FLARE CAST

Prediction system development: regions properties methods, supervised learning methods (verification metrics), error assessment. accessible to the community.



FLARECAST is a European research project (H2020 PROTEC, grant n°640216, 2015-2017) aiming to develop an automated solar-flare forecasting system with unmatched accuracy compared to existing facilities. It is based on automatically extracted physical properties of solar active regions, coupled with state-of-the-art solar flare prediction methods and validated using the most appropriate forecast verification measures.

Objectives:

1. Understand the drivers of flare activity and improve flare prediction

2. Provide a globally accessible flare prediction service that facilitates expansion

3. Engage with space weather end users and inform policy makers and the public.

Consortium: Academy of Athens (coordinator), Northumbria Univ. (project scientist), Trinity College Dublin, Univ. di Genova, CNR, CNRS, Univ. Paris-Sud, FHNW, Met Office.







The FLARECAST project for solar flare forecasting

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FLARECAST approach

- 1. Active regions and flares properties: catalogues,
- extraction of line-of-sight and vector magnetic field active
- 2. Flare prediction algorithms: unsupervised clustering
- 3. Validation of data, benchmarking of forecast
- 4. Active region properties and prediction system will be



Computation of Beff (M. Georgoulis; Barnes et al. 2016)

The primary source of data is SDO/HMI is line-of-sight magnetograms, continuum intensities, vector magnetic field (720s cadence data series); science data and near-real-time data are used. These data are archived and redistributed by the project, at the MEDOC data centre.

FLARECAST architecture



Preliminary results



Left: performance metrics of different methods; Right: importance of different predictors. These plots are for >M1 flares.

Explorative research results by FLARECAST include: - new relationships between active region properties (shear flows, non-neutralized currents, relative magnetic helicity...) and flare occurrence, and CME properties. - exploitation of MHD simulations to investigate eruption triggers and eruptivity proxies. - suitability of forecast time scales

2 FLARECAST papers are accepted for publication, 4 more are submitted.

Management Infrastructure