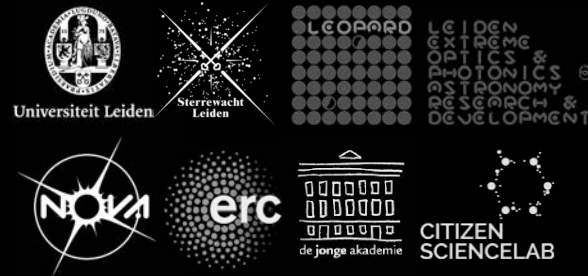


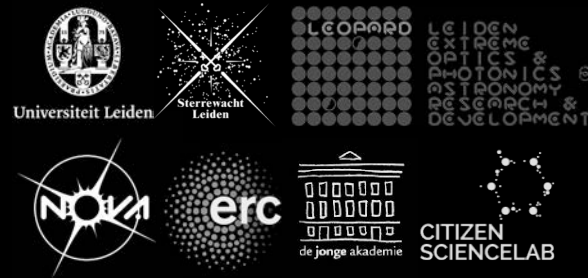
State-of-the-art in **Citizen Science**

Frans Snik



Some personal views of **Citizen Science**
and several highly biased examples

Frans Snik



What is Citizen Science?

Citizen science is the term that is used to describe a wide range of activities, in which people from all walks of life participate in a scientific project in a meaningful way (beyond being subjects in a medical experiment, or participants in a study in the social sciences)

The term *citizen science* was needed many years later for similar reasons. To paraphrase Whewell, we might say that *citizens* are those with rights and responsibilities to participate in some larger collective (such as governance), and *citizen scientists* are thus people exercising their rights and responsibilities to participate in collective scientific endeavors. Participation in the process of governance involves adding one's values, opinions, and perspectives to decision making; participation in the process of science involves adding one's observations and amateur expertise to making new knowledge. In the former, one casts ballots; in the latter, one submits data.

3. The boundaries of what can rightly be termed citizen science are debatable, but there is broad consensus that projects should involve voluntary and active public engagement with research. Projects that cull public data from social media, exploit data gathered from medical cohorts, or incentivise participation without clearly stating the scientific purpose of the activity, are not normally considered to be citizen science, although they may have the potential to become it.

Muki Haklay

Caren Cooper

In Citizen Science, a broad network of people collaborate. Participants provide experimental data and facilities for researchers, raise new questions and co-create a new scientific culture. While they add value, volunteers acquire new learning and skills and gain a deeper understanding of the scientific work in appealing ways. As a result of this open, networked and transdisciplinary scenario, science-society-policy interactions are improved, leading in turn to a more democratic research based on evidence and informed decision-making.

LERU

Societize

This collaboration between scientists and people from all walks of life has received growing recognition by the general media and by researchers. It is now commonly referred to as "citizen science." The term entered the Oxford English Dictionary in June 2014 as "scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions."

Whenever possible, citizen science should be encouraged, where citizens become providers and users of data. This will reinforce and give new meaning to the policy of open access to publications and data; this openness should enable citizens and citizen groups to participate in evidence-based policy and decision-making. This could give rise to new types of partnerships, such as "I4P's" or "P4.0's" where "people" are working together with the public and private sectors. This could be systematically implemented on European, national and regional levels.

Commons Lab

Alternative definitions [edit]

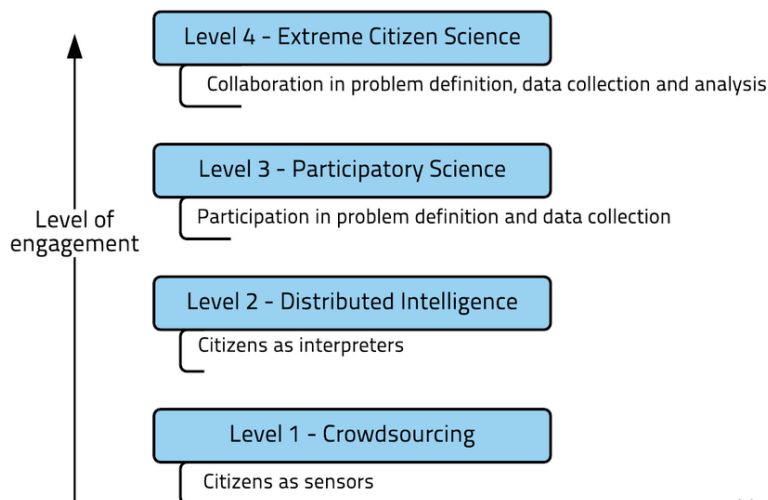
Other definitions for citizen science have also been proposed. For example, Bruce Lewenstein of Cornell University's Communication and S&TS departments describes 3 possible definitions:^[2]

- The participation of nonscientists in the process of gathering data according to specific scientific protocols and in the process of using and interpreting that data.^[2]
- The engagement of nonscientists in true decision-making about policy issues that have technical or scientific components.^[2]
- The engagement of research scientists in the democratic and policy process.^[2]

Wikipedia

EC Lamy report

categories of Citizen Science



Haklay (2013)

10 principles of Citizen Science

1. Citizen science projects actively involve citizens in scientific endeavour that generates new knowledge or understanding
2. Citizen science projects have a genuine science outcome.
3. Both the professional scientists and the citizen scientists benefit from taking part.
4. Citizen scientists may, if they wish, participate in multiple stages of the scientific process
5. Citizen scientists receive feedback from the project.
6. Citizen science is considered a research approach like any other, with limitations and biases that should be considered and controlled for.
7. Citizen science project data and meta-data are made publicly available and where possible, results are published in an open access format.
8. Citizen scientists are acknowledged in project results and publications.
9. Citizen science programmes are evaluated for their scientific output, data quality, participant experience and wider societal or policy impact.
10. The leaders of citizen science projects take into consideration legal and ethical issues surrounding copyright, intellectual property, data sharing agreements, confidentiality, attribution, and the environmental impact of any activities.



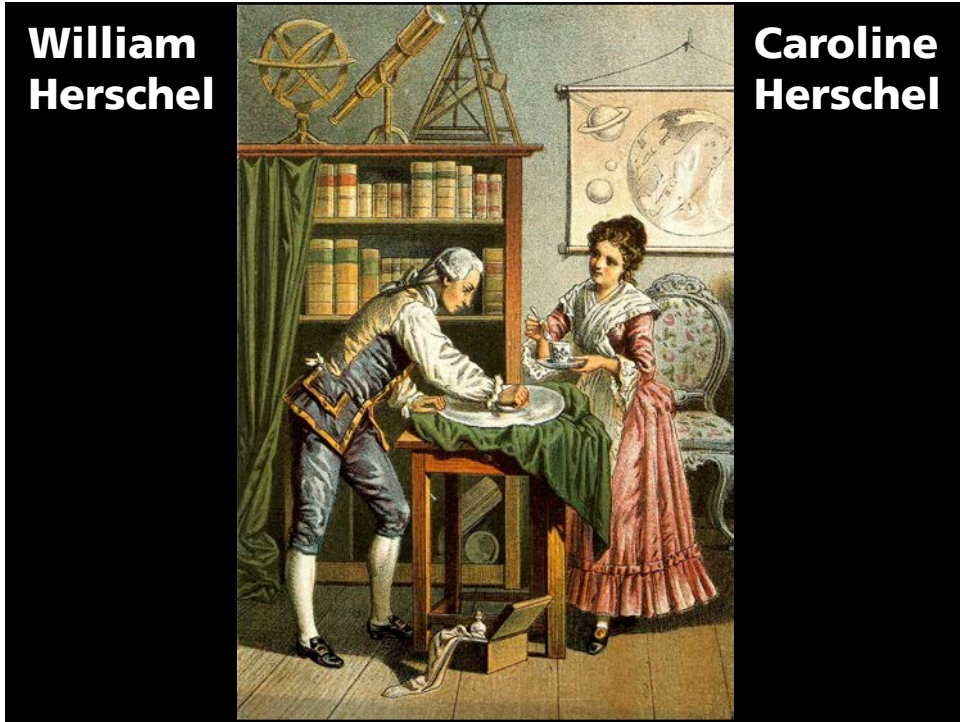
Input and output of Citizen Science

Scientists	Participants
Reasons	
Scientific output	Contribution to goals of project
Outreach	Interest in topics
Environmental Stewardship	Enjoyment
Democratizing	Community
Outcomes	
Data	Knowledge
Peer-reviewed papers	Skills
Discoveries	Interest, attitude
Policy	Empowerment (science for everyone)

courtesy: Anne Land

citizen **science**

citizen science



ENGLISH | F

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Galaxy Analysis

Welcome to Galaxy Zoo's view of the Universe. If you're here you should already have seen the [Tutorial](#), but feel free to go and remind yourself. There's no need to agonise for too long over any one image, just make your best guess in each case.



Galaxy Ref: **587729387677679742**

Choose the Galaxy Profile by clicking the buttons below

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ELLIPTICAL GALAXY

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WILDWATCH KENYA	THE PLASTIC TIDE	PLANETIZEN PORTAL	HIVE HUNTERS	SEABIRD WATCH

biodiversity

1901: Christmas bird count



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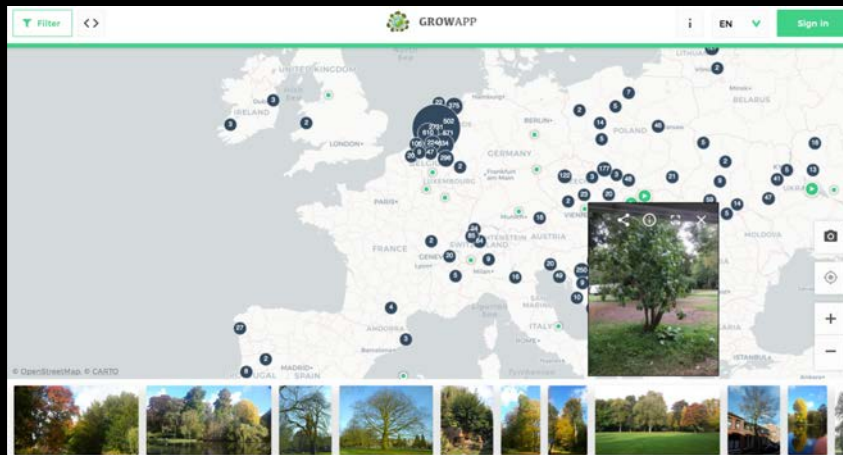
Bijenradar

Iedereen kan helpen met onderzoek aan bijen!
Zie hier de resultaten van Bijenradar van
2016.

Bijenradar

phenology

8th Century:
recording of cherry blossoming in Japan



Filter <> GROWAPP EN Sign in

Map showing phenology data points across Europe (France, Germany, Poland, etc.).

© OpenStreetMap, © CARTO

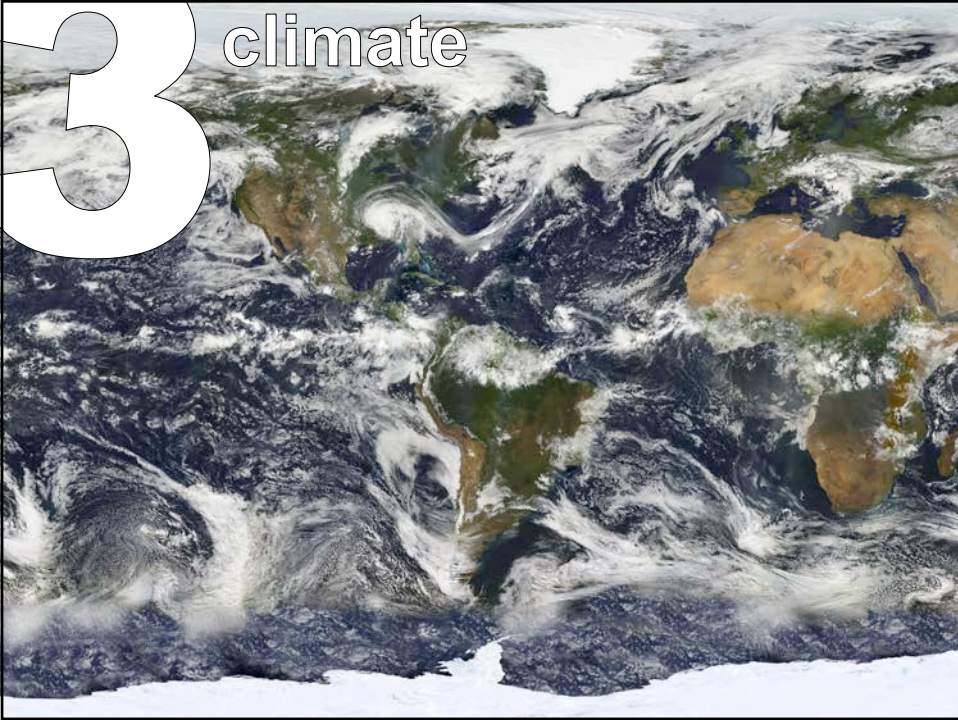
Gallery of photos showing various trees and landscapes.

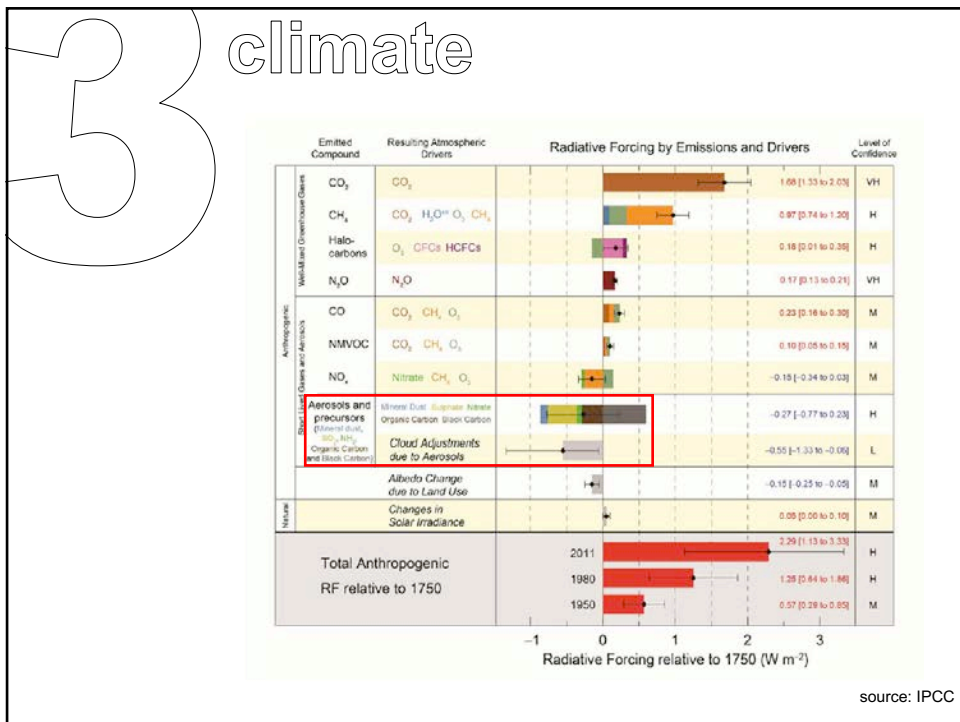
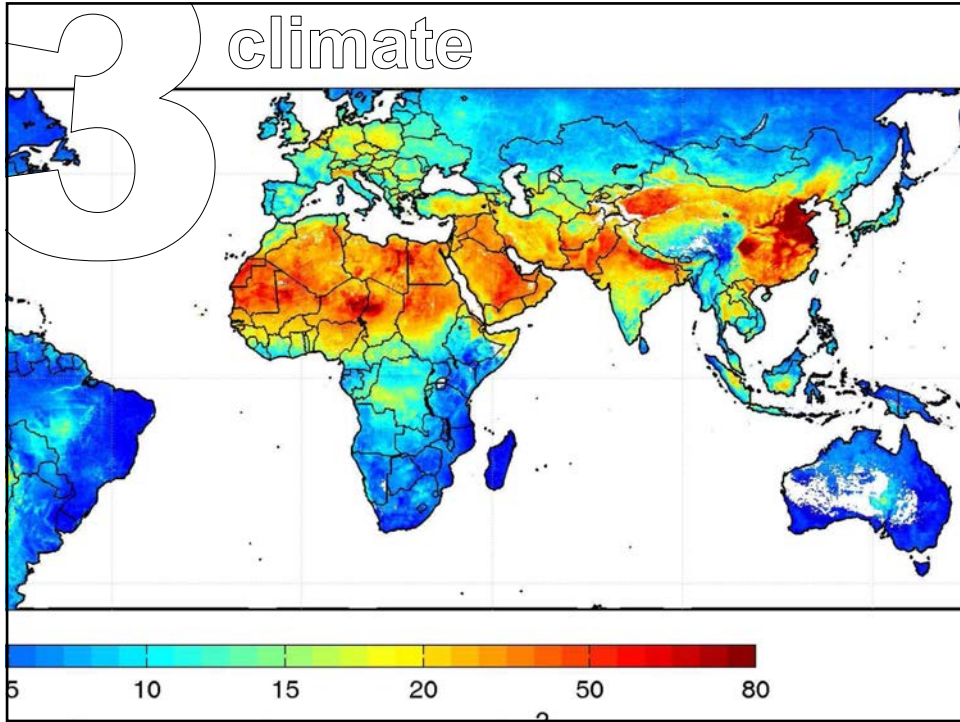


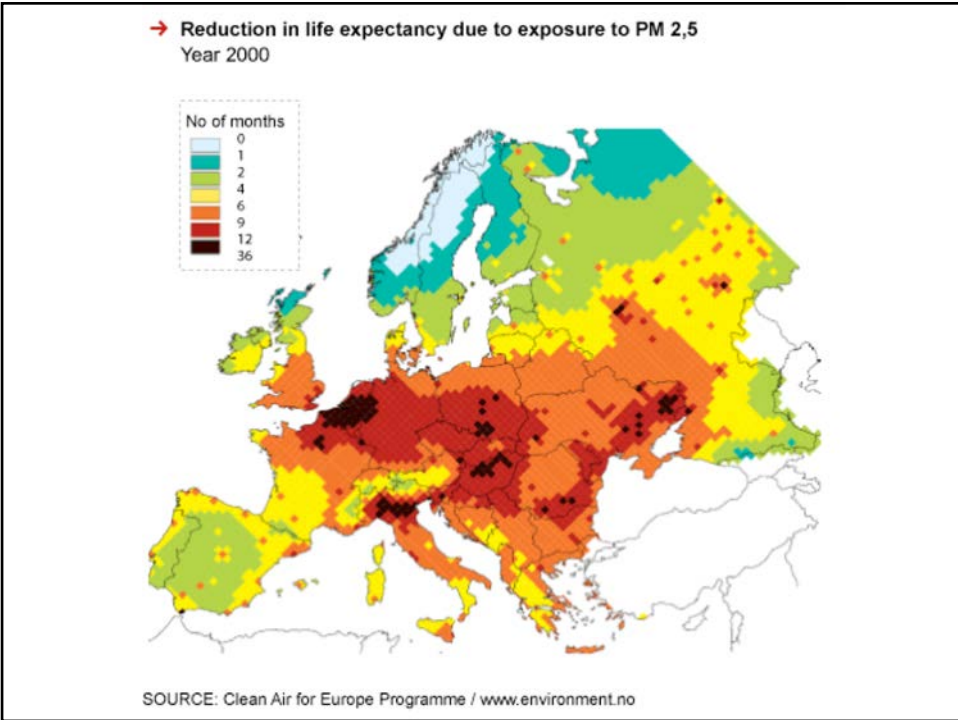
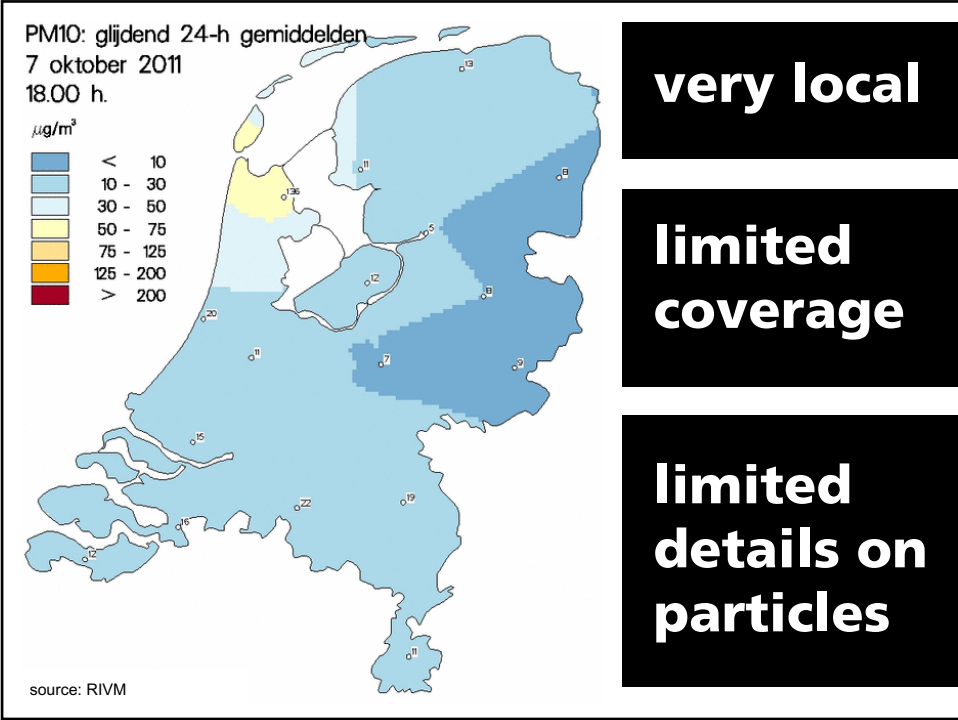


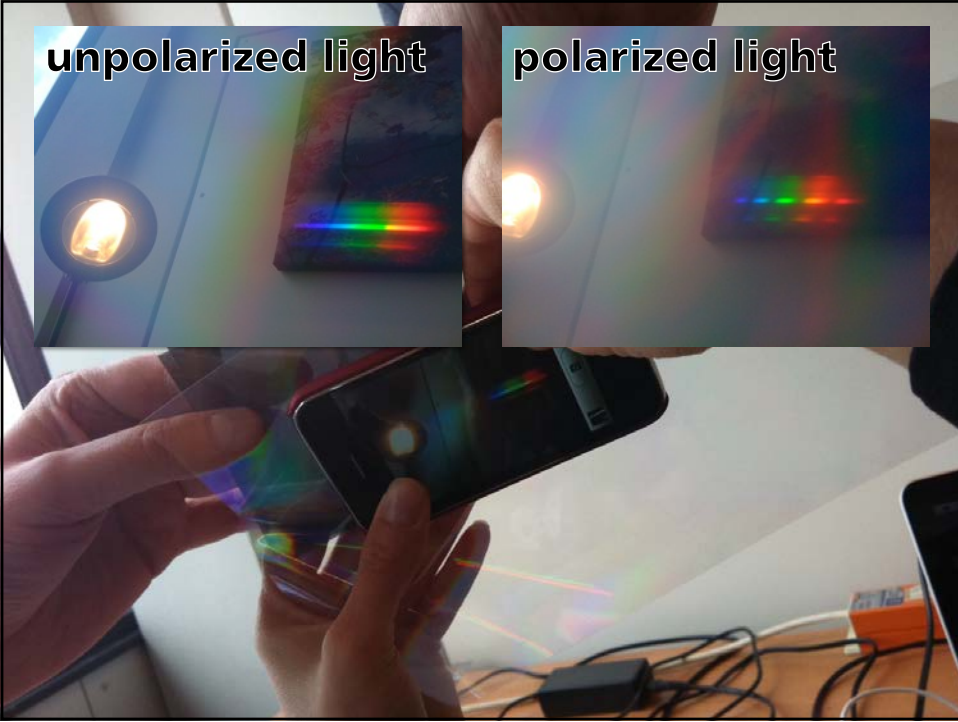


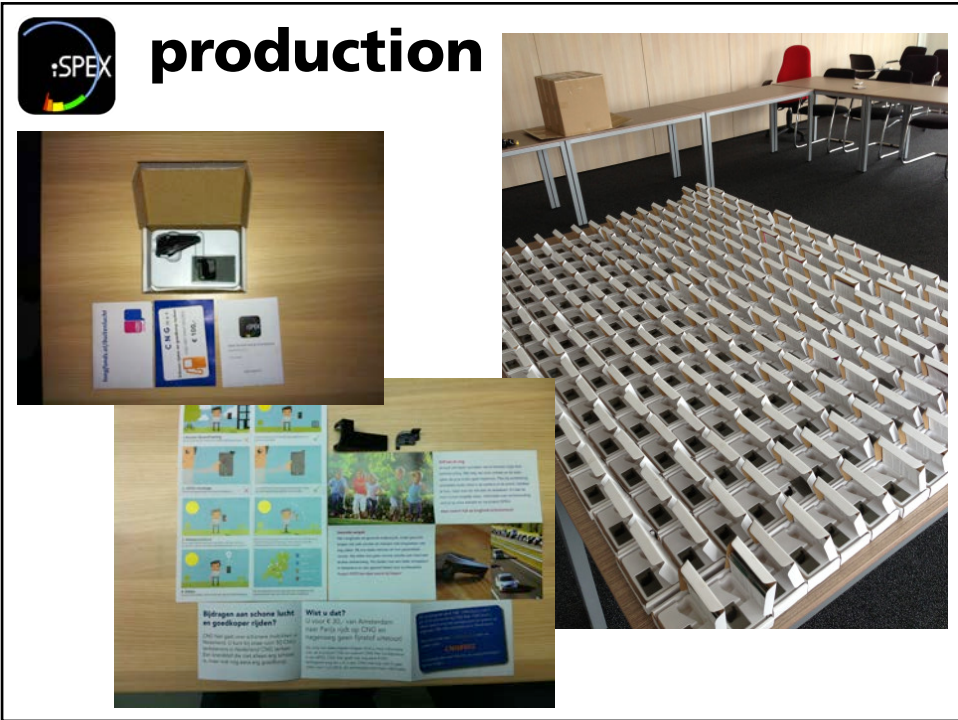
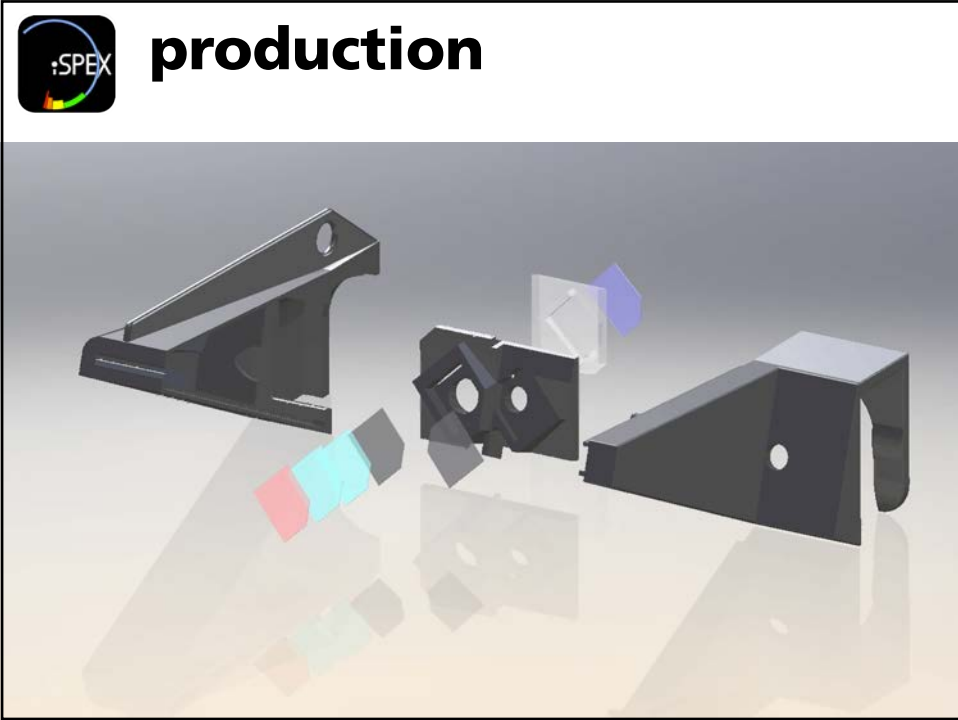

















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national measurement day

 **iSPEX project** @iSPEXnl 5 Jul
De meetdag vindt plaats op maandag 8 juli! Meer informatie op de website ispex.nl

 **Helga van Leur** @helgavanleur 5 Jul
Eindelijk! Maandag 8 juli 1e landelijke iSPEX-meetdag: de luchtkwaliteit meten met jouw smartphone!!! @iSPEXnl zie ispex.nl

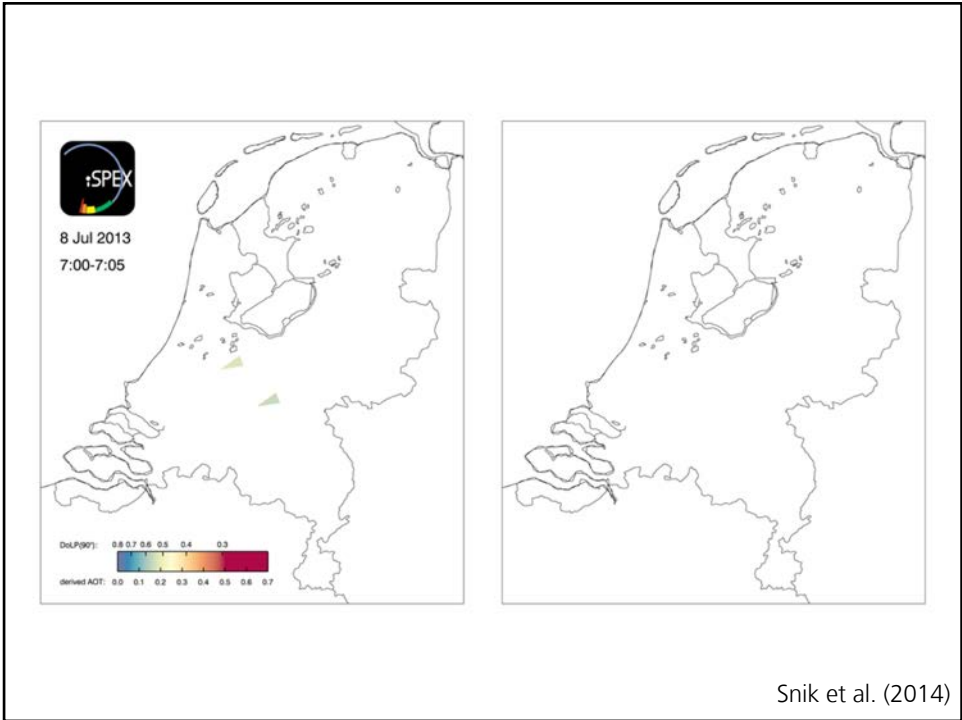
 **André Kuipers** @astro_andre 8 Jul
Meet mee #ispex live experiment for all
 Retweeted by iSPEX project

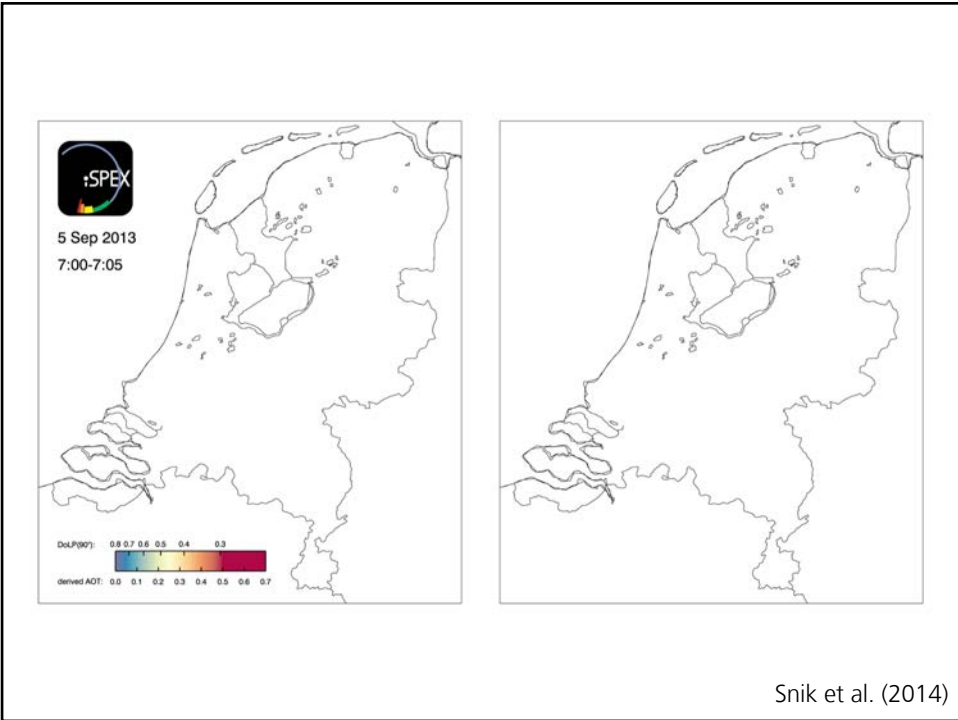
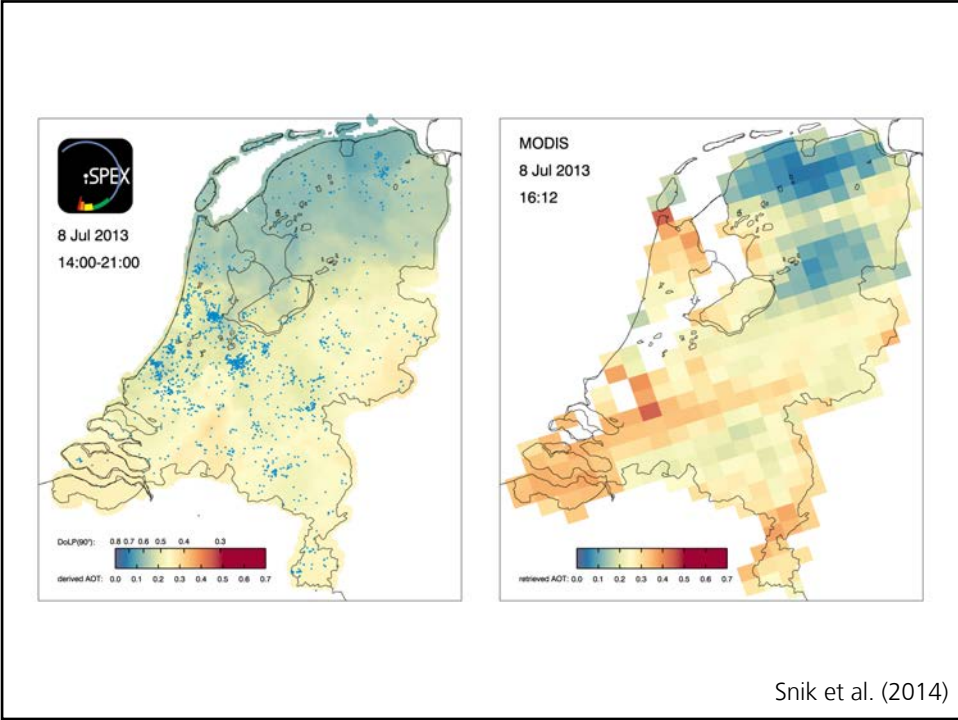
 **Willem-Alexander** @Koning_NL 8 Jul
Let u een beetje op wat u voor #ispex fotografeert met uw mobieltje, Landgenoten? Mijnheer #Obama en de #NSA kijken ook mee. #prism

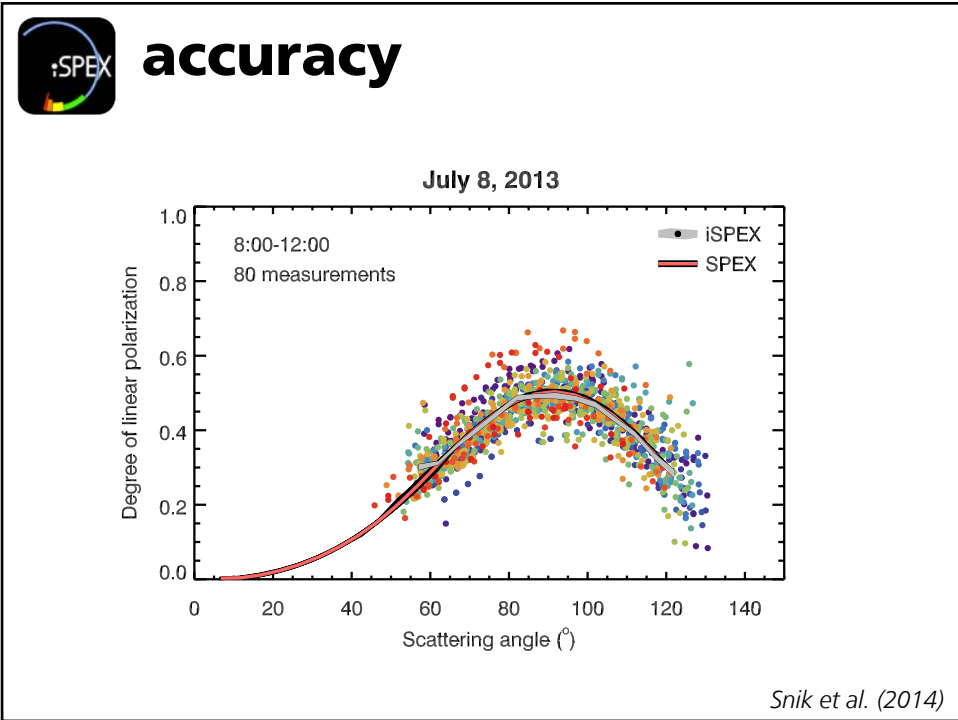
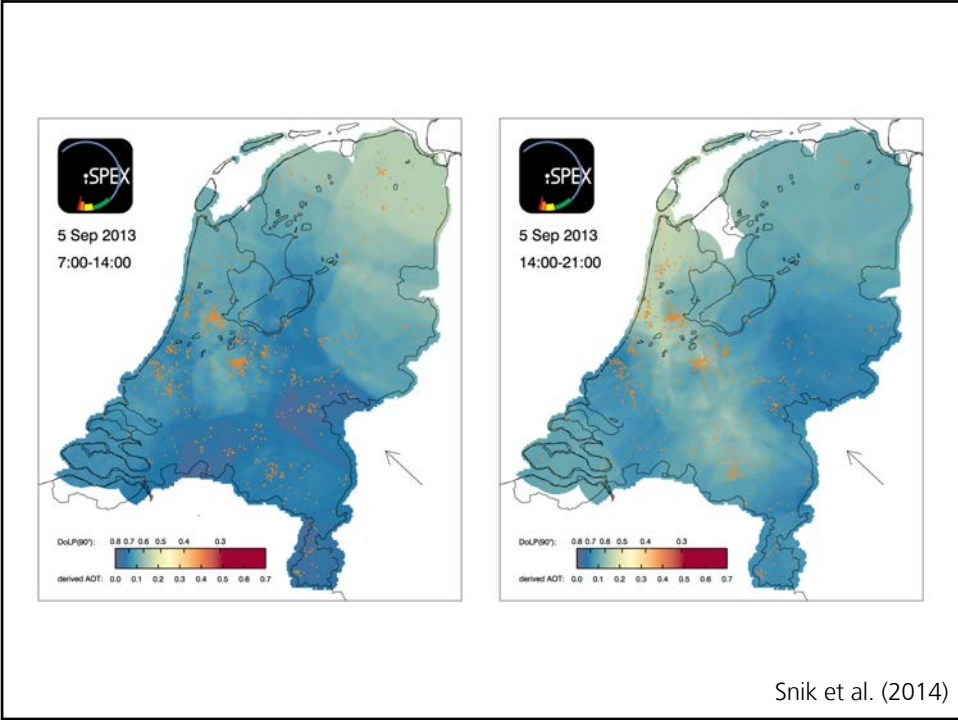


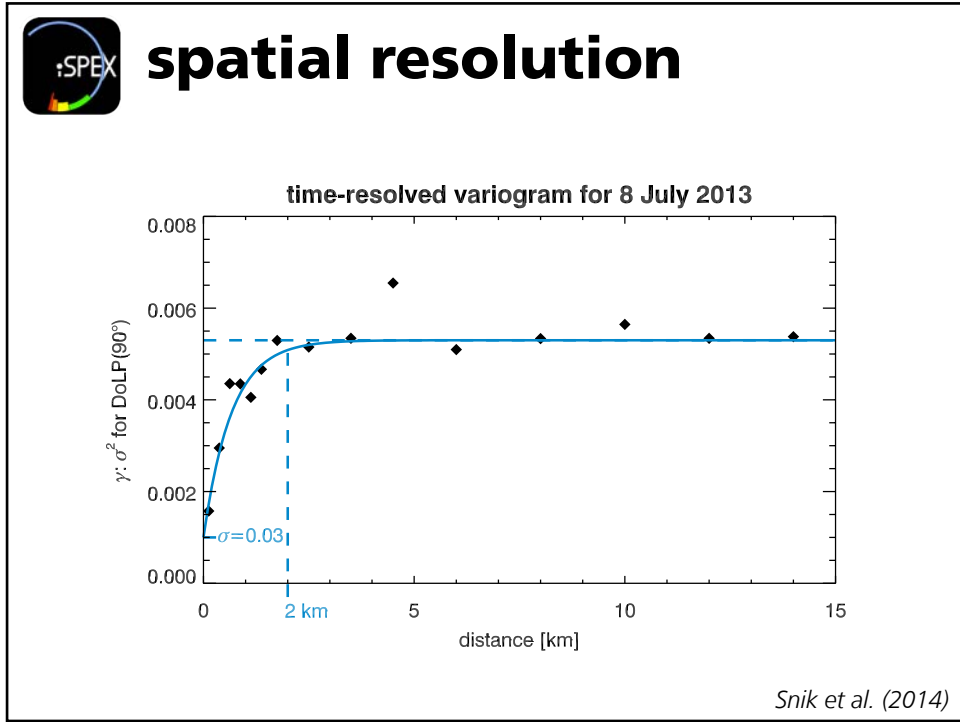












AGU PUBLICATIONS

Geophysical Research Letters

RESEARCH LETTER
10.1002/2014GL061462

Mapping atmospheric aerosols with a citizen science network of smartphone spectropolarimeters

Frans Snik², Jeroen H. H. Rietjens², Amoud Apituley³, Hester Volten⁴, Bas Mijling³, Antonio Di Noia², Stephanie Heikamp¹, Ritse C. Heinsbroek¹, Otto P. Hasekamp², J. Martijn Smit², Jan Vonk⁶, Daphne M. Stam², Gerard van Harten¹, Jozua de Boer¹, Christoph U. Keller¹, and 3187 ISPEX citizen scientists⁵

¹Leiden Observatory, Leiden University, Leiden, Netherlands, ²SRON Netherlands Institute for Space Research, Utrecht, Netherlands, ³KNMI Royal Netherlands Meteorological Institute, De Bilt, Netherlands, ⁴National Institute for Public Health and the Environment, Bilthoven, Netherlands, ⁵Faculty of Aerospace Engineering, Delft University of Technology, Delft, Netherlands, ⁶www.ispex.nl/participants

Key Points:

- The ISPEX add-on turns smartphones into aerosol measurement devices
- Thousands of ISPEX measurements across the Netherlands form AOT maps
- The ISPEX AOT data match MODIS and AERONET data and have 2 km resolution

Supporting Information:

- Readme
- Supporting Text and Figures S1–S6

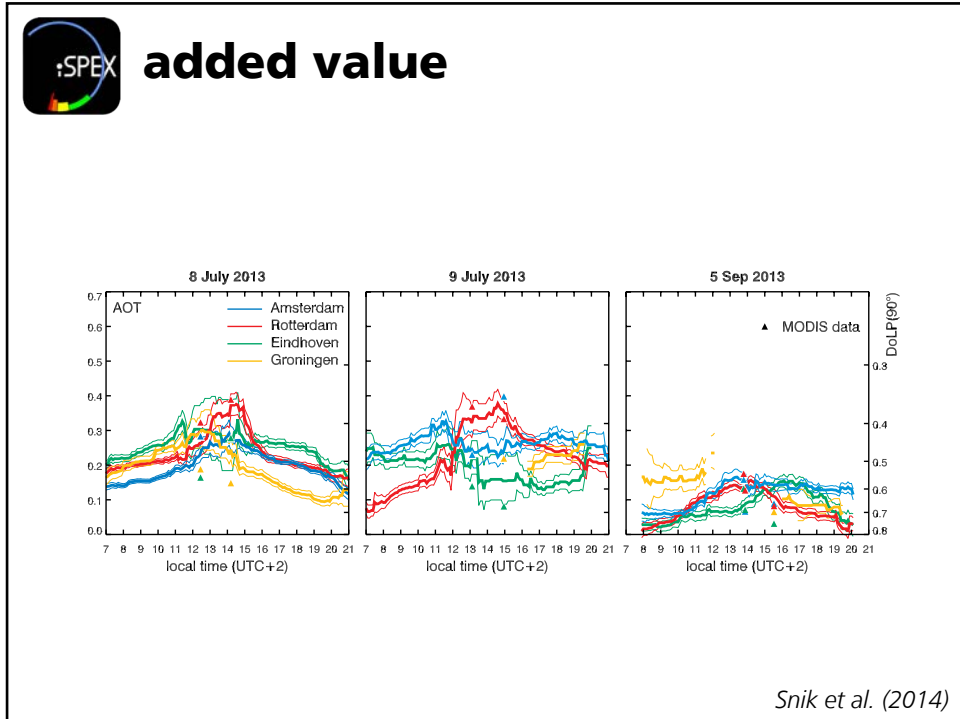
Correspondence to: F. Snik, snik@strw.leidenuniv.nl

Citation: Snik, F., et al. (2014), Mapping atmospheric aerosols with a citizen science network of smartphone spectropolarimeters, *Geophys. Res. Lett.*, 41, doi:10.1002/2014GL061462.

Received 7 AUG 2014
Accepted 8 OCT 2014

Abstract To assess the impact of atmospheric aerosols on health, climate, and air traffic, aerosol properties must be measured with fine spatial and temporal sampling. This can be achieved by actively involving citizens and the technology they own to form an atmospheric measurement network. We establish this new measurement strategy by developing and deploying ISPEX, a low-cost, mass-producible optical add-on for smartphones with a corresponding app. The aerosol optical thickness (AOT) maps derived from ISPEX spectropolarimetric measurements of the daytime cloud-free sky by thousands of citizen scientists throughout the Netherlands are in good agreement with the spatial AOT structure derived from satellite imagery and temporal AOT variations derived from ground-based precision photometry. These maps show structures at scales of kilometers that are typical for urban air pollution, indicating the potential of ISPEX to provide information about aerosol properties at locations and at times that are not covered by current monitoring efforts.

Introduction ... in many ways. They reduce our life expectancy by causing and ... 2014; Krall et al., 2013; Chen et al., 2013; Rosenfeld ... *Climate Change*, 2013; Rosenfeld ... in the



SPEX evaluation

Table 3. Correlations between motivation versus age, attitude and expectations.

	Motivation scale				
	Contribution	Interest	Health concern	Fun	School
Age	.23***	.13***	.15***	.15***	.02
Attitude scale					
Activities	.10**	.40***	.01	.25***	.19***
Optimism	.17***	.28***	.06	.14***	-.01
Trust	.03	.10**	.02	.05	-.03
Expectations					
Good representation	.21**	.18**	.19**	.12**	.02
Not overly positive	.16*	.12**	.07*	.02	.11**
Impact on environmental policy	.26**	.10**	.21**	.11**	.00
Impact on health policy	.29**	.10**	.29**	.08**	.04

N = 1123; Grey = effect size $r > .25$.
 * $p < .05$; ** $p < .01$; *** $p < .001$.

Land-Zandstra et al. (2015)



Handelingen
Tweede Kamer der Staten-Generaal

Vergaderjaar 2013-2014
Vergaderingsnummer 19
Datum vergadering 5 november 2013
Gepubliceerd op 6 februari 2014

Begroting Infrastructuur en Milieu

Aan de orde is de behandeling van:

- het wetsvoorstel Vaststelling van de begrotingsstaten van het Ministerie van Infrastructuur en Milieu (XII) voor het jaar 2014 (33750-XII).

Mevrouw Van Veldhoven (D66):

In dit debat mag het paradigma van de premier, de participatiesamenleving, natuurlijk niet ontbreken. D66 wil graag dat we ons voordeel doen met grassroots-initiatieven, zoals de luchtkwaliteitsmetingen van Milieudefensie en Y-specks, misschien door met hen een goedgekeurde methode te ontwikkelen. Kunnen de bewindsleden zeggen hoe zij dit zouden willen aanpakken?

13 Begroting Infrastructuur en Milieu (XII)

Aan de orde is de voortzetting van de behandeling van:

- het wetsvoorstel Vaststelling van de begrotingsstaten van het Ministerie van Infrastructuur en Milieu (XII) voor het jaar 2014 (33750-XII).

Staatssecretaris Mansveld:

Ik ben ook blij met een initiatief als ISPEX. Dat is de proef die gehouden is om mensen te laten bijdragen aan het meten van de luchtkwaliteit in de eigen omgeving. Daar hebben dit jaar 8.000 mensen aan meegedaan. Dat draagt enorm bij aan de bewustwording rond het onderwerp. Mevrouw van Veldhoven gaf al aan hoe belangrijk die burgerinitiatieven zijn.



Handelingen
Tweede Kamer der Staten-Generaal

Vergaderjaar 2014-2015
Vergaderingsnummer 16
Datum vergadering 28 oktober 2014
Gepubliceerd op 12 november 2014 12:32

13 Begroting Economische Zaken (onderdeel Landbouw en Natuur)

Aan de orde is de behandeling van:

- het wetsvoorstel Vaststelling van de begrotingsstaten van het Ministerie van Economische Zaken (XIII) en het Diergezondheidsfonds (F) voor het jaar 2015 (34000-XIII).

De heer Leenders (PvdA):

Ziet de staatssecretaris mogelijkheden om deze burgers meer te betrekken bij de handhaving? Het raakt burgers immers direct in hun gezondheid, maar bijvoorbeeld ook in hun recreatieplein, om maar niet te spreken van ondernemers, onder meer restauranthouders, op het platteland gevestigd, die erdoor worden geraakt in hun portemonnee. Wellicht dat ISPEX hierin iets kan betekenen, een instrument waarmee burgers fijnstof kunnen meten met hun iPhone. Gisteren hebben we daarover kunnen lezen in de Volkskrant.



Researchers measure atmospheric aerosols with ISPEX optical devices and smartphones.

TECHNOLOGY

Smartphone science

Researchers are learning how to convert devices into global laboratories.

BY JON CARTWRIGHT

A decade ago, Dutch astronomer Frans Snik invented a simple optical device to measure the density of dust, soot and other particles, or aerosols, in the atmosphere that affect human health and the climate. He hoped to launch it into orbit around Earth about a satellite. But one afternoon in 2011, Snik held up a demonstration version of his device to an iPhone camera. The smartphone's screen displayed a rainbow of colours. Snik's optical device was converting incoming light into a spectrum that contained polarization information and channeling it into the camera. Snik realized that he could pair smartphones with the optical device and make the same kind of measurements that he and his colleagues planned to record from space.

An idea was born. "We thought, why not make use of a technology that millions of people carry around in their pockets anyway?"

By 2013, Snik and his colleagues at Leiden University in the Netherlands had given or sold a version of the optical device — called ISPEX — to more than 8,000 willing iPhone users across the country. The users followed instructions provided by an associated app to attach the optical devices to their iPhone cameras and photographed the sky in their local areas. Within a day, reams of crowdsourced spectra had stacked up in an online database, ready for analysis. It resulted in a Netherlands-wide map of atmospheric particles with unprecedented resolution (F. Snik *et al. Geophys. Res. Lett.* 41, 7351–7358, 2014) — several years before the proposed satellite launch and for a fraction of the original estimated cost. The team has since received funding from the European Union to repeat the project in 11 European cities.

CITIZEN SCIENCE

Many researchers are finding ways to exploit smartphones. Snik's project, and those of some geophysicists, astronomers and other scientists who need huge data sets, go one step further. They recruit citizen scientists who use their own smartphones to collect data that would be difficult — if not impossible — to obtain in conventional ways. The various internal sensors that smartphones carry, such as cameras, ▶

31 MARCH 2014 | VOL. 531 | NATURE | 669

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Wanted! An army of citizen scientists to tackle air pollution

A Europe-wide project asks iPhone users to help monitor levels of pollution in major cities



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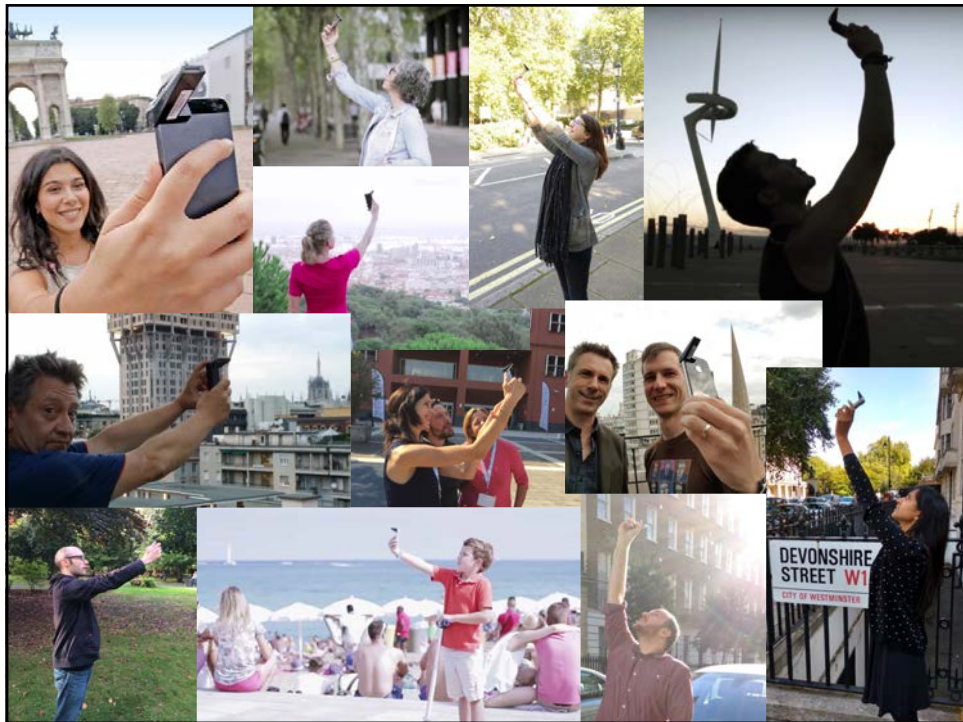


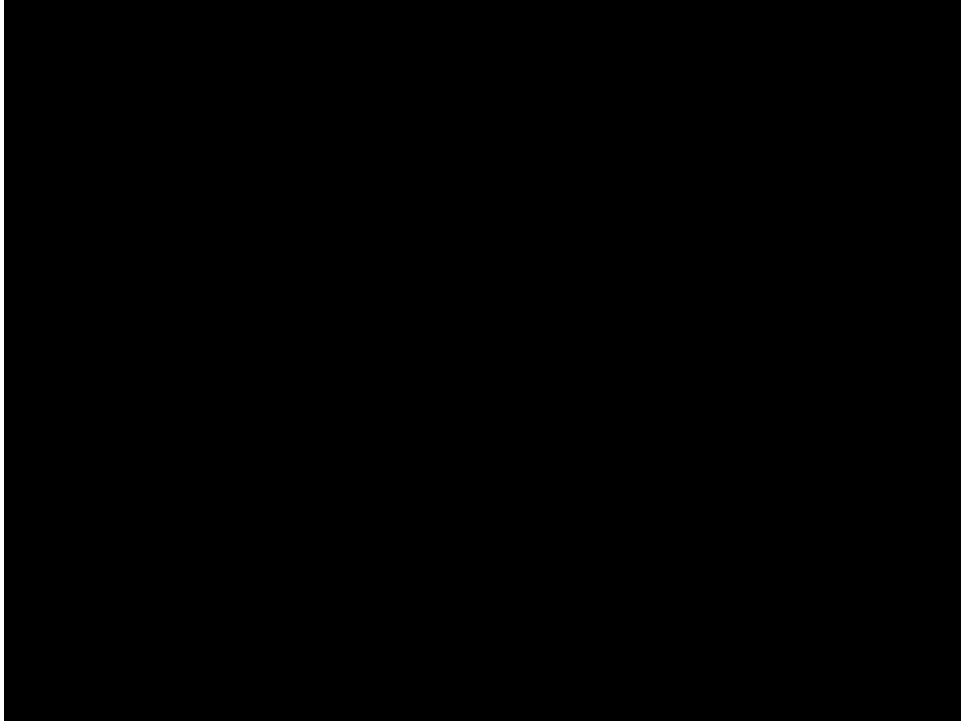
Comments

later

st 2015 07:00 BST

turn off Tinder and exit Instagram – scientists want you to turn your iPhones to research. Launching on Tuesday, the iSpex-EU project aims to recruit people from major cities across Europe, including Manchester and





- iSPEX 2.0 generic add-on & app for most modern smartphones
- calibration procedures
- extended air pollution measurement principle
- water pollution measurements

SwafS-15

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Justice Programme

Pilot Projects & Preparatory Actions

Promotion of Agricultural Products

TOPIC: Exploring and supporting citizen science

Topic identifier: SwafS-15-2018-2019
Publication date: 27 October 2017

Types of actions: RIA Research and Innovation action
single-stage
DeadlineModel: single-stage
Opening date: 11 December 2018
Deadline: 02 April 2019 17:00:00

Types of actions: RIA Research and Innovation action
CSA Coordination and support action
single-stage
DeadlineModel: single-stage
Opening date: 05 December 2017
Deadline: 10 April 2018 17:00:00

Time Zone : (Brussels time)

Horizon 2020
Pillar: Science with and for Society
Work Programme Year: H2020-2018-2020
Work Programme Part: Science with and for Society
Call : H2020-SwafS-2018-2020
H2020 website
Call budget overview

Topic Updates + More

• 06 March 2018 11:23

Regarding the 2018 topics of the H2020-SwafS-2018-2020 call, in the proposal template for part B section

Topic Description + More

the **Citizen Science Lab**



- Connects **scientists** and **non-scientists**.
- Germinates and incubates new citizen science projects that
 - address and urgent **scientific** and potentially **societal issue**,
 - through active contributions by **thousands of participants**.
- Supports with expertise and funding to first pilot/prototyping stage, with goal to become a **sustainable** project delivering **new scientific results**.



the **Citizen Science Lab**



Workshops:

- Air pollution (Jan 2018)
- Evolution of language (Apr 2018)
- Archaeology (Jul 2018)
- Biodiversity in nature parks
- Safety and health in "rough" neighborhood
- Water pollution
- Astronomy

the **Citizen Science Lab**



Air pollution workshop Jan 2018

<https://www.youtube.com/watch?v=WmHQV3pavMQ>