Planet Press: geoscience news for children

Bárbara Ferreira
EGU Media and Communications Manager

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European Geosciences Union

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Space Scoop: the inspiration

- “Brings you the latest astronomy news from across the Universe each week”
- UNAWE – Universe Awareness initiative in collaboration with ESO, ESA, etc.
- Press release from partner organisations + UNAWE science writer = Space Scoop
- Share exciting new astro discoveries to inspire children to develop interest in sci and tech; shows science not dull and outdated
- http://www.spacescoop.org/

TOPICS

SPACE SCOOP

News from Across the Universe

The Brightest Galaxy in the Universe is Tearing Itself Apart

25 Jan 2016

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- Atoms and Molecules
- Asteroids

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- With former EGU Edu Fellow Jane Robb: why not do the same for geosciences?


Planet Press


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- Short versions of EGU press releases
- Child friendly language: target mainly 7-13 year olds (+parents, educators)

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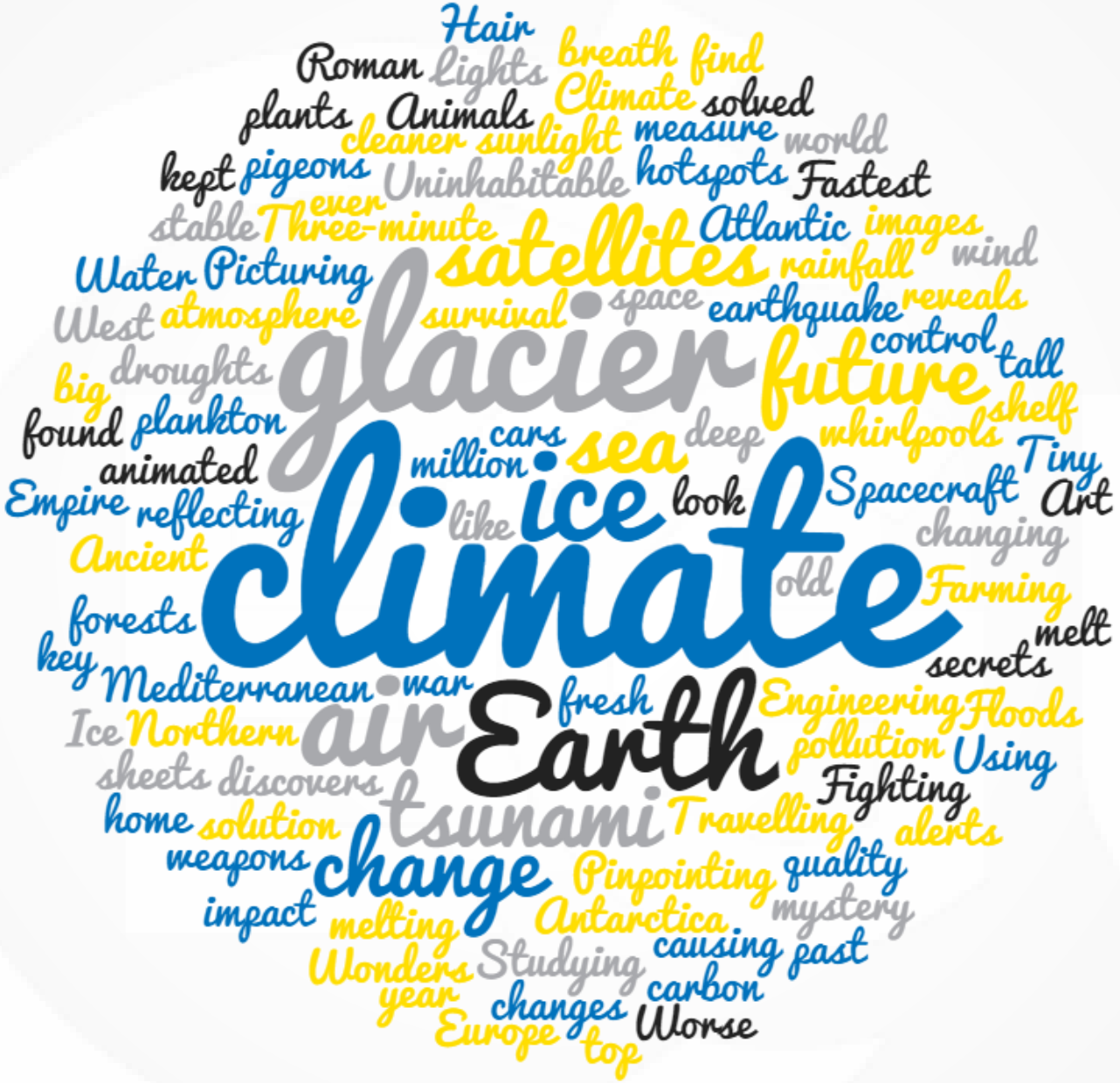
European Geosciences Union



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- Complements other EGU educational initiatives, such as GIFT

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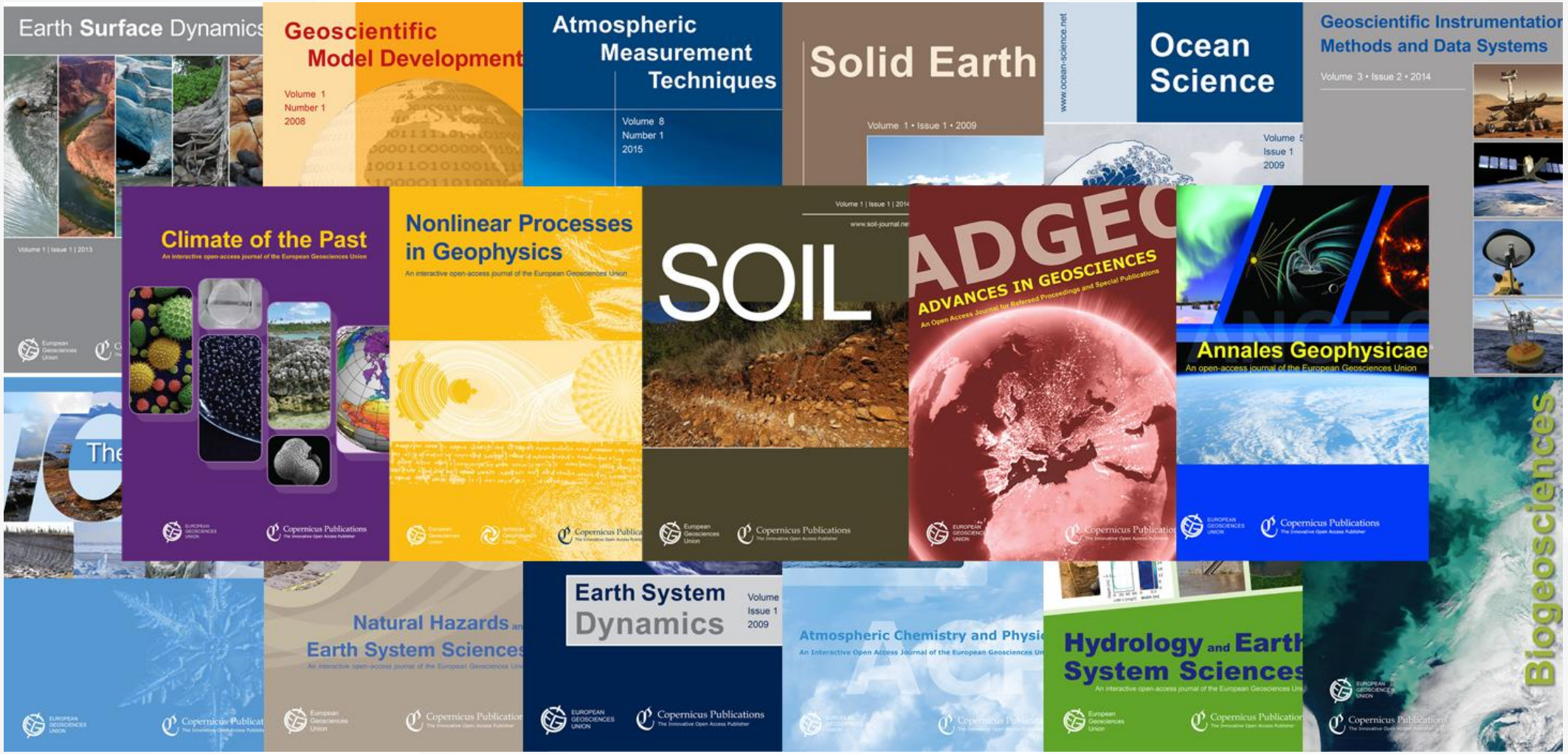

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www.the-cryosphere.net/9/2201/2015/
doi:10.5194/tc-9-2201-2015

The Cryosphere Open Access EGU

Revealing glacier flow and surge dynamics from animated satellite image sequences: examples from the Karakoram

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Revised: 1 November 2015 – Accepted: 2 November 2015 – Published: 26 November 2015

Abstract. Although animated images are very popular on the internet, they have so far found only limited use for glaciological applications. With long time series of satellite images becoming increasingly available and glaciers being well recognized for their rapid changes and variable flow dynamics, animated sequences of multiple satellite images reveal glacier dynamics in a time-lapse mode, making the otherwise slow changes of glacier movement visible and understandable to the wider public. For this study, animated image sequences were created for four regions in the central Karakoram mountain range over a 25-year time period (1990–2015) from freely available image quick-looks of orthorectified Landsat scenes. The animations play automatically in a web browser and reveal highly complex patterns of glacier flow and surge dynamics that are difficult to obtain by other methods. In contrast to other regions, surging glaciers in the Karakoram are often small (10 km^2 or less), steep, debris-free, and advance for several years to decades at relatively low annual rates (about 100 $m a^{-1}$). These characteristics overlap with those of non-surge-type glaciers, making a clear identification difficult. However, as in other regions, the surging glaciers in the central Karakoram also show sudden increases of flow velocity and mass waves travelling down glacier. The surges of individual glaciers are generally out of phase, indicating a limited climatic control on their dynamics. On the other hand, nearly all other glaciers in the region are either stable or slightly advancing, indicating balanced or even positive mass budgets over the past few decades.

1 Introduction

1.1 Visualizing glacier dynamics

Analysis of sequential satellite images has become a common tool for deriving glacier changes through time in all parts of the world. A "standard" way of documenting these changes in scientific journals is the overlay of glacier outlines from different points in time on one of the images used for the analysis (e.g. Baumann et al., 2009; Bhambri et al., 2013; Paul et al., 2004). In the case where multiple images are available and changes take place mostly at the glacier terminus (e.g. during an advance or retreat phase), terminus positions are indicated by multiple lines with years either attached to them (e.g. Jiskoot and Juhlin, 2009) or colour-coded (McNabb and Hock, 2014; Quincey et al., 2011; Rankl et al., 2014). When complex interactions take place between two glaciers (e.g. a tributary is merging with another glacier), phases of the changes are illustrated by showing sequential images side by side (e.g. Belò et al., 2008; Bhambri et al., 2013; Copland et al., 2011; Mukhopadhyay and Khan, 2014) or by two-dimensional drawings of changes in major moraine patterns (e.g. Hewitt, 2007; Meier and Post, 1969; Quincey et al., 2015).

Although these representations of changing glaciers are scientifically sound and exact, they have some limitations in demonstrating dynamic aspects. The key issue is related to the limited ability of the human brain to recognize differences between two (static) images when shown side by side or to translate various outlines of terminus positions into the correct sequence of changes, in particular when changes are out of phase for a couple of glaciers. On the other hand, the human brain recognizes movement well and tends to compensate missing parts in a sequence of animated images due

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Press Release: Revealing glacier flow with animated satellite images

26 November 2015

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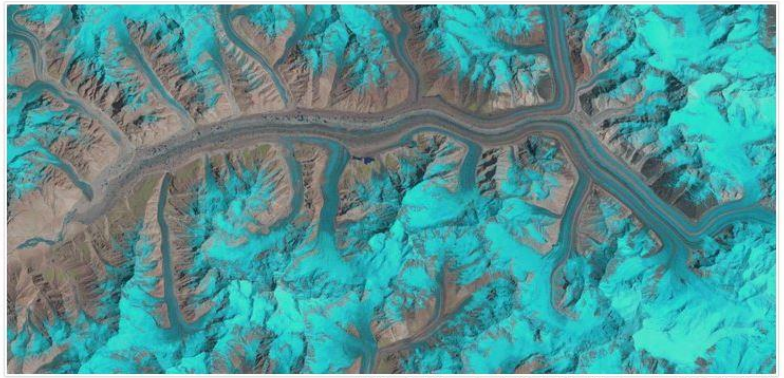

Still from the Baltoro animation (Credit: F. Paul, The Cryosphere, 2015 & USGS/NASA)

Frank Paul, a glaciologist at the University of Zurich in Switzerland, has created animations from satellite images of the Karakoram mountain range in Asia to show how its glaciers flow and change. The images of four different regions compress 25 years of glacier changes into just one second, revealing the complex glacier behaviour in the Karakoram. The animations are published today (26 November) in The Cryosphere, an open access journal of the European Geosciences Union (EGU).

The new animations reveal glacier flow and changes over a much longer time period and at a much larger scale than ever before, using the Karakoram as an example. While time-lapse movies made using daily photographs taken with cameras stationed at glacier fronts are available for some glaciers, they only show changes over a few days to a few years and for a small part of a glacier. The animations now created with satellite images provide a whole new look at glacier dynamics.

The animations use images acquired from 1990 to 2015 by three different Landsat satellites, operated by the US Geological Survey (USGS) and NASA. Twenty five years of relatively slow glacier change are compressed into one second, meaning glacier movement is sped up some 800 million times. "The most interesting insight is to really see how the glaciers flow and how the individual parts of the glaciers, such as the tributary streams, interact," says Paul.

Paul produced the image sequences for four regions – Baltoro, Panmah, Skamri–Sarpo Laggo, and Shaksgam – in the central Karakoram. This mountain range is home to some of the highest peaks in the world, including the famous K2, and glaciers of varying sizes cover much of the steep and high terrain. They show complex behaviour: most of them are not retreating, unlike in other regions in the world, but are advancing or surging (with speeds up to 100 times faster than normal at times) and flowing into each other.

"From a scientific point of view, the key motivation for this research was to understand the highly variable behaviour of the glaciers in the Karakoram. We have known about this for over 50 years, but still have a very limited scientific understanding of what is going on there. The animations are a very practical way to get a better overview and follow the changes through time."

The time-lapse view makes it easier for the human eye to follow glacier flow and detect changes. The Baltoro animation, for example, highlights how fast and steadily the glacier is flowing without changing the position of its front, while the Panmah image sequence shows several surging glaciers flowing into each other.

These changes would be hard to observe by other methods, such as by comparing side-by-side images of a glacier taken at different times. "The side-by-side comparison is a very tedious thing as the brain cannot freeze-frame and virtually overlay the images," Paul explains. "This inability is classically played with in the 'Find the ten errors' images shown in the

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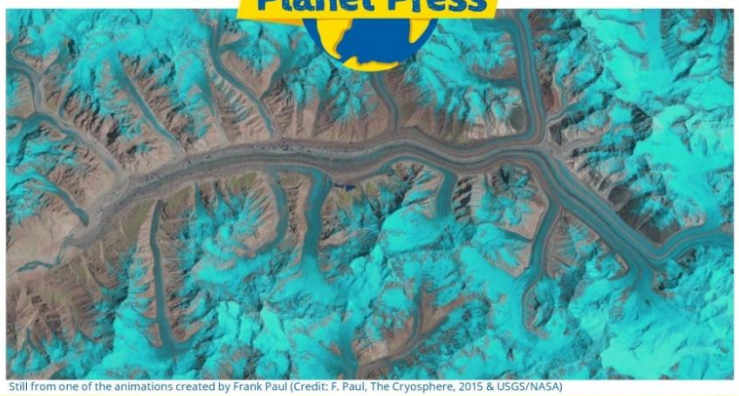
26 NOVEMBER 2015 Planet Press WWW.EGU.EU



Still from one of the animations created by Frank Paul (Credit: F. Paul, The Cryosphere, 2015 & USGS/NASA)

Studying glaciers with animated satellite images

Glaciers are large bodies of ice that can be found near the Poles and in some mountainous regions. They are formed when snow falls, freezes and gets compressed. The weight of the ice forces the glacier to flow. As they move very slowly, the best way to study how they move and change is by looking at glaciers from above and over long time periods.

Frank Paul, a scientist from the University of Zurich in Switzerland, has now come up with a simple method that allows us to easily see glacier movements and changes, using the Karakoram mountain range in central Asia as an example. He started by gathering satellite images of the region taken between 1990 and 2015, which are available for free on the US Geological Survey website. He then displayed them in sequence, using freely available software to create animated pictures in simple GIF format – the type that is very popular for animations on the Internet.

The animations he has now published, available on The Cryosphere website, compress 25 years of relatively slow glacier change into one second, meaning glacier movement is sped up some 800 million times! This, and the fact that they provide a view of the glaciers from above, means we can see the complex movements of Karakoram glaciers over a much longer time period and at a much larger scale than ever before.

Frank believes that animated satellite images could also find use as educational tools, helping children, as well as adults, understand glacier dynamics. "Most importantly, anybody can create these animations," he states. "Everything required to do it – both images and software – is freely available, so I recommend trying this at home."

This is a kids' version of the European Geosciences Union (EGU) press release 'Revealing glacier flow with animated satellite images'. It was written by Bárbara Ferreira (EGU Media and Communications Manager), reviewed for scientific content by Richard Selwyn Jones (Postdoctoral Researcher, Victoria University of Wellington, New Zealand) and Tamsin Edwards (Lecturer, The Open University, UK), and for educational content by Marina Drndarski (Teacher, Elementary School 'Drinka Pavlović', Belgrade, Serbia). For more information check: http://www.egu.eu/education/planet-press/.

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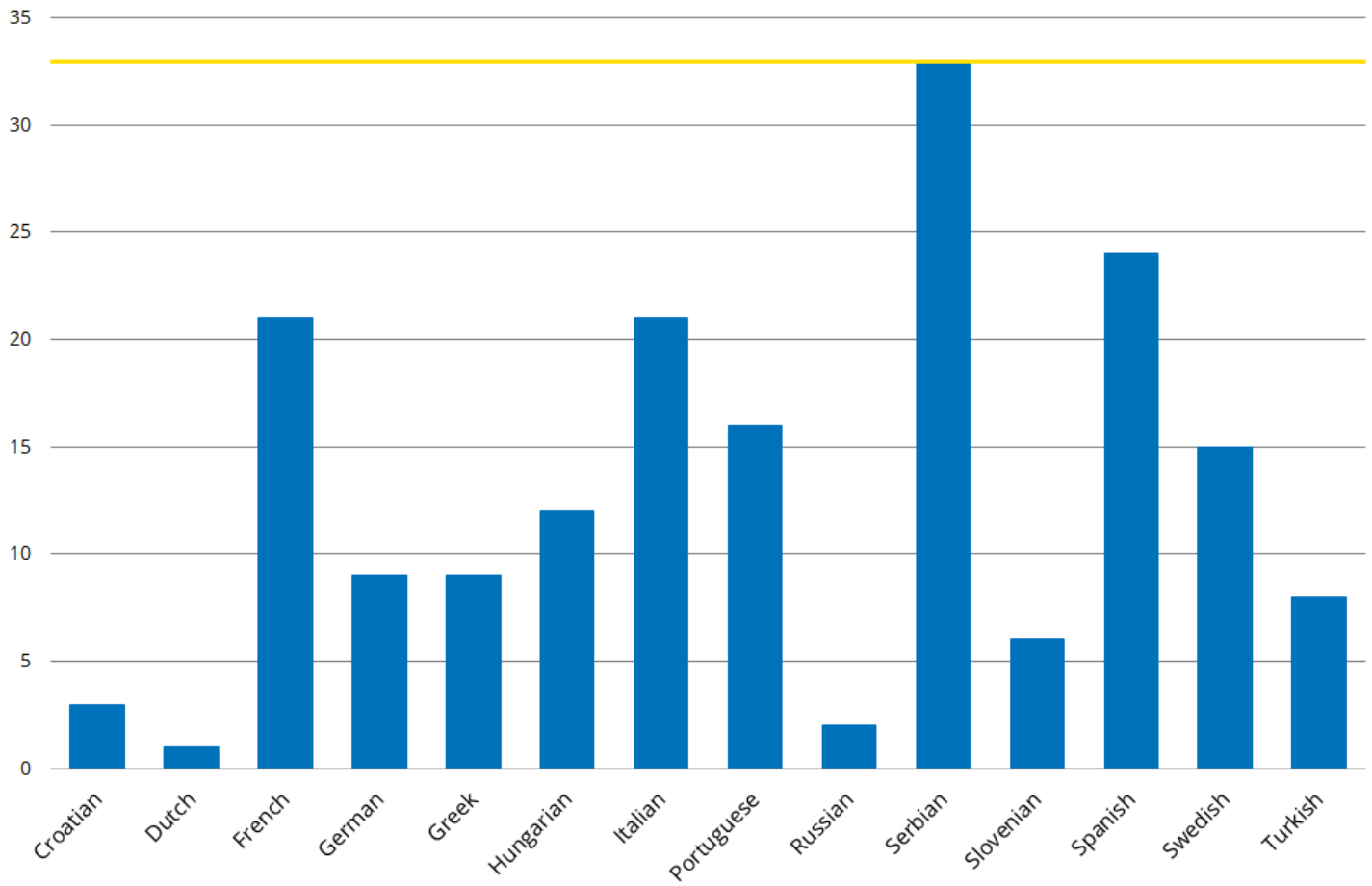
Planet Press translations

(already published online)



Planet Press: the numbers

- 33 Planet Press texts written, reviewed, published (out of 35 sci press releases)
- 180 translations published online (+15 not yet online)
- ~60 volunteer reviewers and translators (scientists and educators) – THANK YOU!!
- ~5,500 hits on Planet Press section of EGU website in past 12 months (comparable to hits on GIFT section of website) – but doesn't reflect actual PP audience

Planet Press: challenges and lessons learnt

- Volunteers are awesome: would be great to have more, especially translators
- But hard to coordinate because Planet Press is side project
- Receive v. positive feedback from educators who work on project & use PP in classroom; from scientists too, who get to explain their research to their kids!

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- Biggest challenges:
  - Distribution: how to get Planet Press to children + classrooms?
  - Measuring impact: how and how much are the texts being used and how well they work?
- Suggestions?