Guest Investigator Final Report

Project Title: **Study of the origin, evolution and geo-effectiveness of 'narrow' CMEs**

Name: **Grzegorz, M. J.**

Affiliation: Astronomical Observatory of Jagiellonian University, Orla 171, 30-244 Krakow, Poland

Email: michalek@oa.uj.edu.pl

Date of visit: From: 31/01/2012 *to:* 17/02/2012

Note: Michalek, G. has been unobtainable since departing the Royal Observatory Belgium. It is believed that Michalek, G has left the field. Therefore we have been unable to obtain a final report. Until we obtain a final report we enclose some excerpts from Michalek's original proposal.

Project Abstract:

Space weather is mostly determined by wide and fast CMEs, which are known to be the most geo-effective. These events have been extensively studied for the last two decades. On the other hand, the narrow CMEs are a small minority of all CMEs and the origin and evolution of these events are at present not well known. The proposed research aimed to fill this gap in knowledge by a detailed study of the narrow (angular width < 20^{o}) ejections.

Primary ROB Contact(s): Dan Seaton

Which Instrument(s) was/were used: SWAP

Were other instruments used in collaboration with PROBA2?

SOHO LASCO C2 and C3 coronagraphs

STEREO COR 1 and COR 2 coronagraphs

(Optional) Description of collaboration:

In addition, SWAP's image cadence allows us to track the early CMEs propagation very accurately for about 30 minutes (depending on the velocity of the CME). Next, at greater distance from the Sun, the CMEs can be tracked and followed by the LASCO C2 and C3 coronagraphs. Now, after turning off most of the instruments onboard the SOHO satellite, the LASCO coronagraphs image the corona with a higher cadence (5-10 minutes). Using both the SWAP and the LASCO C2 and C3 instruments, gave Michalek et al. a unique opportunity to observe CMEs from their ejection in the solar corona up to a distance equal to 30 solar radii. For the purpose of the project goals, we would like to use the SWAP telescope to follow the narrow CMEs as far as possible off-limb, with the purpose of finding the link with the C2 coronagraph images in order to study their dynamic and morphological evolution. The propagation and dynamics of the narrow events was also considered, exploiting data from STEREO coronagraphs.

Was there a dedicated observing campaign performed or planned?

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(Optional) Description of campaign:

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Brief Description of work performed during the visit:

In the study, Michalek et al. explored how the narrow ejections originate, how they propagate and how they could be geoeffective by producing SEPs. This project can be carried out due to the new observational possibilities. In particular, the SWAP telescope onboard the PROBA2 satellite, as the successor to the EIT onboard the SOHO, images the solar corona at a temperature of around one million degrees with a cadence of 1-2 minutes. This instrument can, therefore, provide the necessary information on the coronal features involved in the triggering and evolution of CMEs.

Another very important aspect of the present project was the attempt to construct a numerical MHD model for the triggering and evolution of such narrow CMEs. The collected data will impose restrictions on the constructed computer models. Because of the different magnetic configuration during the triggering of the narrow CMEs, we anticipate that the numerical model will be significantly different from the existing models for the normal CMEs.

Searching through data from satellites, they also examine whether the narrow CMEs can indeed produce SEPs and thus whether they could be hazardous to satellites and/or to astronauts in space vehicles.

Future Plans:
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Has this work been published?

No

If so, Where? Reference/DOI? ADS Link?

Please add below any other comments you might have:
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