COMMUNICATING EARTHQUAKE INFORMATION TO THE PUBLIC IN ITALY: 10 YEARS OF INGV terremoti

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FOREWORD

- Communicating earthquake scientific information is very important in countries like Italy, where seismic sequences are frequent, seismic risk is high, and people's perception of risk is strongly affected by fear.
- After the 2009 earthquake in L'Aquila (central Italy), which claimed 309 casualties and triggered a long lasting dispute among scientists, journalists, citizens, including a suite of criminal and civil trials involving scientists and civil protection officers, the scientific and risk communication in Italy (not only on earthquakes) was facing a crossroad.
- The first choice (feared at that time by many reporters) was to minimize or even elude public communication, in order to avoid misunderstandings and involvement in litigations.
- The second possibility was to increase the efforts in public communication, getting closer to citizens.

INGVTerremoti 2009-2020

- INGV definitely opted for the second choice.
- In the past ten years the INGVterremoti platform has augmented and differentiated its activities on the web and social media, substantially increasing the number of involved people, which amounts today to several hundreds thousand citizens. The platform consists of a coordinated suite of social media channels, including Facebook, Twitter, Youtube and a blog (on wordpress), where we publish both updating during earthquake sequences and scientific topics.
- Our end users are mostly citizens, but also media and authorities. Our tweets on earthquake activity are often in the first pages of web and TV news magazines.

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2018-2020: AUTOMATIC SOLUTIONS

- In September 2018, we started publishing automatic locations/magnitudes for earthquakes in Italy with magnitude equal to or larger than 3, after a careful analysis of the thresholds and of the best format to use, in order to warrant message understandability and to minimize false or incorrect information.
- This issue is very critical both to provide the best and fastest information to citizens, and to increase people's trust in scientific information and institutions. These are often blamed by citizens and by media when contradictory information is offered to the public.
- We will present an analysis of the first 18 months of this testing phase, which has been widely appreciated by the public.

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A COMBINED PLATFORM FOR RELEASING INFORMATION ON EARTHQUAKES IN ITALY

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l'informazione sui terremoti

TWITTER	FACEBOOK	YOUTUBE	BLOG	APPLE IOS + Android
open since 2009	on line from may 2013	on line from february 2010	open since may 2012	Avaible on Apple Store since march 2011
255.700 followers	211.600 friends	12.200 members	700 posts published	900.000 downloads
24.480 tweet published	bidirectional communication	5.640.901 views	48.000.000 views	last update 2019, new version in 2020

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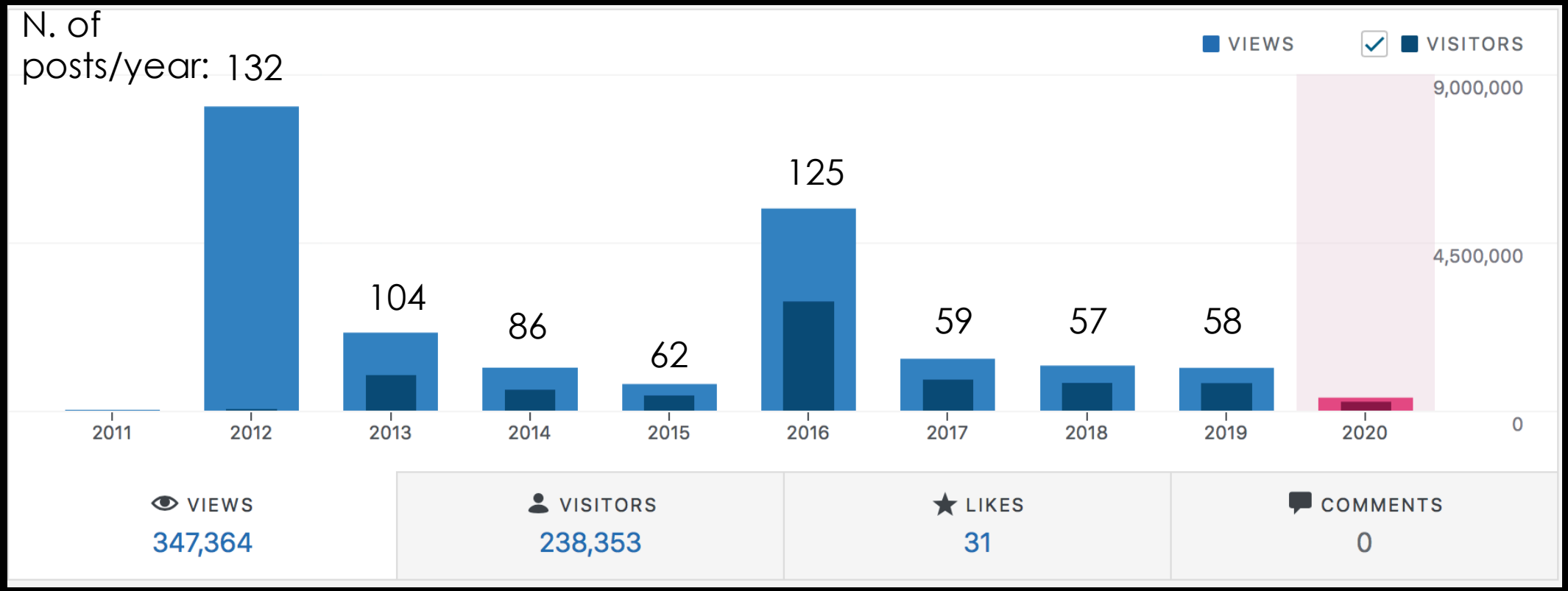
EQ INFO: STRONG VARIATIONS THROUGH TIME (BLOG) 2012-2020



After 2016: higher number of visitors on average

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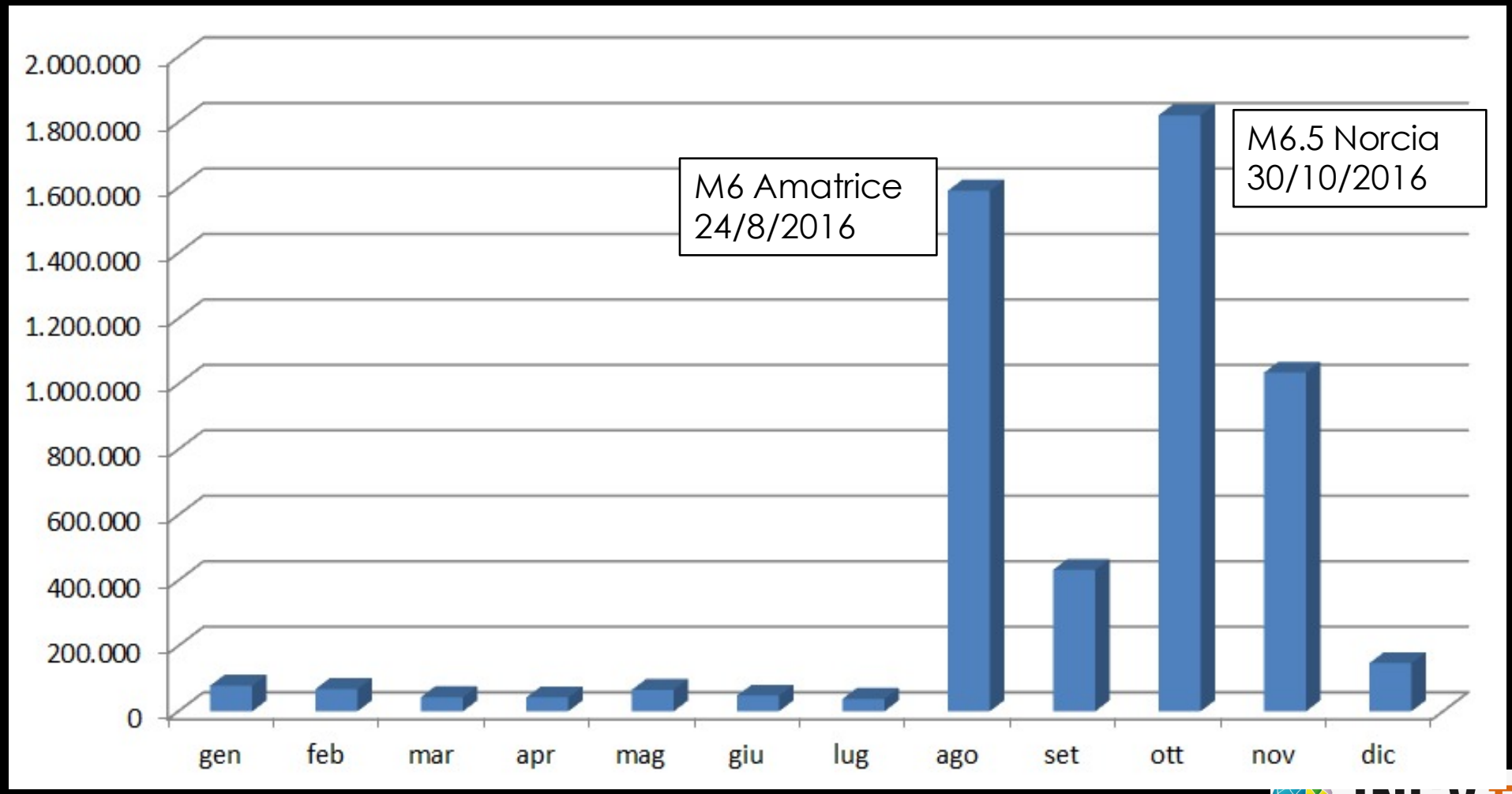
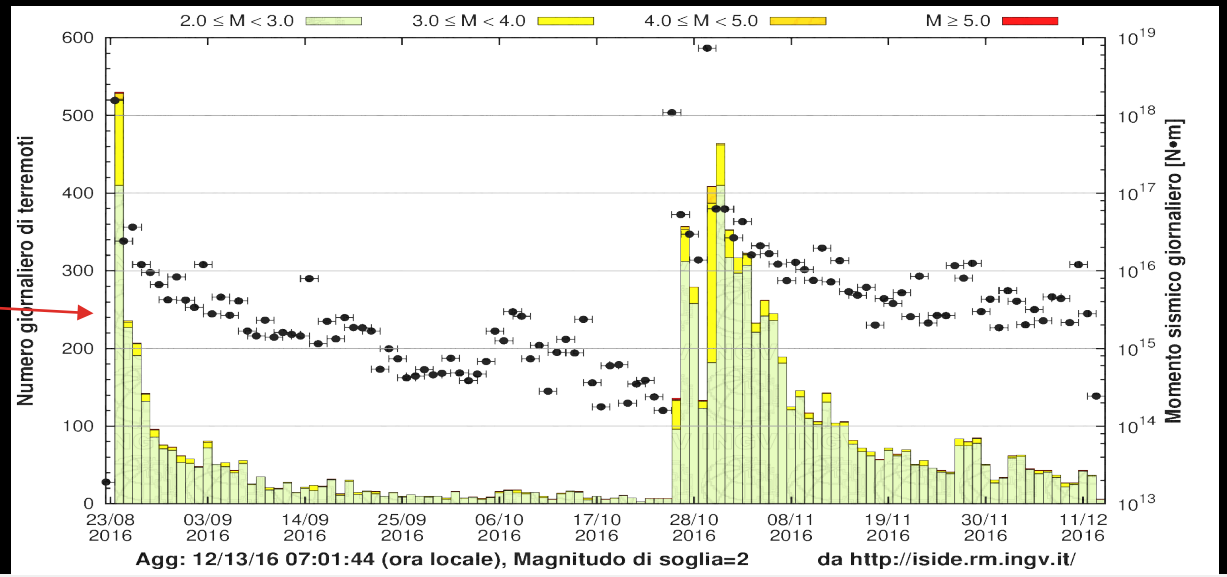
STRONG VARIATIONS THROUGH TIME (BLOG) DURING 2016



OMORI'S LAW APPLIES TO PEOPLE'S ATTENTION FOLLOWING THE TREND OF SEISMIC ACTIVITY

Seismic activity during 2016 in Central Italy (number of eqks and seismic moment release)



Visitors at the INGVterremoti blog

IN 2020, NEW STRUCTURE OF INGVTERREMOTI - BLOG → MAGAZINE

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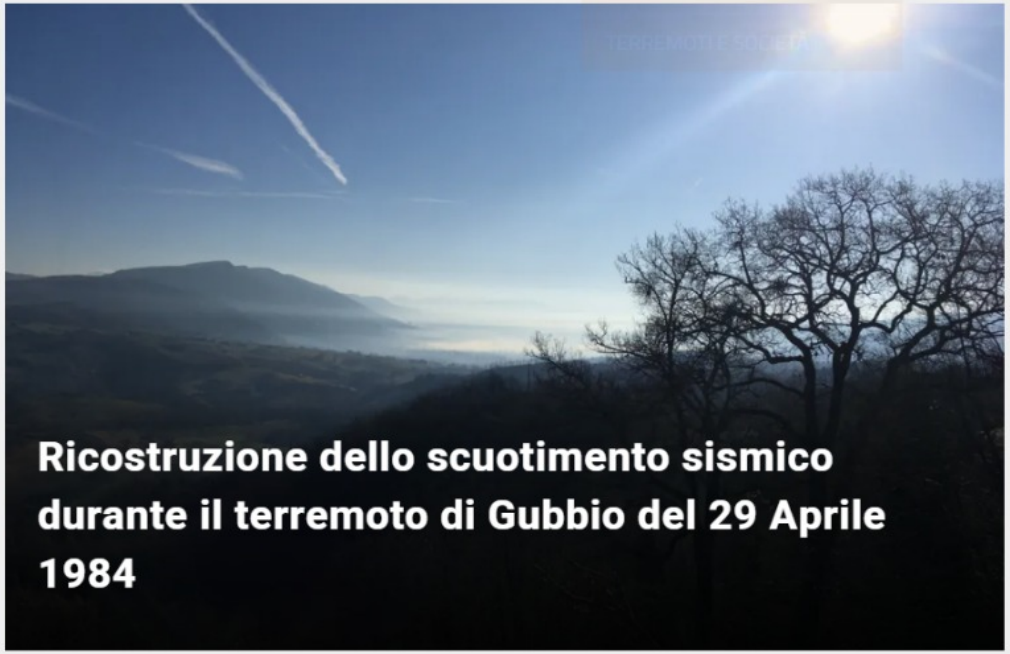
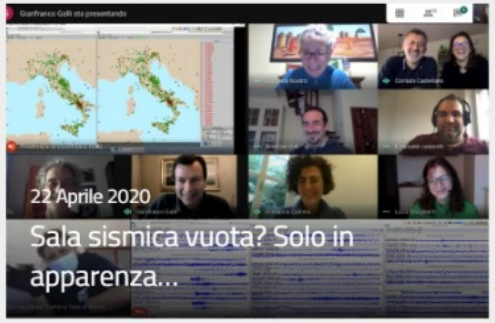
CHI SIAMO | ALLA SCOPERTA DEI TERREMOTI | GLOSSARIO | COMUNICAZIONE E DIVULGAZIONE | RUBRICHE | CONTATTI | giovedì, Aprile 30 2020

TERREMOTI IN ITALIA | TERREMOTI NEL MONDO | TERREMOTI NELLA STORIA | MONITORAGGIO E ATTIVITÀ IN EMERGENZA | PERICOLOSITÀ E RISCHIO | MAREMOTI





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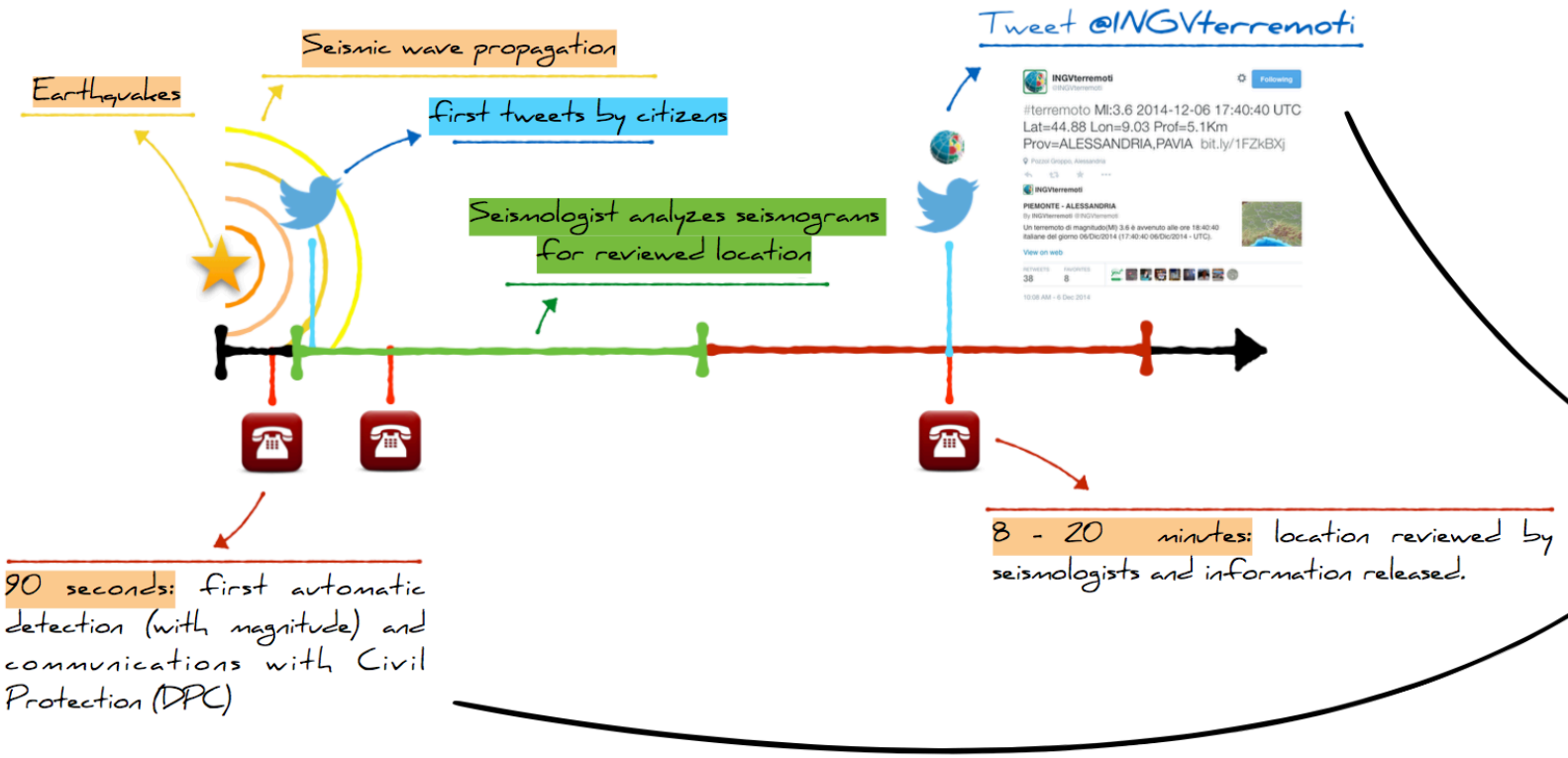
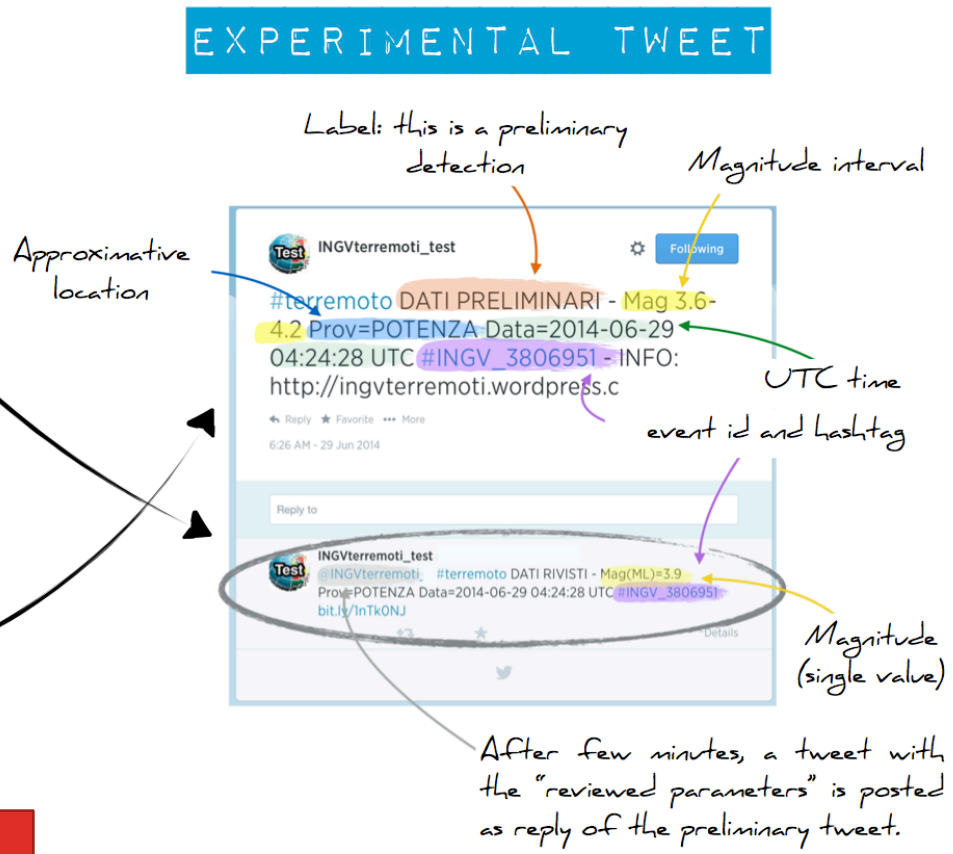
PUBLISHING AUTOMATIC SOLUTIONS 2013-2018: A LONG PATH

- A study on the semantics:
  - Automatic solution vs. Preliminary estimate
  - Zone/Province vs. Municipalities
  - Magnitude range instead of single values

- Steps:
  - Link to a post with explanations, FAQs, etc.
  - Discussion with Civil Protection

CONCEPTUAL SCHEME FOR TWITTING AUTOMATIC SOLUTIONS (from: AGU 2014)





INGV: Timeline of locations and communications to Civil Protection

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THE ONLINE SURVEY (from: AGU 2014)

as reply of the preliminary tweet.

ONLINE SURVEY: 28 JULY 2014 - 12 SEPTEMBER 2014

WHY:

Recent episodes show that "evolving" value of earthquake parameters are seen as: "errors due to ineptitude", "you are hiding the truth", "conspiracy to sedate". Tweeting the automatic detection could increase the risk of debates around magnitude and conspiracy theory (sic!)

GOALS:

- ☐ Improving the comprehension of @INGVterremoti tweets and timeline, especially of the automatic detection experimental tweets
- ☐ Selecting words, structure and information of automatic detection experimental tweets
- ☐ Educating citizens and media to the automatic detection experimental Tweets (and earthquake parameters as evolving estimate)

SURVEY: https://ingvterremoti.typeform.com/to/bahSfj (sorry in Italian)

- ☐ 51 questions, not easy, 10000+ access to the presentation of the survey, 2400+ access to the survey, **1244 complete response**
- ☐ 67% Male, 42% Academic degree, 5% Phd (0.7% geology or geophysics): it is not a representative sample of Italian population
- ☐ Evaluation of basic knowledge in seismology (question about difference of magnitude/intensity and Ml5/Ml6 in size)

good general comprehension of all the proposed of tweet (better a **conversational** structure)

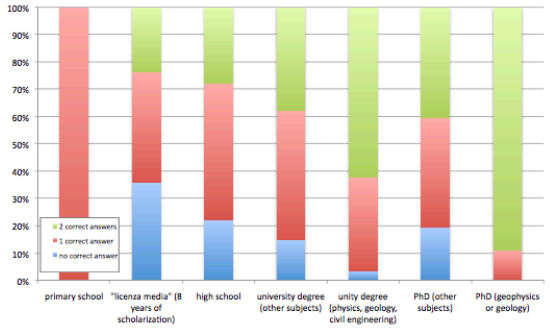
60% **wrong** understanding of **UTC** time (are we going local?)

for 35% it is **complicated** to find the corresponding automatic and reviewed tweets

80% want an estimation of **damages** and casualties (only 45% requested intensity)

only 28% understand correctly the **hashtag** id (too tech?)

after a felt event, **92%** want official information in **2 minutes**
(4% only reviewed tweet, 0.3% no information at all)



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2018: AFTER SOME YEARS OF TESTING AND INTERACTION WITH CIVIL PROTECTION…

AUTOMATIC SOLUTION

- [PRELIMINARY ESTIMATE]
- Magnitude range instead of single value
- Zone/Province instead of precise location

REVIEWED SOLUTION (reply to automatic)

- [REVISED DATA]
- Magnitude ML
- km from closest municipality
- Depth

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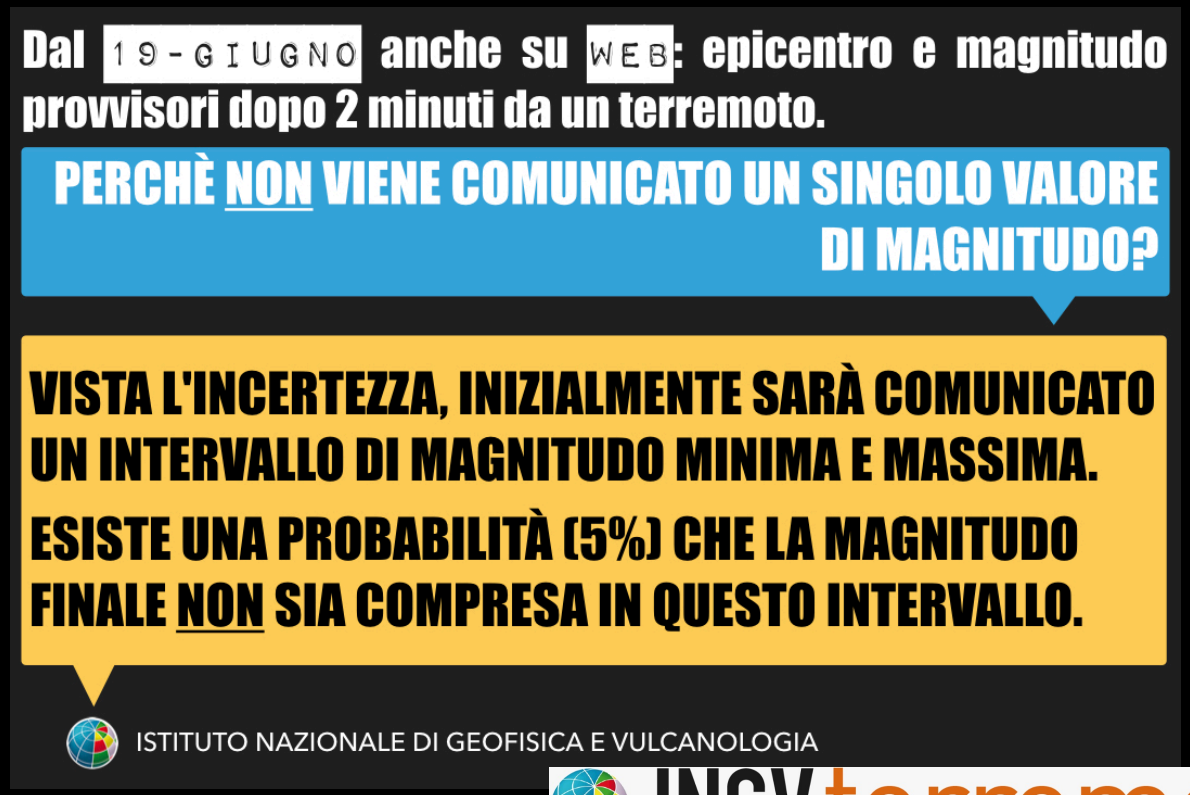
FAQS

Will all earthquakes be communicated?

Only those with M>3 and reliable quality

Why not a single magnitude?

Because of the uncertainty, we will indicate a range. We expect that for 5% of the events the revised mag will be out of range



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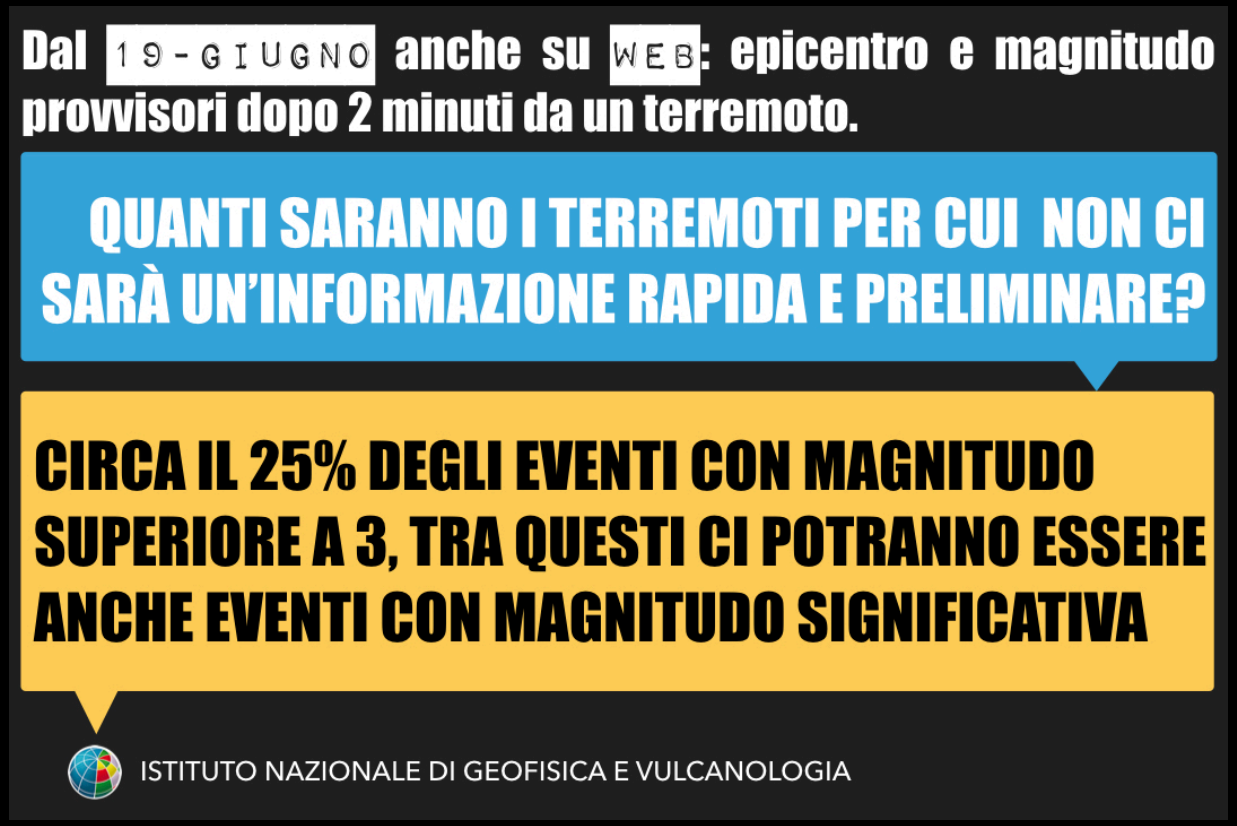
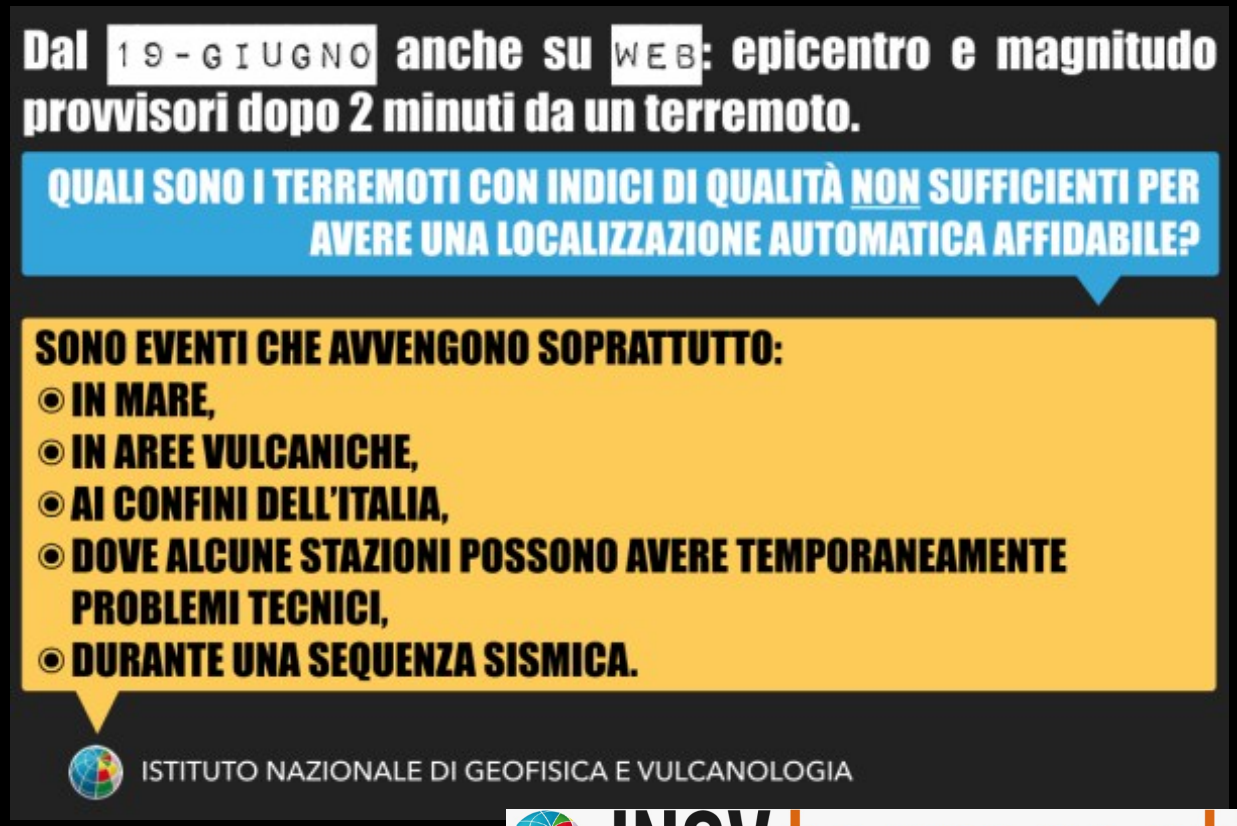
FAQS

How many earthquakes will not have a quick, preliminary estimate?

About 25% of the M>3 earthquakes, possibly some of large magnitude too.

Which earthquakes will not have a reliable fast estimate?
Those at sea, in volcanic areas, along or out of the borders, during a seismic sequence…





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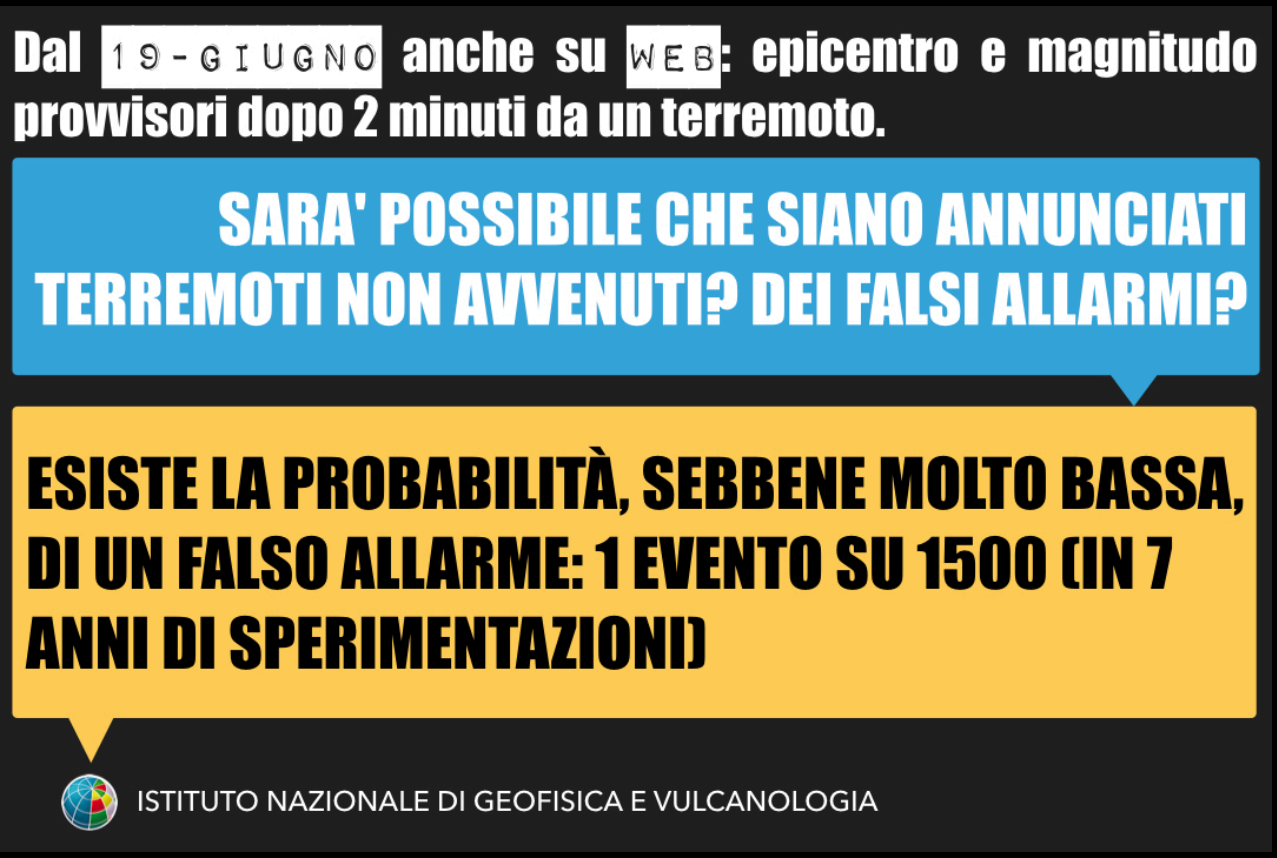
FAQS

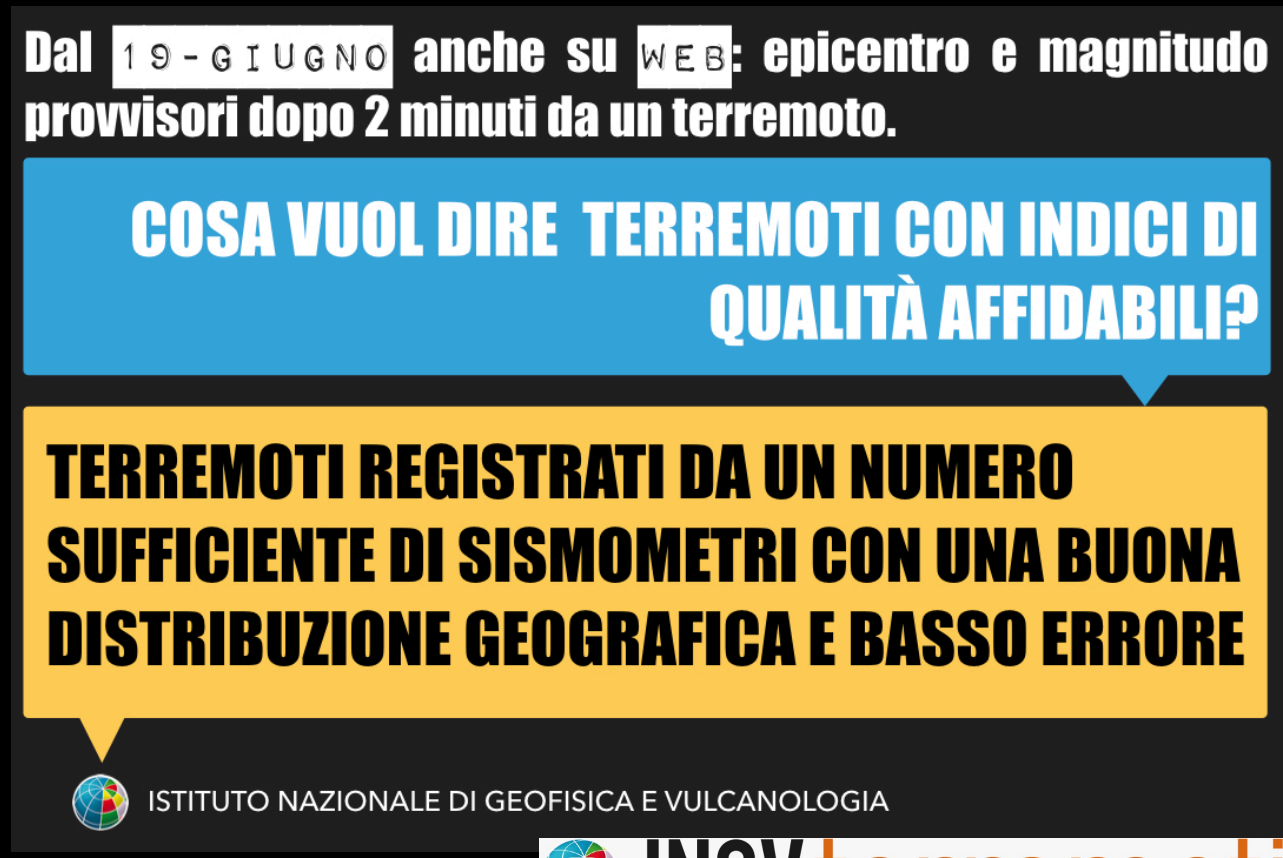
Is it possible that a non-existing event will be communicated?

Yes, although with a very low probability (1 event out of 1,500 after 7 years of tests).

What does "reliable quality indexes" mean?

Earthquakes recorded by a sufficient number of seismometers with a good geographical distribution and low location errors.





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FROM JUNE 2019
AUTOMATIC INFORMATION
ALSO ON THE WEB PAGE
AS
A BANNER REPORTING TIME
ELAPSED FROM THE EVENT

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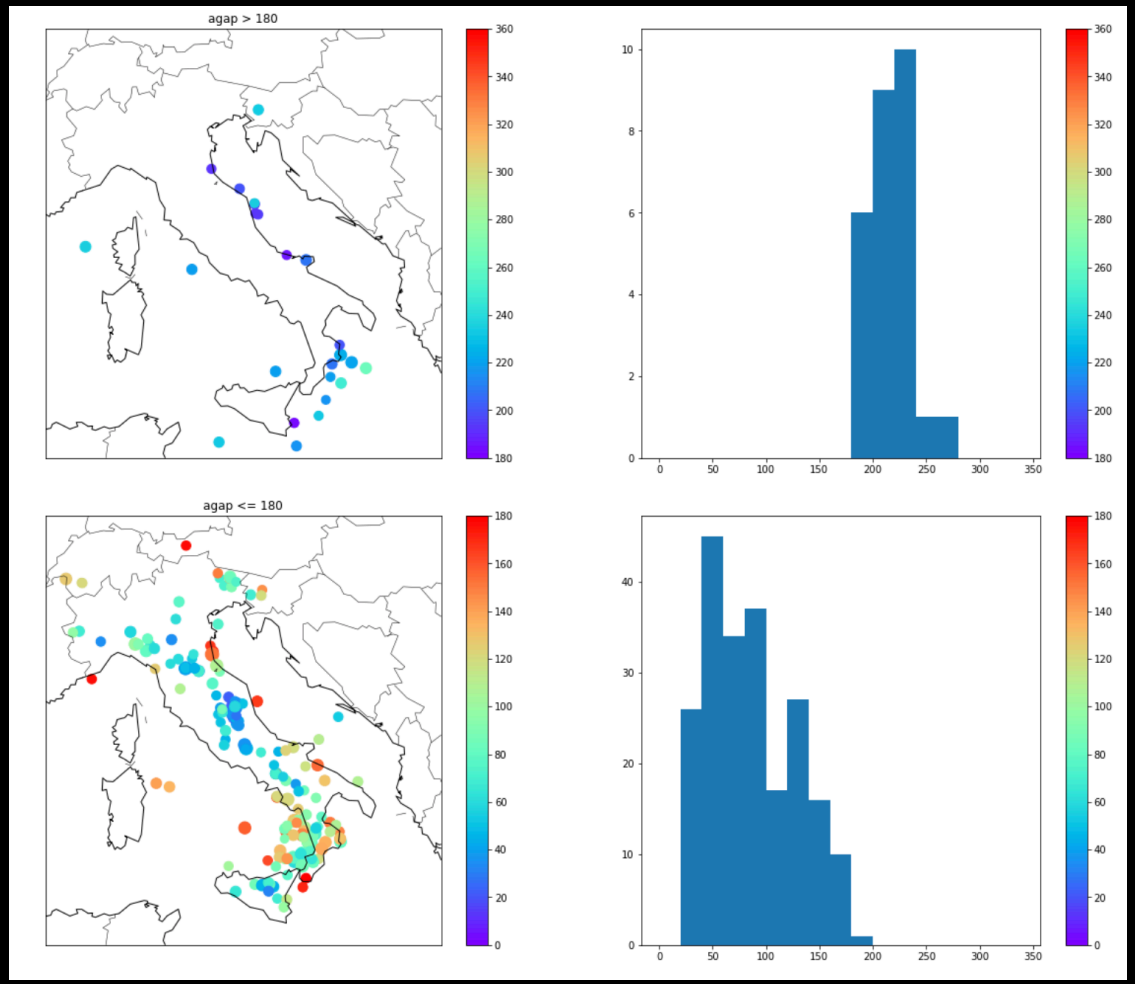
SEVERAL CRITERIA FOR SELECTION (AZIMUTAL GAP, RESIDUALS, ETC.)



Gap > 180°

Gap < 180°

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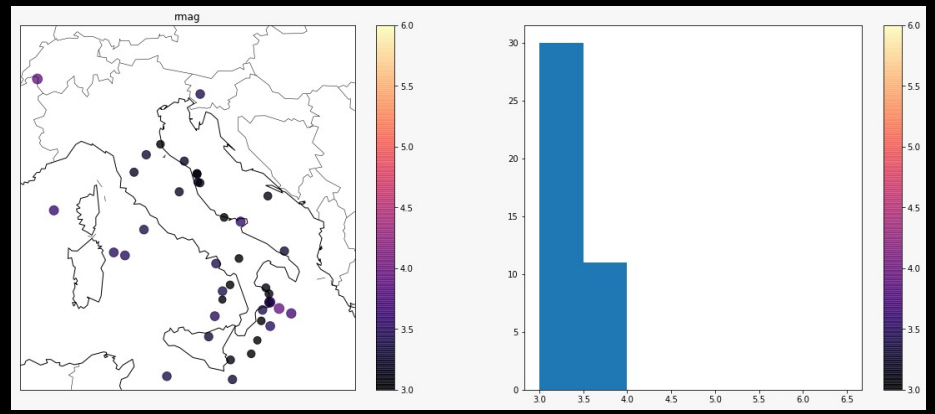
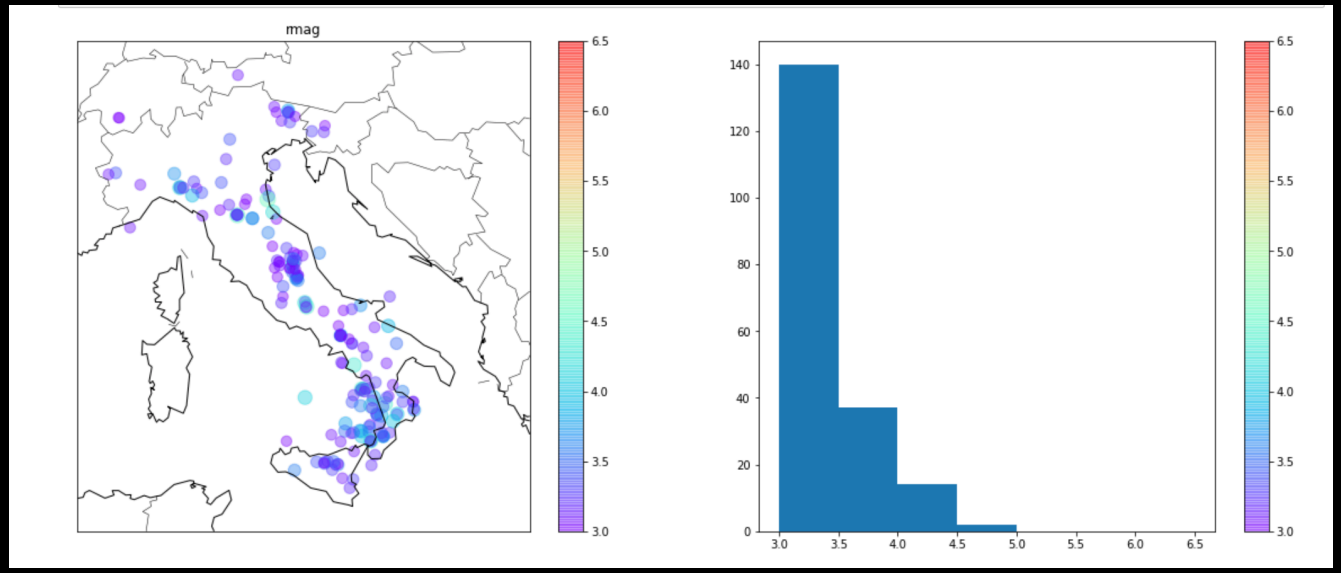
SOME NUMBERS AFTER 18 MONTHS

TOTAL Number of eqs (M>=3)	240	
Tweeted	197 (83%)	
Missed	43 (17%)	(better than 25% expected)
False tweeted (mag overestimated)	6 (3.4%)	(better than 5% expected)





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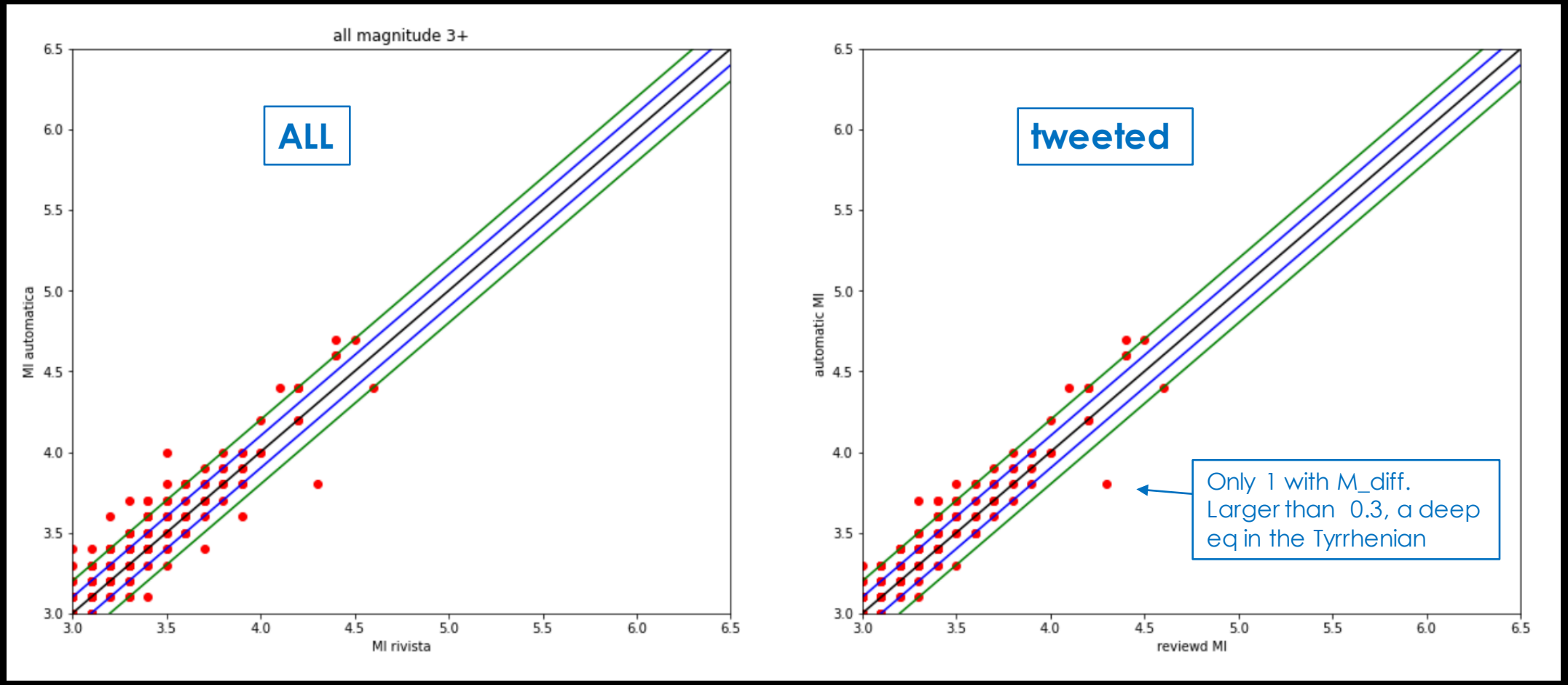
QUALITY OF AUTOMATIC MAGNITUDES COMPARISON WITH REVISED (18 MONTHS)



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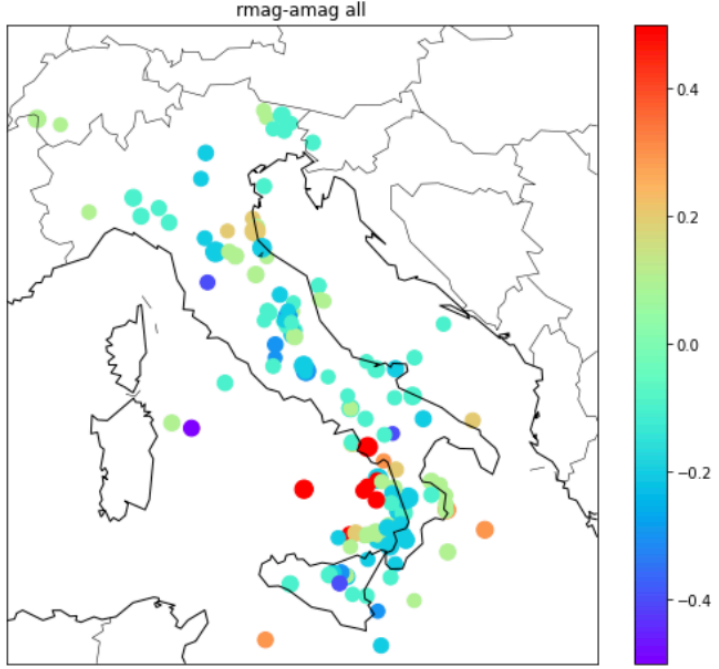

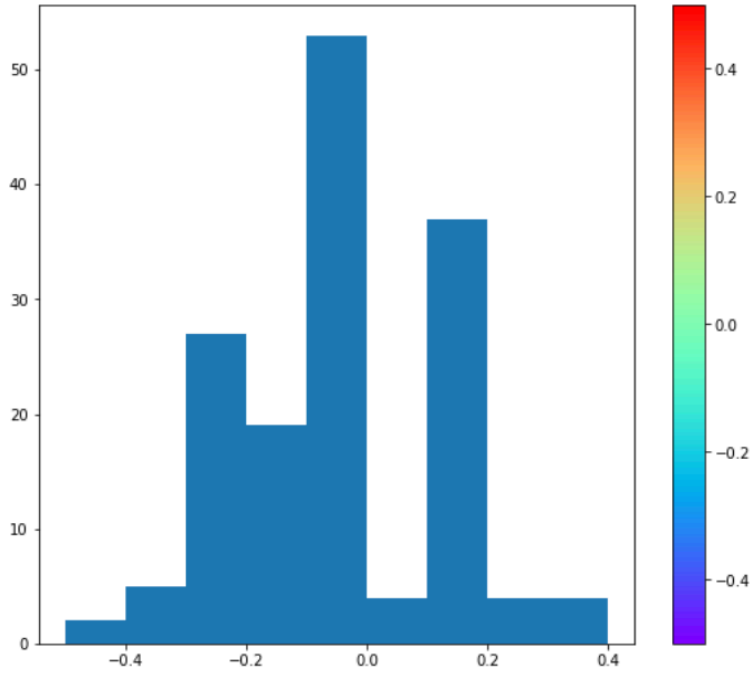

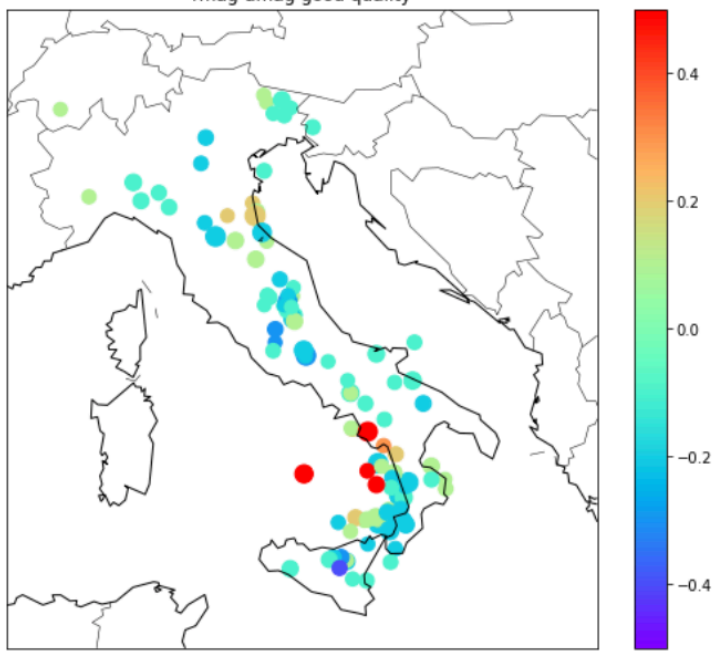

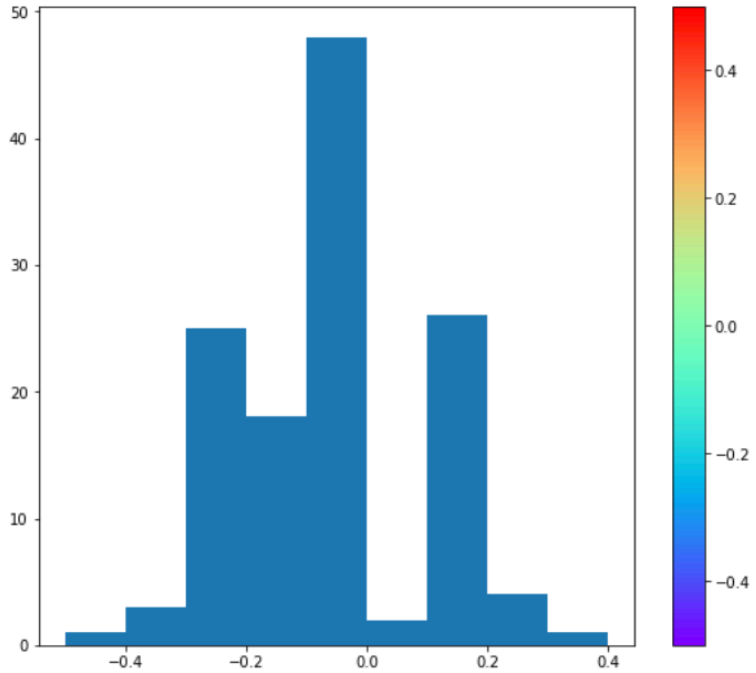

AUTOMATIC VS. REVISED MAGNITUDES (ALL) (TWEETED)

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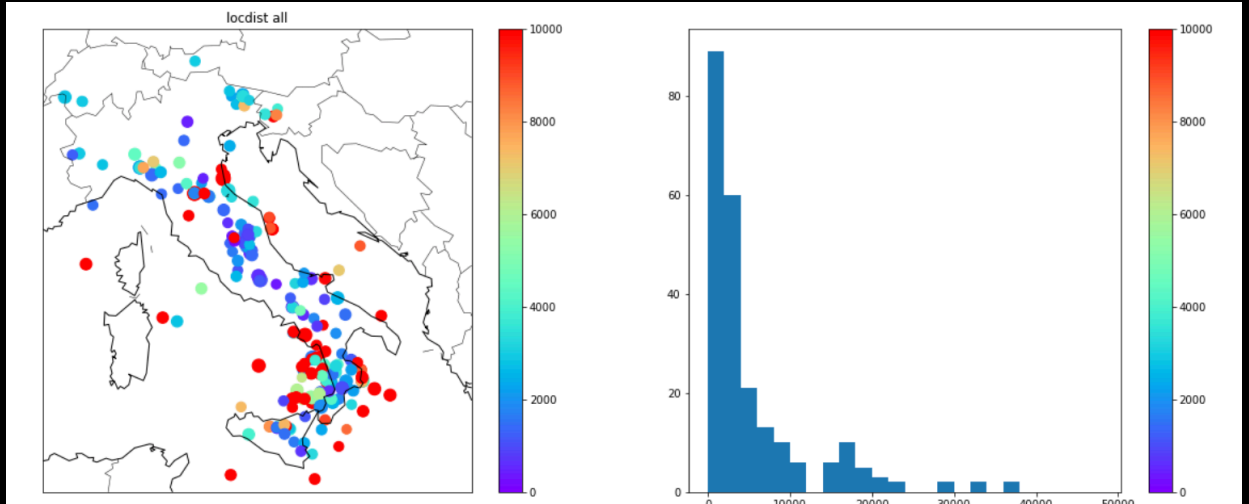
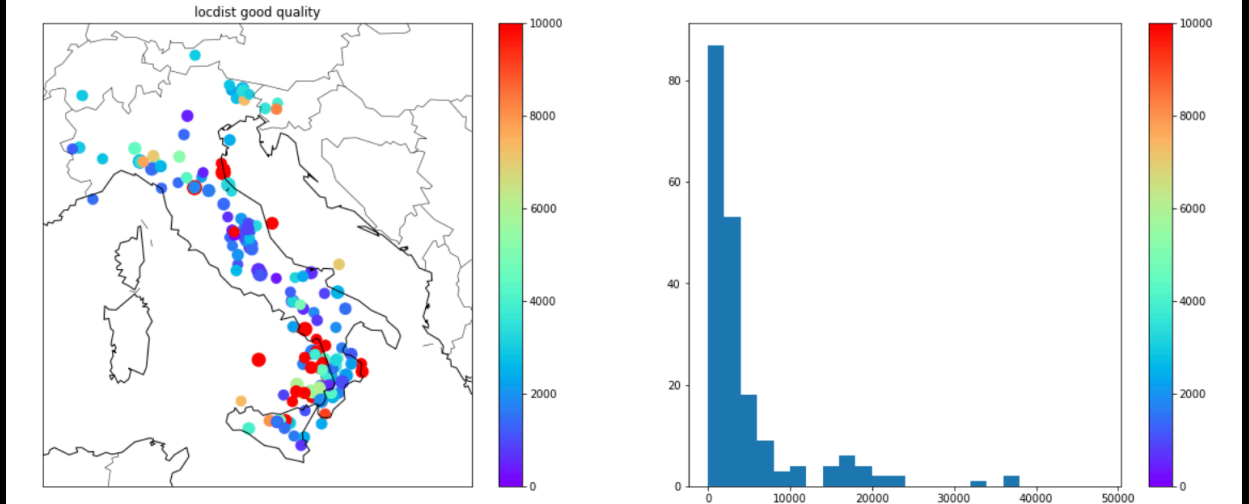
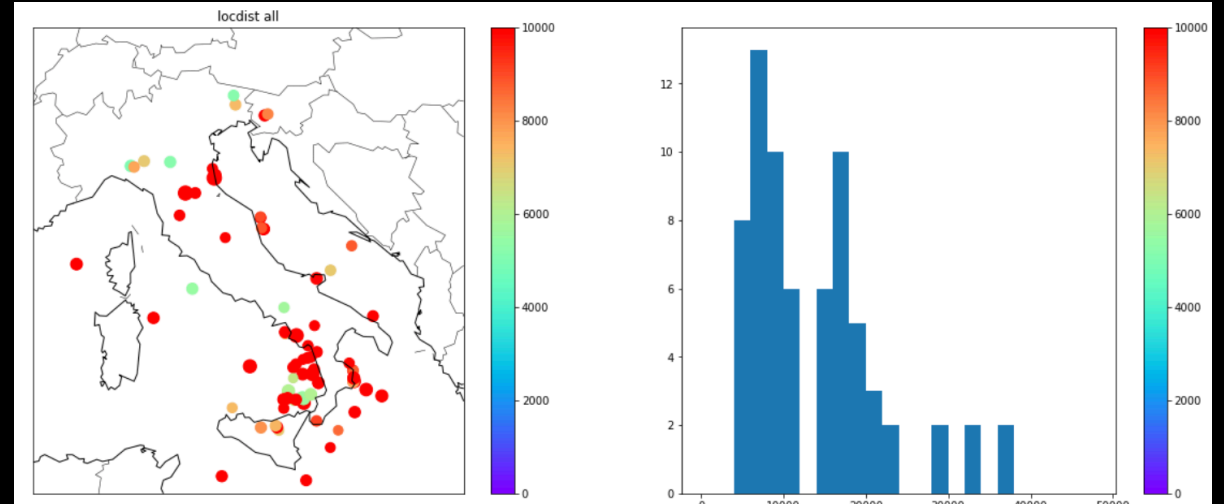
Location Difference (m)

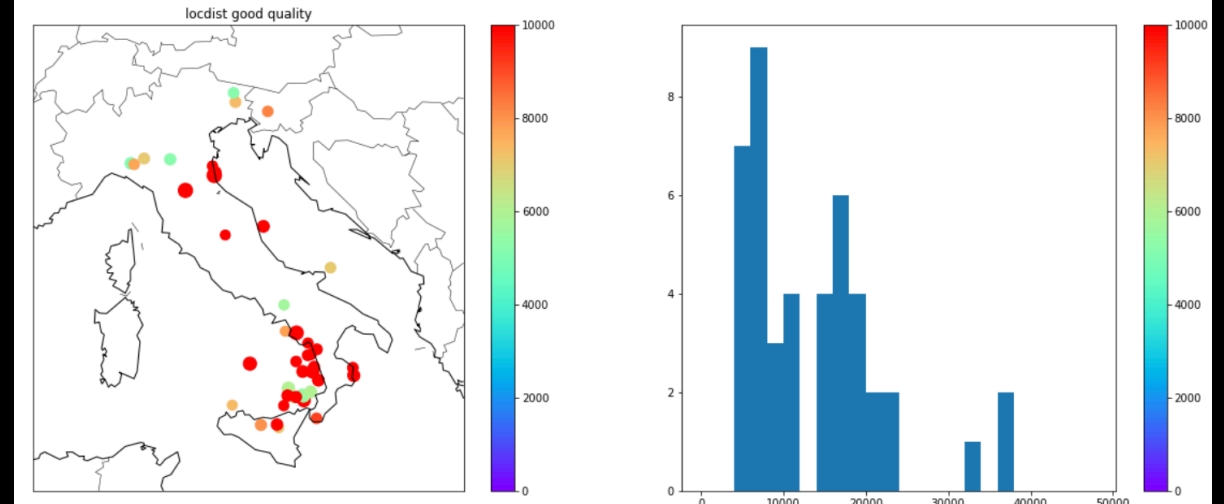
all / tweeted





discarded / good quality





REACTIONS

Automatic solutions are tweeted 2' after the event.

The number of retweets is much higher than those of the revised solutions, coming out mostly after 10'-15'.

This innovation has been strongly appreciated by citizens.

It is important to reduce failures and to avoid low quality info coming out too soon.

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CONCLUSIONS

- The INGVterremoti social platform has grown and has provided an important contribution for raising awareness in a seismic country like Italy.
- After the downfall provoked by the L'Aquila earthquake and trials, INGVterremoti has contributed to raise again the credibility of scientists and scientific institutions.
- The relase of quick, unchecked, solutions is very important and is highly appreciated by citizens
- However, a careful choice of quality parameters is important in order to avoid issuing very fast but wrong information: corrections are not easy, sometimes impossible and expose scientific Institutions to criticism and unfair reprimands by citizens, media and even institutions.

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