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Agenzia Nazionale di Valutazione del  
sistema Universitario e della Ricerca

Evaluation of Research Quality



Valutazione Qualità della Ricerca

# Evaluation of Research Quality 2011-2014 (VQR 2011-2014)

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**Criteria for the Evaluation of Research Products**

**Group of Evaluation Experts**

**for Area 04 Earth Sciences (GEV04)**

**DRAFT 16 Jan, 2016**



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## 1. Introduction

This document describes the organization of the Group of Evaluation Experts for the *Earth Science* Area (hereinafter GEV04) and the criteria of the evaluation process used by GEV04. The document is divided in eight parts. Section 2 lists the *Academic Discipline* (SSD – Academic Discipline), the *Academic recruitment* and the ERC Sectors that are relevant for GEV 04. Section 3 summarizes the internal operating rules of GEV04. Section 4 describes the evaluation criteria for the research products. Section 5 describes the peer review process and guidelines for the selection of external reviewers. Section 6 describes the bibliometric criteria: the databases, the bibliometric indicators, the algorithm and the calibration procedure. Section 7 describes the evaluation criteria for specific products. Finally, Section 8 describes how to solve potential conflicts of interest between GEV04 members and authors of research products.

## 2. Delimitation of the GEV Area

The GEV04 will handle the evaluation of products submitted by the Institutions for the researchers belonging to the *Academic Discipline* (SSD – scientific sector), *Academic recruitment* (SC) and ERC Sectors (ERC) for the Area Earth Science listed in Tables 1-3.

As reported in the Ministerial Decree (DM) and in the VQR call, research workers are intended for researcher, associate professor, and full professor among University personnel, and researcher/technologist, first researchers/technologist, director of research/technologist among personnel of research institutions. Moreover, University professors and researchers formally affiliated to research institutions are included in the term “research workers”.

	Area 04 Earth Sciences <i>Academic Discipline list (SSD)</i>
GEO/01	PALEONTOLOGY AND PALEOECOLOGY
GEO/02	STRATIGRAPHY AND SEDIMENTOLOGY
GEO/03	STRUCTURAL GEOLOGY
GEO/04	PHYSICAL GEOGRAPHY AND GEOMORPHOLOGY



GEO/05	ENGINEERING GEOLOGY
GEO/06	MINERALOGY
GEO/07	PETROLOGY AND PETROGRAPHY
GEO/08	GEOCHEMISTRY AND VOLCANOLOGY
GEO/09	MINING RESOURCES, MINERALOGIC AND PETROGRAPHIC APPLICATIONS FOR THE ENVIRONMENT AND FOR CULTURAL HERITAG
GEO/10	SOLID EARTH GEOPHYSICS
GEO/11	APPLIED GEOPHYSICS
GEO/12	OCEANOGRAPHY AND PHYSICS OF THE ATMOSPHERE

**Table 1. The relevant Academic Discipline (SSD) for Area 04 Earth Sciences**

	<b>Area 04 Earth Sciences</b> <i>Academic recruitment</i>
04/A1	GEOCHEMISTRY, MINERALOGY, PETROLOGY, VOLCANOLOGY, EARTH RESOURCES AND APPLICATIONS
04/A2	STRUCTURAL GEOLOGY, STRATIGRAPHY, SEDIMENTOLOGY AND PALEONTOLOGY
04/A3	ENGINEERING GEOLOGY, PHYSICAL GEOGRAPHY AND GEOMORPHOLOGY
04/A4	GEOPHYSICS

**Table 2. The relevant Academic recruitment (SC) for Area 04 Earth Sciences, macro-sector 04/a Geoscience**

	<b>Area 04 Earth Sciences</b> European Research Council (ERC)
PE10_1	Atmospheric chemistry, atmospheric composition, air pollution
PE10_2	Meteorology, atmospheric physics and dynamics
PE10_3	Climatology and climate change
PE10_4	Terrestrial ecology, land cover change,
PE10_5	Geology, tectonics, volcanology
PE10_6	Paleoclimatology, paleoecology
PE10_7	Physics of earth's interior, seismology, volcanology
PE10_8	Oceanography (physical, chemical, biological, geological)
PE10_9	Biogeochemistry, biogeochemical cycles, environmental chemistry
PE10_10	Mineralogy, petrology, igneous petrology, metamorphic petrology
PE10_11	Geochemistry, crystal chemistry, isotope geochemistry,

	thermodynamics
PE10_12	Sedimentology, soil science, palaeontology, Earth evolution
PE10_13	Physical geography
PE10_14	Earth observations from space/remote sensing
PE10_15	Geomagnetism, paleomagnetism
PE10_16	Ozone, upper atmosphere, ionosphere
PE10_17	Hydrology, water and soil pollution
PE10_18	Cryosphere, dynamics of snow and ice cover, sea ice, permafrosts and ice sheets
SH5_7	Museum and exhibitions
SH5_11	Cultural heritage, cultural memory
SH6_1	Archaeology, archaeometry, landscape archaeology

**Table 3. The relevant ERC sectors (ERC) for Area 04 Earth Sciences**

### 3. Organization of the GEV

The GEV 04 is organized as follows:

#### 3.1 GEV 04 composition

Surname	First name	ENTE	Rule	SSD
FREZZOTTI	MASSIMO	ENEA Roma	Coordinator	GEO/04
BONACCORSO	ALESSANDRO	INGV Catania	Member	GEO/08
CARCIONE	JOSE' MARIA	OGS Trieste	Member	GEO/11
CROSTA	GIOVANNI	Univ Milano Bicocca	Member	GEO/05
DOGLIONI	CARLO	Univ Roma La Sapienza	Member	GEO/03
FEDI	MAURIZIO	Univ Napoli Federico II	Member	GEO/11

FUZZI	SANDRO	CNR-ISAC Bologna	Member	GEO/12
GARZANTI	EDUARDO	Univ. Milano Bicocca	Member	GEO/02
GUZZETTI	FAUSTO	CNR-IRPI Perugia	Member	GEO/04
MATTEI	MASSIMO	Univ Roma Tre	Member	GEO/03
MORELLI	ANDREA	INGV Bologna	Member	GEO/10
MORRA	VINCENZO	Univ Napoli Federico II	Member	GEO/07
OBERTI	ROBERTA	CNR-IGG Pavia	Member	GEO/06
RAFFI	ISABELLA	Univ. Chieti	Member	GEO/01
RAMPONE	ELISABETTA	Univ. Genova	Member	GEO/07

**Table 4. GEV04: coordinator, members, relative Institutions and SSDs.**

### 3.1 Assignment of research products within the GEV

The attribution of the research products among the members of the GEV04, in charge to oversee them evaluation, is based on the SSD suggested by the author who submitted the product. This SSD may differ from author's SSD. Each product will be assigned by the Coordinator to two members which best fit to the evaluation. GEV04 could assign a product to a different GEV if contents will result more appropriate, and evaluation will follow the criteria established for the new GEV.

If the same product is allocated in two distinct GEV, for example if two co-authors suggest two different SSD, it will be evaluated according to the Rules for Evaluation Experts Groups of VQR (Section 3.2). If needed, the Coordinators of the involved GEV involved will establish an Inter-Area *ad hoc consensus group*.



### 3.2 Rules of GEV04

The operating rules of GEV04 are recalled as follows:

- the Coordinator calls the meeting of GEV04 and set the agenda with 15 days before;
- the decisions are taken by a qualified majority among members who attend the meeting (physically or in telematics way). Discussion and vote on decisions can be done via web or phone connection;
- the Assistant assigned by ANVUR to GEV04, Anna Barbara, attends the GEV meetings, with secretariat functions and without suffrage. At the end of each meeting, minutes and a synthetic report outlining the main decisions will be drafted, circulated among GEV members, approved by the Coordinator and then sent to ANVUR to be archived.

## 4. Evaluation procedure

The evaluation of products by GEV04 follows the *informed peer review methodology (IR)*, which consists in employing different, and possibly mutually independent, evaluation methods. GEV 04 has to harmonize the methods, and has responsibility for the final evaluation.

The evaluations methods are:

- Bibliometric analysis, performed following the procedure described below in this document (Section 6). Research products under bibliometric analysis are not *automatically* assigned to the merit classes established by the *Ministerial Decree (DM)* and by the VQR Call. Instead, the assignment is based on the accomplished judgment of GEV 04, which will employ any possible evaluation means beside bibliometric indicators, as the expertise of its members and information reported in the overview forms associated with the products.
- Peer review evaluation by (usually two) external reviewers independently selected by two different GEV04 Members.



- Direct evaluation by the GEV04, which can conduct an internal peer review following the same procedure described for external peer review (two GEV04 members will be involved).

## **5. Peer review evaluation**

Each research product that should be evaluated through peer review will be sent to two external reviewers, chosen independently by the two Members to whom the product was assigned.

Alternatively, a product will be evaluated within the GEV according to the same procedure, providing that the necessary expertise is available and that no conflict of interest is present.

### **5.1 Selection of external peer reviewers**

Given its relevant aim devoted to the public interest, the selection of external reviewers, Italian or foreign, is aligned to the principle of loyal institutional cooperation, dispassion, objectivity and impartiality.

Anonymity of the reviewers is worthy of special consideration, either during preparation of the list of reviewers and at during the evaluation process. The results of the evaluation of single products and the link with the reviewer are not public. The list of the reviewers will be published by ANVUR within 30 days of the publication of the VQR Final Report.

The reviewers are chosen among the most authoritative academics and specialists, owning scientific skills with respect to the disciplines of the products of research submitted to the GEV. They are expected to have been active in research during the time period covered by the VQR.

Starting from MIUR reviewer archive REPRISE, GEV 04 will set up an updated list of external reviewers, which satisfy the scientific requirements. The list will be implemented with new reviewers selected by GEV04. Specifically, the Coordinator will ask GEV members to suggest a significant number of experts in line with the required standards and available for the evaluation. The Coordinator will collect suggestions of other reviewers together with information on their qualification, and will set up a proposal form for compiling a revised list of reviewers, to be approved by the GEV.

These process of integration go on for all the duration of the VQR.





In order to reduce potential conflicts of interest, GEV04 will employ, whenever possible, reviewers from foreign universities and institutions.

Rather than internal reviewers chosen among GEV04 members, GEV04 will preferably employ, whenever possible, external reviewers.

## 5.2 Evaluation peer

The evaluation peer can be done by internal reviewers selected among the members of the GEV, or by external reviewers. The evaluation form will permit to assign a score based on the three evaluation criteria established by the DM and the VQR Call, namely: originality, methodological rigor, and attested, or potential, impact. The form also includes an empty space for a brief comment, to summarize a motivation of the answers provided to questions.

GEV04 will translate the indications from the evaluation form into one of the five classes defined in the DM and VQR Call, as follows:

*A) Excellent (score 1):* the product is at high level in terms of originality and methodological rigor, and has achieved (or is prone to achieve) strong impact within the international and/or national scientific community of reference. Ideally, the research product is placed in the highest 10% of the distribution of the international scientific research production of the Area.

*B) Good (score 0.7):* the product is at good level in terms of originality and methodological rigor, and has achieved (or is prone to achieve) a significant impact within the international and/or national scientific community of reference. Ideally, the research product is placed in the 10-30% segment of the distribution of the international scientific research production of the Area.

*D) Fair (score 0.4):* the product reaches a fair level in terms of originality and methodological rigor, and has achieved (or is prone to achieve) an appreciable impact within the international and/or national scientific community of reference. Ideally, the research product is placed in the 30-50% segment of the distribution of the international scientific research production of the Area.

*C) Acceptable (score 0.1):* the product reaches a sufficient level in terms of originality and methodological rigor, and has achieved (or is prone to achieve) a limited impact within the international and/or national scientific community of reference. Ideally, the research product is in the 50-80% segment of the distribution of the international scientific research production of the Area.



E) *Limited*: the product reaches a low level in terms of originality and methodological rigor, and has achieved (or is prone to achieve) a very limited impact within the international and/or national scientific community of reference. Ideally, the research product is in the 80-100% segment of the distribution of the international scientific research production of the Area.

If the reviewers' judgments disagree, the GEV creates an internal group, termed *Consensus group* which defines the final level through the methodology called *consensus report*. If needed, the *Consensus group* can ask the judgment of a third expert. In case the *Consensus group* is unable to take the final evaluation, the Coordinator will be included in the *Consensus group*.

In any case the final judgment of each product submitted to each GEV is own responsibility of that GEV.

## 6. Bibliometric analysis

All the products published on journals with indexes on ISI Web of Science by Thomson Reuters (WoS) and Scopus by Elsevier (Scopus) databases are suitable for the bibliometric analysis, in particular:

- Scientific article, in form of *Articles*, *Letters* or *Proceedings* Papers published in scientific journals
- Scientific papers of critical review of the literature (Review)

The 10% of the papers submitted to the bibliometric analysis will be randomly chosen by the GEV and will be evaluated also with a peer review, in order to quantify the correlation between the two methods.

### 6.1 The Databases

The GEV 04 will use WoS and Scopus as databases, following the *Journal Metric* (JM) indicators as reported by the author / institution in the product sheet.

### 6.2 Temporal shift for citations

For computation of bibliometric indicators, GEV04 will use the numbers of citations updated on 29 February 2016.



### 6.3 The self citations

The GEV04 examines each product with the self-citations and assesses the final level according to the classes of merit described above. Moreover, if the number of self-citations exceeds the 50%+1 of the total number of citations, the product will be evaluated through informed peer review (IR).

### 6.4 Bibliometric indicators

For all the articles published on indexed journals in WoS and Scopus databases, the evaluation will use an algorithm which considers number of citations and JM impact indicators of the hosting journal related to the publication year.

Consistent with the approach of the international scientific community of the bibliometric sector, and considering the different outputs of available systems to calculate the impact of a journal,

the GEV04, following the recommendation of the Working Group on bibliometric evaluation decided to employ more than one indicator of JM. In particular, for each database, will be used an indicator to measure the popularity of the journal (its definition is based on citations that are computed independently from the origin of each citations) and the prestige of the source of publication (its definition includes citations weighted on the basis of authoritativeness of the publication source).

The impact indicators proposed for the evaluation are listed below:

- for WoS (<https://www.webofknowledge.com>): 5-year Impact Factor (5YIF) and Article Influence (AI)<sup>1</sup>;
- for Scopus (<http://www.journalmetrics.com>): Impact per Publication (IPP) and SCImago Journal Rank (SJR)<sup>2</sup>

For each product, the author/institution will be asked to indicate compulsorily the preferred database (WoS or Scopus) and one impact indicator, between the two associated with it that will be used for evaluation.<sup>3</sup>

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<sup>1</sup> The choice of the 5YIF instead the well-known impact factor (IF) is made because a) the first has more stability, and b) the time frame in which citations are considered (5 years) is the same used for the AI.

<sup>2</sup> The time window in which the citations are considered is 3 years for both indicators. Moreover, the definition of IPP is the same as the 5YIF while definition of the SJR is very similar to that of the IV, although not identical.



## 6.5 The algorithm for classifying products

The algorithm used for the classification of the articles according to the 5 classes of merit (as defined in the DM and VQR Call) is based on a combined use of a bibliometric indicator (JM, measuring the impact of the journal in which the article is published) and the indicator citation (CIT, measuring the impact of the single item). The relative weight of the two indicators varies, depending on the year of publication. Each article is evaluated within a specific reference category (see details below), and the algorithm is calibrated based on the year of publication. The evaluation procedure in the reference category is calibrated in advance, in order to guarantee the probability *ex ante*, at international level, that each article of a particular category, and published in a given year, will fall into one of the classes of evaluation, according to the following percentages:

- A) score 1: the article is at the highest level according to bibliometric analysis and is ranked in the top 10% of the distribution of the international scientific research production of its Sc/ASJC.
- B) score 0.7: the publication has a significant impact on the basis of bibliometric analysis and is ranked in the 10-30% segment of the distribution of the international scientific research production of its Sc/ASJC.
- C) score 0.4: the publication has a fair impact on the basis of bibliometric analysis and is ranked in the 30-50% segment of the distribution of the international scientific research production of its Sc/ASJC.
- D) score 0.1: the publication has a acceptable impact on the basis of bibliometric analysis and is ranked in the 50-80 % segment of the distribution of the international scientific research production of its Sc/ASJC belongs.
- E) score 0: the publication has a very limited impact on the basis of bibliometric analysis and is ranked in the 80-100% segment of the distribution of the international scientific research production of its Sc/ASJC.

The indication of the percentiles that reflects the classes of merit, does not refer to the expected percentage of the assessment of the products presented for VQR. The assessment of individual products is not comparative: each product will be placed in a class regardless of location of the other products.



The first step in the evaluation process is the identification of the reference category (hereinafter Sc), known as Subject Category (Sc) in WoS and All Science Journal Classification (ASJC) in Scopus. A journal can belong to one or more Scs, the indication of which is specified by the author/institution who proposed the product. However, this indication is not binding and can be modified by GEV04 if contents of the article result more relevant to another category that the journal belongs to.

A multidisciplinary category is present both in WoS (*Multidisciplinary Sciences*) and in Scopus (*Multidisciplinary*), and includes journals as Nature, Science, etc., all characterized by a plurality of scientific arguments. Articles published in a journal that is included only in this multidisciplinary category will be reassigned to another category on the basis of (i) the citations reported in the article and (ii) the references made in article. Specifically, for each quoted/quoting journal a category will be identified and subsequently chosen by majority. In this way, the publication will be compared with publications in the same subject area and / or disciplinary. Through placement in the new Sc, the article will bring the JM of the journal and the number of citations received, without changing the distribution of the new Sc/ASJC. The same procedure will be adopted for the journals appearing only in other multidisciplinary subject categories of WoS and Scopus.

For the bibliometric analysis, GEV04 identified the following main reference Sc/ASJC for the sector “Earth Sciences”:

**Subject category** Web of Science

Crystallography  
Engineering, Environmental  
Engineering, Geological  
Engineering, Petroleum  
Environmental Sciences  
Geochemistry & Geophysics  
Geography, Physical  
Geology  
Geosciences, Multidisciplinary  
Limnology  
Materials Science, Ceramics  
Meteorology & Atmospheric Sciences  
Mineralogy  
Mining & Mineral Processing



Oceanography  
Palaeontology  
Remote Sensing  
Soil Science  
Water Resources

*All Science Journal Classification (ASJC) Scopus*

Archaeology  
Atmospheric Science  
Computers in Earth Sciences  
Conservation  
Earth and Planetary Sciences (miscellaneous)  
Earth-Surface processes  
Economic Geology  
Environmental Science (miscellaneous)  
Environmental Chemistry  
Geochemistry and Petrology  
Geology  
Geophysics  
Geotechnical Engineering and Engineering Geology  
Global and Planetary Change  
Nature and Landscape Conservation  
Oceanography  
Palaeontology  
Pollution  
Soil Science  
Space and Planetary Science  
Stratigraphy  
Water Science and Technology

## 6.6 Calibration procedure

The calibration of the bibliometric algorithm is a function of the specific *Sc*/ASJC in the specific year analysed. Moreover, the algorithm distinguishes the typology journal article and letter from review, calculating empirical cumulative distributions differentiated for the different number of citations that reviews typically receive.

The empirical cumulative distribution of the bibliometric indicator (*JM*) relative to the journals belonging to the *SC*/ASJC identified, for the year of publication of the evaluated article, is



calculated and a percentile for each journal is assigned. Subsequently, it is calculated the empirical cumulative distribution function of the number of citations CIT of all articles published by the journals belonging to the SC identified and is assigned a percentile to each article. Each item has two associated percentiles. The two percentiles obtained represent a point in the area  $Q = [0.1] \times [0.1]$  of the coordinate plane, bounded by JM percentile of the journal (X-axis) and percentile of quotes CIT (Y axis). Then, Q is subdivided into five zones or regions to ensure that they comply with the percentage of products belonging to each region, as defined in the VQR Call. The subdivision is accomplished by simple lines identified by:

$$CIT = A \cdot JM + B_n$$

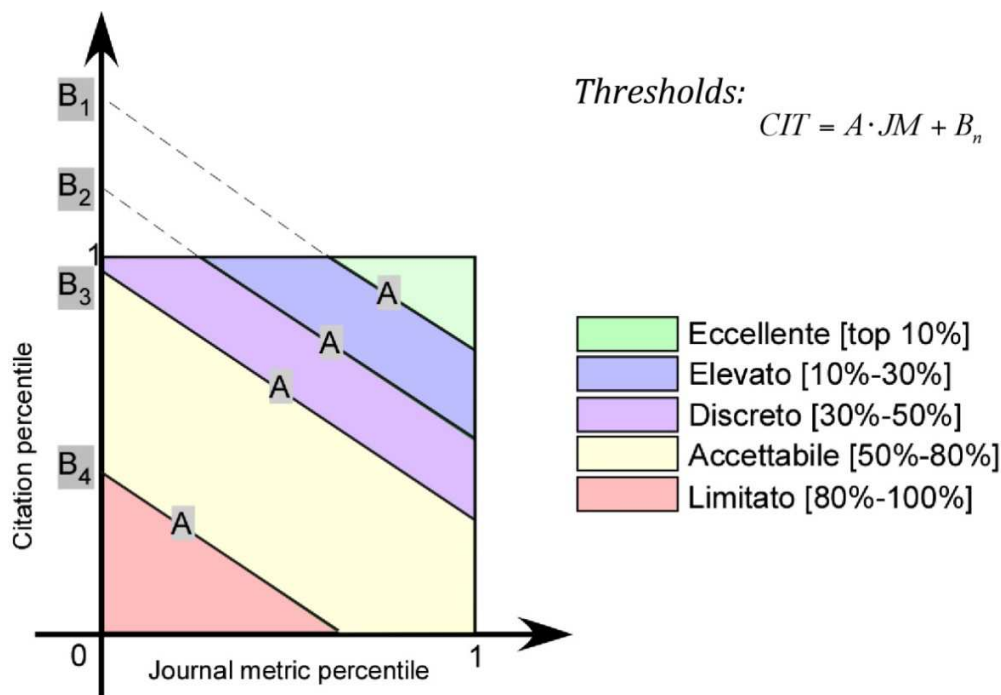
For each of the examined years, the angular coefficient of the straight lines, delimiting the zones, (A) is imposed equal for all the lines and all the SC/ASJC, in order to increase the homogeneity of the adopted criterion. The intercepts ( $B_n$ ) are calculated by ANVUR, depending on the distribution of each category, to ensure that the established percentages are met. An example of a subdivision of Q in the 5 zones is shown in Figure 1. Although the distribution of the articles vary from one category to another and from one year to the next, the algorithm allows to obtain a calibrated assessment.

The slope of the threshold lines (A) is established by each GEV. This has a crucial role because, depending on the value of A, the final classification will rely more on percentile of citations (gradients  $< 1$  in absolute value), or on percentile of the metric of the journal (gradients  $> 1$  in absolute value). In Figure 1, a horizontal line corresponds to an evaluation based only on the citation percentile. According to current literature on the proper use of bibliometrics for evaluation<sup>4</sup>, the use of very steep slopes (generally  $> 1$ ) should be avoided as much as possible, given that it is impossible to use the only JM of a journal as proxy for the impact of an article published in it. In other words, as far as possible, values of (A)  $< 1$  (in absolute value) have to be used, in order to advantage the information provided by the CIT, that is a measure of impact at the level of the individual evaluated product (*article level metric*). This choice is however not absolute, but depends on the different citation practices of the various disciplines / community, as well as on the number and composition of the Sc, which make it more or less reliable, with decreasing of the year of publication, the information provided by the data citation.

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<sup>4</sup>E.g., *San Francisco Declaration on Research Assessment (DORA)* - <http://www.ascb.org/dora/> - and “IEEE Statement on Appropriate use of Bibliometric Indicators” - [https://www.ieee.org/publications\\_standards/publications/rights/bibliometrics\\_statement.html](https://www.ieee.org/publications_standards/publications/rights/bibliometrics_statement.html).

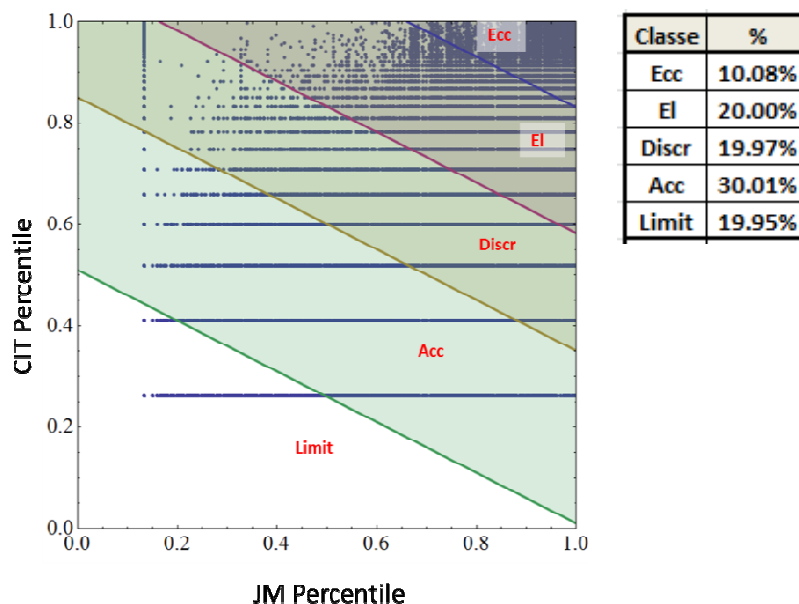




**Figure 1.** Representation of all articles published in a given Sc in a particular year in percentiles. Each publication is positioned in the plane depending on the percentile of the indicator of the impact of the magazine JM (horizontal axis) and the percentile of the number of citations CIT (vertical axis). The plan is divided into five areas according to the percentages shown in the VQR Call. The angular coefficient of the straight lines delimiting the zones is fixed equal for all the lines. The  $B_n$  intercepts are calculated by ANVUR, depending on the distribution of the particular SC, to ensure that the established percentages are met.

Figure 2 shows the calibration of a Sc through four parallel lines. The slope of -0.6 was chosen in order to prioritize the weight of citations in the final evaluation. As shown in the figure, the points that represent the articles of the Sc/ASJR are distributed unevenly. By appropriate selection of the intercepts' values, the percentages of the VQR Call are fully complied. It follows that the specific article submitted to the VQR has an evaluation that always refers to the percentile of the "international scientific production environment in its own region."





**Figure 2.** Example of application of the bibliometric algorithm to a Sc sample. The division of the sub-space Q is done through parallel lines in order to reflect the percentage defined in the VQR call applying the algorithm to the world population of the specific Sc/ASJC.

On the basis of the results of numerous simulations performed by the Working Group (WG) on bibliometric evaluation, GEV04 believe that citation data are stable enough starting from 2013 publication year. Therefore, the slopes to be used in the different years are the following:

- 2011:  $-0.4$
- 2012:  $-0.6$
- 2013:  $-0.9$
- 2014:  $-1.5$

Note that, in order to avoid corrupted results, these values may vary by a maximum of 30%, as resulting from further simulations performed by WG on bibliometric evaluation<sup>5</sup>.

There are borderline cases in which articles are published in journals of high prestige but receive few citations (corresponding to the area at the bottom right in Figure 2) or are published in journals with low JM value but with a high citation impact (corresponding to the upper left area in Figure 2). In such cases, the evaluation procedure will take place through *informed peer*

<sup>5</sup> How, for example, can be classified into class Etc. Top- 10% products that have not received any summons.

review (IR). To identify this type of articles, it is sufficient to track two additional lines, with a positive slope, which identify the areas at the top left and bottom right of Q (see Figure 3).

To identify this type of articles, GEV04, in agreement with the other GEV of bibliometric areas, draws two straight lines with positive slope (see example in Figure 3), so that two triangles are delineated. The triangle in the upper left is determined by the left and top sides of Q with the straight line connecting the point (0; 0.5) with the intersection between the borderline of the classification area “Top -10%” and the top side of Q. The triangle at the bottom right is an isosceles triangle that delineates the 5% of products for years 2011 and 2012 and the 7% of products for year 2013.

Finally, given the low numerical strength of citations for articles published in 2014, the GEV04 decided to submit to informed peer review (IR) all the articles published in 2014 that do not have a final evaluation “Top-10%” on the basis of the proposed algorithm.

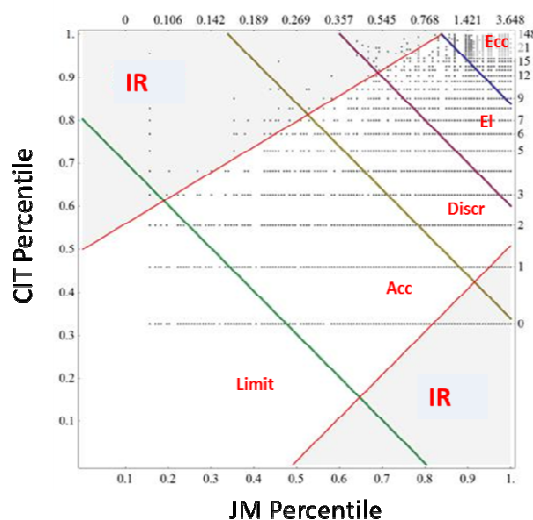


Figure 3. . Example of the uncertain definition of the areas that will be managed through *informed peer review* (IR).



## 7. Other products

The GEV 04, after examination of the various types of product indicated in the VQR 2011-2014 Call and approved by the ANVUR Board of Directors on November 11, 2015, established the following types of products eligible for the research area 04 “Earth Sciences”:

1. Scientific monographs and related products, limited to:

Research monography

Critical handbook, non purely educational

2. Journal article, limited to:

Scientific article

Review essay

Letter <sup>(10)</sup>

3. Article in a volume, limited to:

Article in a volume (Chapter or Essay)

Scientific article in Proceedings of Conference with peer review

Volume editor with introductory essay

Catalogue with introductory essay

Critical entrance in dictionary or encyclopaedia

4. Other types of scientific products (with clear statement on the publication date), limited to:

Exhibitions and Shows

Database and software

Thematic maps

5. Licensed patents within the time interval considered for VQR (01/01/2011-31/12/2014)



The patents will be evaluated through peer review performed by national and foreign experts. For the evaluation, value will be added if the patent has already been assigned or licensed to a company and/or used by industry and/or a research institution.

Other research products listed in Ministerial Decree are considered not eligible for evaluation because not related to the research sector “Earth Sciences”.

Internal reports are not eligible for evaluation, even though published with ISSN. Abstracts related to congress Proceedings will not be considered eligible for evaluation, even though published with ISSN (category F of the call).

## 8. Conflicts of interest

The members of GEV04 abstain from evaluating or assigning to other members or reviewers the following:

- products of whom are author or co-author
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