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PRELIMINARY RESULTS FROM THE MARCH 29, 2006 TOTAL ECLIPSE OBSERVATIONS IN EGYPT

S. Koutchmy[1], J-Y. Daniel [1], J. Mouette.[1], J. Vilinga[1], J-C. Noëns[2], L. Damé[3], M. Faurobert[4], H. Dara[5], A. Hady[6], M. Semeida[7], M. Sabry[7], A. Domenech[1], J-M. Munier[8], R. Jimenez[2], Th. Legault[1], Ch. Viladrich[1], S. Kuzin[9], A. Pertsov[9] and the O.A. Team[10]

Abstract. A coordinated effort has been carried in the framework of the French-Egyptian scientific cooperation to permit joined simultaneous eclipse observations of the solar corona during the total solar eclipse of March 29, 2006. Spaceborne EIT and Lasco (SoHO) observations were also planned at the same time and were successfully collected. Scientists from other countries collaborated on different experiments. The synthetic image showing the magnetic coronal structure of this quasi-minimum corona seen in W-L is given. Some preliminary results are presented; a White Light (W.L.) movie has been also taken during the totality.

1 Introduction

Several groundbased instruments were set-up in 2 selected sites in Egypt, near Sidi-Barany and near Salum. The teams included also several amateurs from the O.A. association of the Pic du Midi Observatory: B. Arquier, M-F. Balestat, C. Frelat, S. Rochain, F. Vaissiere, S. Weiller and O. Wurmser. In both sites the sky was perfectly clear and even deep blue. Some experiments were highly successful.

2 Preliminary results

We obtained many excellent W-L images. A sample of a processed W-L image, aimed at showing the coronal magnetic structures from the IAP experiment operated by J. Mouette, is shown on Fig. 1. The processing permits to show the structure of the middle corona at the best. A neutral radial filter was used near the focus of a Nikon D100 CCD camera after a 820 mm focal length and 102 mm diameter refractor. The aim is to compare the fine structures seen on processed images using a neutral radial filter, both analog and digital, with computed magnetic field lines using different type of algorithms for extrapolating the measured at the surface of the Sun map of magnetic fluxes. Excellent correlations were found with the simulation performed by the Z. Mikic group at San Diego (see his Web site) before the eclipse, which is using the fully consistent set of MHD equations to take into account the stretching effect of the solar wind on the magnetic structures. A more extended comparison was performed after the eclipse in collaboration with Y-M. Wang at NRL (paper submitted

[1] Institut d'Astrophysique de Paris, 98bis Bd Arago, F75014 PARIS, associated to the P. and M. Curie University of Paris VI, France, email: koutchmy@iap.fr
[2] Observatoire Midi-Pyrénées 57, Avenue d'Azereix, BP 826, 65008 TARBES Cedex, France
[3] Service d'Aéronomie du CNRS, BP 3, 91371 Verrières-le-Buisson Cedex, France
[4] Université de Nice Sophia Antipolis, France
[5] Centre de Recherche pour l'Astronomie et les Mathématiques Appliquées, Académie d'Athènes, Greece
[6] Astronomy Dept., Faculty of Sciences Cairo University, 12613-Giza, Egypt
[7] Solar Lab., Solar and Space Research Dept., Nat. Res. Inst. of Astro. & Geophy. (NRIAG) Helwan, Cairo, Egypt
[8] Observatoire de Paris, France
[9] Lebedev Physical Institute, FIAN, Moscow, Russia
[10] Observatoire du Pic du Midi, France

to ApJ, Sept. 2006). W-L images are also showing very well the polar regions with plumes and fine linear rays (work in progress presented at this meeting, to be submitted to Solar Physics). An extended polarisation analysis was performed to analyse both the K-corona and the F-corona in its outer parts. The preliminary analysis immediately brought a new result which was never quantitatively nor qualitatively obtained before: 2 neutral points (zero polarisation) are seen in the polar regions at a radial distance of order of 2 solar radii from the centre. The precise mapping and calibration of the polarisation in 3 colour channels is performed by J-Y. Daniel, S. Koutchmy and F. Sevre at IAP (work in progress) in order to deduce the azimutal and radial distributions of the brightness of the K and the F-corona. Many filtergrams were obtained to show the distribution of the emission measures of the inner and of the middle corona, in the FeXIV green line at 530.3 nm and the FeXIII IR line at 1074.7 nm using stabilised in temperature narrow passband interference filters. Many high spectral resolution spectra were obtained without very much emission lines, using a new but not yet space-qualified fast 14 bits cooled 1K CCD camera (made for the Coronas-Photon X-EUV imagers) which worked fine. Flash spectra were obtained with a fast colour CCD camera; several chromospheric emission lines, including the famous 468.6 nm HeII line, were seen over several frames. Preliminary results are presented on the poster and a W-L movie has been also taken during the totality.

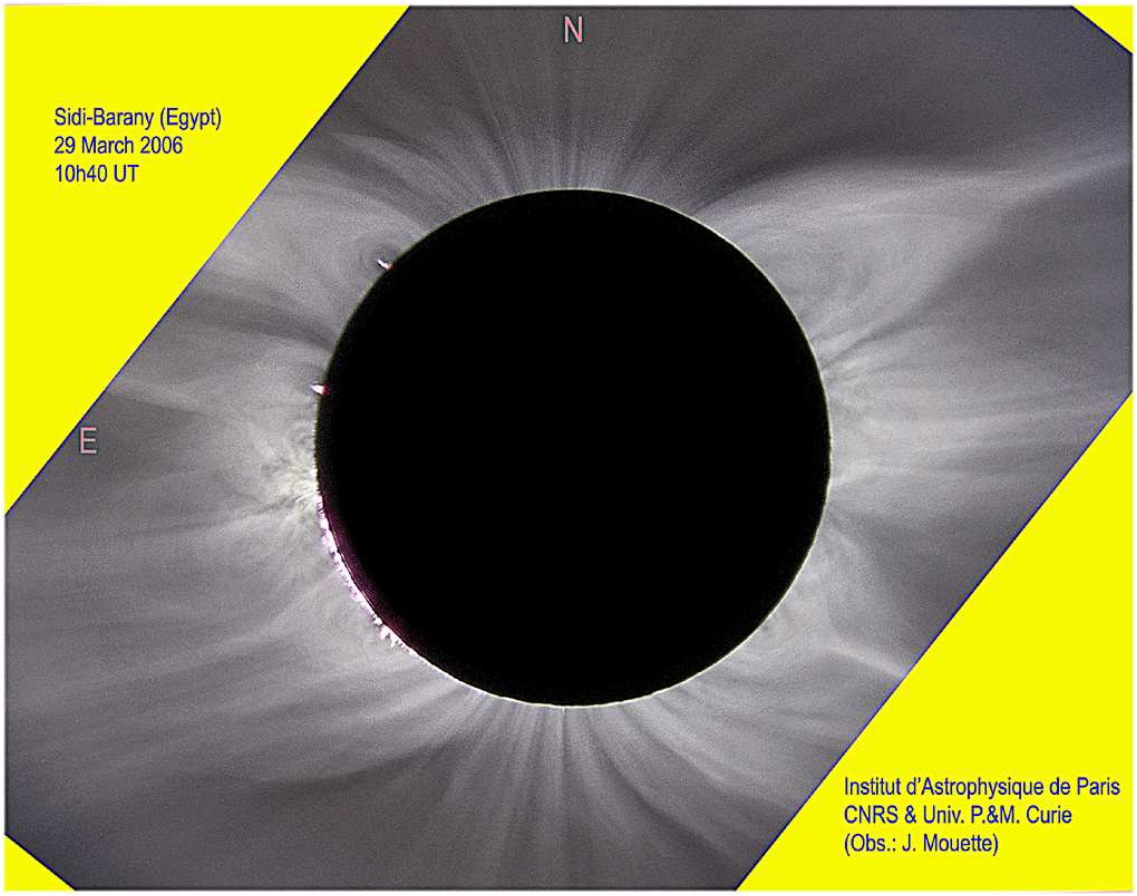

Fig. 1. Processed and correctly oriented image of the middle corona taken using a radial neutral filter put near the focus of the 820 mm focal length F/8 fluorite refractor and before a Nikon D100 CCD camera taking 12 bits colour frames. The composite of several frames is processed to show at the best fine scale details. Note that the used frames for this composite were taken just after the 2nd contact which means that the solar limb at S-E is close to the edge of the Moon, the opposite N-W limb being further from the edge of the Moon. Observer: J. Mouette.