PRIORITY 1 -- FIELDS REQUIRED TO SUPPORT CPC OPERATIONAL PRODUCTS (10 2D Fields)

- Both re-forecasts and real-time forecasts will be provided
- All of these fields will be provided to IRI and CPC
- **Frequency** details:
    - **Average of instantaneous values at 0z, 6z, 12z, 18z:** e.g., average = (00 + 06 + 12 + 18Z)/4
    - **Daily average 00z - 00z:** average over any model time steps in a 24hr period where the period of a day is defined as 0-23:59Z. Please note: If model time steps are not available, then default to the average of instantaneous values at 0z, 6z, 12z, 18z as above.
    - **24 hour instantaneous:** the max/min value in a 24 hour period where the period of a day is defined as 0-23:59Z. Please note: If model time steps are not available, then the instantaneous max/min value can be taken from the output queried over the periods leading to 6z, 12z, 18z, and 24z. For example, the Tmax value for a day would be the max value identified from the periods -- Tmax(0-5:59Z), Tmax(6-11:59Z), Tmax(12-17:59Z), and Tmax (18-23:59).
    - **Accumulated every 24hrs:** if model time steps are available, then the value is defined as accumulated over 0-23:59Z via a sum. If model time steps are not available, then the value should be summed over the available period. For example, sum 0-5:59Z + sum 6-11:59Z + sum 12-17:59z + sum 18z-23:59.
    - **Flux average 00z - 00z:** average of the model time steps over the period defined as 0 - 23:59z. If model time steps are not available, then the average of the average values at model output intervals over the period defined by 0 - 23:59z. For example, [avg(0-6) + avg(6-12) + avg(12-18) + avg(18-24)] / 4.

On 500 and 200 hPa pressure levels

Variable	**CF Standard Name**	**Abbrev**	**Unit**	**Frequency**
Geopotential Height	geopotential_height	zg	m	Average of instantaneous values at 0Z,6Z,12Z,18Z

On 850 and 200 hPa pressure levels

Variable	**CF Standard Name**	**Abbrev**	**Unit**	**Frequency**

Zonal Velocity	eastward_wind	ua	m s^{-1}	Average of instantaneous values at 0Z,6Z,12Z,18Z
Meridional Velocity	northward_wind	va	m s^{-1}	Average of instantaneous values at 0Z,6Z,12Z,18Z

On a Single level

Variable	**CF Standard Name**	**Abbrev**	**Unit**	**Frequency**
2m temperature	air_temperature	tas	K	Daily Average 00Z-00Z
Precipitation	precipitation_flux	pr	kg m^{-2} s^{-1}	Flux Average 00Z-00Z
Surface temperature (SST+land)	surface_temperature	ts	K	Daily Average 00Z-00Z
Outgoing Longwave Radiation at top of Atmosphere	toa_outgoing_longwave_flux	rlut	W m^{-2}	Flux Average 00Z-00Z

PRIORITY 2 Variables to support evaluation of skill of many S2S phenomena for CPC and S2S community research needs (21 2D Fields)

- Both re-forecasts and forecasts (not necessarily in real-time) will be provided to IRI

On 850 hPa level

Variable	**CF Standard Name**	**Abbrev**	**Unit**	**Frequency**

Specific Humidity	specific_humidity	huss	1	Daily Average 00Z-00Z

On 500 hPa level

Variable	**CF Standard Name**	**Abbrev**	**Unit**	**Frequency**
Vertical Velocity (omega)	lagrangian_tendency_of_air_pressure	wap	Pa s^{-1}	Average of instantaneous values at 0Z,6Z,12Z,18Z

On 100 hPa level

Variable	**CF Standard Name**	**Abbrev**	**Unit**	**Frequency**
Zonal Velocity (u)	eastward_wind	ua	m s^{-1}	Average of instantaneous values at 0Z,6Z,12Z,18Z
Meridional Velocity (v)	zonal_wind	va	m s^{-1}	Average of instantaneous values at 0Z,6Z,12Z,18Z

Variable	**CF Standard Name**	**Abbrev**	**Unit**	**Frequency**
10m wind (u)	eastward_wind	uas	m s^{-1}	Average of instantaneous values at 0Z,6Z,12Z,18Z

10m wind (v)	northward_wind	vas	m s^{-1}	Average of instantaneous values at 0Z,6Z,12Z,18Z
2m T daily max	air_temperature	tasmax	K	24 hour instantaneous
2m T daily min	air_temperature	tasmin	K	24 hour instantaneous
2m dewpoint temperature	dew_point_temperature	tdps	K	Daily Average 00Z-00Z
Surface sensible heat flux	surface_upward_sensible_heat_flux	hfss	W m^{-2}	Flux Average 00Z-00Z
Surface latent heat flux	surface_upward_latent_heat_flux	hfls	W m^{-2}	Flux Average 00Z-00Z
Surface stress (tauy)	surface_meridional_stress_positive_to_ the_south	sty	N m^{-2}	Daily Average 00Z-00Z
Surface stress (taux)	surface_zonal_stress_positive_to_the_west	stx	N m^{-2}	Daily Average 00Z-00Z
Mean sea level pressure	air_pressure_at_sea_level	psl	Pa	Average of instantaneous values at 0Z,6Z,12Z,18Z
:q! asd	snow_water_equivalent	swe	kg m^{-2}	Accumulated every 24 hrs
Net surface Radiation (LWup-LWdown+SWup-SWdown)	net_surface_radiation	rad	W m^{-2}	Flux Average 00Z-00Z

Snow density	snow_density	snwd	kg m^{-3}	Daily Average 00Z-00Z
Snow cover	surface_snow_area_fraction_where_land	snc	%	Daily Average 00Z-00Z
Vertically integrated soil moisture	soil_moisture_content	mrso	kg m^{-2}	Daily Average 00Z-00Z
Sea ice concentration	sea_ice_area_fraction	sic	%	Daily Average 00Z-00Z
Convective available potential energy (CAPE)	atmosphere_convective_available_potential_energy	cape	J kg^{-1}	Daily Average 00Z-00Z

PRIORITY 3 Additional variables that have been requested from CPC and S2S community for research purposes (22 2D Fields)

- Both re-forecasts and forecasts (not necessarily in real-time)
- All fields will be provided to IRI

On 850 hPa level

Variable	**CF Standard Name**	**Abbrev**	**Unit**	**Frequency**
Geopotential Height	geopotential_height	zg	m	Average of instantaneous values at 0Z,6Z,12Z,18Z

On 100 hPa level

Variable	CF Standard Name	Abbrev	Unit	Frequency
Temperature	air_temperature	ta	K	Daily Average 00Z-00Z

On 10 hPa, 30 hPa, and 50 hPa levels

Variable	CF Standard Name	Abbrev	Unit	Frequency
Zonal Velocity (u)	eastward_wind	ua	m s^{-1}	Average of instantaneous values at 0Z,6Z,12Z,18Z
Meridional Velocity (v)	northward_wind	va	m s^{-1}	Average of instantaneous values at 0Z,6Z,12Z,18Z
Geopotential Height	geopotential_height	zg	m	Average of instantaneous values at 0Z,6Z,12Z,18Z
Temperature	air_temperature	ta	K	Daily Average 00Z-00Z

PRIORITY 4 Highly specific variables that have been requested by the S2S community

---

- These variables should be retained
- May be provided to individual researchers/specific communities for research purposes (not in real-time) upon request or if there is significant community demand to the IRI

Variable	CF Standard Name	Abbrev	Unit	Frequency
Root zone soil moisture expressed in term of volumetric soil moisture content as volume of water per volume of soil	Average water content in top meter of soil		m^3m^{-3}	Accumulated every 24 hrs
Vertically integrated (sfc to 300 hPa) zonal moisture flux in the atmosphere (for ARs)		uq	Kg / m / s * 24h	Accumulated every 24hrs
Vertically integrated (sfc to 300 hPa) meridional moisture flux in the atmosphere (for ARs)		vq	Kg / m / s * 24h	Accumulated every 24hrs
Vertically integrated (sfc to 100 hPa) zonal moisture flux in the atmosphere (for MJO moisture budget)		uq	Kg / m / s * 24h	Accumulated every 24hrs
Vertically integrated (sfc to 100 hPa) meridional moisture flux in the atmosphere (for MJO moisture budget)		vq	Kg / m / s * 24h	Accumulated every 24hrs
Vertically integrated (sfc to 100 hPa) precipitable water(for MJO moisture				

budget)				
TOA net shortwave radiation				
Vertically integrated (100 to 100 hPa) dry static energy				
Vertically integrated (100 to 100 hPa) dry static energy advection by u and v winds				
LW component of net surface radiation (MJO community)				
SW component of net surface radiation (MJO community)				
Common indices of some particular phenomena				

Optional (1 2D field)

These variables should be saved if possible for research purposes (not real-time) and made available upon request

Variable	**CF Standard Name**	**Abbrev**	**Unit**	**Frequency**
Wave heights (optional)	sea_surface_wave_mean_height		m	Daily Average 00Z-00Z