

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

NOTE: naming convention for files submitted:

ModelShortName.PredictionWindowStartTime.IssueTime.json

JSON key		Type	Boundaries required	Description	Corresponding command line argument for helper script
<b>sep_forecast_submission</b>					
<b>NOTE: removed contact fields</b>					
<b>model</b>					
short_name	string	required	Model information	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	Model information	Link to URL of full model description metadata in CSMC metadata registry in SPASE format (contact CCMC to register your model).	spase-id
issue_time	datetime*	required	Forecast issue time (e.g. model run is complete and forecast is created).	Forecast issue time (e.g. model run is complete and forecast is created).	issue-time
mode	string	required	Forecast issue time (e.g. model run is complete and forecast is created).	allowed values: forecast, historical 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>					
cme			optional		
start_time	datetime*	required, if cme used	> 1 allowed, optional	Timestamp of 1st coronagraph image CME is visible in	cme-start-time
ltoff_time	datetime*	optional		Timestamp of coronagraph image with 1st indication of CME lloff (lost by CACTUS)	cme-ltoff-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			cme-time-at-height-height
coordinates	string	required, if lat or lon used		In solar radii 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, HELCATS, JHU APO, CACTUS_NRI, CACTUS_SDC, COMBAT, SEES, SHO, COAW, STEREO_CDR1 (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
<b>flare</b>					
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 time)	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
urls	string	> 1 allowed, optional		List of urls where flare information can be found, or information was pulled from	flare-urls
<b>cme_simulation</b>					
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
<b>particle</b>					
intensity			> 1 allowed, optional		
observatory	string	required, if particle_intensity used		Name of observatory/spacecraft 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
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
<b>inputs</b>					
magnetic_connectivity			> 1 allowed, optional	Provide if key model inputs are not represented in the triggers field 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 footpoint 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 footpoint 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		connection angle lat + solar event lat - magnetic connectivity footpoint lat	magcon-angle-great-circle
lat	float	optional		connection angle lon + solar event lon - magnetic connectivity footpoint lon	magcon-angle-lat
lon	float	required, if connection_angle used		connection angle lon + solar event lon - magnetic connectivity footpoint lon	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
<b>magnetogram</b>					
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	magnetogram-product-last-data-time
<b>forecasts</b>					
energy_channel			> 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)	
min	float	required		Each forecast is defined by the energy channel specified	energy-min
max	float	required		min of energy channel range	energy-max
units	string**	required		max of energy channel range. -1 represented an unbounded integral channel	energy-units
species	string	required		energy channel units Allowed values: electron, proton, helium, helium3, helium4, oxygen, iron, ion	species
location	string	required		Allowed values: mercury, venus, earth, mars, psip, stereoa, stereob, dawn juno 1, 2, 4, 15 all forecast values provided are relevant only in this prediction window	location
prediction_window			required	start of forecast prediction window (Note that the forecast issue time cannot be more than one hour after the start of forecast prediction window for "forecast" mode)	prediction-window
start_time	datetime*	required		end of forecast prediction window	(first value given for "prediction-window")
end_time	datetime*	required			(second value given for "prediction-window")
peak_intensity			optional		
intensity	float	required, if peak_intensity used		forecast peak intensity value	peak-intensity
units	string**	required, if peak_intensity used		forecast peak intensity value units	peak-intensity-units
uncertainty	float	optional		forecast peak intensity uncertainty value (same units as peak intensity) (for symmetric uncertainties)	peak-intensity-uncertainty
uncertainty_low	float	required, if uncertainty_high used		forecast peak intensity 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 highest uncertainty value (same units as peak intensity) (for asymmetric uncertainties)	peak-intensity-uncertainty-high
time	datetime*	optional		forecast time for reaching peak intensity value	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	peak-intensity-esp
units	string**	required, if peak_intensity_esp used		forecast peak intensity units in the vicinity of shock passage	peak-intensity-esp-units
time	datetime*	optional		forecast time for reaching peak intensity value in the vicinity of shock passage	peak-intensity-esp-time
<b>fluences</b>					
fluence	float	> 1 allowed, optional		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
uncertainty_high	float	required, if uncertainty_low used		forecast fluence's highest uncertainty value (same units as fluence) (for asymmetric uncertainties)	fluence-uncertainty-high
<b>event_lengths</b>					
start_time	datetime*	required		must fall within prediction window	event-length-start-time
end_time	datetime*	optional		forecast energetic particle event start time ("onset" time)	event-length-end-time
threshold	float	required		forecast energetic particle event end time	event-length-threshold
threshold_units	string**	required		threshold used to extract start and end times	event-length-threshold-units
threshold_crossings			> 1 allowed, optional	units of threshold multiple threshold_crossings can be provided for the same forecast energy channel	
crossing_time	datetime*	required, if threshold_crossings used		forecast threshold crossing time	thresh-crossing-times
uncertainty	float	optional		forecast crossing time uncertainty in hours	thresh-uncertainties
threshold	float	required, if threshold_crossings used		particle intensity threshold value crossing time refers to	crossing-thresholds
threshold_units	string**	required, if threshold_crossings used		units of threshold	crossing-threshold-units
<b>probabilities</b>					
probability_value	float	> 1 allowed, optional		multiple probabilities can be provided for the same forecast energy channel	probabilities
uncertainty	float	optional		forecast probability value (range 0 to 1)	prob-uncertainties
threshold	float	required, if probabilities used		plus/minus error bar for probability value (in probability value units)	prob-thresholds
threshold_units	string**	required, if probabilities used		particle intensity threshold value probability forecast refers to	prob-threshold-units
<b>all_clear</b>					
all_clear_boolean	boolean	required, if all_clear used		units of threshold If you do not provide an all-clear forecast do not enter this key. There are three situations for setting all_clear_boolean=false: (1) for >100MeV 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. 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 units of threshold probability threshold value all_clear_boolean refers to. Must specify the threshold if setting all_clear_boolean based on probability forecast	all-clear
threshold	float	required, if all_clear used			all-clear-threshold
threshold_units	string**	required, if all_clear used			all-clear-threshold-units
probability_threshold	float	optional			all-clear-probability-threshold
<b>sep_profiles</b>					
profile_name	string	>1 allowed, required, if sep_profiles used		Text files with 2 columns: datetime* string, predicted SEP intensity for this energy channel. Please name the file uniquely. To accomplish this, we suggest including your model name and issue time in the filename. Guideline: ModelShortName.PredictionWindowStartTime.IssueTime.EnergyChannel.txt	sep-profile
native_id	string	optional		Models that produce ensemble SEP profile forecasts can provide a list of text files. Specify only if forecast has a native id from your model run	native-id

\*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