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Forbush decrease on September 6-13, 2017 observed by the Tanca water-Cherenkov detector

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Introduction

- September of 2017: numerous solar events were registered, among them, three flares with intensity M5.5, X9.3 and X8.2 that originated three halo CMEs (Coronal Mass Ejection). [1,2]

Table 1: Halo CMEs registered by LASCO/C2 in September 2017.

	Arrival Time	Max Kp	Dst min.(nT)	Dst min. Time	Origin
CME1	2017-09-06T23:08Z	4	-23	2017-09-07T09:00Z	M5.5 flare
CME2	2017-09-07T22:30Z	8	-142	2017-09-08T02:00Z	X9.3 flare
CME3	2017-09-12T19:26Z	5	-50	2017-09-13T01:00Z	X8.2 flare

Tanca

- The CMEs produced Forbush decreases on the signal of a muon detector located at the University of Campinas, Brazil, called Tanca (*Tanque de Campinas*).
- Tanca is a replica of the detectors used in Pierre Auger Observatory and it is part of the LAGO (Latin Giant Observatory) collaboration.

Figure 1. Tanca.

Results

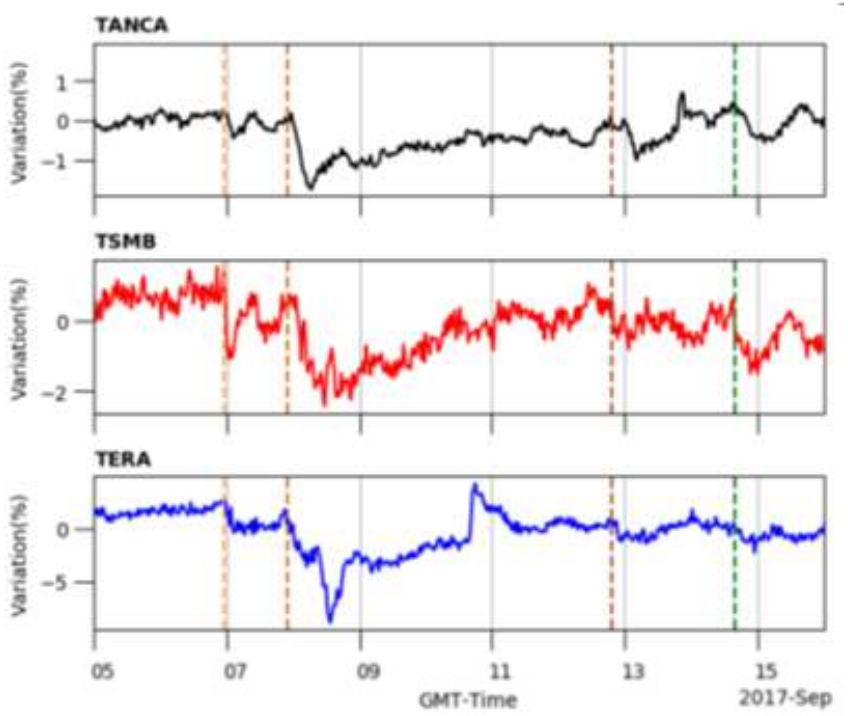

Figure 2. Cosmic ray signal from Tanca (R_C = 9.36 GV) in black, Tsmb (R_C = 9.15 GV) in red and Tera (R_C = 0.01 GV) in September 2017. Tsmb and Tera data are available in Reference [3].

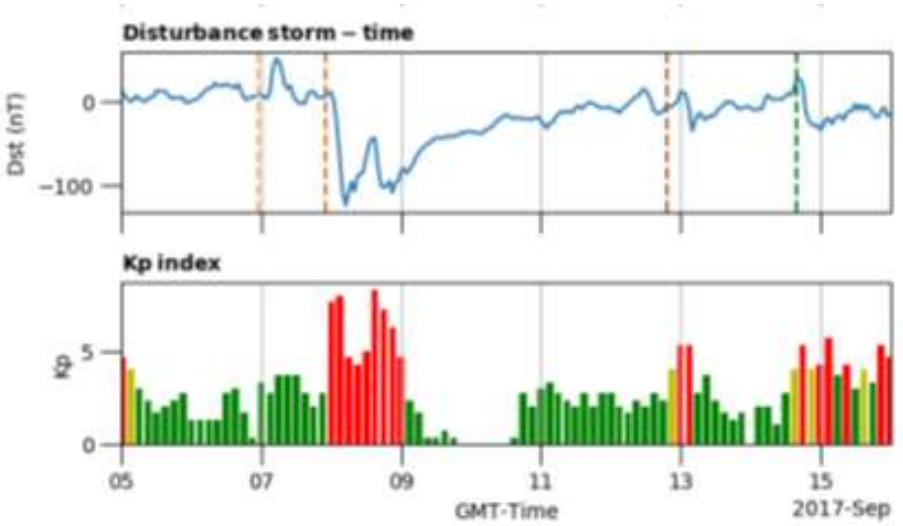

Figure 3. Hourly averaged Dst in cyan and the Kp index (green: Kp < 4, yellow: Kp = 4 and red: Kp > 4) in September 2017. [4]

Conclusion

- Tanca registered four signal decreases: three caused by the shock of CMEs in arrival time at 2017-09-06, 2017-09-07 and 2017-09-12 and one by a stream interaction region in 2017-09-14
- These observations of Forbush events carried out by the Tanca detector show the effects of solar events on the Earth's magnetic field for a region of energy above the energies observed by space missions, adding information about the effects of the more energetic particles of these events.

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Thank you!