

Date	time UTC	time CET, i.e. Belgium	Observations	Phenomenon	What	source or cause	More	impact	
18 January	17:27	18:27	Observations	Flare	X-ray flux starts to increase	SIDC sunspot group 740	X-ray: high energy part of the solar light - flare is a light flash	immediate - on the day side of the Earth - ionisation	SIDC sunspot group
18 January	17:40	18:40	Service	Short wave fadeout	HF communication moderate alert	X-ray flux reached the X-level on the scale A,B,C,M,X. Related to the flare that began at 17:27 UTC January 18	Warning for civil aviation	Radio signals can be partially or completely being absorbed making long distance radio communication on the day side of Earth difficult or impossible.	
18 January	17:59	18:59	Observations	solar radio burst	Radio flux starts to increase - type II		emission in the radio part of the light - indication of the presence of a coronal mass ejection	immediate - on the day side of the Earth - noise in radio receivers like GNSS, jamming radar systems if they look into the direction of the sun	
18 January	18:09	19:09	Observations	flare	X-ray flux peaked at X1.9.		flare of category X on the scale A,B,C,M,X. An X flare is an extreme strong X-ray flash	immediate - on the day side of the Earth - ionisation - impacts radio wave propagation and radio wave absorption	
18 January	18:12	19:12	Observations	Coronal mass ejection - solar wind	full halo CME - estimated speed 1000 to 1500 km/s	SIDC sunspot group 740		No impact - the CME has just left the sun and did not reach Earth yet.	SIDC sunspot group
18 January	18:51	19:51	Observations	flare	X-ray flux has decreased	SIDC sunspot group 740	end of the flare	Impact vanishes immediately	
18 January	19:48	20:48	Service	Short wave fadeout	End of HF communication moderate alert	X-ray flux went below the X-level on the scale A,B,C,M,X.	Warning for civil aviation	Impact had ended.	
18 January	22:50	23:50	Observations	proton storm - Solar energetic particles	>10 MeV proton flux passes the threshold of 10 pfu	CME shock	fast high energy protons with solar origin are detected in the Earth's magnetosphere.	immediate when detected - polar regions - ionisation - radio wave absorption	
19 January	1:00	2:00	Service	Scintillation	GNSS severe alert	Equatorial Plasma Bubbles at sunset (observed almost daily; not related to eruptive space weather)	Warning for civil aviation	Radio signals transmitted by navigation satellites are being impacted by by irregularities in the ionosphere. The receiver has difficulties with the reception of the signals. Navigation using GNSS becomes less accurate or impossible. Impacts occurs typically in the polar and equatorial regions.	
19 January	4:57	5:57	Service	Polar Cap Absorption	HF communication severe alert	Increased proton flux - related to the proton storm that began on 22:50 UTC on January 18	Warning for civil aviation	Radio signals can be partially or completely absorbed making long distance radio communication near the poles of Earth difficult or impossible.	
19 January	5:35	6:35	Service	Scintillation	End of GNSS severe alert	End of Equatorial plasma bubbles	Warning for civil aviation	Impact had ended.	
19 January	7:49	8:49	Service		Halo CME detection alert		Automated alert generated by the CACTUS tool warning for the detection of a (partial) halo CME		https://sidc.be/cactus/out/CME0035/CME.html
19 January	9:06	10:06	Service		Presto		Fast and timely info on the solar events		
19 January	11:21	12:21	Service	Polar Cap Absorption	HF communication severe alert	Increased proton flux - related to the proton storm that began on 22:50 UTC on January 18	Warning for civil aviation	Radio signals can be partially or completely being absorbed making long distance radio communication near the poles of Earth difficult or impossible.	
19 January	10:30	11:30	Service		SIDC Space Weather Briefing		Weekly online briefing with overview of the Space weather of the past 7 days and outlook to the coming week.		
19 January	13:02	14:02	Service		URSigram		Daily space weather bulletin with further analysis		
19 January	16:07	17:07	Service		STCE News Item		detailed information on flare, radio observations, CME observations and PCA (aimed at knowledgeable readers)		https://stce.be/news/800/welcome.html
19 January	16:41	17:41	Service	Polar Cap Absorption	HF communication severe alert	Increased proton flux - related to the proton storm that began on 22:50 UTC on January 18	Warning for civil aviation	Radio signals can be partially or completely being absorbed making long distance radio communication near the poles of Earth difficult or impossible.	
19 January	18:59	19:59	Observations	Coronal Mass Ejection arrived at the L1 point	Shock in Solar Wind parameters	CME Shock in front of the magnetic cloud	Sharp change in magnetic field (due to proton storm the measurements of the velocity are unreliable) and speed in the lagrange point L1 which is around 1 hour upstream of Earth, i.e. the solar wind passing L1 will touch the magnetosphere of Earth around <1 hour later, giving the measured speed of around 1000 km/s.	Geomagnetic storm starts within 1 hour	
19 January	20:30	21:30	Observations	Particle induced ionisation	Particle induced spodaic layer detected in ionograms	Particle precipitation from the magnetotail in auroral oval		Possible disturbances for HF radio operations	https://digisonde.oma.be
19 January	20:57	21:57	Service	Scintillation	GNSS severe alert	Intensification and geographical expansion of the auroral oval due to injection of energy by the CME arrival	Warning for civil aviation	Radio signals transmitted by navigation satellites are being impacted by by irregularities in the ionosphere. The receiver has difficulties with the reception of the signals. Navigation becomes less accurate or impossible. Impacts occurs typically in the polar and equatorial regions.	
19 January	21:00	22:00	Observations	Kp	reached the value 8 on a scale between 0 and 9 for the 3h time window 18:00-21:00 UTC	CME shock + magnetic cloud	disturbance of the magnetic field on the planetary level - this is cumulative, i.e. the disturbance of the magnetic field between 19:00 and 21:00 contributed to this high value.	Geomagnetic storm on the planetary level	
19 January	22:00	23:00	Observations	K Bel	reached the value 8 on a scale between 0 and 9 for the 1h time window 21:00-22:00 UTC	CME shock + magnetic cloud	disturbance of the magnetic field of Earth above Belgium aurora sightings in Belgium	Local geomagnetic storm, indicates an auroral oval expansion over Belgium. The auroval oval is a complex area with auroral structures impacting the reflection and propagation of radio waves	http://ionosphere.meteo.be/geomagnetism/K_BEL/
19 January	22:10	23:10	Service	Polar Cap Absorption and Auroral Absorption	HF communication severe alert	Increased proton flux - related to the proton storm that began on 22:50 UTC on January 18 + geomagnetic storm with Kp=8- on 18:00 -21:00 UTC on January 19	Warning for civil aviation	Radio signals can be partially or completely being absorbed making long distance radio communication near the poles of Earth difficult or impossible.	
19 January	22:13	23:13	Service	Post Storm Depression	HF communication severe alert	Triggered by the geomagnetic storm with Kp > 6 on January 19	Warning for civil aviation	Radio signals are not reflected making long distance radio communication in the impacted areas impossible.	
19 January	23:00	0:00	Observations	K Bel	reached the value 9 on a scale between 0 and 9 for the 1h time window 22:00-23:00 UTC	CME shock + magnetic cloud	disturbance of the magnetic field of Earth above Belgium aurora sightings in Belgium	Local geomagnetic storm, auroral oval expansion over Belgium. The auroval oval is a complex area with auroral structures impacting the reflection and propagation of radio waves	http://ionosphere.meteo.be/geomagnetism/K_BEL/
19 January	23:08	0:08	Service	Scintillation	GNSS severe alert	Intensification and geographical expansion of the auroral oval due to injection of energy by the CME arrival	Warning for civil aviation	Radio signals transmitted by navigation satellites are being impacted by by irregularities in the ionosphere. The receiver has difficulties with the reception of the signals. Navigation becomes less accurate or impossible. Impacts occurs typically in the polar and equatorial regions.	
20 January	0:00	1:00	Observations	Kp	reached the value 9 on a scale between 0 and 9 for the 3h time window 21:00-00:00 UTC (January) 18)	CME shock + magnetic cloud	disturbance of the magnetic field on the planetary level - this is cumulative, i.e. the disturbance of the magnetic field between 19:00 and 21:00 contributed to this high value.	Geomagnetic storm on the planetary level	
20 January	0:35	1:35	Service		STCE News Item		detailed information on the arrival of the Coronal Mass Ejection, beam of protons and aurora (aimed at knowledgeable readers)		https://stce.be/news/801/welcome.html
20 Janaury	1:35	2:35	Observations	HF absorption	Strong decrease of SNR in HF	Enhanced D-layer ionisation	Increase in ionisation in the D layer (due to auroral oval and polar cap particle precipitation) leads to higher attenuation of ionsonde HF signals	increased absorption in HF band	https://digisonde.oma.be
20 January	2:52	3:52	Service	Scintillation	End of GNSS severe alert	Auroral oval returned to normal conditions	Warning for civil aviation	Impact had ended.	
20 January	3:59	4:59	Service	Polar Cap Absorption	HF communication severe alert	Increased proton flux - related to the proton storm that began on 22:50 UTC on January 18	Warning for civil aviation	Radio signals can be partially or completely being absorbed making long distance radio communication near the poles of Earth difficult or impossible.	
20 January	4:02	5:02	Service	Post Storm Depression	HF communication severe alert	Triggered by the geomagnetic storm with Kp > 6 on January 19	Warning for civil aviation	Radio signals are not reflected making long distance radio communication in the impacted areas impossible.	
20 Janaury	5:45	6:45	Observations	Normal ionograms	* Effects of higher absorption as well as particle induced layers no longer observed. * Depleted day-time F-layer	* Belgium no longer under auroral oval * Heated thermosphere leads to less ionisation		Depleted F layer results in MUF depression	http://ionosphere.meteo.be/ionosphere/ionosonde/
20 January	6:59	7:59	Service		Presto		Fast and timely info on the CME arrival and geomagnetic conditions		
20 January	7:43	8:43	Service	Polar Cap Absorption	End of HF communication severe alert	The proton flux decreased to a lower level.	Warning for civil aviation	Impact had ended.	
20 January	7:44	8:44	Service	Post Storm Depression	End of HF communication severe alert	The thermal influx into the atmosphere due to the geomagnetic storm lowered sufficiently.	Warning for civil aviation	Impact had ended.	
20 January	10:28	11:28	Service		Presto		Fast and timely info on the evolution of the geomagnetic conditions and the status of the solar wind		
20 January	12:46	13:46	Service		URSigram		Daily space weather bulletin with further analysis		
20 Janaury	13:00	14:00	Observations	F2 layer recovered	The depletion of the F layer has ended	Ionosphehre returns to normal day-time conditions			http://ionosphere.meteo.be/ionosphere/ionosonde/
20 January	21:20	22:20	Observations	Particle induced ionisation	Particle induced spodaic layer detected in ionograms	Particle precipitation from the magnetotail in auroral oval		Possible disturbances for HF radio operations	https://digisonde.oma.be
21 January	1:50	2:50	Observations	Normal ionograms	No particle sporadic layers	End of particle precipitation event			http://ionosphere.meteo.be/ionosphere/ionosonde/