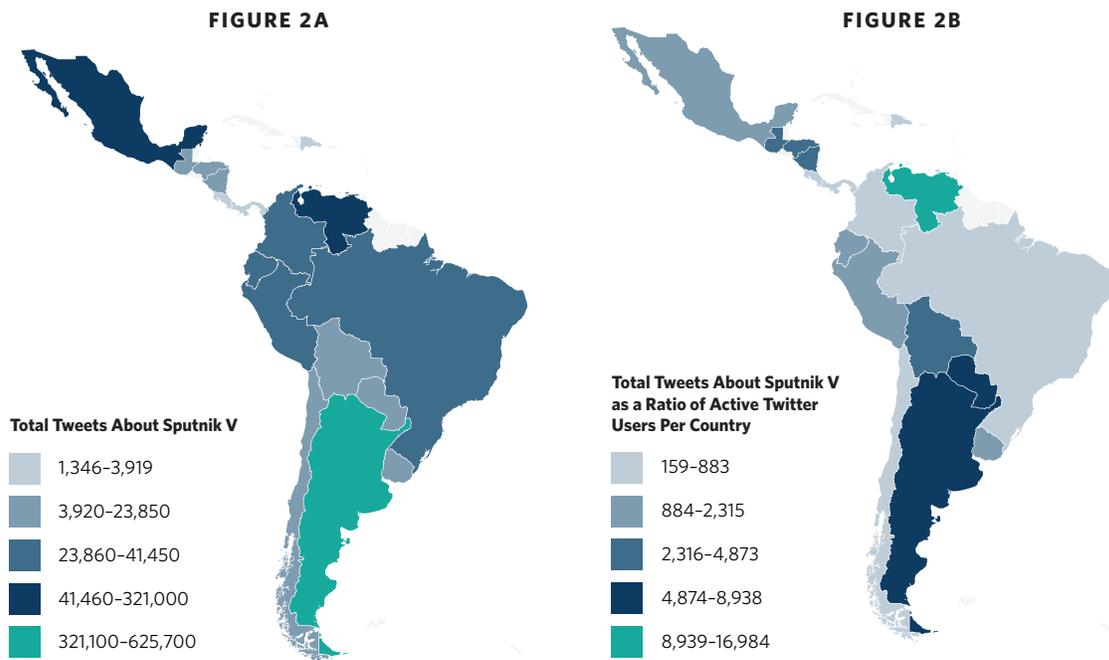
For each country, we gathered tweets that explicitly mentioned the approval, delivery, or distribution of Sputnik V between August 2020 and September 2021,

which we call the “Sputnik V delivered narrative.” There were 60,945 tweets in the “Mexico delivery” conversation; 134,576 in the “Argentina delivery” conversation; and 122,282 in the “Venezuela delivery” conversation.

ARGENTINA

Russia has enjoyed [close political ties](#) to Argentina for many years, thanks in large part to relationships with the center-left Peronist party now led by President Alberto Fernández and Vice President Cristina Fernández de Kirchner (who was formerly president). When the Peronists came back into power in December 2019, ousting the conservative former president Mauricio Macri, Moscow began looking for means to reengage. The pandemic and eventual development of Sputnik V provided the Kremlin with new tools, as did [the tortuous](#) negotiations between Argentine officials and alternate vaccine suppliers.

Figure 2. Distribution of Spanish-Language Sputnik V Tweets by Country



Source: Data were collected by the authors in November 2021 using the Twitter API for Academic Research, available at <https://developer.twitter.com/en/products/twitter-api/academic-research>.



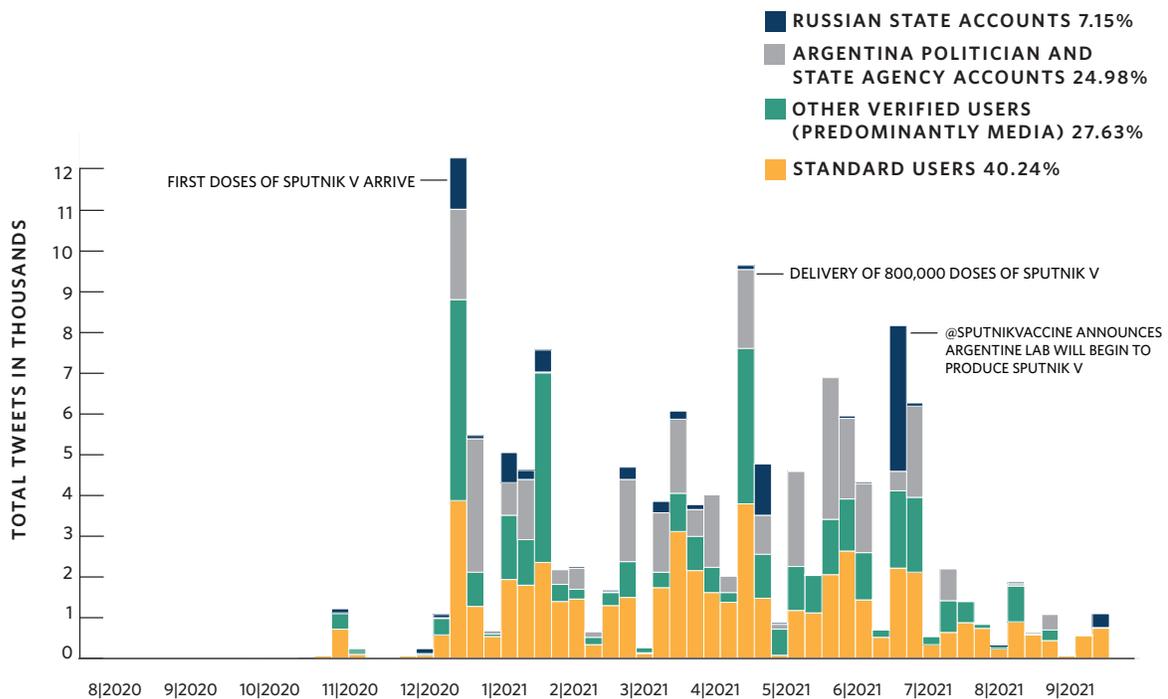
In fact, leaked Argentine documents suggest that the Fernández administration’s decision to use Sputnik V as its primary vaccine may have been driven by [geopolitical](#) considerations rather than public health or economic ones. [Fernández](#) embraced the Russian vaccine early on, publicly getting vaccinated with it.

Prior to the first delivery of Sputnik V on December 24, 2020, Actualidad RT covered every step of the delivery process, with tweets on a wide variety of topics from what the shipment looked like [awaiting pickup](#) in Russia to [heralding the arrival](#) of the flight that brought it to Buenos Aires. These tweets gained relatively limited traction in terms of retweets or likes in Argentina. The [announcement](#) of the arrival of the first Sputnik V vaccine, accompanied by a video of the plane approaching Argentina, was made in a tweet by the Office of the

President of Argentina and followed up by a retweet by Fernández’s personal account. This tweet, in contrast, received thousands of retweets and likes.

Figure 3 displays the Spanish-language Twitter conversation between August 2020 and October 2021 about Sputnik V being delivered to Argentina by the type of entity contributing. For this analysis, Twitter accounts were divided into Russian state accounts, including @ActualidadRT and other state media and embassy pages; accounts belonging to Argentine politicians and state agencies; other verified accounts primarily encompassing journalists and media; and standard, unverified users. All original tweets were then divided into categories based on these groups. In an effort to understand the impact of each account category, retweets and quote tweets were then grouped

Figure 3. Discussion of Sputnik V Delivery to Argentina



Source: Data were collected by the authors in November 2021 using the Twitter API for Academic Research, available at <https://developer.twitter.com/en/products/twitter-api/academic-research>.

Note: To be included in the Spanish “Sputnik delivered” narrative, the tweet needed to have the string “sputnik” in it, be categorized by Twitter as Spanish, and have one of the following stems: “apro,” “autoriz,” “enví,” “llega,” “cargament,” “ateriza,” or “entrig.” To be in the country-specific subnarrative, it also had to include the name of the country, on its own or as a hashtag.

into the category of the account being amplified (for example, a retweet of @ActualidadRT was counted in the Russian state account category).

Russian state media and other Russian state Twitter pages accounted for a relatively small portion of the conversation about the Sputnik V delivery in Argentina. Their tweets and retweets made up just over 7 percent of the total, and a disproportionate share of that is accounted for by a single viral tweet from @sputnikvaccine in June 2021 that announced that the long-delayed second dose of Sputnik V would arrive in Argentina and that a local lab would begin producing the harder-to-manufacture second dose in the country. Argentine state accounts and politicians were responsible for one-quarter of the conversation on the topic on Twitter, about the same as all other verified accounts, which were mostly professional media reporting news. Most of the content promoted by Argentine state accounts and politicians initially highlighted the number of doses the country purchased, their arrival, and details of how they were being deployed in the domestic vaccination campaign. These messages were likely geared to showcase the decisive actions the country's leaders had taken to secure ample supplies of vaccines amid the global shortfall.

Not all the discussions of Sputnik V on Twitter in Argentina were positive. This is not surprising, given that the country faced acute shortages of the [vaccine in](#) mid-2021 that hampered inoculation efforts for months. Argentine Twitter users, including government officials, discussed these delays and responded to popular anger over the stalled vaccination campaign, again to showcase the responsiveness of the country's leaders to an increasingly frustrated and worried population. A @sputnikvaccine [viral tweet](#) in June 2021 about impending deliveries and in-country production may have been geared to shore up the vaccine's flagging [image](#) in the country after the delays. In Argentina, politicians' discussions of Sputnik V on Twitter shifted from highlighting the vaccine's role in one of Latin America's earliest rollouts in early 2021 to damage control after Russia's repeated failure to deliver doses [on time](#) throughout spring and summer 2021.

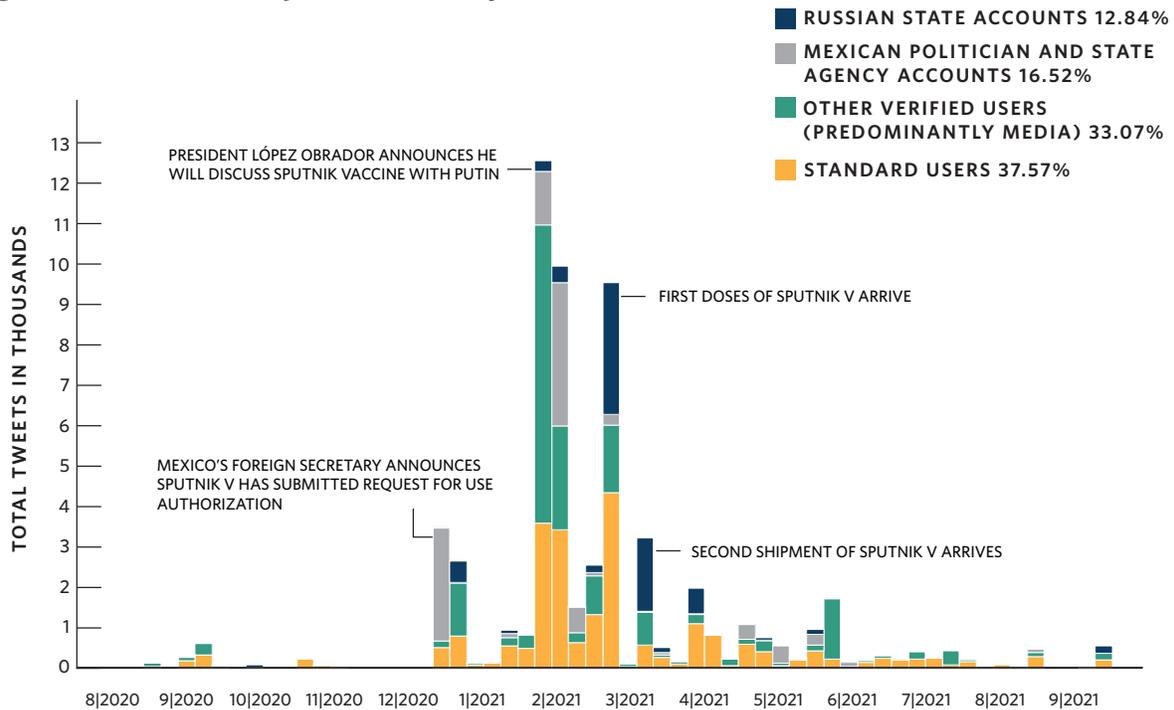
MEXICO

Russia has tried to strengthen its ties with Mexico in [recent years](#) through a wide variety of political, economic, and diplomatic engagements. As wealthier countries like the United States and Canada began stockpiling Western-produced vaccines, Russia used its vaccine diplomacy to make diplomatic and political inroads in Mexico. Compared to Argentina, however, Russia did not have the same support in Mexico for distributing its messaging regarding Sputnik V, and the relatively [robust](#) Mexican social and traditional media environment hampered its ability to get its message out. With the exception of [a popular tweet](#) from Mexico's foreign secretary about Russia's request for a Sputnik V use authorization and a [pair of tweets](#) from President Andrés Manuel López Obrador about his conversations with Putin on the subject, Mexican state officials engaged minimally on the subject. Some opposition leaders took to [social media](#) to protest the country's embrace of Sputnik V from the start, questioning why Mexico would purchase a vaccine that had yet to receive broad-based international approvals.

Retweets of López Obrador's comments and those originating from other politicians and state voices accounted for about 16 percent of the conversation (see figure 4). The discussion generally was more factual than propagandistic. Furthermore, while Sputnik V's first delivery garnered some media coverage, the conversation on Twitter about this was less than half the volume of that in Argentina or Venezuela. Coverage of deliveries was dominated by traditional Mexican media outlets, and retweets of Russian state sources accounted for 12 percent of the conversation, some of it showing no excitement or enthusiasm for the vaccine's arrival. Actualidad RT's tweet announcing the arrival of the first shipment of Sputnik V in Mexico was particularly understated, showcasing a simple [picture](#) of a few officials receiving the vaccine delivery off the airplane.

The most common hashtags used in Mexican conversations of the Russian vaccine's arrival were, in order: #SputnikV, #México, #AstraZenec,

Figure 4. Discussion of Sputnik V Delivery to Mexico



Source: Data were collected by the authors in November 2021 using the Twitter API for Academic Research, available at <https://developer.twitter.com/en/products/twitter-api/academic-research>.

Note: To be included in the Spanish “Sputnik delivered” narrative, the tweet needed to have the string “sputnik” in it, be categorized by Twitter as Spanish, and have one of the following stems: “apro,” “autoriz,” “envi,” “llega,” “cargament,” “ateriza,” or “enrigr.” To be in the country-specific subnarrative, it also had to include the name of the country, on its own or as a hashtag.

#ÚltimoMomento, #ÚltimaHora, and #Pfizer. These hashtags were used predominantly in media tweets that were not actively advocating for Sputnik or disseminating Russian-origin propaganda but rather were discussing the range of vaccines available to combat the virus in a neutral, journalistic manner. In part given Mexico’s far more crowded Twitter space and fairly robust traditional media environment, Russian social messaging campaigns appear to have had limited impact in building a positive image of Sputnik V in the country.

influence on the Twitter conversation concerning Sputnik V’s delivery in the country. Retweets of Russian and Venezuelan state-sponsored content each accounted for only 12 percent of the conversation. Nor does the conversation appear to have been particularly influenced by Spanish-language media more broadly. The majority of the conversation, instead, seems to have originated with standard, nonverified accounts. If one looks more carefully at these accounts, however, there are signs that Russia’s messaging in Venezuela took advantage of a very different form of local state support.

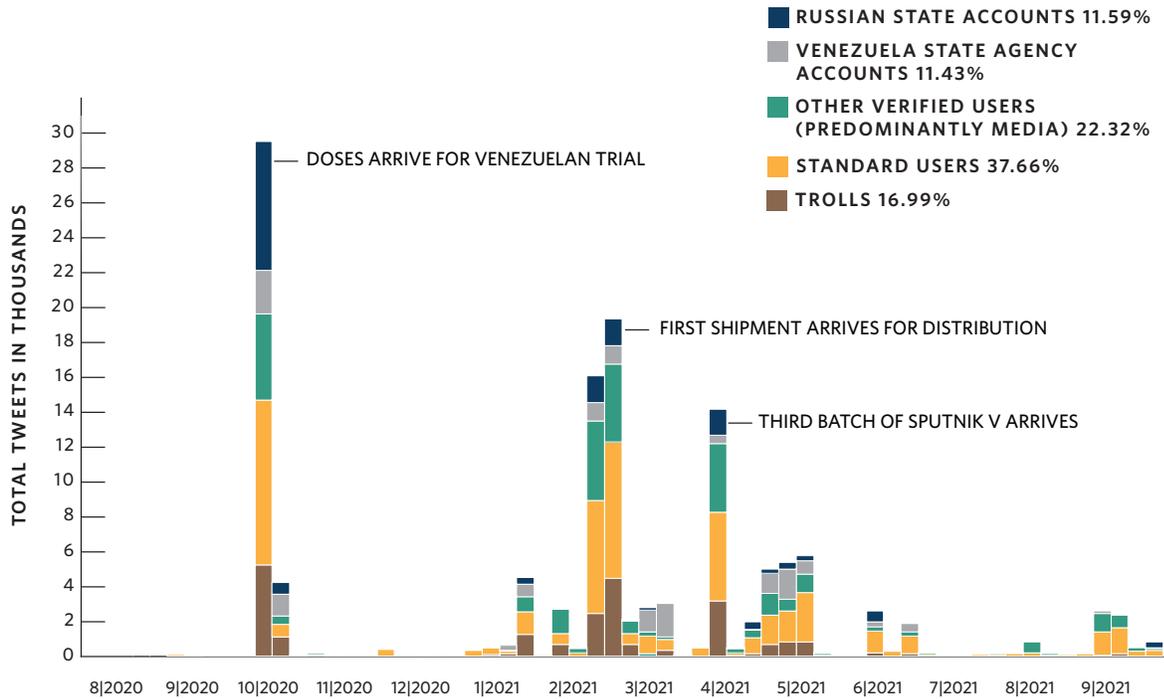
VENEZUELA

The case of Venezuela (see figure 5) is different from that of Mexico or Argentina. Neither Russian nor Venezuelan state channels had a particularly strong

Crowdsourced Trolling

There were many suspiciously similar accounts that contributed substantially to the conversation in Venezuela. These all used the same client (Twitter for Android) to post tweets. They periodically pushed

Figure 5. Discussion of Sputnik V Delivery to Venezuela



Source: Data were collected by the authors in November 2021 using the Twitter API for Academic Research, available at <https://developer.twitter.com/en/products/twitter-api/academic-research>.

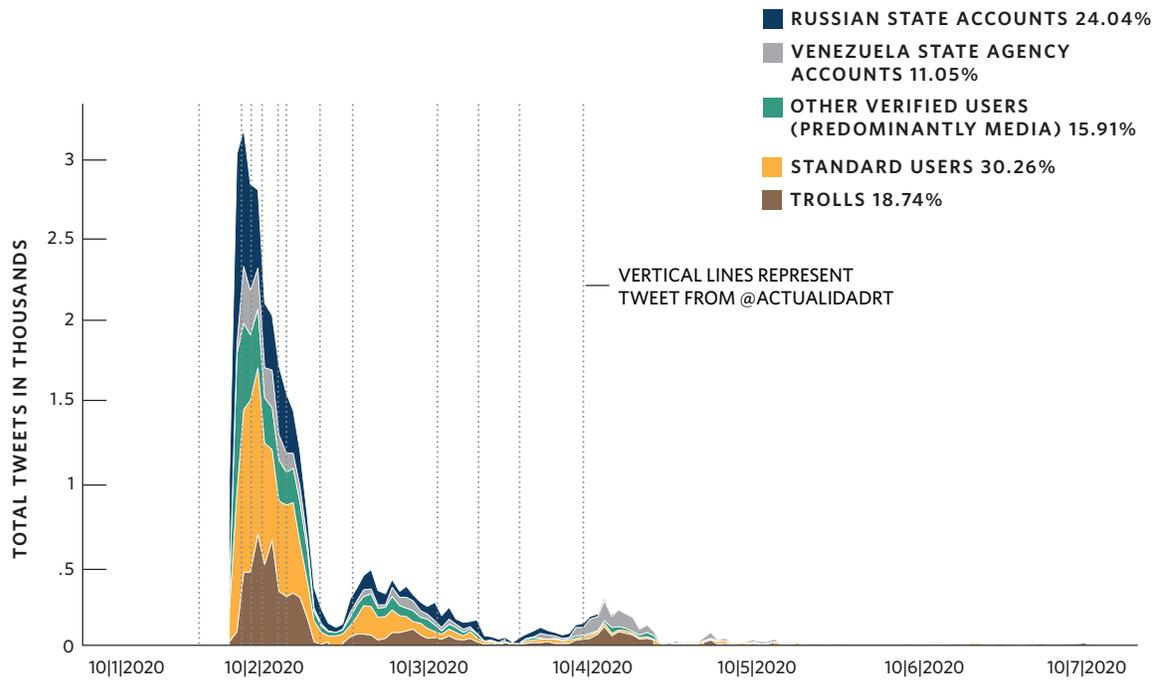
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out hundreds of tweets in the same hour and then stopped. This pattern suggests the use of trolls who quickly initiated and tried to amplify a messaging campaign and then stopped their activity once the message was disseminated. This activity also was coordinated around specific hashtags, many of which were first shared by the official accounts of Venezuela’s [Ministry of Popular Power for Communication and Information](#) (MIPPCI), suggesting a far more targeted and coordinated campaign than those seen in Argentina or Mexico. This behavior is entirely consistent with the crowdsourced amplification campaigns that [Venezuela’s government engaged in in the past](#). On December 2, 2021, Twitter announced the removal of several hundred Venezuelan accounts involved in such behavior and identified an app (Twitter Patria) that they used to organize it.

To measure the role state-sponsored campaigns may have played in promoting Sputnik V narratives, we created a test to identify the most suspicious accounts that demonstrated behavior consistent with past activity by Venezuelan trolls. We labeled accounts that overwhelmingly used the Android client, had links to MIPPCI hashtags, and engaged in extremely high-volume but sporadic output. This test, however, captured only the most suspicious inauthentic accounts. It surely undercounts such accounts that were participating in the Venezuelan campaign, since the nature of the crowdsourcing invited real users to partially repurpose their accounts and the test captured only those accounts that were (nearly) exclusively used for the campaign.

There were 1,851 accounts that satisfied these criteria and directly contributed to the “Sputnik V delivered” narrative in Spanish. If indirect contributions (retweets

Figure 6. Conversation About Sputnik V Trials in Venezuela, First Week of October 2020



Source: Data were collected by the authors in November 2021 using the Twitter API for Academic Research, available at <https://developer.twitter.com/en/products/twitter-api/academic-research>.

of troll accounts by accounts that are not on the list) are included, these accounts produced 36,167 messages in this narrative. Again, this probably understates the output of these accounts, especially early in the period studied, as many participants in the campaign had been suspended and had their content removed by Twitter before their output could be gathered.

Inauthentic state-affiliated activity accounted for 17 percent of the “Venezuela delivery” conversation. These accounts clearly do not represent a level of genuine enthusiasm for the vaccine in Venezuela. They do serve important functions, however, for the state and for Sputnik V. They function as an inexpensive mechanism to spread state propaganda and as a means of maintaining the perception, even if false, of support for this propaganda. Retweets and likes of state-affiliated accounts give an artificial impression of community endorsement.

CONCLUSIONS

While Russian state media has developed an audience throughout Latin America, nowhere did it truly drive the conversation about Sputnik V. To the contrary, much of its messaging did not seem intended to drive the regional conversation but rather to publicize Russia’s benevolence and technological prowess to a wide audience.

Looking at, for instance, the Twitter conversation related to delivery of Sputnik V to Venezuela for testing in October 2020, the story spikes quickly on the day of the announcement but then ebbs away (see figure 6). This is despite repeated tweets from Actualidad RT, which continued discussing the issue for the two days following the announcement. It alone did not sustain the volume of the conversation.

Actualidad RT's tweets, however, may not have tried to foster discussion or genuine interest in the vaccine—they appear to have been simple promotion for Russia. The target audience did not seem to be the Venezuelan people but audiences in the rest of Latin America instead. The [stories](#) these tweets linked to detail all that Russia has done for Venezuela and highlight its generosity. These are stories not about what Sputnik V can do for Venezuela but rather what Russia can do for Latin America, with Venezuela as Moscow's country of choice to promote that narrative.

This suggests that Russia's state social media efforts in Latin America are an important complement to its great power ambitions and more traditional propaganda efforts to promote positive images of itself. Sputnik V's backers in Moscow have used the vaccine as a tool for amplifying and communicating about Russian prestige and influence in the region. Such messaging spreads most effectively, however, where there are opportunities to leverage existing local partners to assist in its distribution and where there is a less robust media space.

In Argentina, these partners were politicians and government outlets, which presumably hoped to benefit domestically from this messaging. In Venezuela, Russia took advantage of its ally's state propaganda and disinformation networks for the lion's share of the effort. Both countries' leaders worked with Russia to promote Sputnik V because it was politically advantageous for them to do so.

This element of domestic political advantage is illustrated by how the messages of Russia's local partners changed when delivery delays pushed politicians into damage control. In Argentina, delivery shortages became a [tense issue](#) between the two countries with Argentine officials noting the political peril created by their country's initial overdependence on a single vaccine. When deliveries of Sputnik V restarted in late summer 2021, Russian and Argentine actors pushed a positive narrative once again, highlighting [local production](#) capabilities and locally produced shots being delivered to health agencies and

regional centers. Yet, in the end, on-time Sputnik V deliveries lagged well behind expectations that had been created in the initial buildup. These delays slowed Argentina's vaccine rollout for months, which fed popular discontent and contributed to the ruling Peronist party's [defeat](#) in the November 2021 midterm parliamentary elections, in which, for the first time since 1983, the party lost its Senate majority.

Analyzing Russia's messaging around Sputnik V, it seems its state actors are often willing to allow their local partners to take the spotlight and credit. In Mexico, where Russia lacked adequate local partners, positive messaging about Sputnik V did not break through the country's social media chatter. The vaccine was treated more critically in the diverse media landscape. The discussion was often laced with skepticism born of the fact that the country had other vaccine options. Russian state media was just one voice in the crowd. While its influence may be growing in Latin America, that tool alone was not sufficient to bolster Sputnik V's image or Russia's overall influence in Mexico.

In Venezuela, state-sponsored trolls helped amplify positive messages about Sputnik V. The country's more restrictive media environment for the most part overlooked shortages and delivery delays, even though these problems complicated the Maduro government's vaccine [rollout](#). Twitter activity about Sputnik V appears to have been largely inauthentic, driven by state-sponsored trolls. These trolls supported the government's messaging about the vaccine and shored up Sputnik V's image artificially in Spanish-language social media in Latin America as Russia struggled to live up to its promises as a partner in curbing the pandemic.

It is striking that the promoters of Sputnik V underperformed amid the opening left by the United States' decision in 2020 and the first half of 2021 to prioritize access to vaccines for its own population over providing support to countries in regions like Latin America. Russia sought to take advantage of U.S. missteps in the region and presented itself as a viable

alternative. Yet, it inflated [expectations](#) about the rollout of Sputnik V and then failed to use its diplomatic, economic, and scientific might to deliver the solutions it had [promised](#). No amount of social media activity could overcome the reputational effects of these shortcomings. Russia's public relations apparatus was working with what it had, and in the case of Sputnik V, it was not enough.

Russia's failure to follow through was largely a self-inflicted wound that led to tension with Latin America's governments and damaged its soft power with the region's populations. It also provided the United States and others with greater maneuvering room to reengage there. Argentina by summer 2021 began to [pivot away](#) from its dependence on Sputnik V, reaching agreements with leading global vaccine providers that opened the country to other sources of COVID-19 jabs. Mexico has reengaged with the United States at the state and private-sector levels to expand vaccine supplies. As of [January 3](#), Argentina and Mexico had been fairly successful with their vaccination rollouts. They were also both ahead of Russia, with Argentina now on par with far [wealthier countries](#) according to the Johns Hopkins University Global Vaccine database.

ACKNOWLEDGMENTS

The authors would like to thank Matt Chambers, the executive director of visual analytics at Clemson University, for his assistance.

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NOTES

- 1 Major [regulators](#) have accused the developers and marketers of Sputnik V of being slow in providing full transparency on the vaccine and complete data on its safety and efficacy. Along with waning efficacy of all COVID-19 vaccines, this complicates the ability to compare their effectiveness.
- 2 Data were collected by the authors in November 2021 using the Twitter API for Academic Research, available at <https://developer.twitter.com/en/products/twitter-api/academic-research>.

For complete source notes, please read this article at [CarnegieEndowment.org](https://www.carnegieendowment.org).

