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Outline of the talk

- CSEP Italy Results
- The importance of CSEP in OEF
- OEF in Italy, new perspectives
CSEP Italy Results

Test
Time: 1 August 2009 – 31 July 2014
1-day forecasts: 1826
Space: Italy inside the black area
Target events (M 3.95+): 97

Model Submitted
ETAS LM
ETES FMC
STEP NG
STEP LG

Sequence
2012 Emilia Romagna

Taroni et al. (2018)
One-day forecasts for 29 May 2012

The overprediction of the ETES model is due to a bug in the software code submitted in the test center.

Taroni et al. (2018)
CSEP Italy Results

Emilia sequence

Taroni et al. (2018)
CSEP Italy Results

May 20, 2019  
Mw 6.1

May 29, 2019  
Mw 5.9

Taroni et al. (2018)
CSEP Italy Results

ensemble models

Cumulative information gain

Weight of each model as function of the time

Taroni et al. (2018)
The importance of CSEP in OEF Italy
The importance of CSEP in OEF Italy

No singles models are used!

ENSEMBLE forecasting model. Each model is weighted according to its forecasting performances

Selected models (constraints)
The models must be submitted to at least one CSEP experiment.

The test in CSEP experiment indicates the scientific robustness of these models for the potential uses in operational earthquake perspective.
The importance of CSEP in OEF Italy

The OEF without the CSEP …..
The importance of CSEP in OEF Italy

The ensemble models perform well in the 1-day testing class; the pass the N- and S-Test and show IG comparable to the best performing model (ETAS_LM)
OEF in Italy, new perspectives
OEF in Italy, new perspectives

Seismic Catalog → ETAS LM → ETES FMC → Ensemble Model → Final Output:
OEF in Italy, new perspectives

OPERATIONAL EARTHQUAKE FORECAST 4 - Italy

Current weekly Probability:
- MMI 6+
- MMI 7+
- MMI 8+
- MI 4+
- MI 5.5+

Lat: 41° 41.2', Long: 12° 2', get the time evolution of the weekly probability in the selected area

last run: 2014/05/08 00:00
- area probability: 4.22e-3

Center (Location): ______ Dimension (km): ______
get the time evolution of the weekly probability in the selected area

2014/05/08:
- area probability: 0.004

Time Evolution of the probability for Intensity greater than 7
OEF products

Every day at midnight:
• calculates the weight of the model with the seismicity occurred in the previous week;
• provides the new probability (MI 4+, MI 5.5+, MMI 6+, MMI 7+, MMI 8+) values for the next week;
• send the map with the probability of one or more events with MI 4+ in a private tweet

When occurred an event with MI 3.5+:
• provides the new probability (MI 4+, MI 5.5+, MMI 6+, MMI 7+, MMI 8+) values for the next week;
• send the map with the probability of one or more events with MI 4+ in a private tweet

When occurred an event with MI 5.0+:
• provides the new probability (MI 4+, MI 5.5+, MMI 6+, MMI 7+, MMI 8+) values for the next week;
• send the map with the probability of one or more events with MI 4+ in a private tweet
• send an email with an pdf attached (earthquake notification report)
In the 2020 the map will be public and posted in a dedicated webpage. In the page will be present:

- a Italian map with the probability of one or more events with MI 4+;
- a video that shows the evolution of the probability (starting from 1 January 2018 up to last map created for the system);
- A link for the earthquake notification report for the events with MI 5.0+;
- a section about the information that the map and video provide.

In this moment the webpage is evaluated to check the impact of the information to different level of the society (housewives, workers, students, researchers ecc.....).
OEF in Italy, new perspectives

Future work:

CSEP
• test the models for the period 2014-2019;
• introduce new testing tool (RISE Project);
• develop new earthquake forecast models (RISE Project);

OEF
• synthetic events replenishment in the hours after the mainshock (incompleteness catalog);
• insert new models in the ensemble;
• change the actual model weight procedure (from SMA to gSMA or BMA);
• insert in result of the hybrid model the uncertainties to each single model;
• migrate all system code in Python and sharing it in GitHub.
Thanks for your attention