1 Dear editor and reviewers,

3 thank you for the helpful comments and suggestions. I really appreciate.

5 Point-by-point reply to the comments:

7 1) Line 126: specify the magnitude of the earthquake and the name of the town.

9 Done (revised file line 120-121)

11 2) Line 305: in the abstract, you say more than 400 schools.

13 I have corrected the sentence (line 235 of the revised file)

15 3) Line 312- 316: The project discusses the calendars up to 2016- what future competitions are you
16 talking about? What have you done in the competitions from 2017 onwards?

18 I have added an explaining sentence (line 300-303 revised file)

20 5) Line 319-322. how do these general considerations relate to your project?

22 I have added an explaining sentence (line 309-310 revised file)

25 Before the manuscript can be accepted I kindly ask you to improve the quality of English, for typos and
26 style. The reviewer and I annotated the most relevant issues but a more thorough review on your part is
27 necessary.

29 To improve typos and style the manuscript was revised by an English translator. I hope that this revision
30 has made the text clear.

33 A marked-up manuscript version showing the changes made follow below.

36 **10 years with Planet Earth essence in the primary school children drawings**

38 Giuliana D'Addezio

39 INGV – Istituto Nazionale di Geofisica e Vulcanologia, Rome Italy

40 giuliana.daddezio@ingv.it

42 **Abstract**

43 "10 years with Planet Earth" is the title of the calendar addressed to primary schools, realized in

44 2016 by the Istituto Nazionale di Geofisica e Vulcanologia - Italian Instituteion of Geophysics

45 Geophysical Research Institution - for primary school. The cCalendar Competition is the outcome

46 of a project created conceived to support and complement 15 years of dissemination activities

47 withwith in schools. Each year for 10 years, We we have printed the calendars, that represented for

48 10 years, each year with a different subjects related to a World world in constant evolution. Each

49 year we have launched a calendar competitions among schools, asking children to send in drawings

related to ~~on~~ the chosen theme~~.~~, The aim was to stimulate interest in learning about Earth Sciences and Planet Earth dynamics, as well as ~~. Our aim is~~ to raise awareness on water resources availability, prevention of natural disasters and planet sustainability. We have received about 10,000 drawings from students of more than 400 schools. For each yearly competition, we have chosen the most significant drawings and we have included them in the calendar. The authors of the drawings have been awarded by scientists, journalists, artists, ~~and~~ science communicators and even by a minister. In addition to the competition, the drawings reflect impressions and thoughts, and illustrate the children's point of view. From ~~drawings~~ the images, one can ~~sense~~ feel a great sensitivity, consideration, responsiveness~~,~~ and respect for the ~~Planet~~ planet ~~and~~ as well as a positive feelings ~~for~~ towards Science.

1. Introduction

The Istituto Nazionale di Geofisica e Vulcanologia (~~hereinafter~~ INGV) is one of the most important international research i~~I~~nstitut~~ione~~s in the field of geophysics. As part of the Italian Civil Protection Service, INGV provides vital support for seismic and volcanic risk mitigation programs on a global scale and ~~for~~ emergency management. INGV is ~~entrusted with the surveillance of the~~ in charge of monitoring seismicity of the national territory, the activity of Italian volcanoes and ~~the of~~ early warning for tsunami in the Mediterranean area, through instruments with cutting-edge technolog~~yically advanced instrumentation networks~~. Particular attention is ~~devoted~~ given to the dissemination of scientific culture, aiming to ~~and the~~ develop~~ment of the~~ awareness of risks and prevention. INGV manages the museums dedicated to Geophysics and Volcanology - the Geophysical Museum of Rocca di Papa, the Vesuvian Observatory, the Aeolian Information Centres - and collaborates in the scientific management of the Laboratory Museum of Earth Sciences of Ustica and the Volcanological Museum of Nicolosi. In these museums, INGV ~~created~~ organized permanent and temporary scientific exhibitions and installations (Pagliuca et al., 2007; Avvisati et al., 2015; D'Addezio et al., 2015). Furthermore, during national and international events and festivals, as well as in projects with schools, INGV researchers and technicians offer educational and outreach initiatives on Earth Sciences (Pessina et al., 2012, D'Addezio et al., 2014; Lanza et al., 2013; Musacchio et al., 2015a; 2015b~~;~~ 2019; Amici and D'Addezio, 2018; ~~D'Addezio et al., 2014;~~ Di Nezza *et al.*, 2018). ~~We also organize yearly educational and outreach activities for schools (Pessina et al., 2012, Lanza et al., 2013; Musacchio et al., 2015a; 2015b, 2019; Amici and D'Addezio, 2018)~~. The goal is to ~~respond to~~ meet the needs and ~~the requests~~ demands of the community on issues regarding our planet~~,~~ and to engage society in a correct, straightforward and

efficient communication ~~on~~ about scientific research and technological innovations. In a world that needs citizens to be more informed, aware, and able to make ~~crucial~~ important decisions about their own health and safety, knowledge is crucial to handle doubts and take ~~decisions with~~ conscious~~ness~~ decisions. Educational activities are designed to ~~help~~ raise awareness ~~about~~ of Earth sciences and research, as well as ~~stimulate~~ to generate interest in scientific culture.

This work is a ~~summarises~~ summary of the first 10 years of INGV's calendar competitions~~,~~ and describes ~~an~~ the experience of Earth Science education ~~by~~ through drawings. The project on the artistic representation of scientific subjects ~~, that involves scientific subject and its artistic representation by~~ through drawing~~s~~, ha~~s~~ve been presented at the EGU session Earth sciences and Art. The paper describes th~~is~~e project and ~~investigates~~ discusses the impact and ~~effectiveness~~ efficiency of our approach.

The calendar projects

One of the most successful INGV initiatives is the creation of calendars, designed for ~~the~~ schools and realized ~~thanks to the~~with drawings from the contest for primary school children. ~~competitions among the children of primary schools.~~ The ~~objective~~ aim is to introduce the opportunity of ~~provide a pleasant occasion for~~ discussion among scientists, teachers, and students. The initiative achieved great participation and appreciation, as every year schools join~~ed~~ in with enthusiasm by sending pupils' drawings ~~made by children~~ on a~~~~ specific theme~~s~~, that keep ~~changing~~es every year~~,~~ and ~~is~~ are chosen within ~~the subjects of~~ Earth Science subjects. Earthquakes, volcanic eruptions, tsunamis, magnetic storms and other phenomena are manifestations of the complexity and the changing dynamic~~sity~~ of our planet, which began more than four billion years ago and never ~~ended~~stopped. In the past decades, we recognized that global warming is part of the Earth's dynamism. Although we are already facing the crises of climate change, ~~and that it will have~~ an ~~profound~~ even stronger impact ~~on~~ will be felt by future generations.~~, although we are already facing the crises of climate change.~~

By involving primary school children in this project, we have the chance to bring them closer to science ~~closer to~~ and ~~them and also~~ to investigate their ~~children's~~ point of view on the Earth, ~~s~~Science, ~~e~~Environment, and ~~s~~Sustainable ~~b~~Behaviour. Indeed, ~~the content of~~ children's ~~drawings~~ artworks may provide insight~~s~~ into their feelings and thoughts about the world and the way it ~~functions~~works. Drawing is an important activity for children since it ~~not only stimulates~~ encourages their imagination, ~~and~~ but it also represents an amazing way of displaying emotion~~s~~. Many authors in the field of education have been focusing on ~~c~~Children's drawings (Farokhi and Hashemi, 2011; Cherney et al., 2007), which can be useful to understand ~~. can tell you so much~~

~~about~~ their fears, joys, dreams, hopes and nightmares. ~~The drawings of young children have~~ ~~attracted and interested many authors in the field of education~~ ~~(Farokhi and Hashemi, 2011;~~ ~~Cherney et al., 2007).~~ The use of ~~drawing~~ artworks as a tool for teaching and learning science ~~teaching and learning~~, is described and discussed in the literature (Phyllis, Eds, 2017). For exampl~~es~~e, drawings have been used to investigate learning strategies (Van der Veen, 2012), to analyse children volcanic risk awareness (Brasini et al., 2020), and ~~the children~~their perceptions o~~f~~ the ~~e~~Environment ~~–~~(Günind, 2012). In our project, ~~children's~~ the drawings may ~~represent useful~~ ~~tools that~~ provide valuable information ~~for the assessment of~~to understand children's environmental perceptions and their major expectations and concerns ~~for~~about the future.

The first calendar ~~has been realized as a~~was the result of an educational project with a school (see the description of the 2004 – 2005 Calendar). ~~The~~After the success of the ~~initiative~~first calendar, the experience was repeate~~d~~ed ~~suggested the repetition of the experience~~ and ~~,~~ ex~~tended: ing~~ ~~panding the invitation to~~ all Italian primary schools were invited ~~the invitation~~ to participate. Launch calls were prepared for each competition. The calls included a brochure illustrating the ~~main motivations behind~~ importance of the chosen theme and some starting points for the discussion. ~~—~~Information on the competition was spread via institutional websites, and via social media. The initiative has been advertised in all ~~All the~~ INGV venues and ~~locations contributed to~~ ~~the calls diffusions, even in occasion of education and outreach~~in all dissemination activities ~~carried~~ ~~out in their venues~~. As a result, we collected drawings from schools ~~distributed in the~~ ~~entire~~throughout the whole Italian territory. The first four calendar editions were organized by the INGV Settore Formazione e Divulgazione Scientifica (Training and Educational Office). Starting from the 2009 calendar, I have coordinated the competitions together with the INGV Laboratorio Didattica e Divulgazione Scientifica (Educational and Outreach Laboratory).

For each calendar a working team, composed by researchers, graphic experts, and occasionally science communicators and/or psychologists, took care of the ~~drawing~~ selection. ~~were~~ ~~was managed~~ ~~by a working group, composed by researchers and graphic experts, occasionally with science~~ ~~communicators and/or psychologists.~~ The collected drawings were selected ~~based~~ on the basis of~~on~~ their relevance to the theme, their originality and attractiveness and~~, last but not least,~~ the~~i~~r inherent message. For some calendars, also texts have been chosen among ~~those~~ the ones sent by the children, together with the drawing~~s~~. In the final selection we have considered ~~the~~gender and age~~s~~ balance and ~~the~~uniformity in the geographic distribution of the winners.

The graphic designs of the calendars were developed and realized by the INGV Laboratorio Grafica e Immagini (Graphics and Images Laboratory) (Riposati et al., submitted). Each graphic project was inspired by the theme of the competition and realized by ~~taking into account~~considering the

heterogeneity of drawings, using different techniques, colors and subjects, but ~~and~~ always keeping the focus on the children's work. ~~Educational~~ The attendee schools received educational materials produced by INGV, in addition to copies of the calendars~~, were sent to the participating schools~~. ~~Copies of the calendar~~The latter ~~were~~ have ~~been~~ also been distributed ~~also~~ to the schools participating ~~to~~ in INGV projects and events, but not directly to the contest.

~~Events were organized to award~~ Award ceremonies were organized at the INGV venue in Rome to reward the winners~~.~~ ~~They were hosted in the INGV venue in Rome, with their~~in the presence of classmates, teachers and often ~~their~~ relatives. They received certificates of attendance, medals, ~~games~~ scientific games, and T-shirts with the logo of the competition. We invited scientists, journalists, artists, and science communicators, to the award ceremonies. Remarkably, the Italian Minister of Public Education came to the INGV headquarter in Rome to support the event ~~in~~ on October 20, 2005, personally rewarding the winners.

2. The 2016 calendar

For the 2016 calendar we ~~have choose~~ chose the drawings used in the past calendars, dedicated to the Earth (Fig. 1). This initiative ~~gave~~ allowed us ~~an the~~ opportunity to reflect, evaluate, and sum up the message that ~~these~~this 10 year-long project ~~is communicating~~ was conveying to the scientific community regarding the relationship between children and our planet ~~Earth~~. ~~Below is~~A a description of the calendars, whose images contributed to the one released in 2016~~,~~ follows ~~below~~calendar.

174

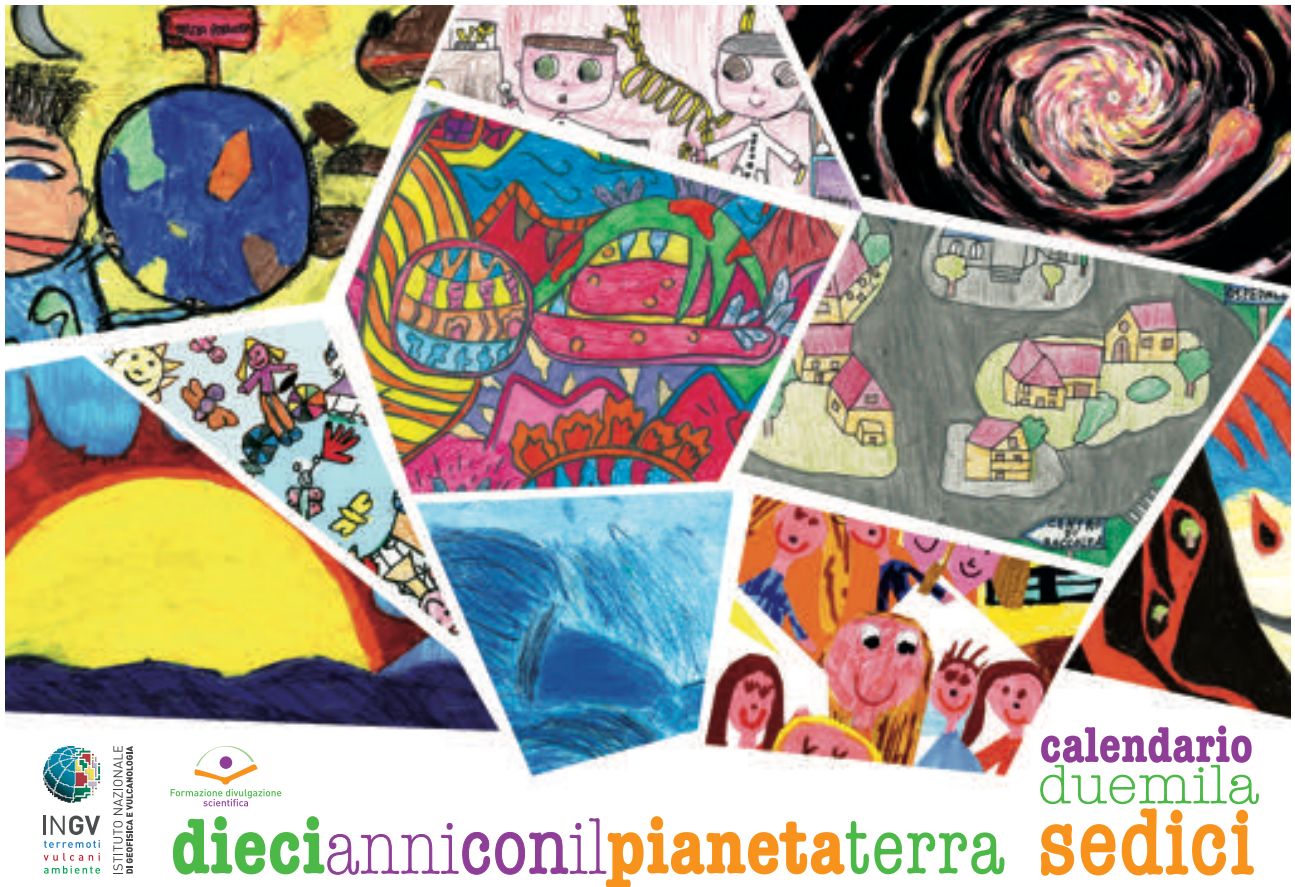



Fig. 1. The cover page of the 2016 calendar made with a collage of all previous calendar covers (edited by INGV Laboratorio Didattica e Divulgazione Scientifica and INGV Laboratorio Grafica e Immagini).

*2004 – 2005 Calendar **"A natural phenomenon called earthquake"***

The first calendar was inspired by the project "When the Earth has a~~a~~ stomach ache" (Burrato et al., 2004). In 2000 a small ~~size~~ earthquake (M4.1) ~~hit~~ hit the Aniene Valley, ~~a town~~ near Rome. This event was strongly felt in the ~~little~~ town of ~~Agosta~~Subiaco (RM), ~~impressing~~shocking ~~by~~ teachers and students of ~~the~~ a local primary school~~,~~. This ~~fact~~ ~~and suggested~~lead to the idea of developing a dissemination a~~~~ project focused on earthquakes ~~focused on earthquakes~~. Children, who have been taught about earthquakes, can be engaged to use their artistic expressions, and demonstrate their awareness on this phenomenon through drawings (Izadkhah and Gibbs, 2015). The aim of the project was for the children to learn about the causes of earthquakes and to become familiar with a phenomenon often considered random and ~~unforeseeable~~unpredictable. Moreover, an important ~~task~~ aim of the project was to train students and teachers to behave properly during the occurrence of an earthquake. At the end of the project, the researcher team realized a calendar that displays earthquakes using the kids' original drawings and texts, ~~showing~~ presenting their own impressions

193 and experiences on earthquakes and on shaking effects. ~~In accordance with~~According to the
194 researchers' efforts, most students have focused on what they have learned about the simple
195 behaviours that can help reduce the damage.
196

Calendar 2005 – 2006 **"Once upon a time there was a Volcano"**

198 Drawings of this calendar were chosen among 853 works dedicated to volcanoes. The drawings
199 show the fascination and fear that the "mountains of fire" ~~arouse~~ arise in children. Month after
200 month, children ~~tell~~ told us about the legends of the past regarding volcanoes. Hephaestus, the god
201 of fire in the Greek mythology, that had his nether forge in~~side~~ the ~~interior of~~ Etna~~,~~ and ~~working~~
202 worked alongside the ~~Cyclopes~~cyclopes, giants with a single eye. Many drawings represented the
203 volcano as an island, such as the island of Vulcano in the Eolian archipelago, the dwelling of the
204 homonymous god of fire of the ancient ~~roman~~ Roman people. At the end of the Middle-age in fact,
205 the name 'volcanoes' was given to the mountains of fire, because of ~~It's from~~ Vulcano Island ~~itself~~
206 ~~that, at the end of the Middle-age, the mountains of fire were given the name volcanoes~~. Children
207 also represent~~ed~~ active volcanoes ~~in their activity, with~~and the damage ~~of~~ caused by eruptions, fire
208 and flames, hous~~es~~ing in danger and frightened people~~;~~, ~~but~~ also the role of volcanoes for the life of
209 the planet, with the emissions of flowers and fish~~es~~ from craters, and the slopes of the volcano
210 covered with vegetation are also a subject of the children's drawings.
211

Calendar 2006 – 2007 **"Telling the Story of the Earth"**

213 In this calendar, children drew the Earth's ~~h~~History and the ~~many~~ different living beings that have
214 dwelled on it, showing Mother Earth's diversity and ~~grandeur~~greatness. We received 2200
215 drawings, illustrating the children's point of view on the history of the planet, from the origins of
216 the Universe and of the solar system, the first forms of life, the differentiation of species in the
217 waters and then on land, with dinosaurs, mammals and humans. Through the children's ~~drawings~~
218 sketches one c~~a~~on follow the story of an extraordinary adventure, a Universe full of energy, seas
219 and oceans crowded with forms of life ~~forms~~, with ~~the unmissable~~ giant dinosaurs among luxuriant
220 vegetation, grappling with smoking volcanoes~~.~~, then the ~~beginning~~ birth of the human race, with
221 human ancestors and other hominids engaged in hunting, and finally the incoming of civilization.
222

Calendar 2007 – 2008 **"Living with a Star"**

224 On the occasion of the International Heliophysical ~~year~~ Year (IHY), the 2007 competition ~~were~~ was
225 dedicated to the Sun, "our star" (Fig. 2). Thanks to the European Cooperation in Science and
226 Technology (COST269 project ~~partnership)~~, schools from 8 European countries - Czech Republic,

227 Cyprus, Finland, France, Italy, Poland, Spain and the United Kingdom - participated to in this the

228 competition. The winning Drawings drawings were chosen among about 1300 works. Realized in

229 all the languages of the participating countries, this calendar collected the drawings inspired by "our

230 star". Fantastic images were produced drawn of the Sunsun, sitting in space with other celestial

231 bodies, rockets and satellites, and spreading out coloured colourful rays. There areSome drawings

232 that recall life on Earth, the sSun and, the rainbow and the warm sunshine rays inon the beaches in

233 summer. There are images related primarily to the energy and life brought by the Sunsun. Finally,

234 Sun the sun interaction with the Earth at different latitudes: eclipses, auroras, the Sun sun in

235 summer and non-Sun sun in winter, in some cases probably inspired by personal children

236 experiences.

237

238 *2009 Calendar "The Earth of tomorrow is today in my hands"*

239 For the UNESCO International Year of Planet Earth we focused on the issue of human

240 responsibility on the sustainability of the planet, trying to stimulate young students' in becoming

241 active citizens of tomorrow. Children's relationships with nature for environmental education have

242 s been explored using the 'draw and write' methodology (Kalvaitis and Monhardt, 2012). Climate

243 change will have multiple effects on human health and it is the definingan important challenge for

244 the development of young humans in the 21st century. We suggested topics on climate, oceans, and

245 seas and continental waters to raise sensitize awareness in the younger generation on the beauty to

246 theof -Earth beauty and natural resources, as well as on natural hazards and on the relation between

247 humans and Earth's health. Children responded by sending drawings of rainbows, waterfalls,

248 volcanoes and flower fields, but also with images showing concern for the environmental

249 degradation and the indiscriminate use of the planet's resources. Disrespectful behaviour is

250 sometimes represented as fought by "Superheroes" or protectors. Moreover, drawings on the

251 natural environments and everyday life highlight virtuous and environmentally friendly behaviour,

252 respect for the environment and the importance of taking care of it (Fig. 3).

253

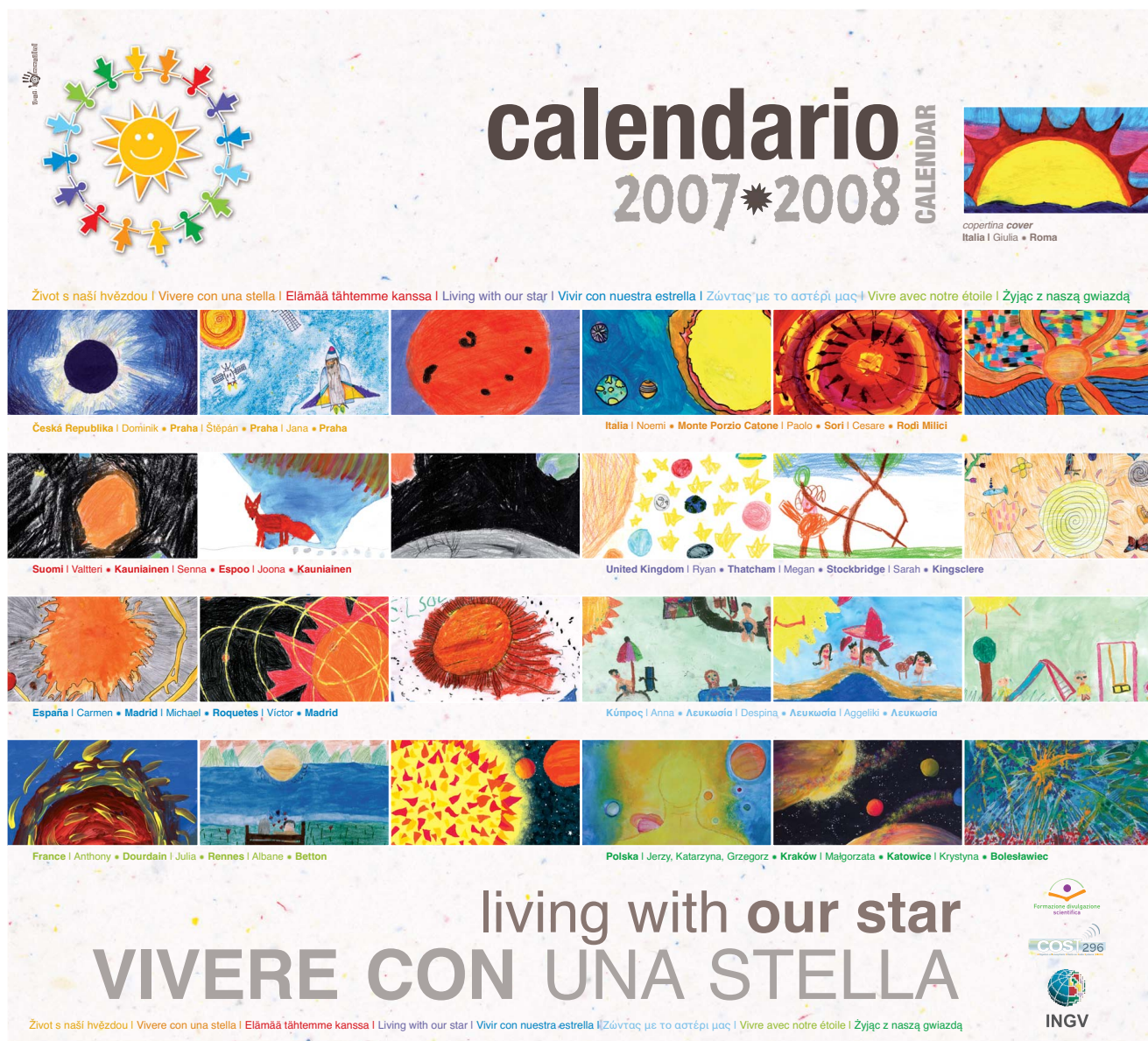



Fig. 2. The back cover of the 2007-2008 calendar dedicated the to the Sun and realized, through a partnership ing of European countries in the COST269 project, in 8 languages (edited by INGV Settore Formazione e Divulgazione Scientifica and INGV Laboratorio Grafica e Immagini).

*2010 calendar **"Precious Earth"***

The 2010 calendar still focused on children's attention on planet Earth and the effect of human activity on the Earth it. We asked children to create a message, by drawing an image to promote planet Earth. The title, 'Precious Earth', was chosen to underline how our existence completely depends on planet Earth, where we have evolved. We are and will continue to be part of it and will continue to be so if we manage to maintain a dynamic balance between a sustainable life and the Earth's ecosystem. The alteration of the planet's natural climate cycle calls for a more responsible and efficient use of natural resources in the future and the promotion and development of alternative energy sources. From the collected drawings and texts, emerges a sense of respect for the planet, a

consciousness of its beauty and uniqueness emerges, as well as and sadness for activities that perceived are seen as damaging for the planet. Also, Tthe texts suggest the same sensitivity, i.e.: *Va bene cercare un altro mondo ma se ti trattiamo bene sarà sempre bello chiamarti casa* It's okay to look for another world but if we treat you well it will always be nice to call you home:. *Chiudo gli occhi e sogno un mondo pulito e nessuno alza un dito. Sogno le persone rispettose dell'ambiente e la natura tornare vincente* I close my eyes and dream of a clean world and nobody raises lifts a finger. I dream of people who respect the environment and nature becoming thees a winner again.

Fig. 3. The back cover of the 2009 calendar dedicated the to the Earth and to the today present responsibility to protect the environment (edited by INGV Laboratorio Didattica e Divulgazione Scientifica and INGV Laboratorio Grafica e Immagini).

*2011 Calendar **"I'm a Scientist too! Science and scientists from the children point of view"***

In the International Year of Youth, established by the United Nations General Assembly, the theme was selected with the purpose of finding to find out how children's point of view on see the world of science, scientists and research, and its potential and future perspective is. Children were asked to answer the following questions through a given the suggestions and asked to create a drawing: (1) How do you imagine a scientist? How do you imagine the daily activities of a researcher? (2)

What is the invention you consider the most important among all those you know? (3) What would you invent?

During the competition, 986 drawings were collected. What we got is a colorful and busy world, full of young scientists confident in the power of science and technology, engaged in inventing devices to make us happy, to travel in space and time, and to solve the Earth problems ~~of the Earth~~ (Fig. 4).

A sample of 200 drawings ~~have~~ has been analyzed in order to test and tune a classification scheme and to infer some considerations of the perceived image of science, scientists and inventions from the child's point of view (Rubbia et al., 2015). The analysis reveals a persistent gender stereotype related to scientists, since 70% of the depicted persons were male and 45% of girls draw male scientists. The image of a 'mad scientist', mainly related to male scientists, is still present (15%). Female scientists are drawn by girls, ~~;~~ and they are represented as young, not crazy and are usually good-looking. Scientists of both genders are young, and this is ~~a~~ positive: ~~image, in that~~ scientists may be perceived as closer to everyday life (Rubbia et al., 2015).

*2012 Calendar **"Mission Possible: let's save the world"***

The theme was inspired by the International Year of Sustainable Energy for All, designated by the United Nations General Assembly to promote research ~~of~~ on new green technologies and to focus on environmental problems and the future of the Earth. Our planet provides all the resources that allow life to flourish. Many of these resources depend on delicate balances and are not unlimited. We consume more resources than the Earth can generate. Almost all of the energy and raw materials we use to produce or build what surrounds us and what we need~~ed~~ to live comes from the Earth. A land that ~~feeds,~~feeds warms and offers us beauty.

In the brochure of the call we have suggested some priority for the mission:

1) ~~counteract~~ Counteract the pollution of air, water and soil~~;~~
2) ~~stop~~ Stop global warming and the destruction of ecosystems~~;~~
3) ~~develop~~ Develop new green technologies~~.~~

Children's fantasy offered us images of a planet with rainbows, trees, clean rivers and lakes, school buses powered by pedals, eco-volcanoes, machines that convert waste into flowers. ~~In fact, T~~the real challenge for children was to draw inventions. We can see green' ideas and technologies based on solar energy for high-speed trains or pizza ovens, an energy that comes from the destruction of weapons or by harnessing volcanoes (Fig. 5). In other words, ~~Sustainable~~ sustainable ~~Development~~

321 development that is able to meet the needs of the present without compromising those of future
322 generations.
323

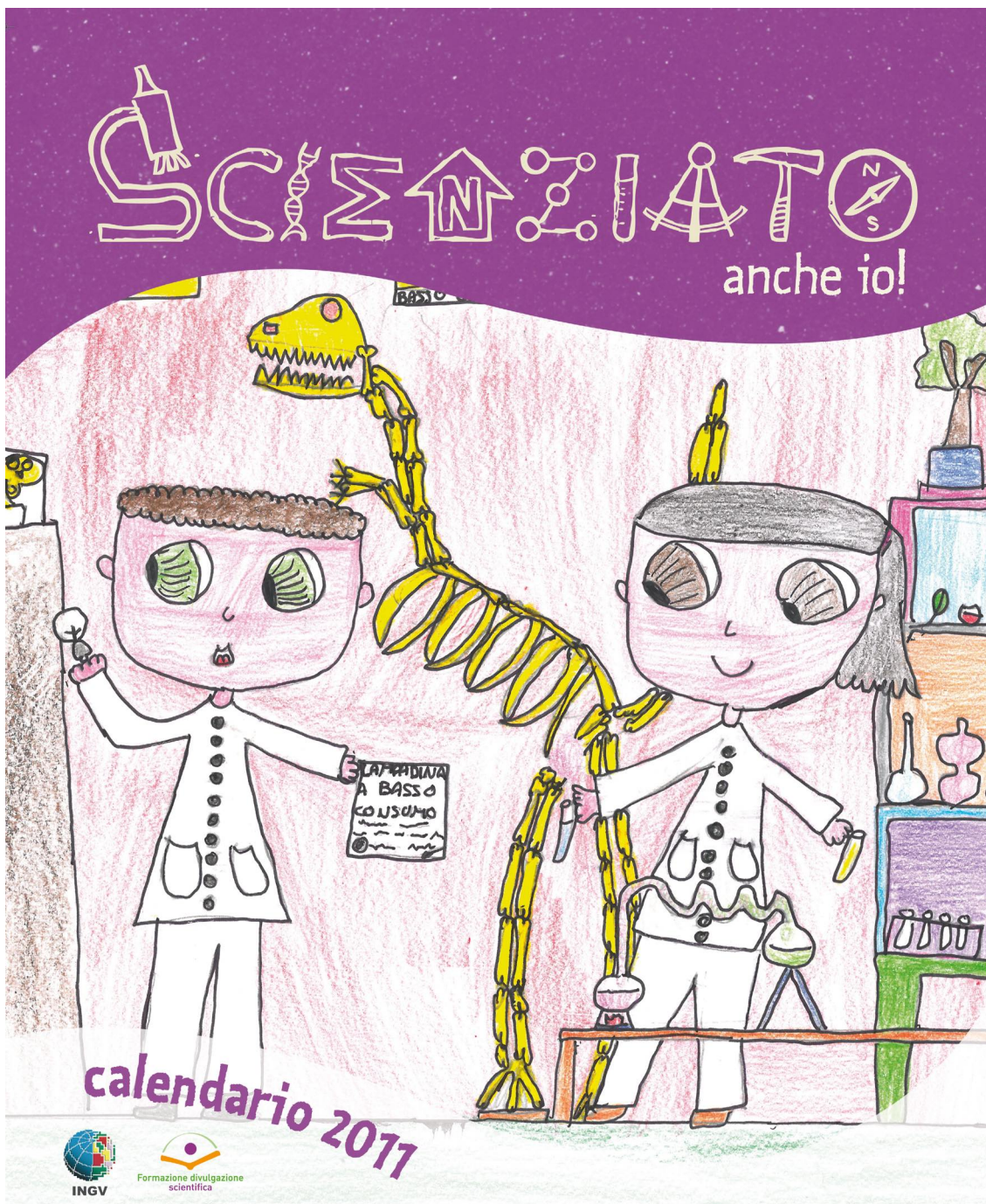
324
325

326 **Fig. 4.** The design chosen for the 2011 calendar cover, summarizes the main themes presented in the
327 drawings sent by the children. Smiling scientists, confident of the potential of science, engaged in
328 enthusiastic discoveries to improve planet life (edited by INGV Laboratorio Didattica e Divulgazione
329 Scientifica and INGV Laboratorio Grafica e Immagini).
330
331
332

Fig. 5. One of the ~~drawing~~drawings selected for the 2012 calendar. The drawing shows a very complex project of an eco-volcano, with very detailed instructions and precise statements on the low cost of the project and on the absence of pollution (edited by INGV Laboratorio Didattica e Divulgazione Scientifica and INGV Laboratorio Grafica e Immagini).

*2013 Calendar **"In the heart of the Earth"***

What do ~~students of~~ primary schools students imagine ~~there is~~ inside the Earth? Scientists agree on ~~for~~ a common representation of the interior of the Earth, but so far no one ~~has yet gone~~went to check it. Inside the Earth, temperature and pressure increase progressively until they reach very high values~~,~~ that challenge any technology known to date. We went to the moon, but we have not been able to go for more than a few kilometres ~~inside~~ into the Earth. From the 1034 drawings, we ca say~~have received,~~ that the interior of the Earth is definitely very colourful and sometimes animated by turtles, butterflies and fire-breathing dragons. In some cases, it consists of cand~~y~~ies, cream and chocolate, precious stones and fire feeding volcanoes. Some drawings were inspired by legends and myths alluding to the existence of underground, hidden and mysterious worlds, also inhabited by people and fantastic creatures.

353 *2014 Calendar "The Magic of Water"*

354 Water is an essential part of the Earth making it a rare planet. Precious and indispensable to life,

355 water is a ~~wealth~~ fundamental necessity that we ~~are claimed~~need to protect. By ~~increasing~~ raising

356 awareness, we can avoid the waste and pollution ~~water wasting or polluting~~ of water.

357 We received 1195 children's drawings, where water is represented in its plentiful manifestations, in

358 the atmosphere and on the Earth's surface (Fig. 6). Placid waters of lakes and lagoons, pouring

359 waterfalls reflecting ~~where~~ the sun ~~is reflected~~, more ~~troubling~~ troubled water that gives rise to

360 glaciers and ice figures, and polluting boats. There are also suggestive images that reminded us of

361 extreme weather events such as floods ~~and~~ or very powerful rain, which represent a sign of

362 awareness. ~~In fact, the~~The understanding of water's varied and sometimes powerful manifestations

363 in the atmosphere and on the Earth's surface, promotes a correct approach with ~~use of~~the territory

364 and respectful ~~a behaviours a~~ behaviours ~~of respect and attention for the~~towards ~~natural~~

365 ~~nature~~environment.

366

367

368
369 **Fig. 6.** The back page of the 2014 calendar dedicated the to the water (edited by INGV Laboratorio Didattica
370 e Divulgazione Scientifica and INGV Laboratorio Grafica e Immagini).
371

3. Final considerations

The 10 years of INGV's calendar competitions directly involved more than ~~about~~ 400 schools. ~~In addition~~Besides, at least 500 other schools have been ~~reached by~~part of the initiative each year by receiving copies of the calendar. We have collected about 10,000 drawings. These data indicate a ~~good~~high level of impact of the calendar drawing competition approach. ~~With the exception~~Except for ~~of~~ the first calendar, result~~ing~~ed from a specific ~~in presence~~ educational activity, the scientific messages were conveyed without a direct interaction ~~with~~between children and researchers. The launch call brochures represented only a starting input. T~~he t~~eacher~~s~~ ~~had the opportunity to~~ organize~~d~~ special lessons to raise awareness in pupils ~~awareness~~ on the competition topics and to better develop the calendar theme subject.

After 4 years of interruption due to other demanding outreach activities, ~~T~~the calendar project, ~~after 4 years of interruption due to the arise of other demanding outreach activities~~, has been restored in 2020. ~~T~~and ~~t~~hanks to the cooperation with the Science Together-NET project (a~~n~~ European Researchers' Night project, financed by the European Commission under the Marie Sklodowska-Curie actions) ~~with the~~we expect the competition to take place again in ~~ation~~ ~~to be active for~~ the next years. The interaction with researchers can be enhanced in future competitions by organizing, for the participating schools, lectures and workshops using distance learning technologies. This could more effectively convey the scientific messages to teachers and students. Moreover, a direct interaction, even if at distance, can ~~give~~offer the possibility ~~to have a~~of feedback on the effic~~ien~~acy of the initiative on raising knowledge and awareness.

This work, summarising 10 years of the INGV's calendar competition, represents a contribution to a more general investigation on the INGV training activities imprint. T~~In fact, t~~he organization of training and outreach activities can benefit from the knowledge of the cognitive and emotional outcomes of the beneficiaries. Projects with schools and ~~with~~in public have been analysed ~~in order~~ to ~~gauge~~determine the effects of the training activities and the motivations of participants. These studie~~s~~d provided information over the amount of popularity and effectiveness of training in various contexts (D'Addezio, 2019; D'Addezio *et al.*, 2014; Lanza *et al.*, 2013; Musacchio *et al.*, 2015a; Musacchio *et al.*, 2015b). Moreover, we can perform a more general analysis on how the scientific message has been received, on the ability of scientists in transferring concepts, ideas, information in a correct ~~but also~~and captivating way.

~~Apart from~~Besides the competition, the drawings we received in ten years of continuous activity with schools depict~~ed~~ children's impressions and reflections, and provide~~d~~ an opportunity to

understand the~~ir~~ ~~children's~~ point of view. ~~In fact, children's~~ Children's drawings can provide valuable information on the development of ~~children's~~ their environment perceptions (Farokhi and Hashemi, 2011). How do young people ~~cope~~ deal with global problems, such as climate change, potential sources of worr~~ies~~y and distress? Generally, children cope with worr~~ies on i.e. climate change~~ y by ~~using~~ having less problem-focused behaviour~~,~~ ~~and more~~taking distance~~ing~~ and plac~~ing~~e trust in researchers and technological development to a higher degree than adults (Ojala, 2012). Our analysis shows that this attitude can be observed in the children's drawings. In fact, from the drawings and texts we have collected~~,~~ a great consideration, a deep environmental concern and respect for the planet ~~emerge~~arise. As shown in other experiences (Kalvaitis and Monhardt, 2012), children ~~demonstrated~~ showed a positive relationship with nature ~~(Kalvaitis and Monhardt, 2012)~~. A similar positive relation~~ship~~ between children ~~and~~ science and scientists also emerge~~s~~ from the calendar drawings. Science and technology are perceived as powerful tools that are capable to handle the continuous challenges humanity is facing. Moreover, children represent themselves as users of these tools to solve problems and improve the world. In this light, the outcome of the calendar project, give~~s~~ us hope that similar initiatives can contribute in increasing the knowledge of the Earth and the fragile human ecosystem in the hearts and minds of future active citizens.

The author declare~~s~~ that she has no conflict of interest. Figures are from INGV publications.

Acknowledgement

The project has been made possible thanks to the teachers and to the wonderful students that participated to the competitions with drawings that have intrigued, touched, enchanted~~,~~ and surprised us. We are grateful for everything they have chosen to share with us.

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