

## Visual Schema for JSON files submitted to the SEP Scoreboard

NOTE: naming convention for files submitted:

ModelShortName.PredictionWindowStartTime.IssueTime.json

JSON key	Type	Boundaries	Description	Corresponding command line argument for helper script
<b>sep_forecast_submission</b>		required		
<b>model</b>		required	Model information	
short_name	string	required	Short name (e.g. acronym) of model to appear on scoreboard. Consider including version number with acronym if distinction needed, 16 character limit.	model-short-name
spase_id	string	required	Link to URL of full model description metadata in CCMC metadata registry in SPASE format (contact CCMC to register your model).	spase-id
version	string	required	model version. allows up to 15 characters	
submodel_name	string	optional	Additional name of a specific submodel/submodule/or mode that is used to create the model forecast	
<b>issue_time</b>	datetime*	required	Forecast issue time (e.g. model run is complete and forecast is created)	issue-time
<b>mode</b>	string	required	allowed values: forecast, historical, nowcast, simulated_realtime_forecast, simulated_realtime_nowcast Provide if forecast is issued based on a trigger. This can be expanded. Contact CCMC to add your trigger if it is missing.	mode
<b>triggers</b>		optional		
cme		> 1 allowed, optional		
start_time	datetime*	required, if cme used	Timestamp of 1st coronagraph image CME is visible in	cme-start-time
liftoff_time	datetime*	optional	Timestamp of coronagraph image with 1st indication of CME liftoff (used by CACTUS)	cme-liftoff-time
lat	float	optional	CME latitude (deg)	cme-lat
lon	float	optional	CME longitude (deg)	cme-lon
pa	float	optional	CME plane-of-sky position angle (measured from solar north in degrees counter-clockwise)	cme-pa
half_width	float	optional	CME half-width (deg)	cme-half-width
speed	float	optional	CME speed (km/s)	cme-speed
acceleration	float	optional	CME acceleration (km/s <sup>2</sup> )	cme-acceleration
height	float	optional	CME height at which the above parameters were derived (solar radii from Sun center)	cme-height
time_at_height	datetime*	optional	CME time at specified height	
time	datetime*	required, if time_at_height used		cme-time-at-height-time
height	float	required, if time_at_height used	in solar radii	cme-time-at-height-height
coordinates	string	required, if lat or lon used	Coordinate system for CME lat/lon parameters (e.g. HEEQ or Carrington)	cme-coordinates
catalog	string	optional	Name of catalog where CME information was pulled from. allowed values: ARTEMIS, DONKI, HELGATS, JHI_API, CACTUS_NRL, CACTUS_SIDC, CORIMP, SEEDS, SOHO_CDAW, STEREO_CDR1, SWPC, MLSO_KCOR (contact us to add a new catalog name)	cme-catalog
catalog_id	string	required if catalog=DONKI, otherwise optional	id that uniquely identifies this CME data in the catalog	cme-catalog-id
urls	string	> 1 allowed, optional	List of urls where CME information can be found, or information was pulled from	cme-urls
derivation_technique	string	optional	automated/manual	
process	string	required if derivation_technique used	SWPC, CAT, Stereocat, Plane-of-sky, FlareDerived	
method	string	required if derivation_technique used	allowed values: LE (leading edge), TE (Trailing Edge), RH8 (Right Hand Boundary), LH8 (Left Hand Boundary), BW (Black White Boundary), COR (Prominence Core), DS (Disconnection Front), SH (Shock Front)	
measurement_type	string	optional		
flare		> 1 allowed, optional		
last_data_time	datetime*	required, if flare used	Last time data timestamp that was used to create forecast (relevant for forecasts issued before flare end times)	flare-last-data-time
start_time	datetime*	optional	Flare start time	flare-start-time
peak_time	datetime*	optional	Flare peak time	flare-peak-time
end_time	datetime*	optional	Flare end time	flare-end-time
location	string	optional	Flare location in Stonyhurst coordinates. N00W00/S00E00 format	flare-location
intensity	float	optional	Flare intensity (W/m <sup>2</sup> )	flare-intensity
integrated_intensity	float	optional	Flare integrated intensity (J/m <sup>2</sup> )	flare-integrated-intensity
noaa_region	integer	optional	Associated NOAA active region number (including the preceding 1)	flare-noaa-region
peak_ratio	float	optional	The peak ratio of the long and short GOES X-ray channels	
catalog	string	optional	Name of catalog where flare information was pulled from. allowed values: SolarSoft Latest Events, DONKI, SIDC Solar Demon, COMSEP SWPC, SIDC FlareMail (contact us to add a new catalog name)	flare-catalog
catalog_id	string	required if catalog=DONKI, otherwise optional	id that uniquely identifies this flare data in the catalog	flare-catalog-id
urls	string	> 1 allowed, optional	List of urls where flare information can be found, or information was pulled from	flare-urls
cme_simulation		> 1 allowed, optional		
model	string	required, if cme_simulation used	Model name	cme-sim-model
simulation_completion_time	datetime*	optional	Simulation completion time	cme-sim-completion-time
urls	string	> 1 allowed, optional	List of urls where simulation information can be found, or information was pulled from	cme-sim-urls
particle_intensity		> 1 allowed, optional		
observatory	string	required, if particle_intensity used	Name of observatory/spacecraft/model data are from	pi-observatory
instrument	string	required, if particle_intensity used	Name of instrument data are from	pi-instrument
last_data_time	datetime*	required, if particle_intensity used	Last time data timestamp used to create forecast	pi-last-data-time
intensity	float	optional	Intensity value	
units	string	required, if intensity used	units for intensity value	
energy_channel	float	required, if intensity used	energy channel info for the intensity value	
min	float	required, if intensity used	min of energy channel range	
max	float	required, if intensity used	max of energy channel range. -1 represented an unbounded integral channel	
units	string**	required, if intensity used	energy channel units	
species	string	required, if intensity used	allowed values: electron, proton, helium, helium3, helium4, oxygen, iron, ion	
forecast_issue_time	datetime*	optional	For alert systems based on model inputs, the intensity value is a model forecast. Enter the issue time for that forecasted intensity value here.	
ongoing_events		> 1 allowed, optional	If an ongoing event triggers your forecast, list the properties you used	
start_time	datetime*	required, if ongoing_events used	start time	pi-ongoing-events-start-time
threshold	float	required, if ongoing_events used	threshold used to define the event in pfu	pi-ongoing-events-threshold
energy_min	float	required, if ongoing_events used	min of energy channel range in MeV	pi-ongoing-events-energy-min
energy_max	float	required, if ongoing_events used	max of energy channel range in MeV. -1 represented an unbounded integral channel	pi-ongoing-events-energy-max
radio		> 1 allowed, optional		
observatory	string	required, if radio used	Name of observatory/spacecraft data are from	
instrument	string	required, if radio used	Name of instrument data are from	
last_data_time	datetime*	required, if radio used	Last time data timestamp used to create forecast	
intensity	float	optional	Intensity value	
units	string	required, if intensity used	units for intensity value	
frequency_range		required, if intensity used	frequency range for intensity value	
min	float	required, if frequency_range used	min of frequency range	
max	float	required, if frequency_range used	max of frequency range	
units	string**	required, if frequency_range used	energy channel units	
window		optional	relevant window in which radio data are used	

		start_time	datetime*	optional	start of relevant window	
		end_time	datetime*	optional	end of relevant window	
		identified_burst		optional		
		type	string	optional	type of identified radio burst: allowed values: II, III, IV	
		start_time	datetime*	optional	start of identified radio burst	
	gle			> 1 allowed, optional		
		last_data_time	datetime*	required, if gle used	Last time data timestamp that was used to create forecast (relevant for forecasts issued before GLE end times)	
		start_time	datetime*	optional	GLE start time	
		peak_time	datetime*	optional	GLE peak time	
		end_time	datetime*	optional	GLE end time	
		stations	string	> 1 allowed, optional	List of stations reporting a GLE	
		catalog	string	optional	Name of catalog where flare information was pulled from.	
		catalog_id	string	optional	allowed values: GLE Alert++ (contact us to add a new catalog name)	
		urls	string	> 1 allowed, optional	id that uniquely identifies this GLE data in the catalog	
		human_evaluation		> 1 allowed, optional	List of urls where GLE information can be found, or information was pulled from	
		last_data_time	datetime*	required, if human_evaluation used	Last time data timestamp used to create forecast	
	inputs			> 1 allowed, optional	Provide if key model inputs are not represented in the triggers field	
		magnetic_connectivity		> 1 allowed, optional	Provide if specific magnetic connectivity information was used to produce your forecast	
		method	string	required, if magnetic_connectivity used	allowed values: Parker Spiral, PFSS-Parker Spiral, WSA, WSA-ENLIL, ADAPT-WSA-ENLIL (contact us to add your method to this format)	magcon-method
		lat	float	optional	latitude (deg) position of magnetic field line footprint linking the observing spacecraft to the Sun (in Stonyhurst coordinates).	magcon-lat
		lon	float	required, if magnetic_connectivity used	longitude (deg) position of magnetic field line footprint linking the observing spacecraft to the Sun (in Stonyhurst coordinates).	magcon-lon
		connection_angle		optional	angle between the related solar event and the foot point of the magnetic field line linking the observing spacecraft to the Sun.	
		great_circle	float	optional	great circle distance between the solar event and the magnetic connectivity footprint (deg)	magcon-angle-great-circle
		lat	float	optional	connection angle lat = solar event lat - magnetic connectivity footprint lat (deg)	magcon-angle-lat
		lon	float	required, if connection_angle used	connection angle lon = solar event lon - magnetic connectivity footprint lon (deg)	magcon-angle-lon
		solar_wind		optional	Use if a certain solar wind speed was assumed to compute the magnetic connectivity	
		observatory	string	optional	Name of observatory/spacecraft data are from	magcon-solar-wind-observatory
		speed	float	required, if solar_wind used	Assumed solar wind speed to compute magnetic connectivity	magcon-solar-wind-speed
		magnetogram		> 1 allowed, optional	Provide if a magnetogram was used to produce your forecast	
		observatory	string	required, if magnetogram used	Name of observatory/spacecraft data are from	magnetogram-observatory
		instrument	string	required, if magnetogram used	Name of instrument data are from	magnetogram-instrument
		products		optional		
		product	string	> 1 allowed, optional	Name of data product used	magnetogram-product
		last_data_time	datetime*	required, if products used, > 1 allowed	Last time data timestamp available at the time of forecast, and was used to make the forecast	magnetogram-product-last-data-time
		coronagraph		> 1 allowed, optional	Provide if a coronagraph was used to produce your forecast	
		observatory	string	required, if coronagraph used	Name of observatory/spacecraft data are from	
		instrument	string	required, if coronagraph used	Name of instrument data are from	
		products		optional		
		product	string	> 1 allowed, required, if products used	Name of data product used	
		last_data_time	datetime*	> 1 allowed, required, if products used	Last time data timestamp available at the time of forecast	
	forecasts			> 1 allowed, at least 1 required	>1 allowed such that forecasts for multiple energy channels can be submitted in one file (if they have the same issue time)	
		energy_channel		required	Each forecast is defined by the energy channel specified	
		min	float	required	min of energy channel range	energy-min
		max	float	required	max of energy channel range. -1 represented an unbounded integral channel	energy-max
		units	string**	required	energy channel units	energy-units
		species	string	required	allowed values: electron, proton, helium, helium3, helium4, oxygen, iron, lon	species
		location	string	required	allowed values: mercury, venus, earth, mars, psp, stereob, stereob, diem, juno, L1, L2, L4, L5	location
		prediction_window		required	all forecast values provided are relevant only in this prediction window	prediction-window
		start_time	datetime*	required	start of forecast prediction window	(first value given for 'prediction-window')
		end_time	datetime*	required	end of forecast prediction window	(second value given for 'prediction-window')
		peak_intensity		optional		
		intensity	float	required, if peak_intensity used	forecast peak intensity at onset value	peak-intensity
		units	string**	required, if peak_intensity used	forecast peak intensity at onset value units	peak-intensity-units
		uncertainty	float	optional	forecast peak intensity at onset uncertainty value (same units as peak intensity) (for symmetric uncertainties) (cannot be used with either uncertainty_low or uncertainty_high)	peak-intensity-uncertainty
		uncertainty_low	float	required, if uncertainty_high used	forecast peak intensity at onset lowest uncertainty value (same units as peak intensity) (for asymmetric uncertainties)	peak-intensity-uncertainty-low
		uncertainty_high	float	required, if uncertainty_low used	forecast peak intensity at onset highest uncertainty value (same units as peak intensity) (for asymmetric uncertainties)	peak-intensity-uncertainty-high
		time	datetime*	optional	forecast time that the peak intensity value will be reached	peak-intensity-time
		peak_intensity_esp		optional		
		intensity	float	required, if peak_intensity_esp used	forecast peak intensity value in the vicinity of shock passage (ESP)	peak-intensity-esp
		units	string**	required, if peak_intensity_esp used	forecast peak intensity ESP units	peak-intensity-esp-units
		uncertainty	float	optional	forecast peak intensity ESP uncertainty value (same units as intensity) (for symmetric uncertainties) (cannot be used with either uncertainty_low or uncertainty_high)	peak-intensity-esp-uncertainty
		uncertainty_low	float	required, if uncertainty_high used	forecast peak intensity ESP lowest uncertainty value (same units as intensity) (for asymmetric uncertainties)	peak-intensity-esp-uncertainty-low
		uncertainty_high	float	required, if uncertainty_low used	forecast peak intensity ESP highest uncertainty value (same units as intensity) (for asymmetric uncertainties)	peak-intensity-esp-uncertainty-high
		time	datetime*	optional	forecast time that peak intensity ESP value will be reached	peak-intensity-esp-time
		peak_intensity_max		optional		
		intensity	float	required, if peak_intensity_max used	forecast max peak intensity for the entire prediction window value	peak-intensity-max
		units	string**	required, if peak_intensity_max used	forecast max peak intensity value units	peak-intensity-max-units
		uncertainty	float	optional	forecast max peak intensity uncertainty value (same units as intensity) (for symmetric uncertainties) (cannot be used with either uncertainty_low or uncertainty_high)	peak-intensity-max-uncertainty
		uncertainty_low	float	required, if uncertainty_high used	forecast max peak intensity lowest uncertainty value (same units as intensity) (for asymmetric uncertainties)	peak-intensity-max-uncertainty-low
		uncertainty_high	float	required, if uncertainty_low used	forecast max peak intensity highest uncertainty value (same units as intensity) (for asymmetric uncertainties)	peak-intensity-max-uncertainty-high
		time	datetime*	optional	forecast time that the max peak intensity value will be reached	peak-intensity-max-time
		event_lengths		> 1 allowed, optional	must fall within prediction window	
		start_time	datetime*	required	time that the intensity exceeds threshold_start	event-length-start-time
		end_time	datetime*	optional, unless fluences is used	time that the intensity drops below threshold_end	event-length-end-time
		threshold_start	float	required	threshold used to extract start time	event-length-threshold
		threshold_end	float	optional	threshold used to extract end time, if not provided assume threshold_end=threshold_start	
		threshold_units	string**	required	units of threshold	event-length-threshold-units
		fluences		> 1 allowed, optional	corresponds to event lengths	
		fluence	float	required, if fluence used	forecast fluence value (corresponds to event length)	fluence
		units	string**	required, if fluence used	forecast fluence units	fluence-units
		uncertainty_low	float	required, if uncertainty_high used	forecast fluence's lowest uncertainty value (same units as fluence) (for asymmetric uncertainties)	fluence-uncertainty-low

		<i>uncertainty_high</i>	float	required, if <i>uncertainty_low</i> used	forecast fluence's highest uncertainty value (same units as fluence) (for asymmetric uncertainties)	fluence-uncertainty-high
		<i>fluence_spectra</i>		> 1 allowed, optional		
		start_time	datetime*	required if <i>fluence_spectra</i> used	time that the intensity exceeds threshold_start	
		end_time	datetime*	required if <i>fluence_spectra</i> used	time that the intensity drops below threshold_end	
		threshold_start	float	required if <i>fluence_spectra</i> used	threshold used to extract start time	
		threshold_end	float	required if <i>fluence_spectra</i> used	threshold used to extract end time	
		threshold_units	string**	required if <i>fluence_spectra</i> used	units of threshold	
		fluence_units	string**	required if <i>fluence_spectra</i> used	units of threshold	
		fluence_spectrum		required if <i>fluence_spectra</i> used, > 1 allowed		
		energy_min	float	required if <i>fluence_spectra</i> used	low edge of energy bin in MeV	
		energy_max	float	required if <i>fluence_spectra</i> used	high edge of energy bin in MeV, -1 represented an unbounded integral channel	
		fluence	float	required if <i>fluence_spectra</i> used	fluence value that corresponds to energy bin (defined by energy_min, energy_max), and calculated between start_time and end_time	
		<i>threshold_crossings</i>		> 1 allowed, optional	multiple threshold_crossings can be provided for the same forecast energy channel	
		crossing_time	datetime*	required, if <i>threshold_crossings</i> used	forecast threshold crossing time	thresh-crossing-times
		uncertainty	float	optional	forecast crossing time uncertainty in hours	thresh-uncertainties
		threshold	float	required, if <i>threshold_crossings</i> used	the particle intensity exceeds this threshold (e.g. 10 pfu)	crossing-thresholds
		threshold_units	string**	required, if <i>threshold_crossings</i> used	units of threshold	crossing-threshold-units
		<i>probabilities</i>		> 1 allowed, optional	multiple probabilities can be provided for the same forecast energy channel	
		probability_value	float	required, if <i>probabilities</i> used	forecast probability value (range 0 to 1)	probabilities
		uncertainty	float	optional	plus/minus error bar for probability_value (in probability_value units)	prob-uncertainties
		threshold	float	required, if <i>probabilities</i> used	the SEP probability_value forecast is for the particle intensity to exceed this threshold value (e.g. 10 pfu)	prob-thresholds
		threshold_units	string**	required, if <i>probabilities</i> used	units of threshold	prob-threshold-units
		<i>all_clear</i>		optional	if you do not provide an all-clear forecast do not enter this key.	
		all_clear_boolean	boolean	required, if <i>all_clear</i> used	There are three situations for setting all_clear_boolean=false: (1) for >10MeV energy channel, your forecast of peak intensity OR threshold crossing exceeds 10 pfu OR your probability forecast for a threshold of 10 pfu exceeds your custom probability_threshold; (2) for the >100MeV energy channel, your forecast of peak intensity OR threshold crossing exceeds 1 pfu OR your probability forecast for a threshold of 1 pfu exceeds your custom probability_threshold; (3) for your custom (non-integral) energy channel, your forecast peak intensity OR threshold crossing exceeds your custom threshold. Custom cases (3) are being stored but will not be used in the all-clear scoreboard display.	all-clear
		threshold	float	required, if <i>all_clear</i> used	particle intensity threshold value all_clear_boolean refers to. Can be (1) 10 pfu for >10MeV channel (2) 1 pfu for >100MeV channel (3) custom	all-clear-threshold
		threshold_units	string**	required, if <i>all_clear</i> used	units of threshold	all-clear-threshold-units
		probability_threshold	float	optional	probability threshold value all_clear_boolean refers to. Must specify this threshold if setting all_clear_boolean based on probability forecast.	all-clear-probability-threshold
		<i>alert</i>		optional		
		alert_type	string	required, if alerts used	allowed values: quiet, warning, alert	
		flux_threshold		> 1 allowed, required, if alerts used		
		min	float	required, if alerts used		
		max	float	required, if alerts used		
		units	string**	required, if alerts used		
		source	string	optional	specify source if more than one threshold across multiple sources are used	
		probability_threshold		optional		
		min	float	required, if probability_threshold		
		max	float	required, if probability_threshold		
		<i>sep_profile</i>	string	optional	Text file with 2 - 4 columns: datetime* string, predicted SEP intensity for this energy channel (float), optional uncertainty (if symmetric) or uncertainty_low (if asymmetric) (float) value, optional uncertainty_high (float) value. Please name the file uniquely. To accomplish this, we suggest including your model name and issue time in the filename. <b>Guideline: ModelShortName.PredictionWindowStartTime.IssueTime.EnergyChannel.txt</b>	sep-profile
		<i>source_info</i>		optional	Models that produce ensemble SEP profile forecasts can provide a list of text files	
		native_id	string	optional	Information specific to native/raw outputs from observations and models that produce profiles.	
		native_flux_type	string	optional	Specify only if forecast has a native id from your model run	
		<i>status</i>		optional	allowed values: differential, integral	
		current_status	string	required, if status used	give the current status of the model/observations	
		comment	string	optional	give more details regarding the current status of the model/observations	
		<i>observations</i>		optional		
		<i>all_clear</i>		optional	use this field for observations helpful for interpreting SEP forecasts/observations. also use the inputs field above to define the observatory and instrument used	
		all_clear_boolean	boolean	required, if <i>all_clear</i> used	true or false	
		all_clear_type	string	required, if <i>all_clear</i> used	allowed values: cme (more can be added upon request)	
		<i>alert</i>		optional		
		alert_type	string	required, if alert used	allowed values: ALERT, OBSERVER ALERT, CANCEL ALERT, SUMMARY	
		start_time	datetime*	required, if alert used	start time of the alert, usually this is the observation start time	
		end_time	datetime*	optional	optional end time of alert, usually this is the observation end time	
		comment	string	optional	give more details regarding the alert	

\*datetime expected in UTC and in the format(s): "YYYY-MM-DDTHH:MM:SSZ"

\*\*units string format: Example: "MeV^-1\*s^-1\*cm^-2\*sr^-1". Another example: "pfu" where 1 pfu = 1 s^-1\*cm^-2\*sr^-1

JSON filename guideline: ModelShortName.PredictionWindowStartTime.IssueTime.json

Profile text filename guideline: ModelShortName.PredictionWindowStartTime.IssueTime.EnergyChannel.txt

Please do not use colons (:) in your filenames