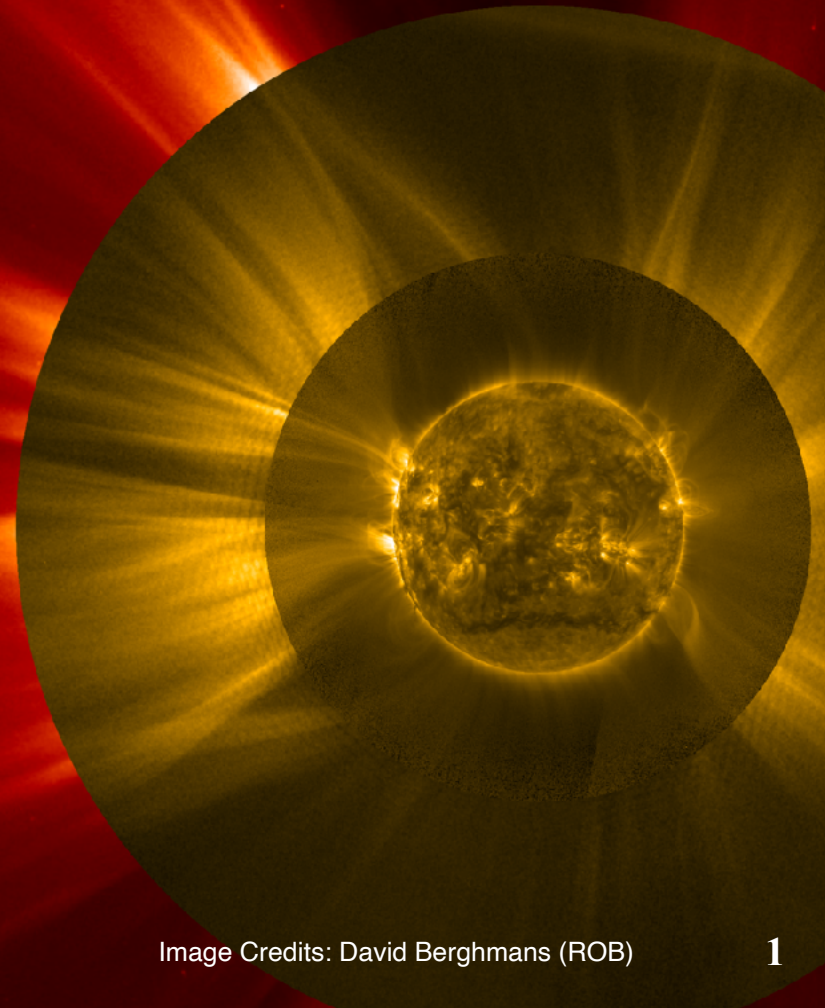


Categorising Large-Scale Coronal Structures Observed by EUI/FSI Instrument

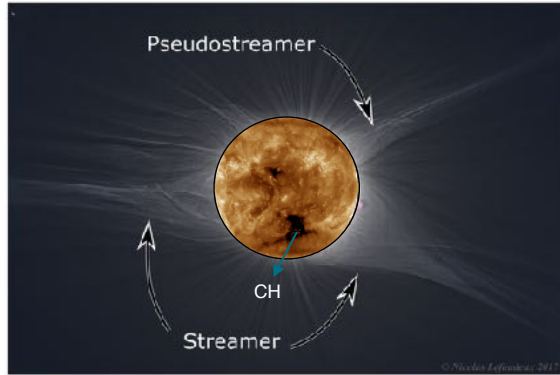
Vasanth Anandan,
J.Magdalenic, M.Mierla
S.Valliappan
and EUI core team members.



Outline

- Introduction
- Coronal Web Structure
- Events
- Data
- Catalogue
- Statistical Analysis of Parameters
- Future Work

Introduction: Solar Corona and Solar Wind



- Fast Solar Wind - Coronal Holes(CH)
- Slow Solar Wind - Streamers
- Intermediate Solar Wind - Pseudo Streamers

What do We Know:

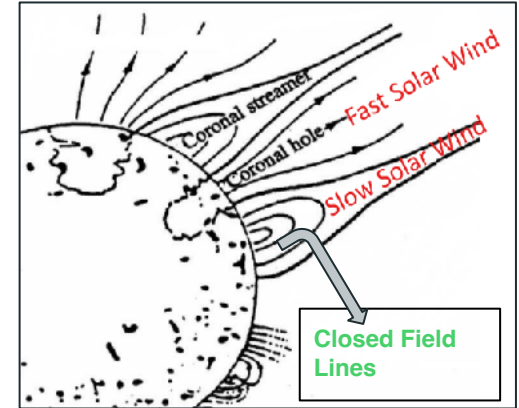
Different Mechanisms are involved in **Slow Solar Wind** Origins.

1) Open magnetic field regions with large expansion factor

2) **Interchange reconnection:** between open field lines in the coronal hole with the nearby closed coronal loops.

3) **Streamer Blobs:** The weak magnetic field at the streamer cusp

4) **Coronal Web Structure:** A combination of 1st and 2nd Scenarios

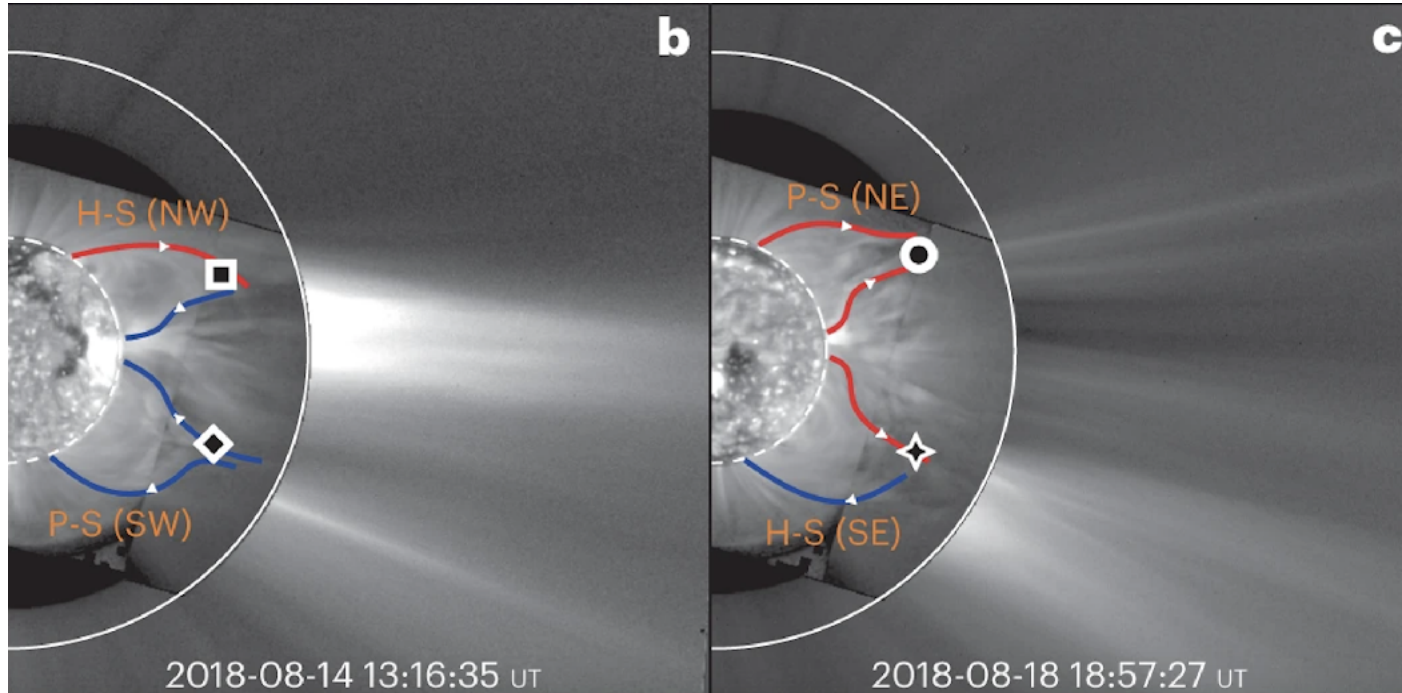


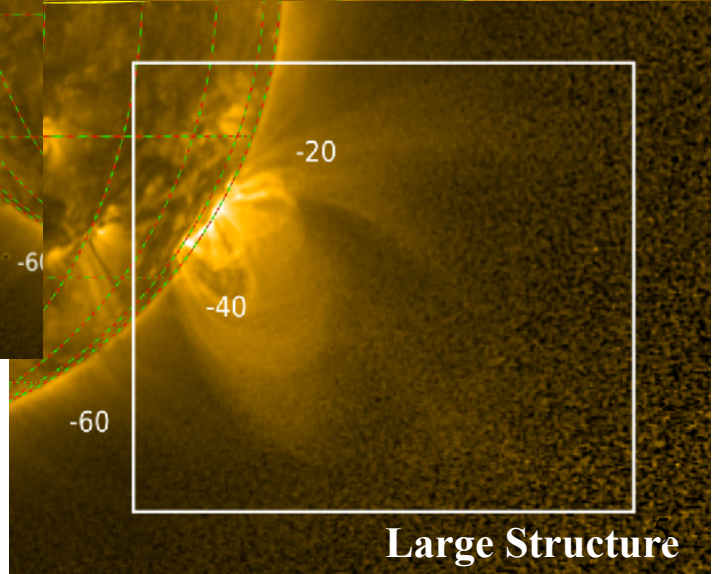
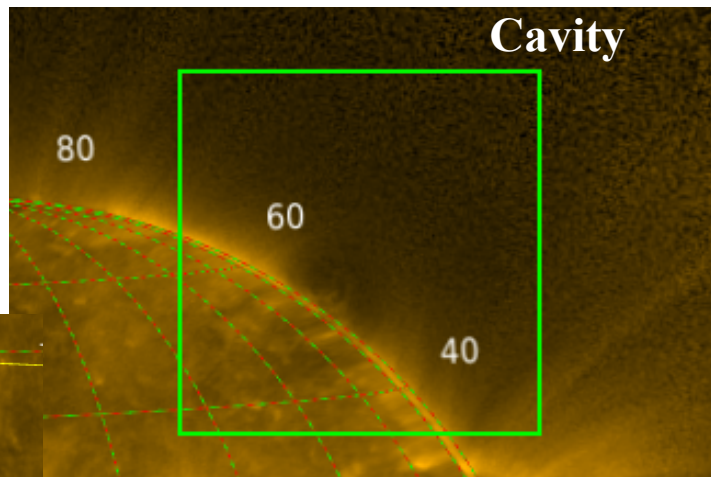
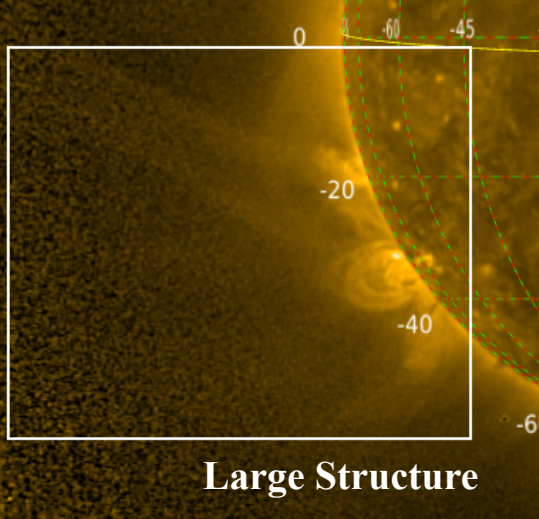
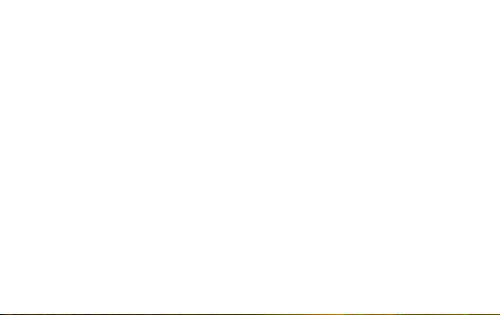
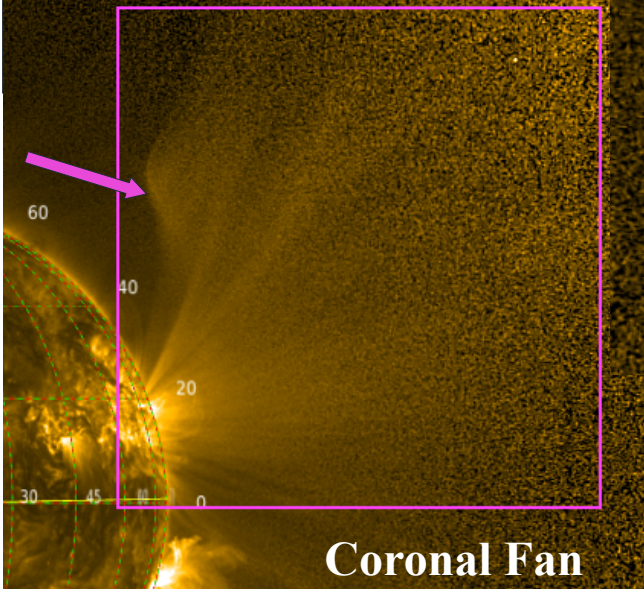
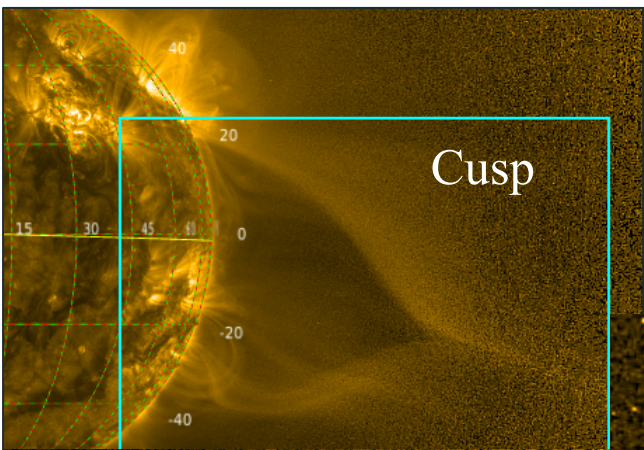
- It is **unclear** how the closed field lines permeating these regions are opening up to release the trapped plasma.



Coronal Web Structure:

Paper Title : “Direct Observations of a complex coronal web driving highly structured slow solar wind”
[Pradeep Chitta et al (2022)]



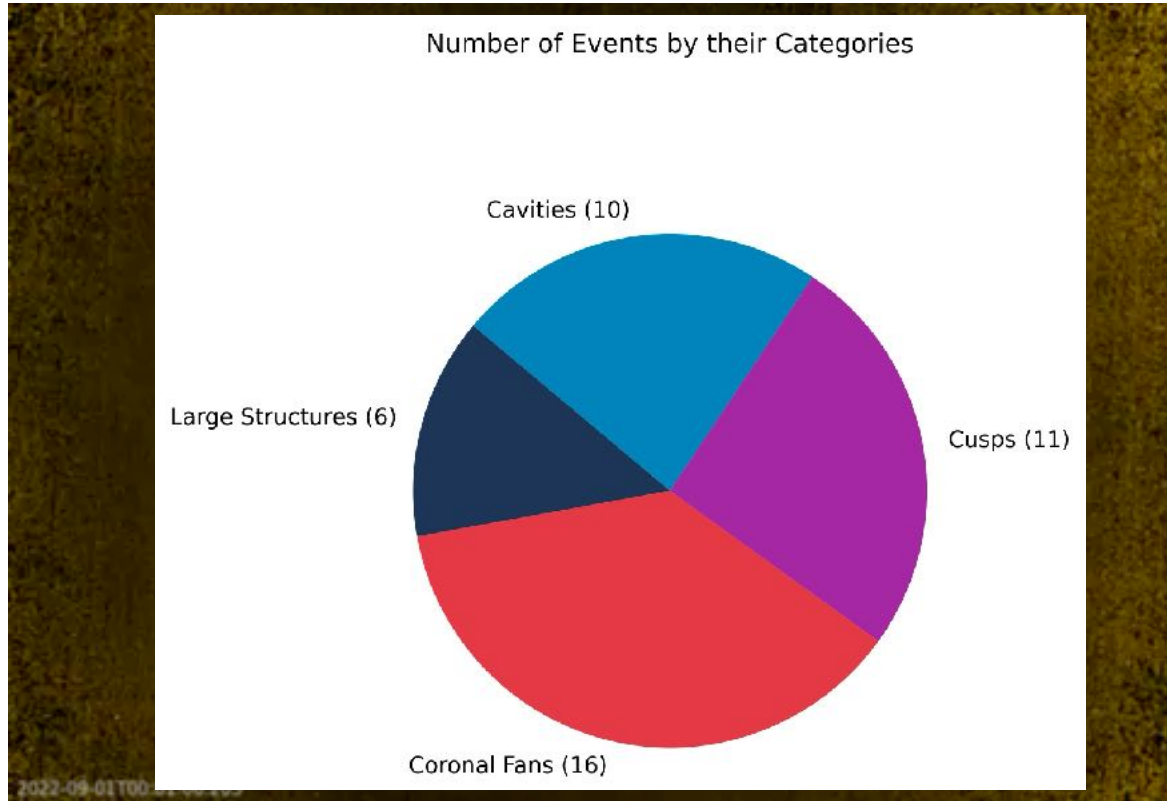


Data:

EUI/FSI (174Å) - Data from
2022

Cadence: 1 Hour & 30 Minutes

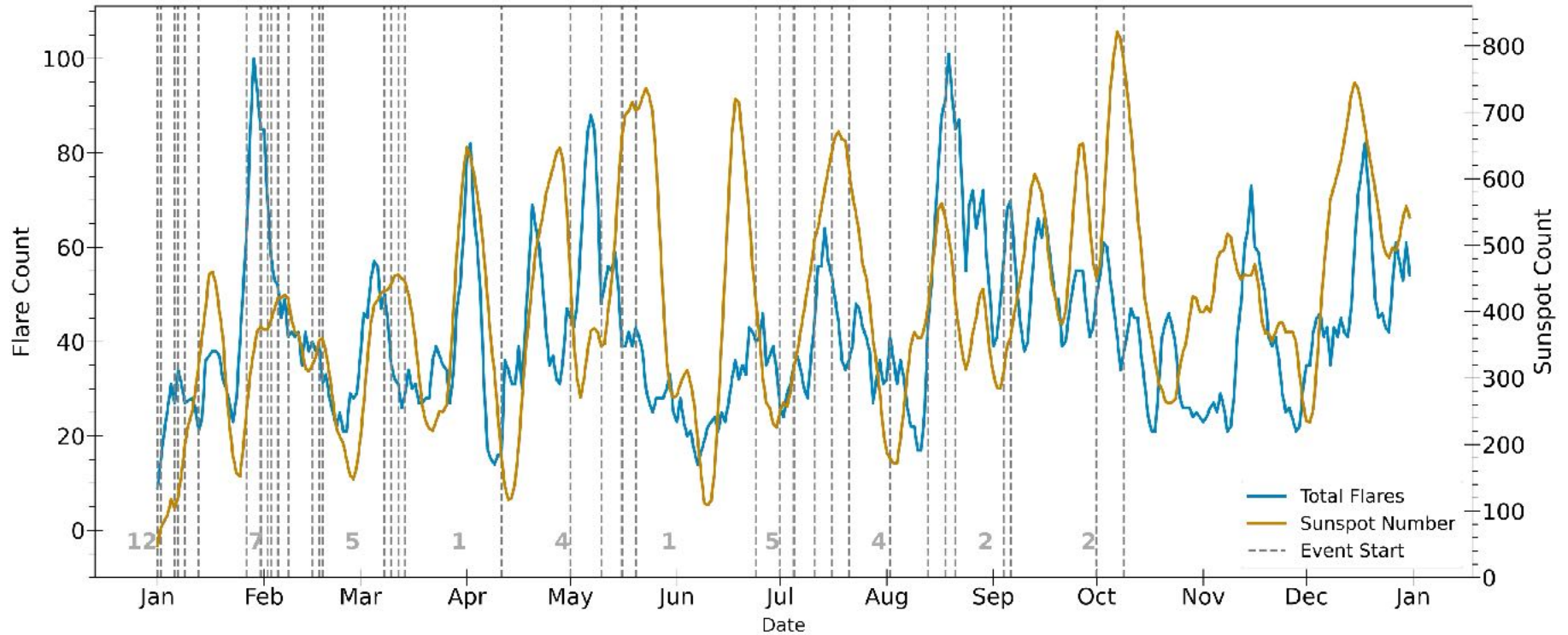
January - October
(2022): 43 Events



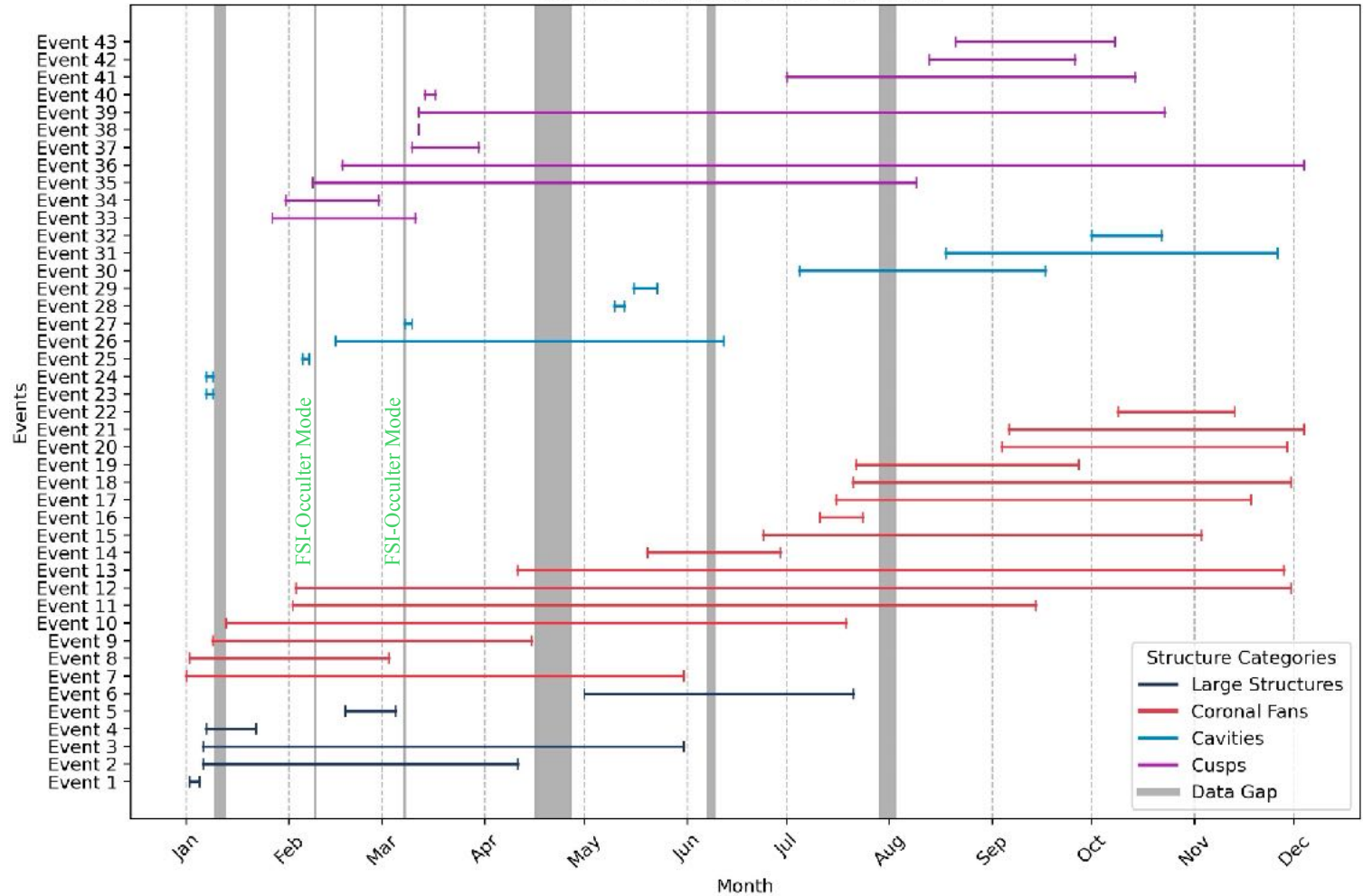
Catalogue:

Event ID	Start Date	Start Time	End Date	End Time	Duration (Days)	Duration (hh:mm:ss)	Structures Observed	Active Region	Distance Fo	Position Angl	Position Angl	Width (°)	Height (R _o)
20220102_174650_112	2022-01-02	16:22:50	2022-01-05	1:26:50	2	9:04:00	Large Structure	Yes	1.01	112	134	22	-
20220102_174650_245	2022-01-02	21:56:50	2022-03-03	15:10:50	59	17:14:00	Coronal Fan	Yes	1.01	245	262	17	-
20220102_174650_283	2022-01-01	0:00:50	2022-05-31	14:20:50	150	14:20:00	Coronal Fan	Yes	1	283	296	13	-
20220107_115450_105	2022-01-06	17:48:50	2022-04-11	11:30:50	94	17:42:00	Large Structure	Yes	1.01	105	124	19	-
20220107_115450_53	2022-01-06	23:24:50	2022-05-31	14:20:50	144	14:56:00	Large Structure	Yes	1.02	53	74	21	-
20220108_084650_310	2022-01-07	9:08:50	2022-01-09	13:52:50	2	4:44:00	Cavity	May be No	1.02	310	323	13	1.19
20220108_084650_29	2022-01-07	13:18:50	2022-01-09	7:04:50	1	17:46:00	Cavity	May be Yes	1	29	46	17	1.14
<i>There was a small data gap from 2022-01-09_13:52:50 to 2022-01-12_03:30:50</i>													
20220113_193850_232	2022-01-13	4:18:50	2022-07-19	1:31:00	186	21:12:10	Coronal Fan	Yes	1.02	232	244	12	-
20220130_082050_233	2022-01-31	11:48:50	2022-02-28	4:21:50	27	16:33:00	Cusp	Yes	1.02	233	250	17	1.22
20220206_072250_307	2022-02-05	10:30:50	2022-02-07	15:45:35	2	5:14:45	Cavity	May be No	1	307	331	24	1.15
20220209_021035_21	2022-01-27	7:56:50	2022-03-11	16:40:50	43	8:44:00	Cusp	Yes	1	21	59	38	1.32
20220122_110250_55	2022-01-07	16:08:50	2022-01-22	5:12:50	14	13:04:00	Large Structure	May Be No	1	55	114	59	-
20220217_103650_24	2022-02-18	3:58:50	2022-03-05	0:40:50	14	20:42:00	Large Structure	May Be Yes	1	24	76	52	-
20220217_214650_137	2022-02-15	10:56:50	2022-06-12	2:30:20	116	15:33:30	Cavity	May Be No	1.02	137	157	20	1.18
<i>There was a occulter mode of FSI from 2022-02-08_04:23:25 to 2022-02-08_07:53:25</i>													
20220302_213022_58	2022-01-09	18:58:50	2022-04-15	12:00:50	95	17:02:00	Coronal Fan	Yes	1	58	76	18	-
20220312_112050_33	2022-03-12	2:40:50	2022-03-12	21:40:50	0	19:00:00	Cusp	May Be Yes	1	33	54	21	1.26
20220317_142050_207	2022-03-14	23:20:50	2022-03-17	23:10:50	2	23:50:00	Cusp	May Be Yes	1.02	207	249	42	1.9
20220308_134535_30	2022-03-08	9:20:35	2022-03-10	15:30:50	2	6:10:15	Cavity	May Be Yes	1	30	46	16	1.12
20220329_173450_252	2022-03-10	10:30:50	2022-03-30	17:00:50	20	6:30:00	Cusp	Yes	1.01	68	104	36	1.88
<i>There was a data gap from 2022-04-16_07:00:50 to 2022-04-26 17:00:50</i>													
20220501_000050_221	2022-02-02	2:58:50	2022-09-14	12:01:00	224	9:02:10	Coronal Fan	Yes	1.02	221	245	24	-
20220504_072050_65	2022-05-01	21:30:50	2022-07-21	3:51:00	80	6:20:10	Large Structure	Yes	1	65	114	49	-
20220504_160050_127	2022-02-08	23:25:35	2022-08-09	17:11:00	181	17:45:25	Cusp	May Be Yes	1.02	127	160	33	1.43
20220510_155050_274	2022-02-03	6:58:50	2022-11-30	18:37:00	300	11:38:10	Coronal Fan	Yes	1.01	274	302	28	-
20220513_185050_23	2022-03-12	12:15:35	2022-10-23	4:40:55	224	16:25:20	Cusp	May Be Yes	1	23	59	36	1.53
20220510_114050_295	2022-02-17	6:26:50	2022-12-04	18:43:00	290	12:16:10	Cusp	May Be Yes	1.01	295	340	45	1.49
20220510_114050_246	2022-04-11	3:30:50	2022-11-28	14:13:00	231	10:42:10	Coronal Fan	Yes	1.02	246	258	12	-
20220511_003050_320	2022-05-10	21:40:50	2022-05-13	18:50:50	2	21:10:00	Cavity		1	320	332	12	1.08
20220519_042050_312	2022-05-16	11:30:50	2022-05-23	3:20:50	6	15:50:00	Cavity	May Be No	1.01	312	329	17	1.12
20220520_003050_108	2022-05-20	13:30:50	2022-06-29	23:50:50	40	10:20:00	Coronal Fan	Yes	1.01	108	124	16	-

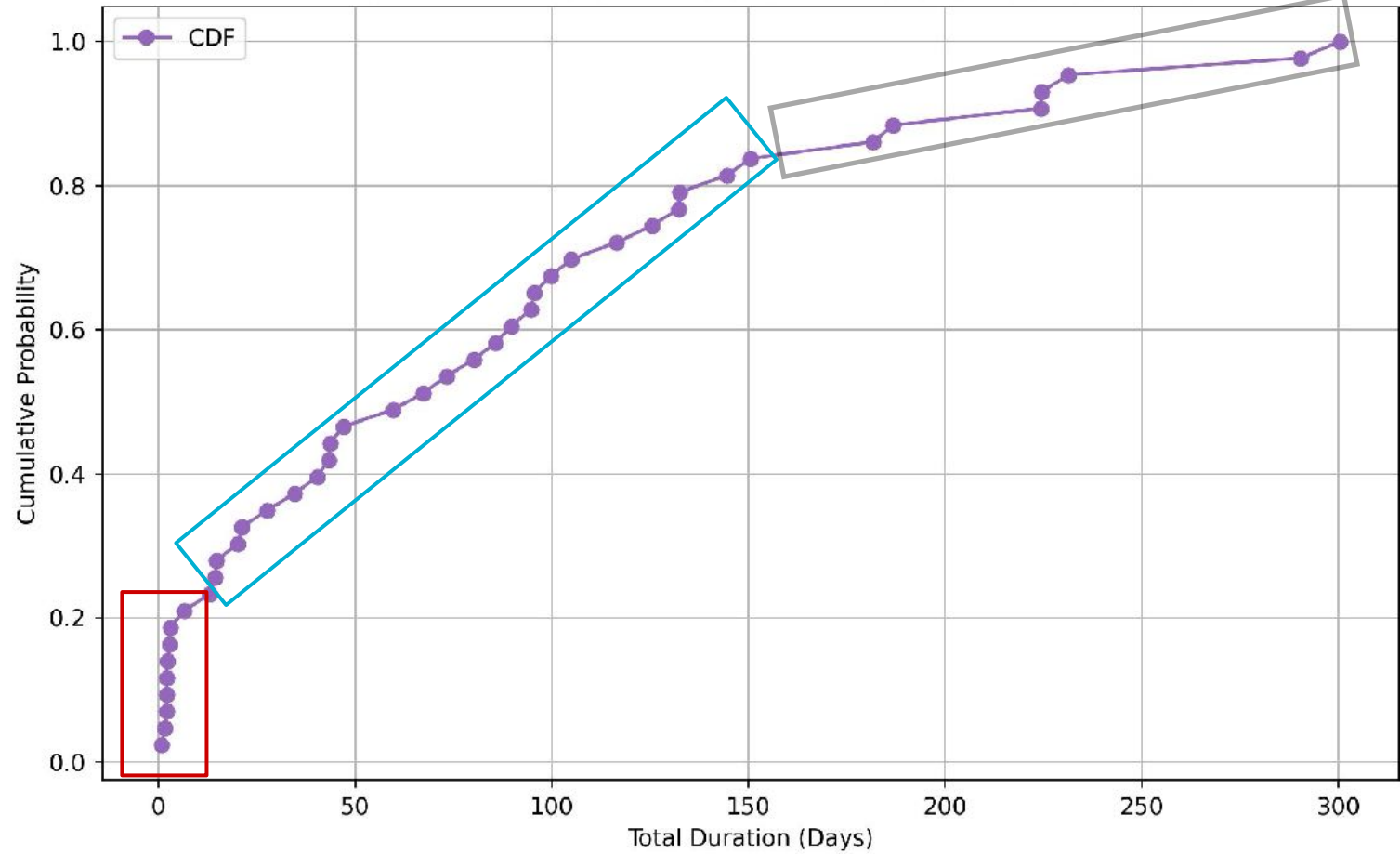
Flares, Sunspot Number and Events Occurrence:



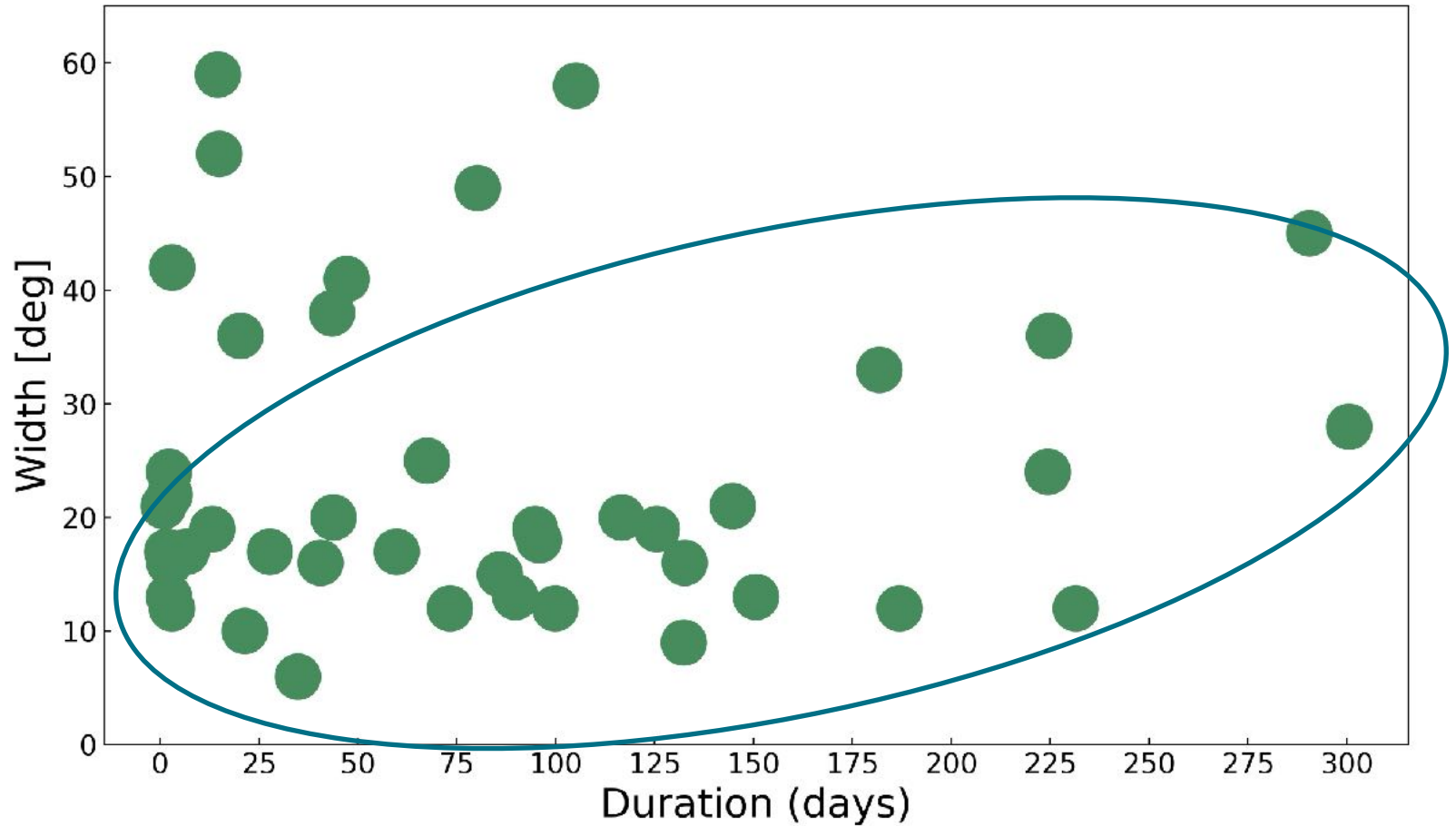
Event Durations by Their Categories

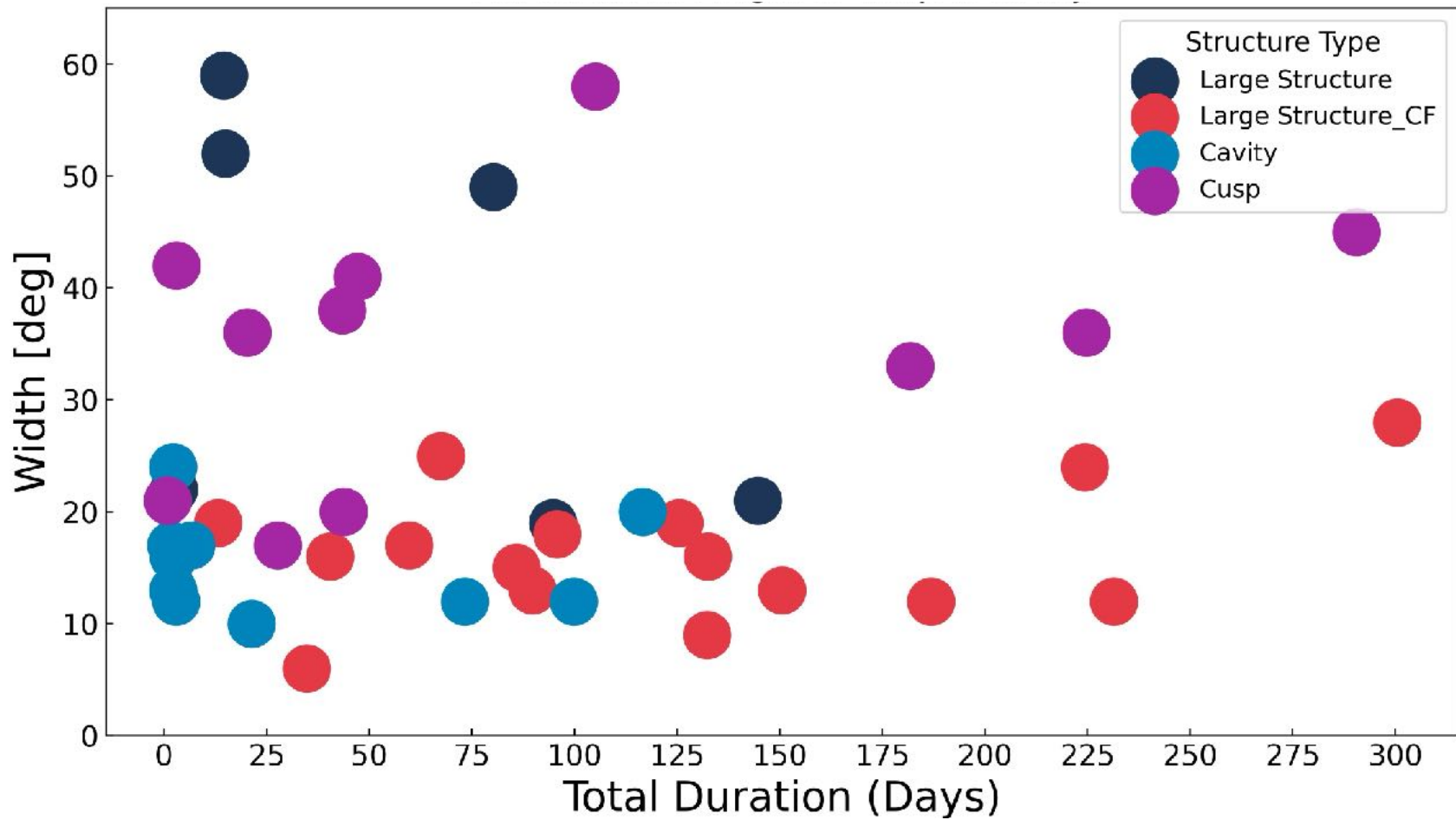


Cumulative Distribution of Durations of the Structures Observed

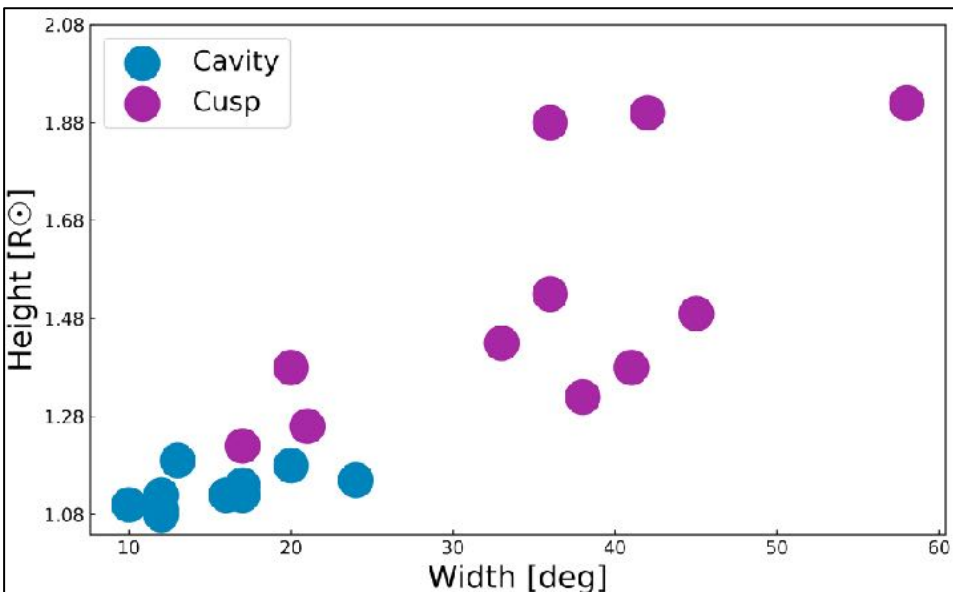


Width of the Observed Structures versus their Durations

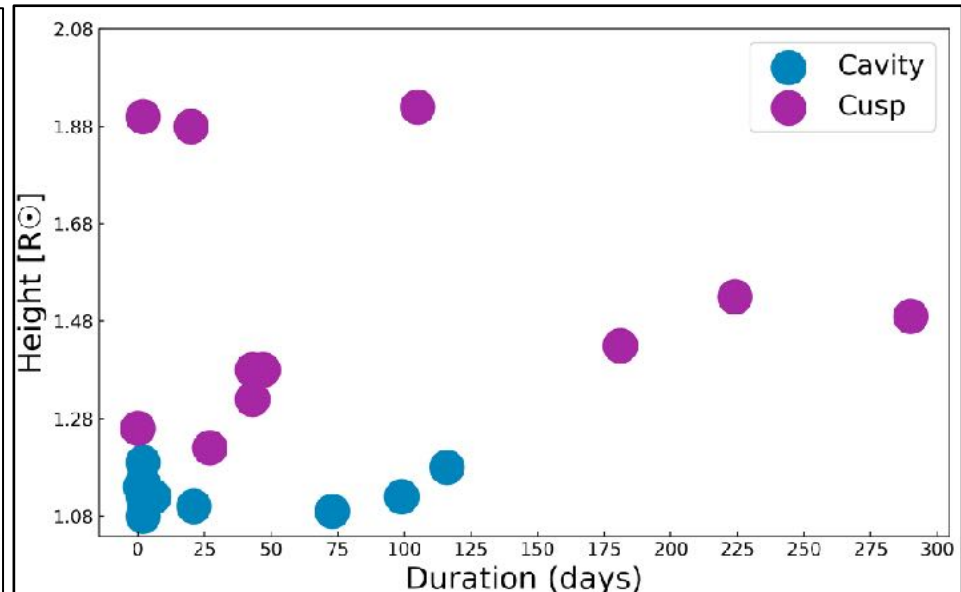




Height of the Cusps and Cavities vs its Width:



Height of the Cusps and Cavities vs its Duration:



Future Work:

EUI/FSI - Structures Observed from Limb

Vantage Point Observation - STEREO-A / EUVI (171Å)

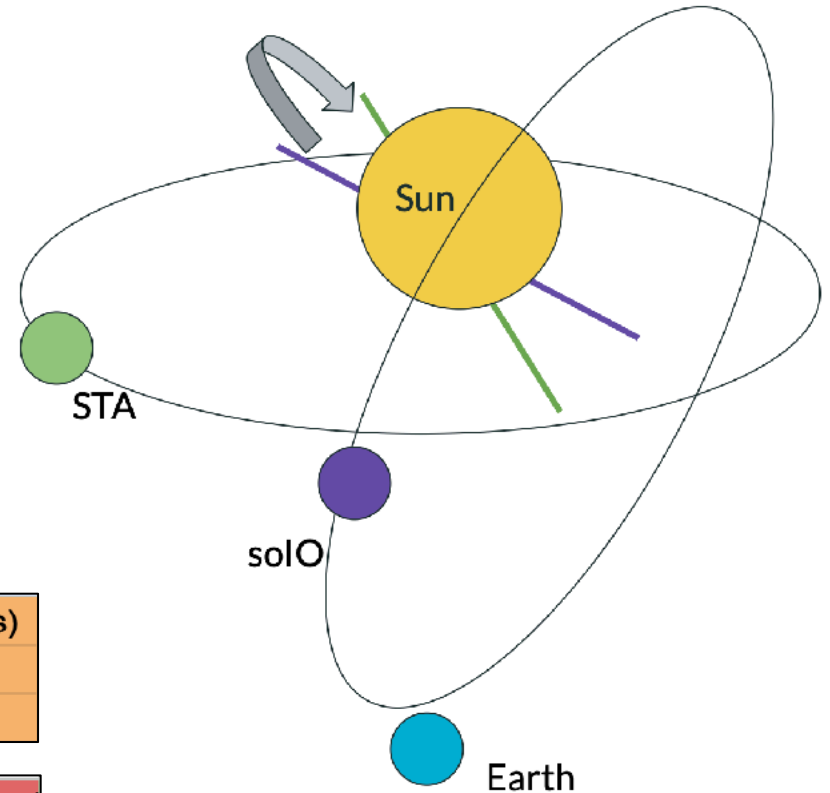
The duration of the analysed structures increased

EUVI →

Start Date	Duration (Days)	Duration (hh:mm:ss)
2021-12-20	15	11:17:16
2021-12-19	72	18:00:00

FSI →

Start Date	Duration (Days)	Duration (hh:mm:ss)
2022-01-02	2	9:04:00
2022-01-02	59	17:14:00



Thank You!