Ensemble Model Earthquake Forecasts during the 2010-12 Canterbury, New Zealand, Earthquake Sequence

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Outline

100 Models and dataset

101 The ranking measure

102 Rank of the models

103 Ensemble models

104 Rank with Ensemble models

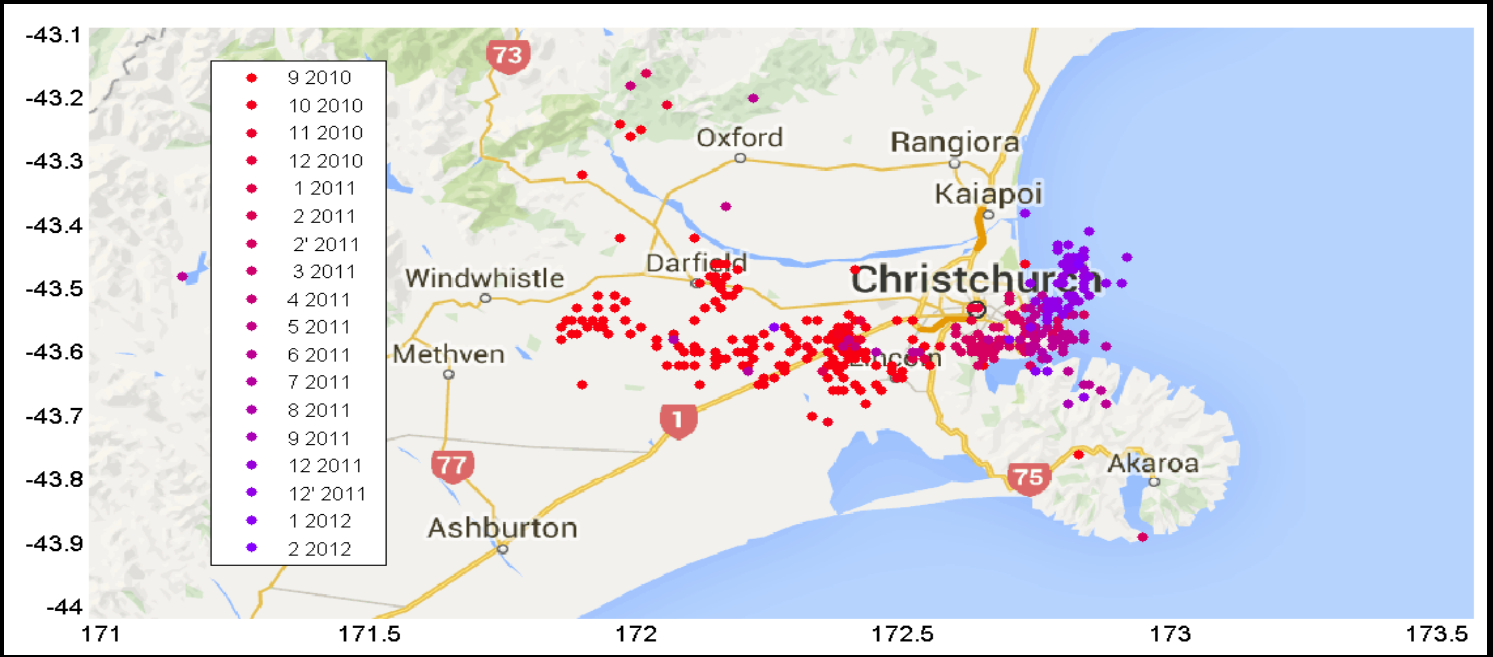
105 Conclusions

Models and dataset

14 models for 1-month forecast: statistical, physics-based, hybrid (STEP + Coulomb stress change)

18 months, 20 time windows (18 + 2 updating after big earthquakes)

Target earthquakes: Mw > 3.95



The ranking measure

As ranking measure we use LOG-LIKELIHOOD of observed data

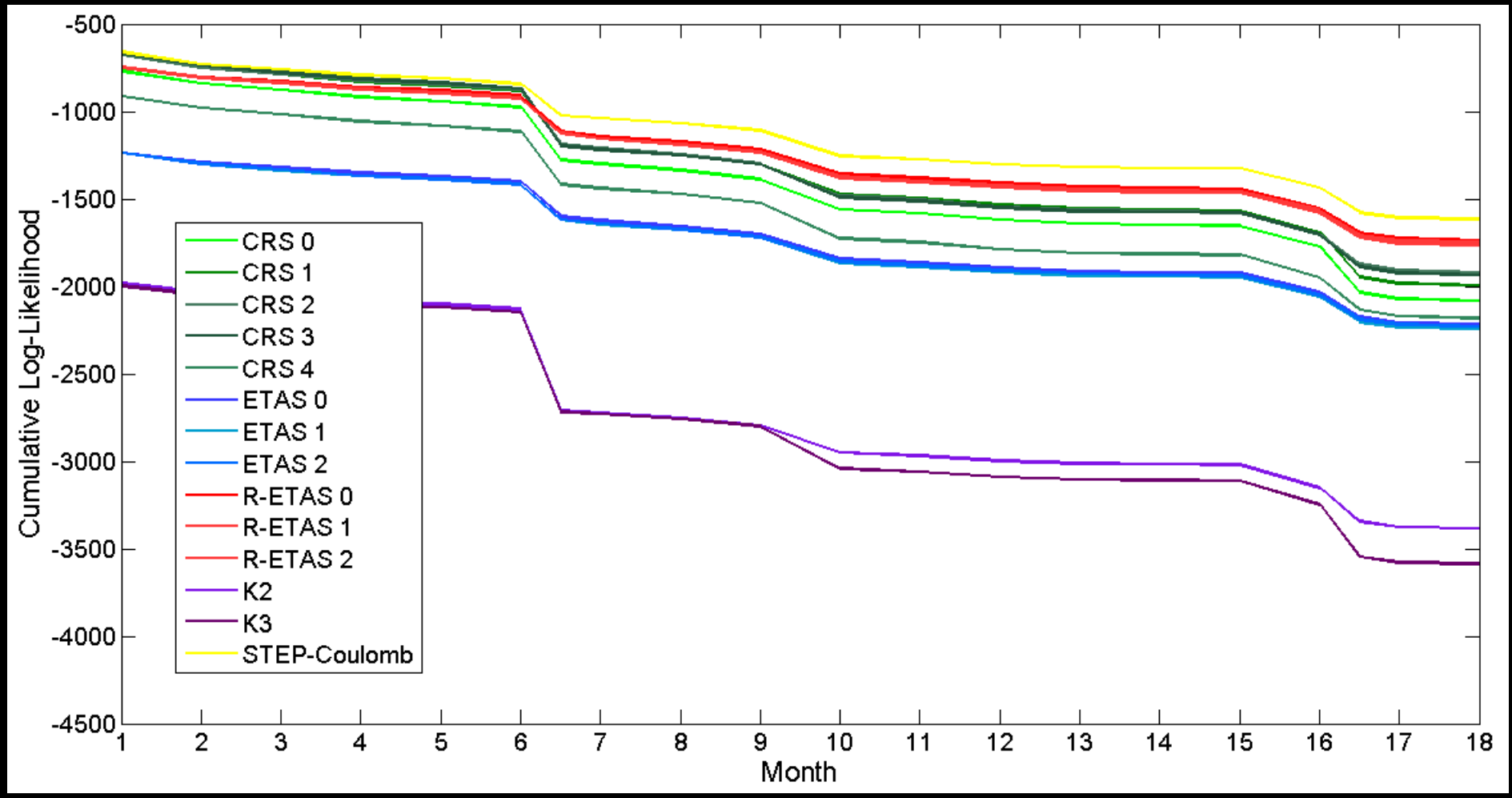
We do not perform tests, we only provide a rank of the models

To calculate Log-likelihood we assume:

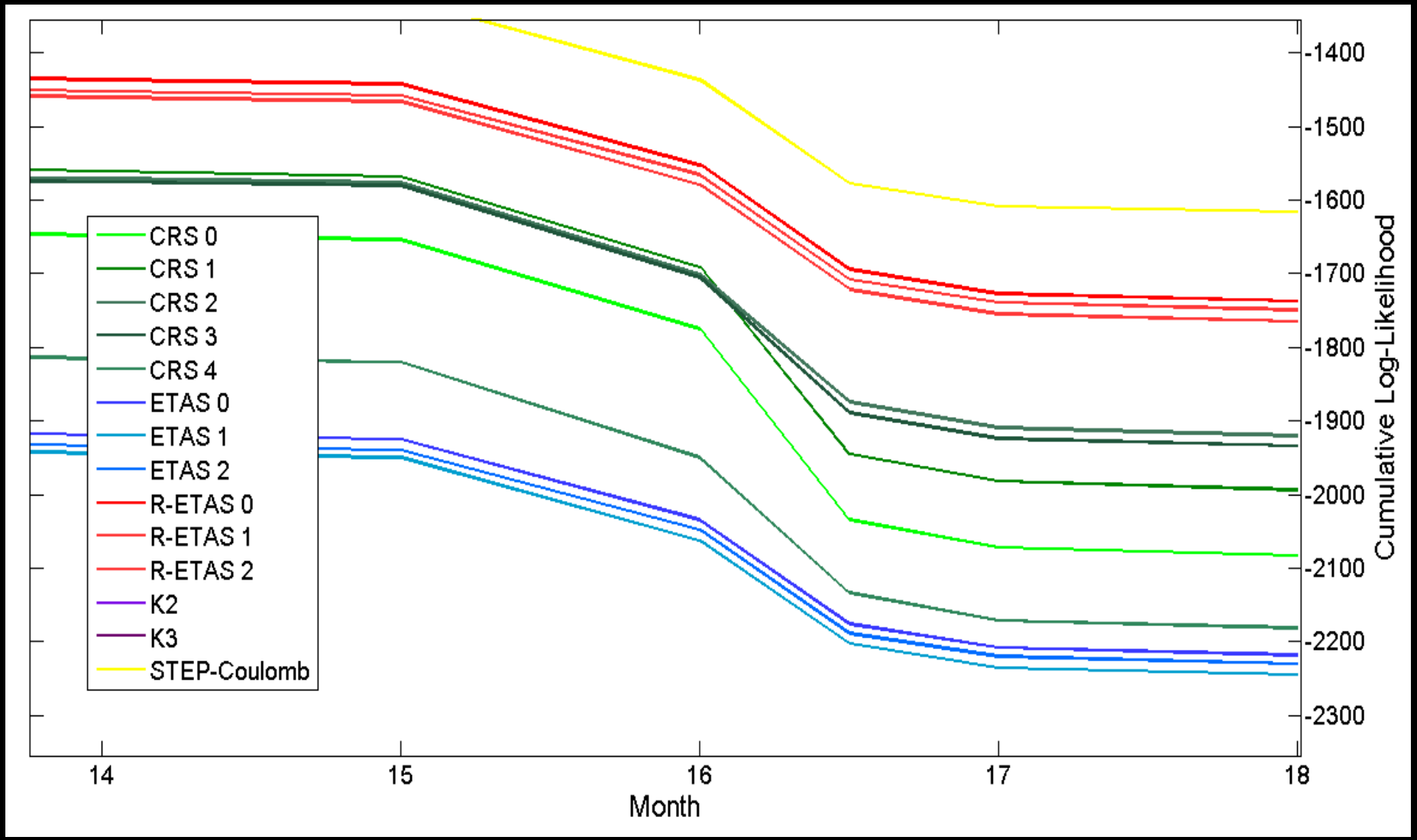
Independence

Poisson distribution

Rank of the models



Rank of the models (zoom)



Ensemble models

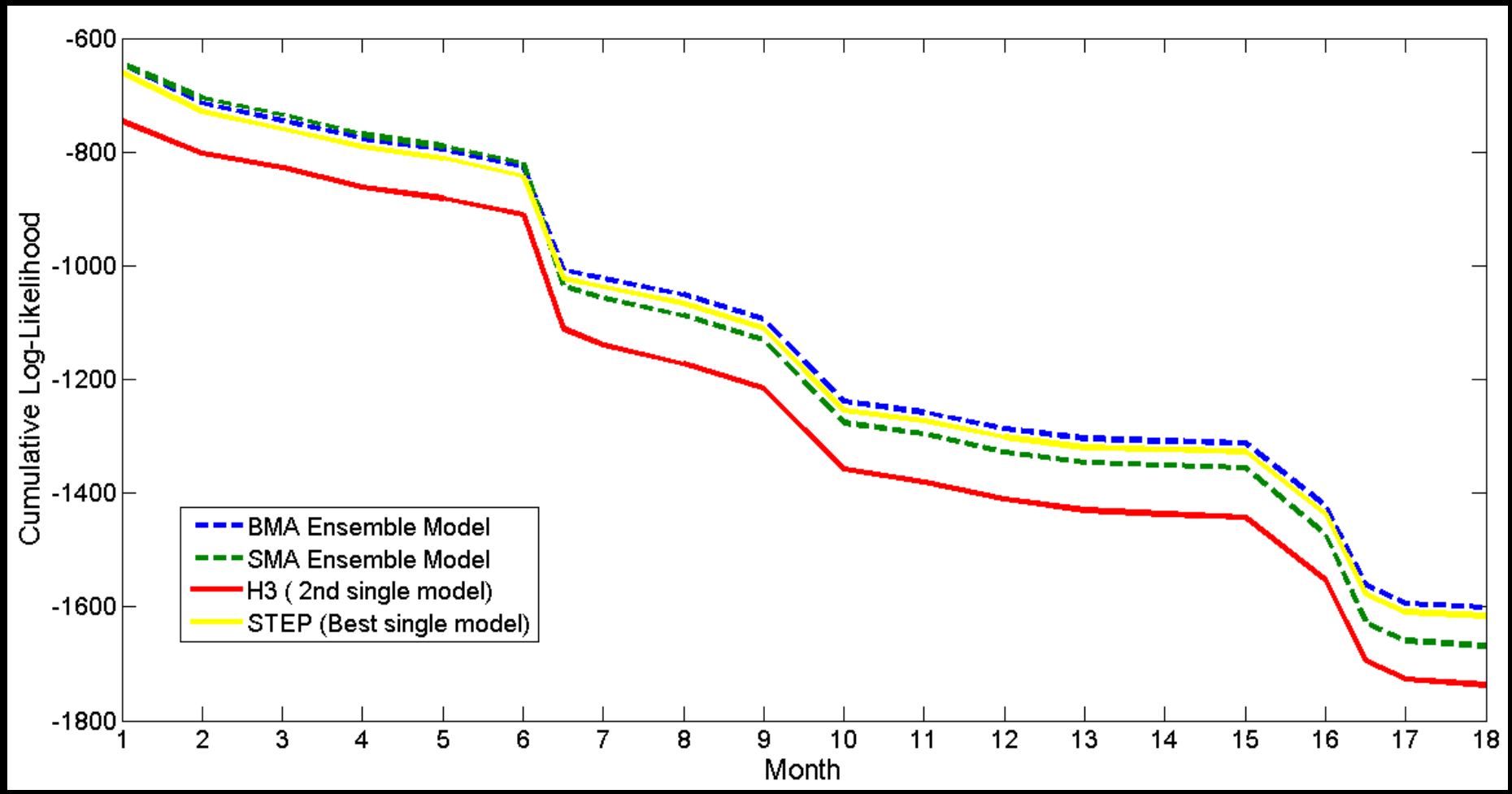
To build ensemble models we create a weighted average of the all 14 models

BMA => weight proportional to the likelihood

SMA => weight proportional to 1/LL

We also take into account the correlation between the models' forecast

Rank with Ensemble models



Conclusions

The best performing single model is the STEP-Coulomb model

Even if the Ensemble and the best single model perform comparably, using an ensemble model offers a great advantage, because we never know since the beginning which model will be the best performing, but you may reasonably know sincethe beginning that Ensemble model will perform well.