

Use and abuse of scientific output in scientific outreach and researcher's training in science communication

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What is science communication ? (1)

Science communication is more than (popularized) scientific information:

- Getting and keeping the attention of a non-captive audience
- Building a bridge between scientists and non-scientists
 - Through interactions and dialogue, beyond transmission (and the « deficit model »)
 - Taking into account other types of knowledge
 - In a particular social and cultural context

What is science communication (2)?

Scientific communication entangled with purpose(s) and intent(s)

- Being convincing about the value of one's research
- Being convincing about the value of science in the public debate
- Advocating for a research project, a discipline, an institution, ...
- Advocating for (more) science funding
- Advocating for careers in STEM
- Persuading the audience to adopt new behaviors and engage into action

Use of rhetoric and argumentation in science communication (training)

Rhetoric as the faculty of observing in any given case the available means of persuasion (Aristotle, *Rhetoric*)



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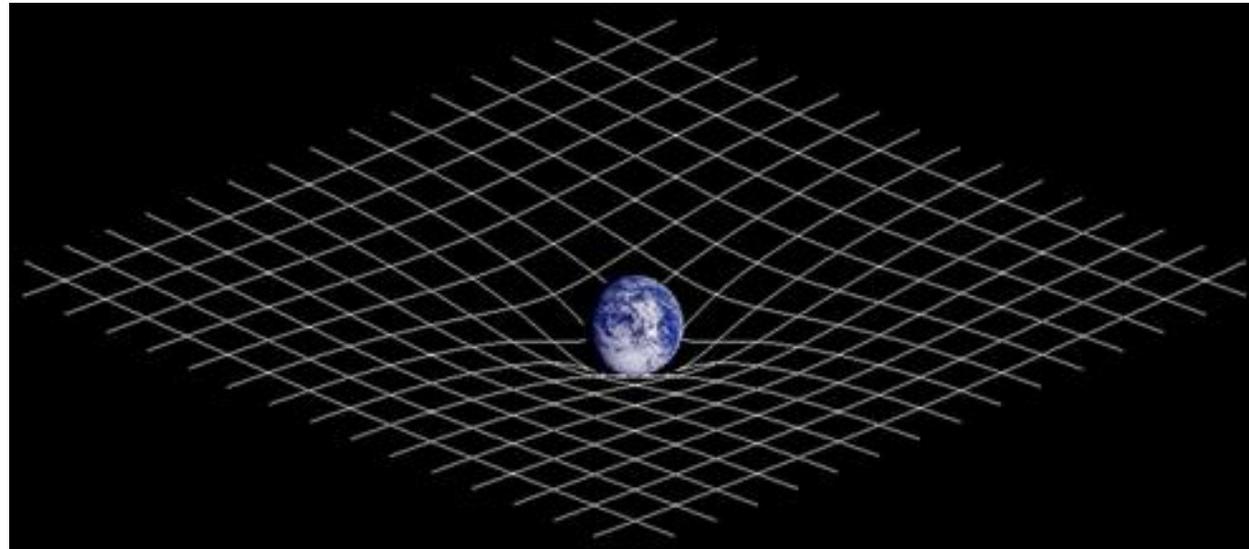
Using without abusing (1)

Transparency about the objectives

- Clarifying the purpose(s) and intent(s)
 - at individual level (*inventio* of the most adequate means)
 - at institutional/organizational level
 - Science communication training organized by/for the communication department of the university
 - Science communication training organized by/for the PhD Training cell

Using without abusing (2) Arguments (Logos)

- Master the art of analogy (metaphor, example, comparison)
 - The right analogy is always a trade-off



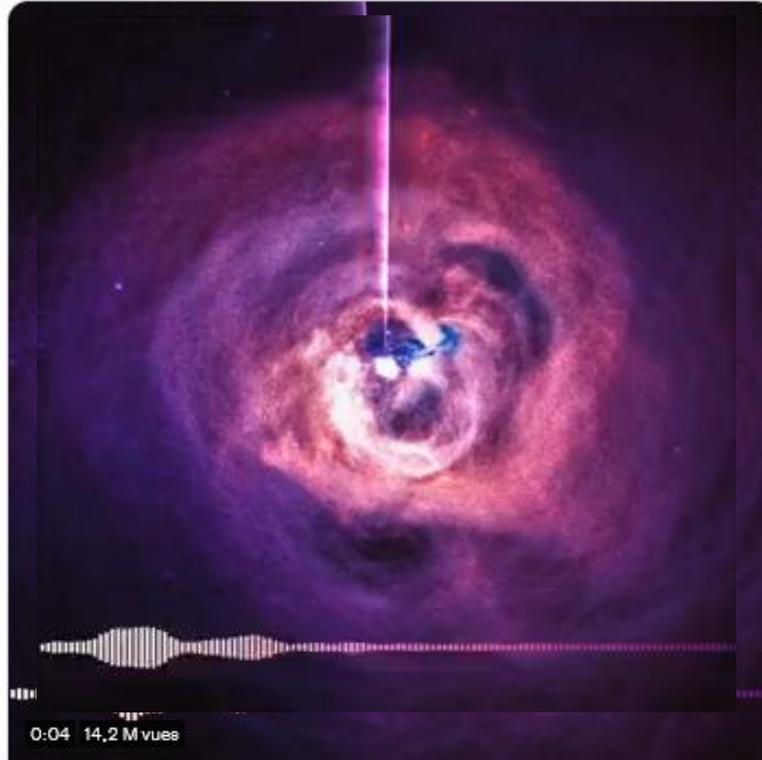


NASA Exoplanets ✓
@NASAExoplanets



The misconception that there is no sound in space originates because most space is a ~vacuum, providing no way for sound waves to travel. A galaxy cluster has so much gas that we've picked up actual sound. Here it's amplified, and mixed with other data, to hear a black hole!

[Traduire le Tweet](#)



NASA Data Sonification: Black Hole Remix

In this sonification of Perseus, the sound waves astronomers [previously](#) identified were extracted and made audible for the first time. The sound waves were extracted outward from the center.

 **sanyuyu hakusho** 🧐
@cybxrart · [Suivre](#)

Turning up the sound of a Black Hole and it sounds like hundreds of tortured souls being dragged underneath a lake of fire

2:23 PM · 22 août 2022

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5 h · 🌐

PLANETE | "On dirait des centaines d'âmes torturées traînées sous une mare de feu" 😬



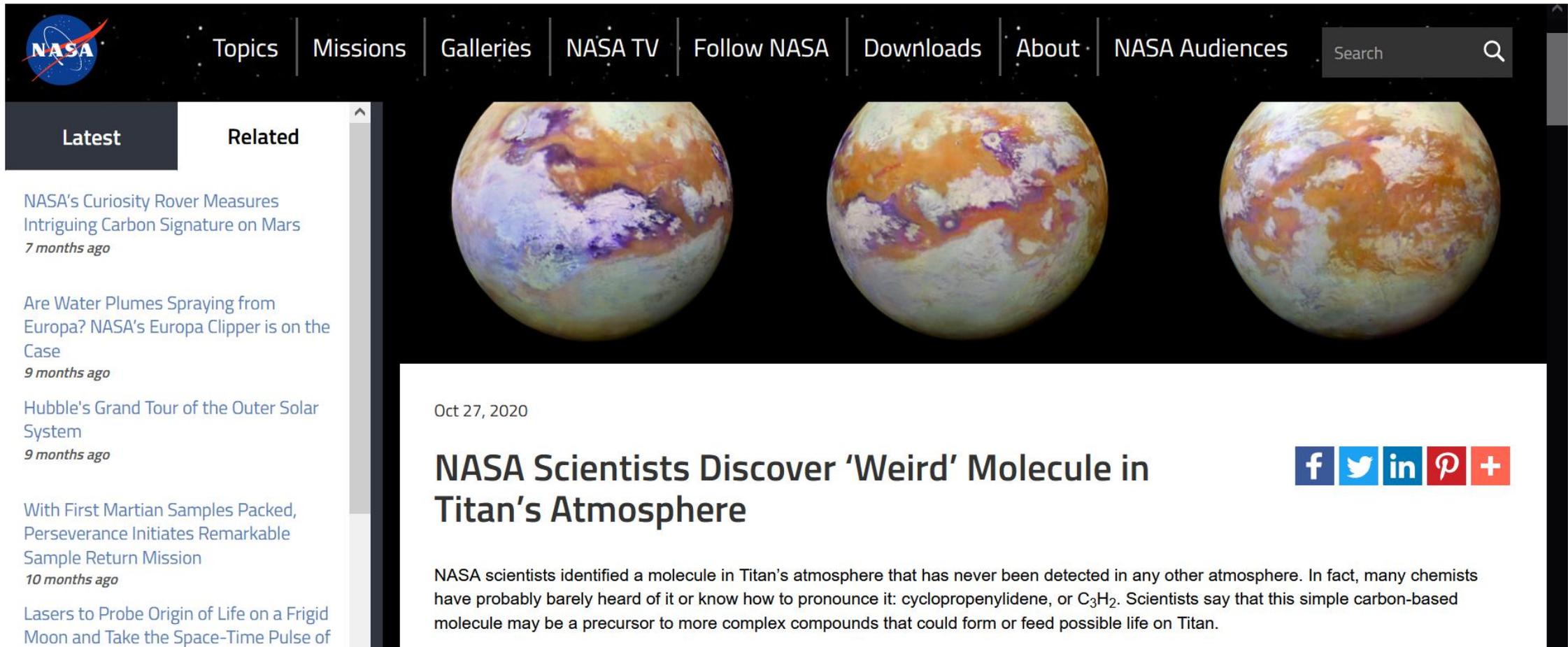
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La NASA partage les sons produits par un trou noir sur Twitter

Using without abusing (3) : Pathos

- Avoid excessive emotion and sensational story telling



The screenshot shows a NASA website article. At the top is the NASA logo and a navigation menu with links for Topics, Missions, Galleries, NASA TV, Follow NASA, Downloads, About, and NASA Audiences. A search bar is on the right. Below the navigation is a 'Latest' sidebar with four article teasers: 'NASA's Curiosity Rover Measures Intriguing Carbon Signature on Mars' (7 months ago), 'Are Water Plumes Spraying from Europa? NASA's Europa Clipper is on the Case' (9 months ago), 'Hubble's Grand Tour of the Outer Solar System' (9 months ago), and 'With First Martian Samples Packed, Perseverance Initiates Remarkable Sample Return Mission' (10 months ago). The main content area features three images of Titan, a moon of Saturn, showing its orange and white surface. Below the images is the article title 'NASA Scientists Discover 'Weird' Molecule in Titan's Atmosphere' dated Oct 27, 2020. The article text states that NASA scientists identified a molecule in Titan's atmosphere that has never been detected in any other atmosphere. The molecule is cyclopropenylidene, or C_3H_2 . The article also includes social media sharing icons for Facebook, Twitter, LinkedIn, Pinterest, and a plus sign for more options.

Oct 27, 2020

NASA Scientists Discover 'Weird' Molecule in Titan's Atmosphere

NASA scientists identified a molecule in Titan's atmosphere that has never been detected in any other atmosphere. In fact, many chemists have probably barely heard of it or know how to pronounce it: cyclopropenylidene, or C_3H_2 . Scientists say that this simple carbon-based molecule may be a precursor to more complex compounds that could form or feed possible life on Titan.



ABONNÉ

ACCUEIL > CIEL ET ESPACE

Une étrange molécule détectée dans l'atmosphère de Titan

PUBLIÉ LE 02 NOV 2020 À 15H08 | MODIFIÉ LE 13 MAI 2022 | PAR VINCENT NOUYRIGAT

Les scientifiques de la NASA ont identifié une molécule jamais détectée auparavant dans l'atmosphère d'une planète ou d'une lune. **Découverte dans l'atmosphère de Titan**, l'un des satellites de Saturne, cette simple molécule à base de carbone et d'hydrogène pourrait être un élément de la formation de composés plus complexes, et peut-être, **être à l'origine d'une forme de vie sur cette lune...**

LES PLUS LUS



L'effet Mandela : la preuve de l'existence...

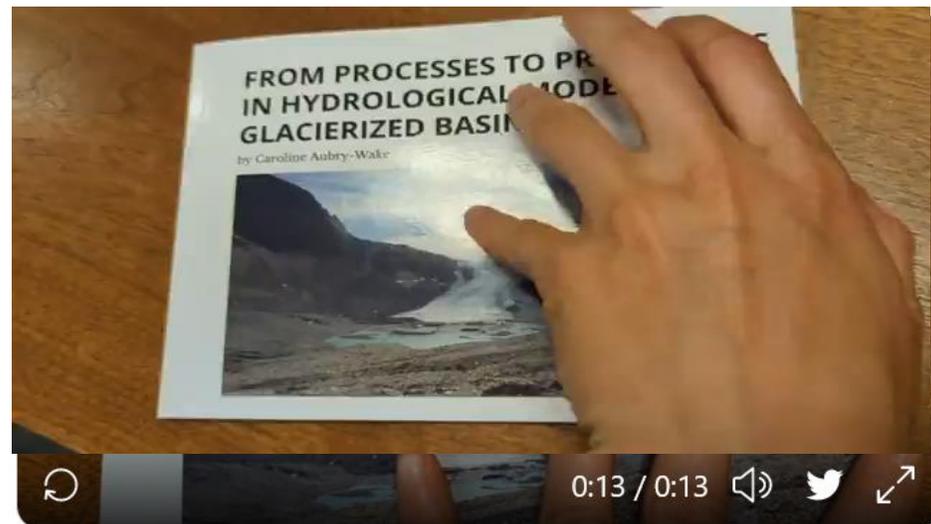
Using without abusing of rhetoric (3) : Excess of pathos

- Tell the story of your research



I wanted my partner, my parents and my friends to understand what I did these last 5 years... So I made a small book for them, filled with images and stories relating to my PhD thesis. It has the same chapters, but much more enjoyable to read (and to write)!

#PhD #scicomm



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HOW CORN MAKES
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CAMPUS

UC DAVIS

FIELD OF STUDY

PLANT BIOLOGY



Using without abusing of rhetoric (3) Pathos

- Show empathy



Using without abusing (4) Ethos

- Clarify the limits of one's expertise
 - Scientist (in the field)
 - Engaged scientist (in the field)
 - Public intellectual (risk of ultracrepidarianism)
 - (Scientifically informed) citizen (risk of argument from authority)

Cologna, V., Knutti, R., Oreskes, N., & Siegrist, M. (2021). Majority of German citizens, US citizens and climate scientists support policy advocacy by climate researchers and expect greater political engagement. *Environmental Research Letters*, 16(2), 024011.

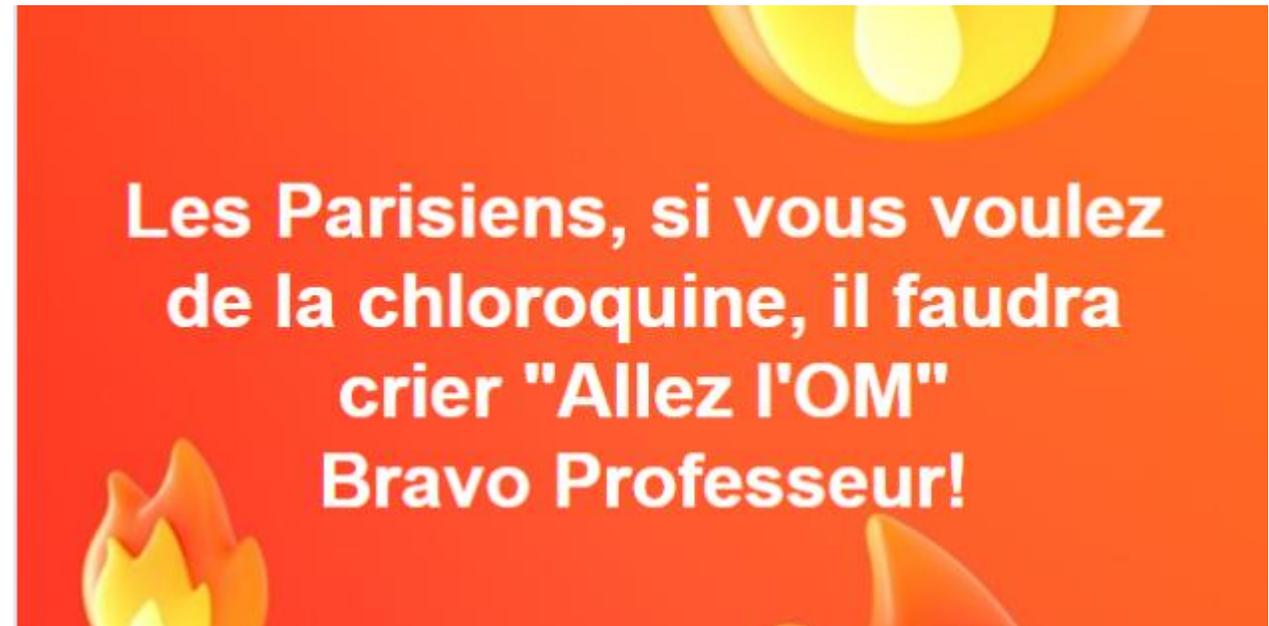
Using without abusing (4)

Ethos

“Scientists need to talk about the values that motivate them and shape the science they do. In many cases, scientists’ values are less different from the people who are rejecting science than you might think. And where values overlap, trust can be built.”

(Naomi Oreskes, Science Historian,
<https://www.theguardian.com/science/2019/nov/03/naomi-oreskes-interview-why-trust-science-climate-donald-trump-vaccine>)

Using without abusing (5) Engaging in the (social) media



Using without abusing (5) Engaging in the (social) media

- Make a conceptual difference between
 - Controversies
 - Possibility of (partial) consensus
 - Participants' opinions may evolve
 - Participants agree to disagree eventually
 - Polemics
 - Confrontation of opinions
 - *Ad Hominem* argumentation
 - Absence of any cooperative mindset
- Engage in controversies (if you wish so) but avoid polemics

Some final thoughts

- Rhetoric and argumentation are useful
 - For the practice of science communication
 - For theorizing and being reflexive about science communication practices
 - For providing a frame to the « science of science communication »
- Science communication as a particularly complex activity
 - Combining research outputs (epistemic information) with rhetoric and argumentation
 - Finding the most adequate trade-off (using - not abusing - epistemic information)
 - Case by case approach needed
- Science communication training as an opportunity to discuss with scientists the best trade-off, according to the case