

# **A steady progress towards Diversity, Equality and Inclusion in STEM disciplines: a geoscience case study in Italy**

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## **Abstract**

*Significant progress has been made over the last 25 years. At the beginning of the third millennium, as long as the Istituto Nazionale di Geofisica e Vulcanologia (INGV, National Institute of Geophysics and Volcanology) started growing, initiatives to develop and enhance human capital flourished and consolidated in Europe. The European Charter for Researchers, the Italian Code of Equal Opportunities, and the equality strategy in the European Research Area, to quote some references, foster commitments for more welcoming working environments and more responsible research and innovation. In its turn, over decades, INGV has seen a positive shift in favour of less represented gender, in female leadership and women participation, experiencing a situation common to many research organizations which are hard sciences oriented. At the same time, work-life balance and unease mitigation measures have been piloted and implemented. Nonetheless, more collective efforts are required to face current challenges. Natural hazards have different impacts on society. Therefore, gendered and intersectional perspectives must be adopted. The paper presents general concepts about gender equality in the first section, with a particular emphasis on the principles of the European Charter of Researchers and citation of relevant literature to making geoscience more diverse, equal, and inclusive. In the second part, the case study of INGV is provided,*

*illustrating the main achievements and ongoing activities with a gendered perspective.*

Keywords: Equality; Diversity; Inclusion; Gender; Women; European Charter of Researchers



## 1. Introduction and general framework

The beginning of the third millennium marked a new era both for the Istituto Nazionale di Geofisica e Vulcanologia (INGV, National Institute of Geophysics and Volcanology of Italy) and the European Research Area, with the flourishing of initiatives to develop and enhance human capital. The European Charter for Researchers, the Italian Code of Equal Opportunities, and the Equality Strategy in the European Research Area, to quote some references, foster commitments for more welcoming working environments and more responsible research and innovation.

The paper aims to illustrate 1) the evolution of gender equality concepts in the last two decades with a European perspective and a special focus on geosciences and 2) the experience of INGV in this framework.

The European Charter for Researchers, published in 2005 [EC, 2005], includes commitments to favorable working conditions in research organizations and higher education institutions. Among many other principles, it sets out the principles of non-discrimination and gender balance as follows:

*Non-discrimination. Employers and/or funders of researchers will not discriminate against researchers in any way on the basis of gender, age, ethnic, national or social origin, religion or belief, sexual orientation, language, disability, political opinion, social or economic condition. [EC 2005, p.16]*

*Gender balance. Employers and/or funders should aim for a representative gender balance at all levels of staff, including at supervisory and managerial level. This should be achieved on the basis of an equal opportunity policy at recruitment and at the subsequent career stages without, however, taking precedence over quality and competence criteria. To ensure equal treatment, selection and evaluation committees should have an adequate gender balance. [EC 2005, p.18]*

The new version of the European Charter of Researchers was published in 2023 as a Council recommendation to Member States [EUR-LEX, 2023]. It revamps the

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principles and shapes them in an updated manner. In particular, the Non-discrimination principle is reinforced and motivated as follows, with the diversity of researchers impacting research results and society:

*Embracing diversity. A core principle of European Research Area is to take account of diversity in the broad sense, including, inter alia, gender, racial or ethnic origin, religion or belief, social diversity, disability, age, sexual orientation and combating discrimination on all grounds. Employers and/or funders should embrace diversity in their researchers since different life experiences add valuable perspectives to research projects. Also, diversity in participants can inform research results applying to and enriching the diverse societies we live in. Acknowledging unconscious biases, for instance in hiring, promoting and in reviewing tasks, and compensating for them where possible is also needed, particularly in the realm of science [EUR-LEX 2023, Annex 2 p.5].*

The *Gender Equality* principle replaces and expands the former *Gender Balance*; from the original request for balancing different genders in research teams and decision-making bodies, it promotes the integration of gender dimension in research, combating gender-based violence and sexual harassment, and refers to Gender Equality Plans (GEP) as tools to foster and monitor sustainable institutional changes:

*Gender Equality. All stakeholders should foster gender balance in research teams, managerial, decision-making bodies, recruitment and promotion committees, and advisory groups. This also includes fostering the integration of the gender dimension in research, teaching and innovation content in order to improve the scientific quality, excellence, and societal relevance of the produced knowledge. Gender Equality also aims at combating gender-based violence and sexual harassment. Gender Equality shall be understood from an intersectional perspective, where different systems of power between gender and other social categories and identities intersect and reinforce each other. Sustainable institutional changes, channelled through Gender Equality plans or similar, that allow for proper reporting of infringements, and include monitoring and evaluation systems, are adequate mechanisms to promote Gender Equality [EUR-LEX 2023, Annex 2 p.5].*

In the last decade, scientific articles have frequently appeared and increased, illustrating the poor representation of women and gender minorities in STEM disciplines (Science, Technology, Engineering and Mathematics) particularly in geosciences [Agnini et al., 2020; Handley et al., 2020; Henriques and Garcia, 2022;

Kavanagh et al., 2022]. Scientific societies and women's associations also started reflections on these issues [Jesus-Rydin et al., 2020; Errami et al., 2021; Velasco et al., 2021; Amadori and EDI, 2023; Kernén et al., 2023].

Errami et al. [2021] provide a worldwide overview, looking at gender equality in the framework of the Sustainable Development Goals. The European Geosciences Union through its Diversity, Equality, and Inclusion Group [Jesus-Rydin et al., 2020] and the Seismological Society of America - JEDI Task Force [Velasco et al., 2021] are recently championing these topics with noteworthy programs, that represent a relevant trend compared to the past. Kernén et al. [2023] as well, point out gender inequities in professional geological societies and call for mitigation actions. Kavanagh et al. [2022] draw a picture of women's representation in the field of volcanology. They start with analysing data on memberships of international volcanology organizations, such as the International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI), which shows a proportion of male/female 60/40 in the members, and point out that "currently, IAVCEI members can only select 'female' or 'male' during registration, erasing non-binary and genderqueer scientists"; they continue commenting on positions in volcanology committees, awards and lead-authorship on volcanology papers, and surveys. Agnini et al. [2020] look at the past twenty years in Italian Universities in the area of geosciences and comment on trends, which show an increase in the number of female full and associate professors, from 9.0% to 18.5% and from 23.6% to 28.9% respectively, considered positive, but not satisfactory enough. Similar patterns are reported in Australasia, with a 26/74 ratio female/male researchers [Handley et al., 2020]. Imbalances are reflected in authors and editors of geology journals [Henriques and Garcia, 2022].

In Italy, in 2021, the Italian Geological Society (SGI) created a new Division dedicated to Equity, Diversity and Inclusion, "PanGEA, Geoscienze Senza Frontiere". This new SGI Division aims to coordinate and promote activities to overcome differences in gender, sexual orientation, ethnic origin, disability, language and age and support inclusiveness in Italian geology. This Division is also conceived as an open environment, intended to create opportunities for communication, mutual support and professional development [Amadori and EDI, 2023].

Since 2022 organisations applying to the funding programme Horizon Europe are required to have a Plan aiming at Gender Equality, covering the following five areas: a) Work-life balance and organisational culture; b) Gender balance in leadership and decision-making; c) Gender equality in recruitment and career progression; d) Integration of the gender dimension into research and teaching content; e) Measures against gender-based violence, including sexual harassment. The Guidance provides organizations with precious suggestions to cope with all these aspects [EC, 2021].

The absence of women in top positions is complained about in many workplaces and the phenomenon has been studied by identifying various “syndromes.” The incapacity of female professionals to nominate themselves for leadership positions has been discussed and written about extensively. The *impostor syndrome* is well known. Feenstra et al. [2020] contextualize it, suggesting focusing on the environment and not so much on individuals. Many successful people feel like impostors and describe the feeling of having ended up in esteemed roles not because of merit or achievement, but because of some oversight on the part of those who evaluated them, or by pure luck. Despite objective success, these individuals express difficulty in internalizing their achievements and accomplishments and this syndrome has negative effects on their well-being and career. These internalized and negative perceptions of the self arise from environments and social interactions that lead people to question their capabilities and worth. Although the phenomenon manifests itself at the level of the individual, that is, they are individuals to feel like impostors, these individuals do not exist in a social vacuum. Instead, people’s social context is of great importance in determining how they feel [Feenstra et al., 2020]. Is the working environment hostile? What kind of sexism is in place? “Children, youth, and adult women and men around the world endorse *ambivalent sexism*, meaning they agree with items that measure both *benevolent sexism*, such as “women should be protected by men”, and *hostile sexism*, such as “women seek to gain power by gaining control over men”. *Hostile sexism* has a negative tone and denigrates women who challenge traditional gender roles and ideologies, such as professionally successful women; it communicates a view of gender relations as competitive, with women wanting to dominate men and threatening men’s higher status in society. In contrast, *benevolent sexism* has a more positive tone: it idealizes and flatters women who embody traditional ideals, such as stay-at-home mothers, and portrays women as morally pure and extraordinarily caring, but also weak and incapable of caring for themselves; benevolent sexism portrays gender relations as cooperative and complementary, with men responsible for protection and safety and women dedicated to care and reproduction” [Barreto and Doyle, 2023].

Some female researchers have broken the *glass ceiling* and some others are still at the *sticky floor*. Is the *Queen Bee* phenomenon ongoing? Cibibin and Leo [2022] clearly describe the situation. Several studies have shown that women who obtain leadership roles in male-dominated environments are more likely to endorse gender stereotypes. That is, *they tend to hinder rather than support* their subordinates’ growth and have negative attitudes toward them. The term “queen bee syndrome” has been used to describe the phenomenon that senior women tend to uphold the structural hierarchy that has allowed them to achieve success. Women are forced



to adapt to the male culture that pervades the organization to reach top positions, but when they adopt behaviours and attitudes typically reserved for men, they are perceived as deviating from the role that has been assigned to them by society: it seems that there is no escape. Backlash research has found that women who succeed at tasks traditionally perceived as masculine are rated as disliked by both men and women themselves. This backlash occurs because successful women violate descriptive and prescriptive gender norms and are assumed to lack feminine traits, such as warmth. The Queen Bee phenomenon is the result of social circumstances related to the threat to social identity that women face in companies that discriminate against them: the tension between women's personal ambitions and the gender stereotypes expressed around them creates a threat to their social identity. Acting like a queen bee is, for these women, a way to pursue their ambitions in sexist organizational cultures. Da Rocha Grangeiro et al. [2024] provide a comprehensive review.

Harassment as well negatively impacts the advancement of women pursuing scientific careers. Harassment in the workplace represent a troublesome issue both for those who experience it individually and for institutions that must deal with it. The testimony published *anonymously* in [Nature, 2016] depicted very well the problem in its contingency and consequences in career development. The narrated episode is sadly iconic: a female scientist and a senior male colleague shared an apartment, to save money and optimize time for publications. The male colleague verbally and physically harassed her, and used the data and materials she prepared for a grant proposal without a shot. Given the situation, she was suggested to avoid the field trip with him, and to leave the team "for personal reasons"; the legal case that lasted a year and a half ended in her favour, the harasser was found guilty of research misconduct and inappropriate behaviour, but, since the verdict was not made public, the University did not fire him nor he was banned from public occasions, such as conferences. In a word, *"The female scientist who was harassed by a senior male colleague feels let down by the system that is supposed to protect her"*.

After the explosion of the #me-too movement and campaign, in 2017, gender-based violence and sexual harassment fully entered public discourses in different contexts, being these topics addressed more systematically in international conferences and academia, which is not free from these harmful and unwanted behaviours [Avveduto et al., 2019]. Possible actions and strategies started to be delineated by European projects, such as UniSAFE [Fajmonová et al., 2021].

Career progressions are strictly connected to assessment criteria. A European initiative started a process of reform of research assessment converging on a set of principles summarized on an agreement - Agreement on Reforming Research Assessment (ARRA) - published in July 2022.

The first principle of the ARRA is “Recognize the diversity of contributions and careers in research, depending on the needs and nature of the research itself”. Indeed, diversity in the ARRA has different meanings: a) recognise the diversity of research activities and practices, with a diversity of outputs, b) acknowledge and valorise the diversity in research roles and careers, including roles outside academia, c) ensure gender equality, equal opportunities and inclusiveness. Consider gender balance, the gender dimension, and take into account diversity in the broader sense (e.g., racial or ethnic origin, sexual orientation, socio-economic, disability) in research teams at all levels, and in the content of research and innovation.

## **2. An Italian case study: the evolving scenario at INGV**

In Italy, the Equal Opportunities Code 198/2006<sup>1</sup> represented a milestone in favour of gender equality, later expanded. Furthermore, Equal Opportunities Committees (CPO, *Comitati Pari Opportunità*) were transformed in the Unique (or Unified) Committees to Guarantee Equal Opportunities, Employee Wellbeing, and Non-Discrimination at Work (CUG, *Comitati Unici di Garanzia*) with a broader mandate. According to Italian laws<sup>2</sup>, the creation of such a committee is mandatory in public structures; each CUG has several duties towards the hosting organization, such as making proposals, providing advice, and monitoring progress to develop equal opportunities, enhance well-being in the workplace, and fight discrimination of any type. It was in 2011 that the INGV, on the proposal of its Equality Committee inserted the gender equality statement in its Statute.

In its turn, over decades, INGV has seen a positive shift in favour of less represented gender, in female leadership and women presence, experiencing a situation common to many research organizations which are hard sciences oriented. At the same time, work-life balance and unease mitigation measures have been piloted and implemented. In the following sections, INGV's evolving scenario is analysed with “a light touch” referring to the scheme of the essential factors for gender equality in Research and Innovation, according to the requirements of EC Horizon Europe's request [EC, 2021].

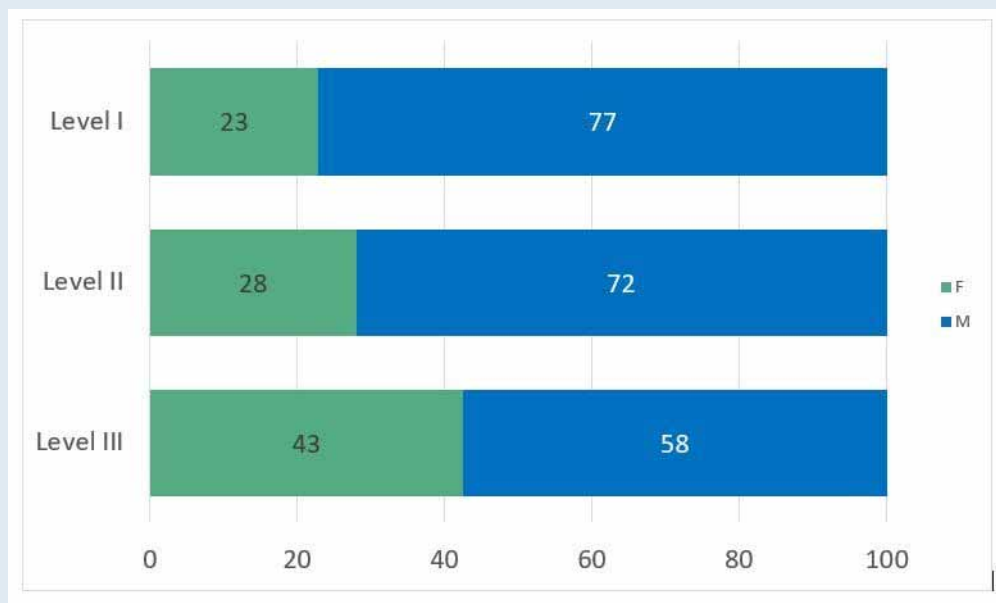
<sup>1</sup> <https://www.altalex.com/documents/codici-altalex/2011/09/19/codice-delle-pari-opportunita-tra-uomo-e-donna> (accessed 23 December 2024).

<sup>2</sup> In accordance with provisions of article 21 Law no. 183/2010, <https://bit.ly/3Hhigz2> (in Italian, accessed 23 December 2024) modified by government directive no. 2/2019, <https://bit.ly/3Ofn7df> (in Italian, accessed 23 December 2024).

## 1.1. Gender balance in leadership

INGV is a medium-sized public research organization, with around 1000 staff, and with a well-defined mission. INGV's general objective is to contribute to the understanding of the dynamics of the Earth System, in its different phenomena, and solid and fluid components, and to the mitigation of associated natural risks. Due to its strong STEM connotation therefore, and given its vocation in the field of geosciences, it is natural to expect a male predominance in staff composition [Rubbia, 2023].

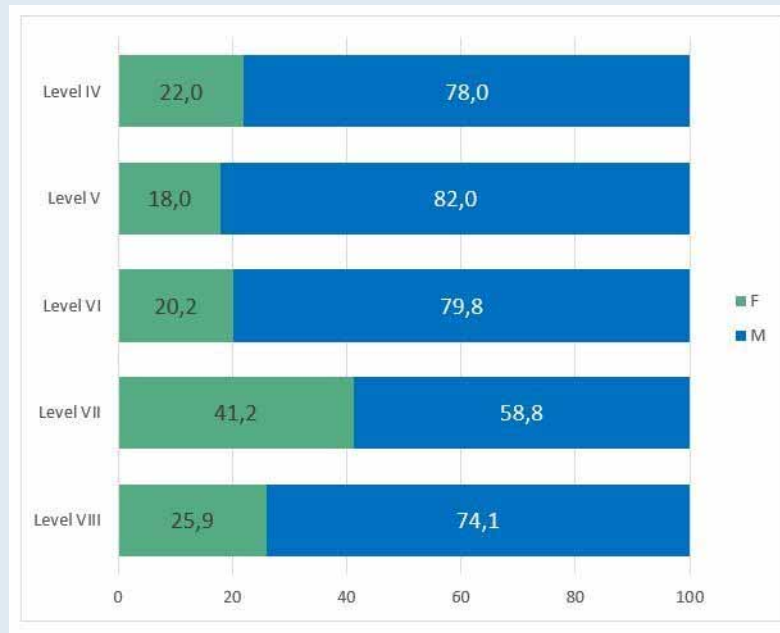
In particular, as of 31 March 2023, INGV consisted of 946 units, including research and technologist, technical and administrative personnel. The male component prevails over the female component in overall terms. Among the employees, 61.5% are men and 38.5% are women. The male component prevails among the research and technologist staff (Figure 1) and among the technical staff (Figure 2). While the female component is preponderant among the administrative staff (Figure 3). Among the research staff, the percentage of men is 62% (378 units), while women make up 38% (233 units).



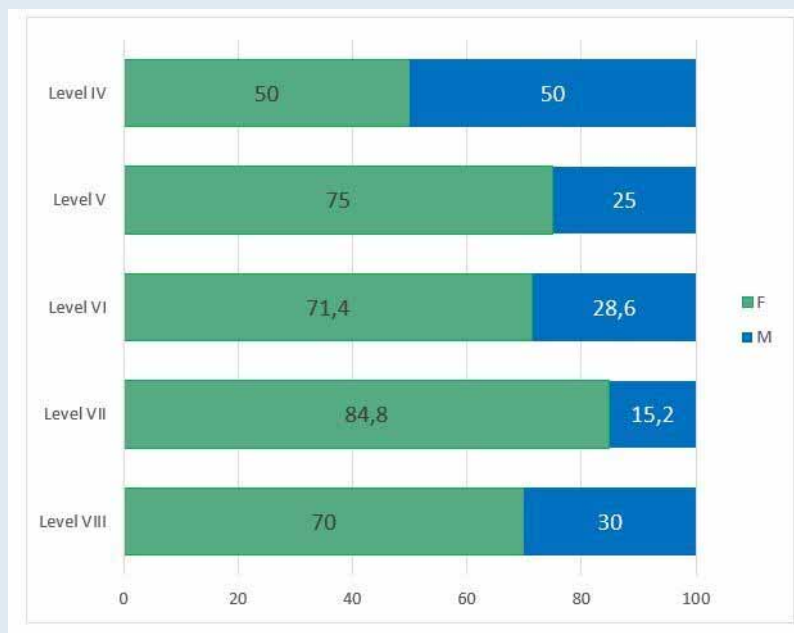
**Figure 1.** Research and technologist staff by level (I-III) and gender as of 31 March 2023. Percentage values. Level III corresponds to the entry-level, while Level I is the higher level.



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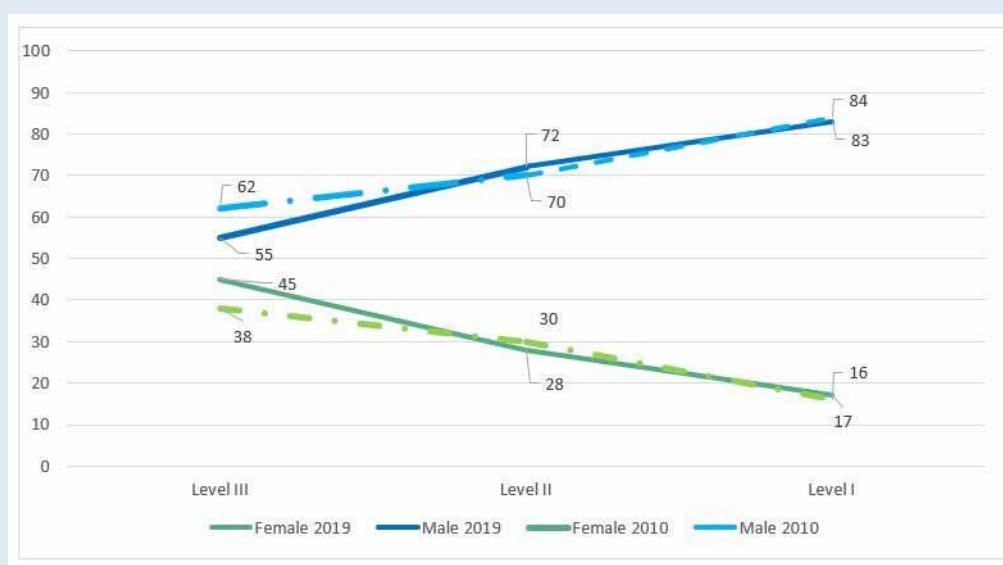
**Figure 2.** Technical staff by level (IV-VIII) and gender as of March 31, 2023. Percentage values. Levels increase with the career progression.



**Figure 3.** Administrative staff by level (IV-VIII) and gender as of March 31, 2023. Percentage values. Levels increase with the career progression.

We find similar percentages in other Italian research institutions, albeit they are of different sizes. At the Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS, National Institute of Oceanography and Experimental Geophysics), the female presence is around 40% among research and technologist staff [OGS, 2022, p.14]. A similar situation is that of the Consiglio Nazionale delle Ricerche (CNR, National Research Council) if we look at the percentage composition of the research staff at the CNR-DSSTTA - Department of Earth System Sciences and Environmental Technologies [Cerbara and Caruso, 2022, p.77]. An exception is the Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA, Italian Institute for Environmental Protection and Research), with a preponderant female presence in general [ISPRA, 2022] and which in particular in research and technologist staff (level I-III) sees a “percentage of women equal to 55.66% (349 units) and men equal to 44.34% (278 men)” [ISPRA, 2023].

The so-called scissors diagram indicates little difference between the two genders at the beginning, but going towards higher levels the gap increases, a well-known and frequent pattern in the Italian scientific community. In ISPRA, for example, the share of female research staff “is decreasing from one level to another: in particular, the percentage of women from level III (54.8%) undergoes a reduction of approximately 4 percentage points to the next level, while the same is halved at the top level (25%)” [ISPRA, 2022, p.30].



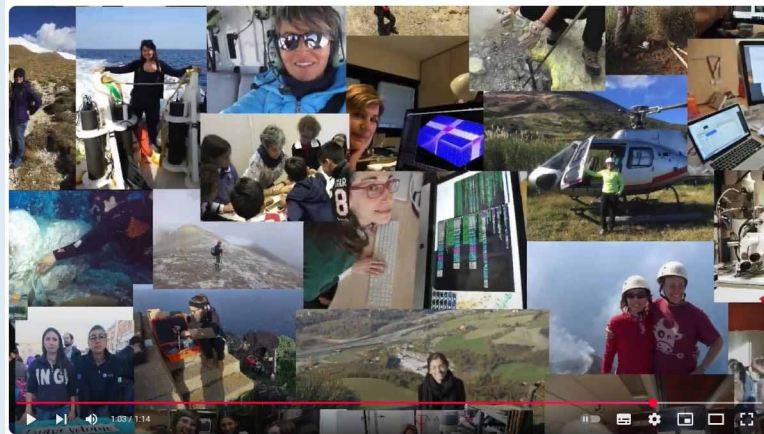
**Figure 4.** Research career gaps for levels I-III (researchers and technologists), years 2010 and 2019. Percentage values on the vertical axis.

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Comparing INGV figures of researchers and technologists at a distance of ten years (2010 - 2019), we are approaching male/female parity at the entry level (level III), while for levels II and I a strong divergence persists.

## 1.2. Gender Equality in recruitment and career progression

In recent years, attention has been given to engaging more girls in science, particularly STEM. Dedicated initiatives are aimed at showing that these disciplines should not be considered only as masculine. The International Day of Women and Girls in Science is one of these occasions. INGV has also started to participate, with various outreach events during the years (Figure 5).



**Figure 5.** A screenshot from the video realized on the occasion of February 11, 2019 – International Day of Women and Girls in Science at INGV: <https://ingvterremoti.com/2019/02/11/le-donne-dellingv-per-la-giornata-internazionale-delle-donne-e-delle-ragazze-nella-scienza/> (accessed 23 December 2024).

Since 2005, INGV has promoted a contest regularly, inviting primary schools to provide drawings, while a selection is published in the institutional calendar, an example in Figure 6. An analysis was initiated on the 2011 calendar, based on the Draw A Scientist approach. Do boys and girls imagine a scientist in the same way? Do stereotypical images of science and scientists persist, or something is changing? Is there a gap between children's perceptions and scientists' reality? and how can this gap be filled? The analysis reveals a persistent gender stereotype related to scientists. Girls drew fewer technologists, fewer technical

tools and more inactive scientists: 57% of scientists drawn by girls were depicted as doing nothing, 33.7 % as experimenting; on the other hand, their drawings are more commented, with richer descriptions and dialogues in the speech bubbles. Women scientists were often depicted as assistants, but when alone appeared self-confident enough to give their name to a discovery or to hope for the Nobel Prize. Less stereotyped images emerged for groups of pupils, which participated in educational events and guided visits to INGV research laboratories or are relatives of INGV researchers [Rubbia et al., 2015]. A comparison between the two calendars, 2011 and 2021, seems to indicate a more positive perspective: female students associated women with science much more frequently than they did in the earlier decade [D'Addezio and Besker, 2024].

A gender-sensitive language is also important. Words matter in shaping our worldview [Rubbia, 2015]. Language reflects the attitudes, behaviours and norms within a society. Women play an active role in society, yet - all too often - we use language that ignores or minimises their contribution. The dominance of masculine words for general references can reflect assumptions about gender roles and influence readers [EIGE, 2019]. The latest versions of INGV Code of Conduct embed the suggestions of inclusive language from guidelines provided by European Institute Gender Equality (EIGE) and Italian Ministry of Research [MIUR, 2018].

De Lucia et al. [2021] analysed INGV staff distribution over 20 years, from its establishment to 2019. According to Moretti et al. [2024] proportions remained relatively stable... "what is slowly changing in recent years is the presence of women in research and managerial leadership positions".

Notably, between 2016 - 2020, a woman served as General Manager and, since 2016, one of the three Department Directors has been women (2016 - 2022 for the Earthquakes Department, and since 2022 for the Volcanoes Department). "Currently, 4 out of the 10 Directors of the INGV Offices are women, reflecting a positive trend towards gender parity in leadership roles. Additionally, both the recently elected INGV members of the Scientific Council are women, underscoring the growing influence of female voices in shaping scientific discourse and decision-making. In the present day, an increasing number of women fulfil pivotal roles across research, technical, and administrative realms, actively contributing to coordination and leadership. Notable instances include women actively engaged in the preparation and execution of seismic, volcanic and tsunami emergency protocols. Their responsibilities encompass crucial tasks and providing support services for emergency response teams (including operational rooms for seismic, volcanic, and tsunami surveillance, network monitoring infrastructures, or emergency response teams)", [Moretti et al., 2024].

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**Figure 6.** 2011 INGV calendar. Claudia drew the “machine that makes you happy”.

INGV signed the Agreement on Reforming Research Assessment (ARRA) in July 2023 to reinforce the value of the diversity of products, results, and practices of the research in the geosciences carried out in the Institute and participates in the Coalition for Advancing Research Assessment (CoARA)<sup>3</sup>. The working group CoARA@INGV decided to undertake the reform journey with a participatory approach, evolving gradually and in a shared way, organizing staff assemblies regularly to discuss, identify, and propose/follow a path of real and substantial reform, engaging various stakeholders both in the research team and the administrative structures. Members of the working group CoARA@INGV took part in the activities of the Italian National Chapter and of thematic international Working Groups to benefit from mutual learning and networking activities. One of these thematic working groups goes under the acronym TIER (Towards an Inclusive

<sup>3</sup> <https://coara.eu/> (accessed 23 December 2024).



Evaluation of Research), whose main objectives include addressing the primary sources of unconscious bias and intersectional gender discrimination in the current evaluation practices and identifying mitigation actions. INGV has a person in TIER in the role of Task Force coordinator.

A comprehensive review of biases in academia has been provided by the advice paper of the League of European Research Universities (LERU) [Gvozdanovic and Maes, 2018]. Parental leaves are an example, but not the only one. “Periods of parenting leave, returning to work part-time after pregnancy and birth or any care-related part-time employment are clearly female-connotated career patterns and are frequently thought to indicate a lower degree of career commitment. The assumption that only women will (or should) concern themselves with care responsibilities frequently goes hand in hand with the assumption that appointing women might turn out to be a liability for an organisation” [Gvozdanovic and Maes, 2018, p.10].

### **1.3 Measures against gender-based violence, including sexual harassment**

In Italy, sanctioning procedures are stated in the labour contract, thus they should be known and applicable. But, troubles persist both in denouncing on one side and in minimizing on the other. Micro-aggressions and downsizing the problem do damage. The situation is similar over countries and there is still the need “to establish a culture of zero tolerance toward sexual harassment and violence”. Changes will require time. Beyond training and awareness initiatives, concrete support from peers and top management would make a difference for the community.

In 2011, INGV adopted the first Code of Conduct against physical and psychological harassment while organizing seminars and establishing collaborations with the so-called confidential counsellors, who play a crucial role in preventing, managing and solving mobbing issues and harassment occurring in the workplaces [Sangianantoni et al., 2018].

### **1.4 Integration of gender dimension into research**

INGV is engaged in monitoring and scientific research for the understanding of several natural phenomena that impact society. At the same time, INGV performs outreach, communication and public engagement activities considering that better knowledge and awareness can mitigate the potential effects of natural hazards. The study of gender inequalities should not be limited to inequalities in the



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workplace, we have to consider how gender inequalities drive disaster risks and impacts.

Tagliacozzo and Di Tullio [2021] proposed to adopt the methodology underlying the definition of the Gender Equality Plan (GEP) in an institute to a broader application domain, such as disaster science. This approach involves, among other elements, including more women in emergency committees, who can understand and manage diverse needs.

Not all of us react in the same way, when facing an earthquake, a flood or a fire, for example. In analysing the social impact of natural phenomena, the most recent and detailed studies take into account sex, i.e. the biological characteristics, and gender, that is the behaviours dictated by society and the cultural context, which can vary over time and from country to country. It is important to be able to reflect on these differences, linked to sex for biological aspects and to the gender of individuals for behaviour, when, for example, analysing the effects of phenomena on health, access to information or the perception of risks of various nature.

Gender analysis very often arises from multidisciplinary projects, in which a team of experts from different disciplines, including sociology, investigates society's responses through targeted interviews and questionnaires, to draw inspiration from what has happened and develop future mitigation actions.

Some initial considerations stemmed from the project DIGEST - "Dimensioni di GEnere nelle Scienze della Terra" (Gender dimensions in Earth sciences), funded by INGV (Board Resolution No. 214/2021) and examples of various gendered hazards are reported in [Rubbia, 2022a,b; Rubbia and Grezio, 2024].

### **3. Conclusions and challenges in the next future**

The work aimed to highlight the evolution of gender equality concepts in the last two decades from a European perspective and to frame the experience gained by INGV during this period, as a case study of research performing organization in Italy in a STEM field like geoscience and implementing to a certain extent the positive actions suggested more broadly.

The general framework is given by the evolution of the European Charter of Researchers and the citation of relevant literature to make geoscience more diverse, equal, and inclusive. In particular, the two versions of the Charter, published in 2005 and 2023 respectively, show the evolution from an expected gender-balanced research environment towards a broader approach: from the auspice of balancing different genders in research teams and decision-making bodies, the most recent version of the Charter promotes the integration of gender dimension in research

and innovation content, combating gender-based violence and sexual harassment, and refers to Gender Equality Plans (GEPs) as tools to foster and monitor sustainable institutional changes. The choice to refer to such a set of recommendations instead of laws was dictated by the opportunity of both easily showing the evolution of the concepts at a time distance of twenty years, and giving a framework known internationally.

The cited literature includes papers addressing women's presence in the field of geoscience, still a male-dominated field with some progresses, together with works illustrating the most relevant syndromes used to describe the phenomena that negatively affect women in the workplace.

Regarding INGV, staff figures have changed slowly over the years; the distribution of male/female in research staff is similar to that of other institutes with similar missions; the male component prevails among researchers, technologists and technicians, while the female component is preponderant among the administrative staff. Comparing INGV figures of researchers and technologists at a distance of ten years (2010 - 2019), the male/female parity is almost reached at the entry level, while for levels senior roles a strong divergence persists. Nonetheless, in the last 8 years women have been present in leadership and managerial roles.

Over the years, the International Day of Women and Girls in Science represented an opportunity to showcase INGV's activities to attract more girls to geosciences. Actions have been progressively put in place, mainly driven by laws, recommendations or good practices. A Gender Equality Plan was drafted in 2021, and regularly INGV CUG participates in drafting the Integrated Plan of Activities and Organization (PIAO). Envisaged actions include the continuation of awareness campaigns and wellbeing surveys, updating of Code of conducts and confidential counsellors; actions to train all employees on gender discrimination are periodically implemented, while training helping them to recognize unconscious biases should be organized.

Structural changes take time, we will have to use it with confidence.

**Acknowledgments.** This paper is the result of many years of studies, discussions, and actions in the framework of INGV CUG, the Committee to Guarantee Equal Opportunities, Wellbeing and Non-Discrimination of workers, of women scientists networks, such as Donne e Scienza<sup>4</sup> (the Italian association of women in science), and the European Platform of Women Scientists (EPWS)<sup>5</sup>, as well as of expert groups like GeTa<sup>6</sup>, the Gender and Talent group of CNR and the

<sup>4</sup> <http://donnaescienza.it> (accessed 23 December 2024).

<sup>5</sup> <http://epws.org> (accessed 23 December 2024).

<sup>6</sup> <https://www.irpps.cnr.it/geta-osservatorio-su-genere-e-talenti/> (accessed 23 December 2024).

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