

Metrics Workshop

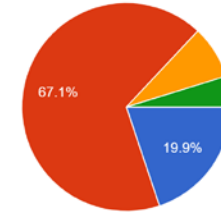
Survey 1 Space Weather

15 December 2020

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Linden Wolf, Sarah Lu, Deepthi Achuthavarier, Cristiana
Stan, Yan Xue and UFS V&V AT

SRW Application (142 responses)

Of which sector do you consider yourself a part?
146 responses

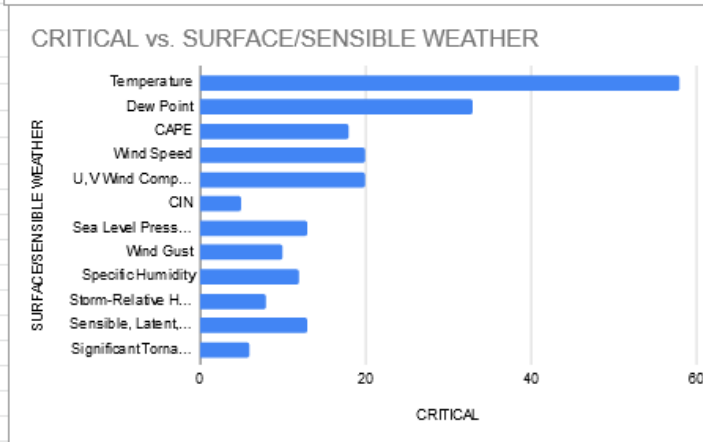
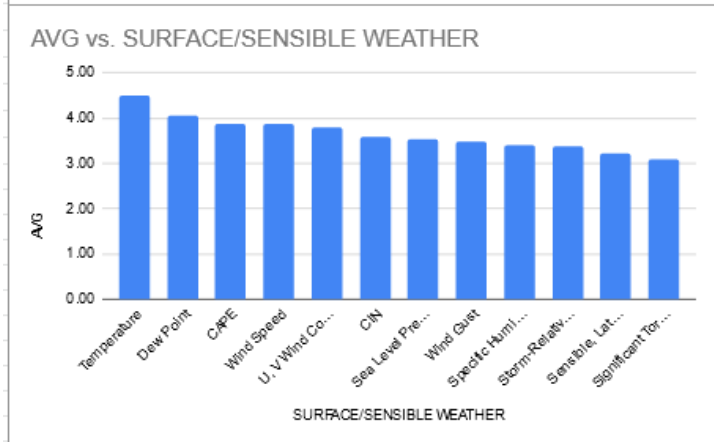
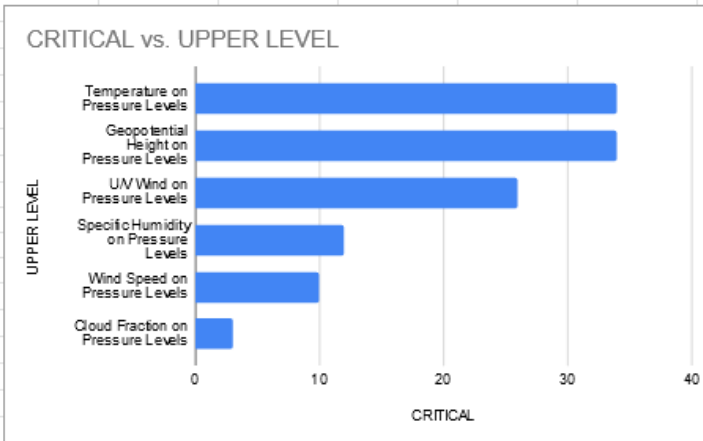
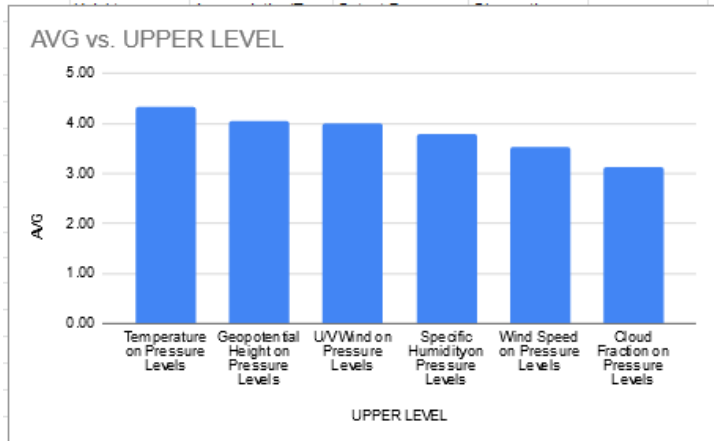


Top 3 fields for each subsection (mean rating; number of criticals)

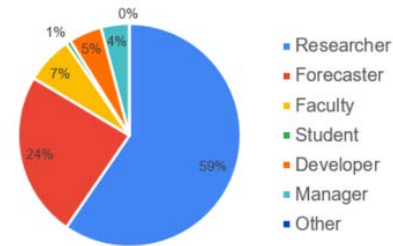
- Upper-Level Synoptic (79 responses):
 1. Temperature on Pressure Levels (4.33; 34)
 2. Geopotential Height on Pressure Levels (4.06; 34)
 3. U/V Wind on Pressure Levels (4.01; 26)
- Surface/Sensible Weather (102 responses):
 1. Temperature (4.51; 58)
 2. Dew Point (4.06; 33)
 3. CAPE (3.88; 18)
- Aviation (51 responses):
 1. Ceiling (4.53; 35)
 2. Visibility (4.51; 31)
 3. Turbulence (3.94; 12)
- Precipitation, Severe, and Winter Weather (114 responses):
 1. Precipitation (4.53; 70)
 2. Precipitation Type (4.05; 25)
 3. Simulated Reflectivity (3.98; 42)
- Air Quality (32 responses):
 1. PBL Depth (4.13; 11)
 2. Particulate Matter (4.07; 11)
 3. Aerosol Optical Depth (3.83; 9)
- Land Surface and Hydrologic (54 responses):
 1. Soil Moisture (4.20; 21)
 2. Latent Heat Flux (4.02; 15)
 3. Sensible Heat Flux (4.02; 13)

SRW Complete Rankings

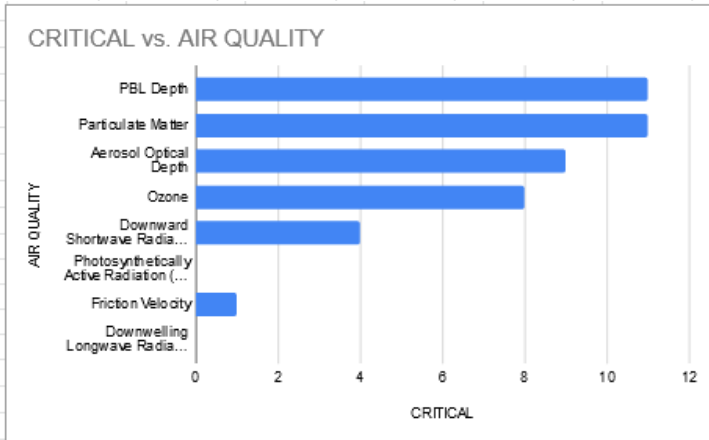
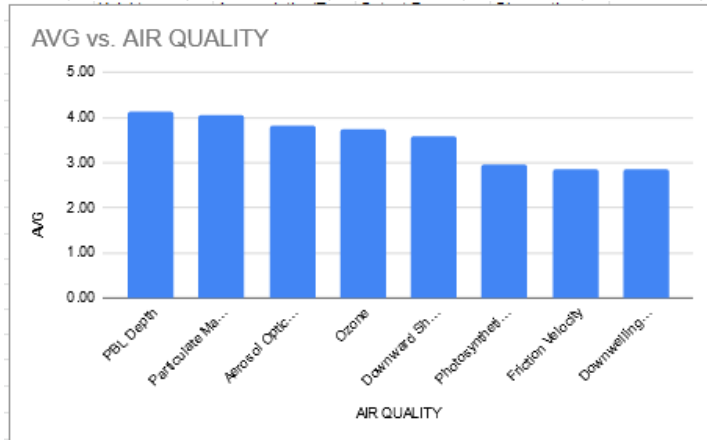
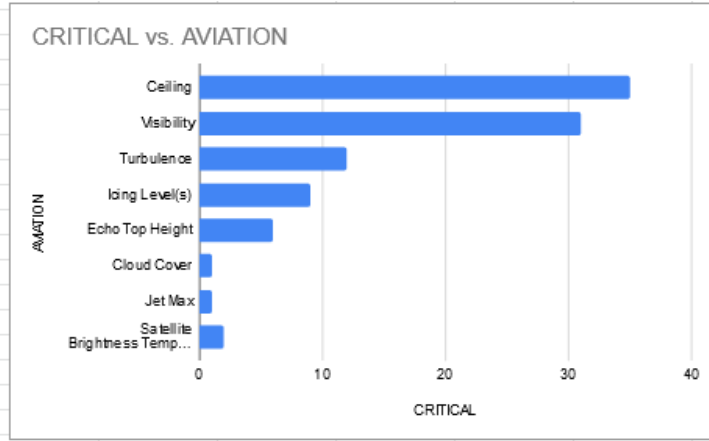
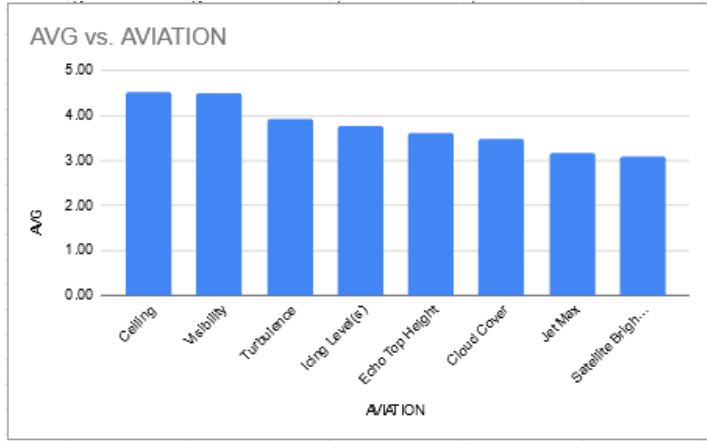
With which of these job descriptions do you most identify?



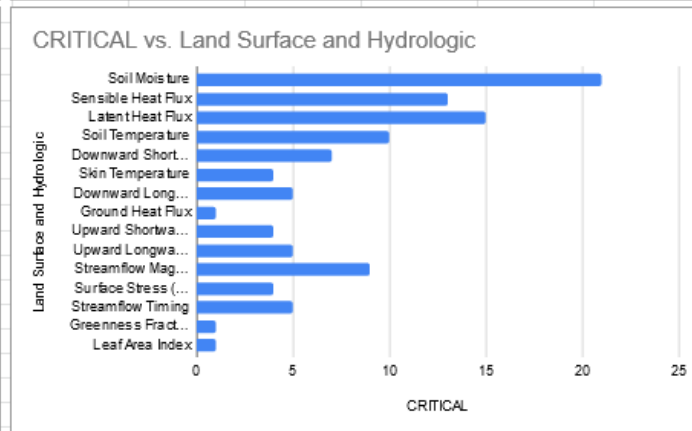
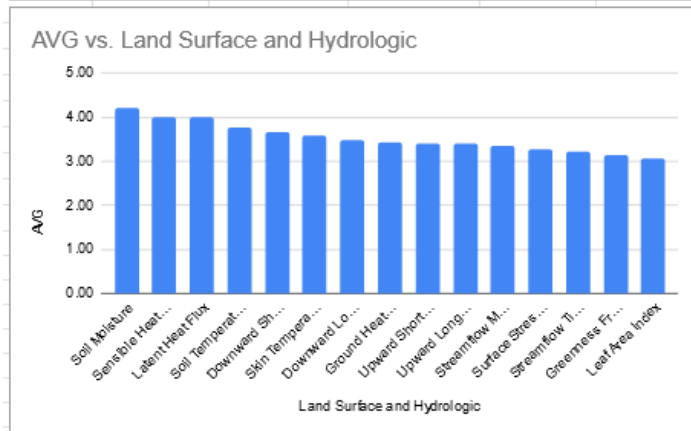
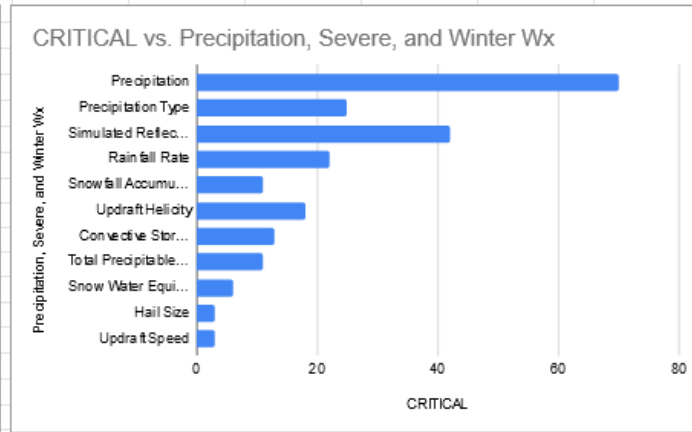
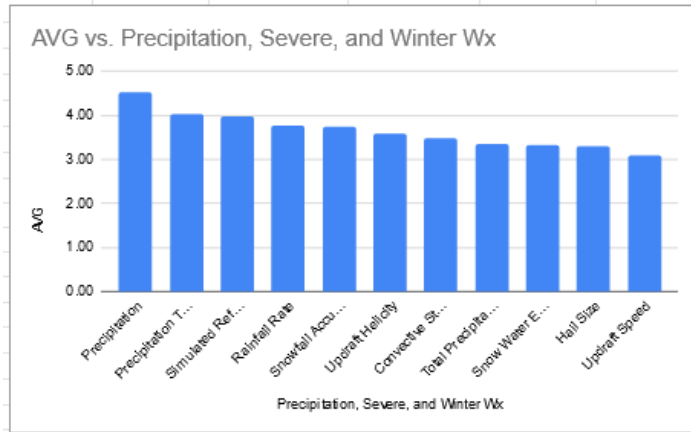
Short Range Weather Application



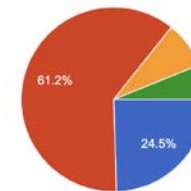
SRW Complete Rankings, cont.



SRW Complete Rankings, cont.



MRW Application (98 responses)



Top 3 fields for each subsection (mean rating; number of criticals)

- Upper-Level Synoptic (64 responses):

1. Geopotential Height Pressure Levels (4.67; 47)
2. Temperature on Pressure Levels (4.24; 21)
3. U/V Wind on Pressure Levels (3.95; 17)

- Surface/Sensible Weather (77 responses):

1. Precipitation (4.62; 45)
2. Temperature (4.47; 41)
3. Dew Point (3.89; 10)

- Land-Sfc (49 responses):

1. Soil Moisture (4.38; 25)
2. Latent Heat Flux (4.12; 16)
3. Sensible Heat Flux (4.10; 15)

- Marine/Wave (32 responses):

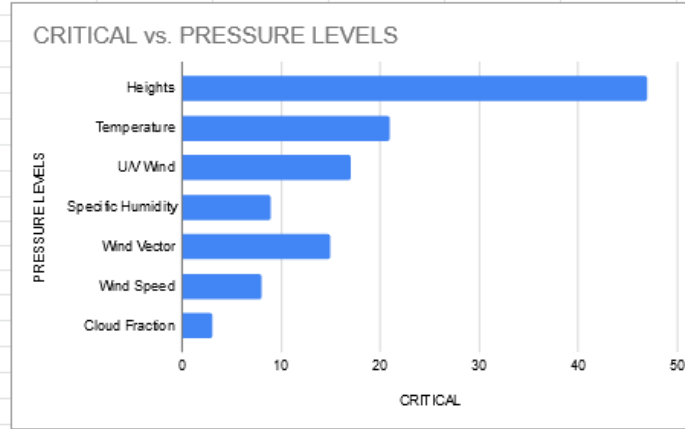
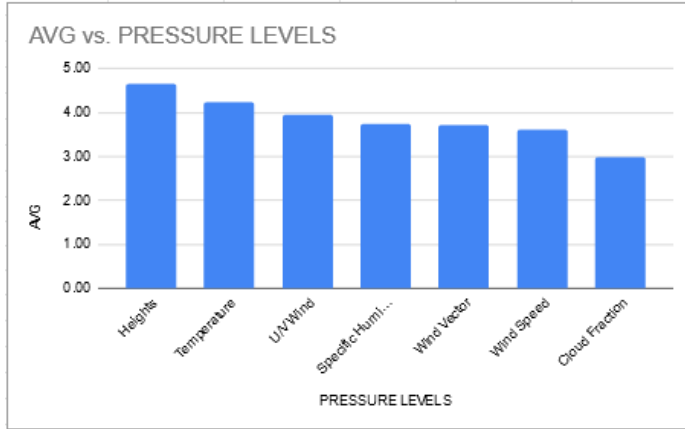
1. Sea-Surface Temperature (4.27; 17)
2. Marine Wind Speed (4.16; 8)
3. Significant Wave Height (4.13; 15)

- Sub-Seasonal (77 responses):

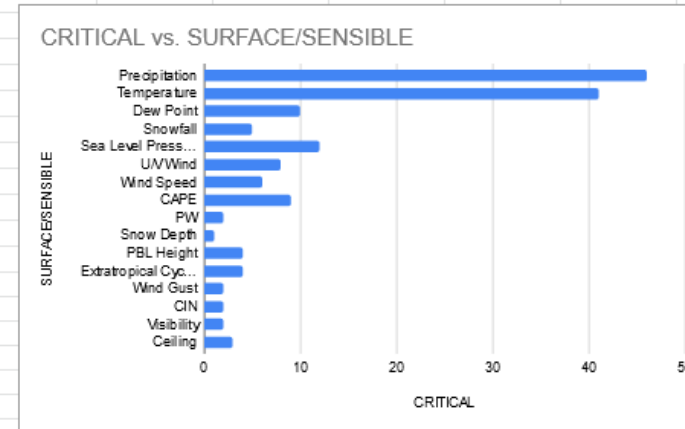
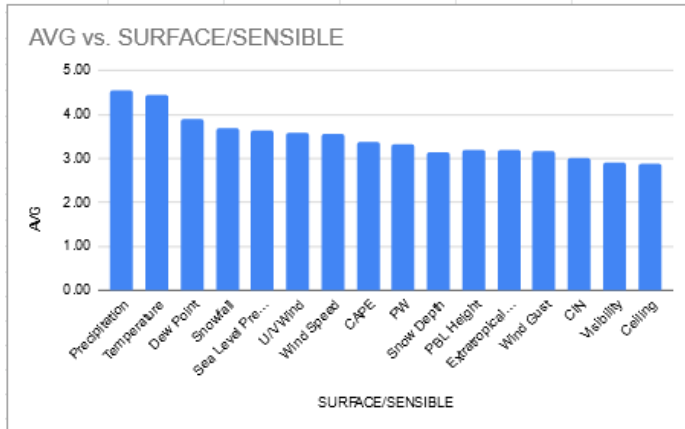
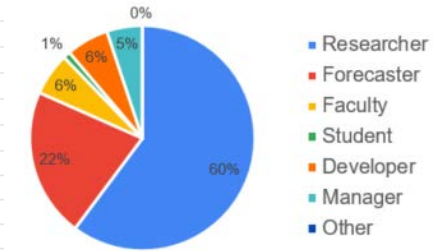
1. MJO Index (4.00; 14)
2. Drought Indices (3.89; 9)
3. ENSO Index (3.78; 11)

MRW Application, cont.

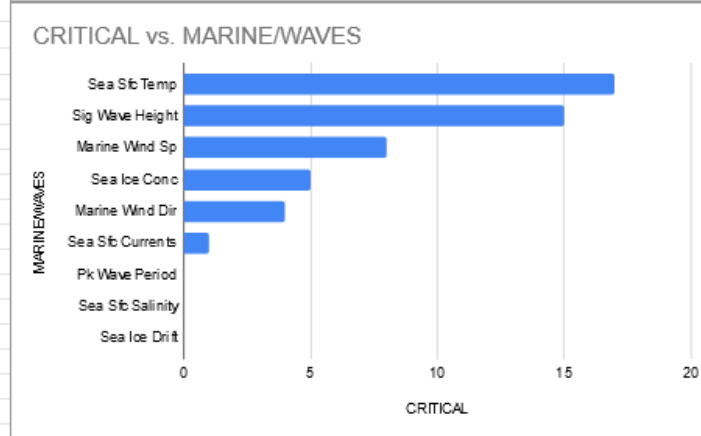
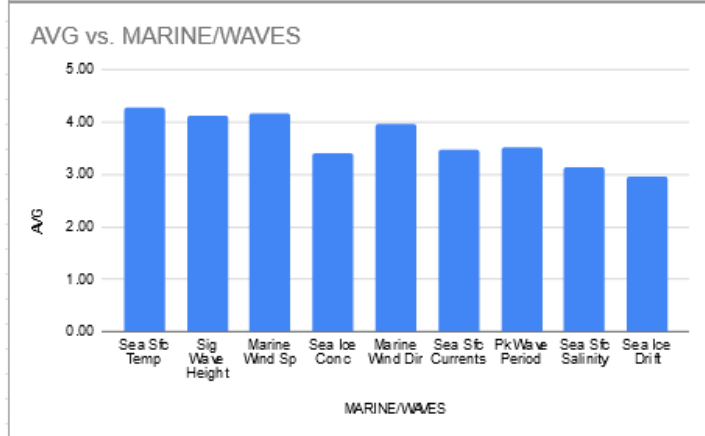
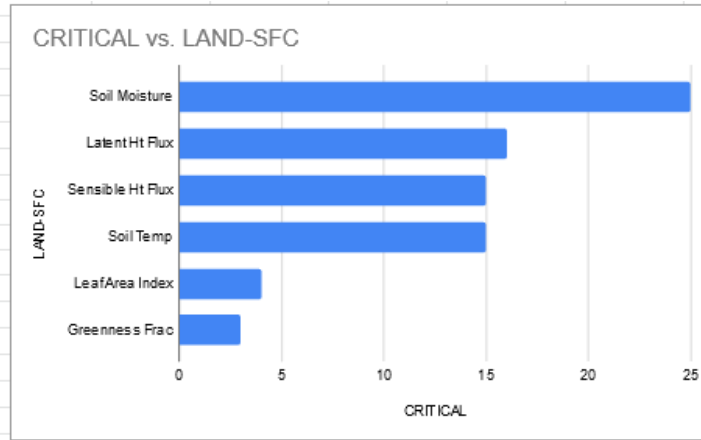
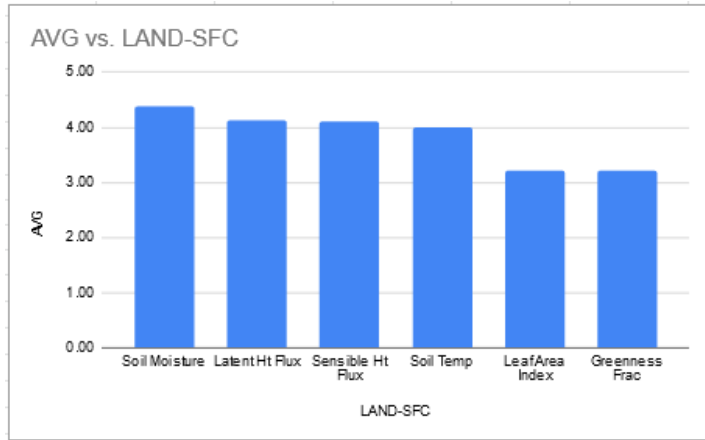
With which of these job descriptions do you most identify?



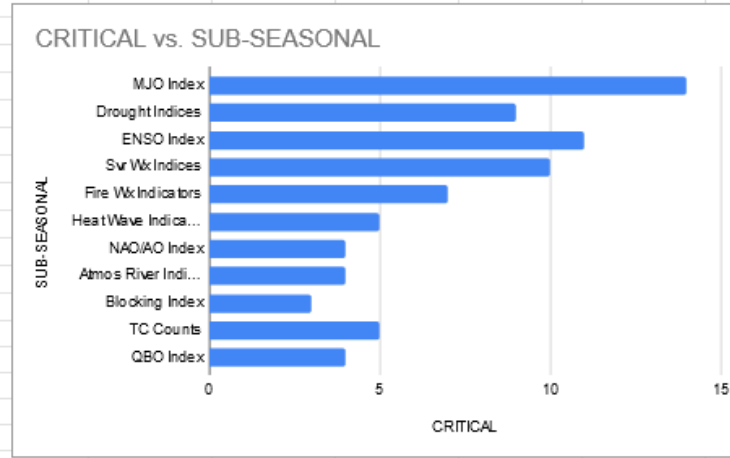
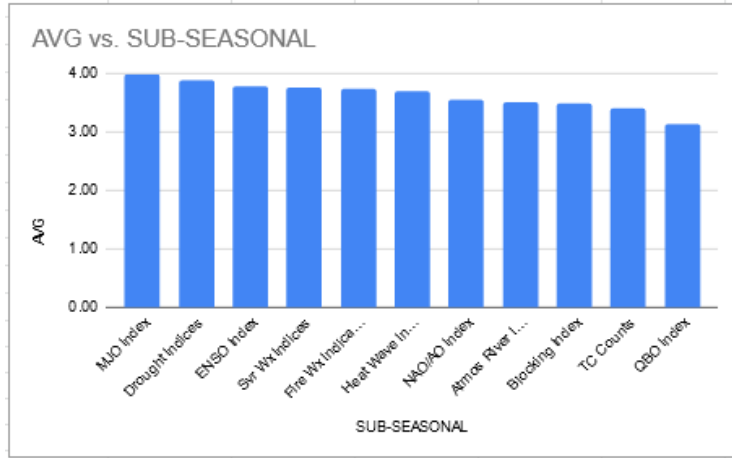
Medium-Range Weather Application



MRW Application, cont.



MRW Application, cont.



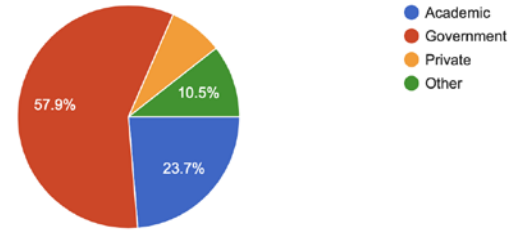
Sub-Seasonal to Seasonal was included in MRW because that is how it is aligned in the UFS R2O project

Upon reflection, we have decided to break out S2S into its own survey for Survey 2

MRW Application, cont.

- Additional Fields: (* denotes more than one mention)
 - Upper Levels: ozone*, vertical velocity, RH, temperature anomalies, cloud hydrometeors
 - Sensible/Surface Weather: sim. reflectivity*, cloud top height, ice accum, wind chill, heat index, wind shear, specific humidity, precip type, storm-relative helicity, wind shear, cloud water path
 - Land-Sfc: snow cover*, downwelling radiation, net radiation, runoff, ground heat flux
 - Marine/Wave: visibility, sea ice thickness, upper ocean heat content, snow depth on ice, wind shear
 - Sub-Seasonal: monsoon indices, PNA index, GWO Index, ocean heat content
- Key Takeaways
 - Some of the additional field suggestions were covered in a different subsection
 - For upper level and surface, the top two choices stood far above the other options; third place was quite as clear-cut; multiple wind options may have “split votes”
 - For marine/wave, a top three was very clear
 - For land-sfc, there was a clear top two with a second tier of two additional parameters
 - The sub-seasonal section was a complete free-for-all. One parameter stood out at the top, but very little separated the parameters behind that one

Seasonal Application (38 responses)

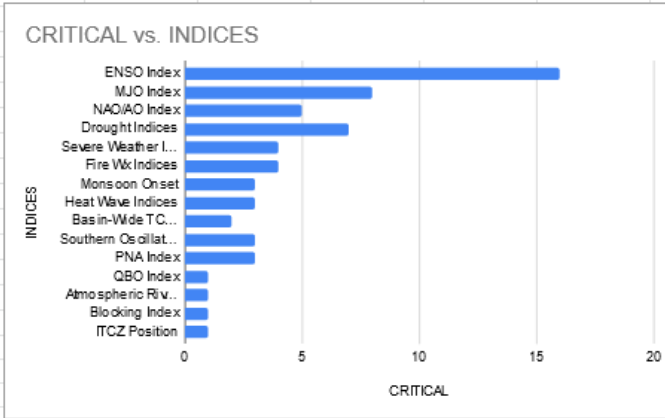
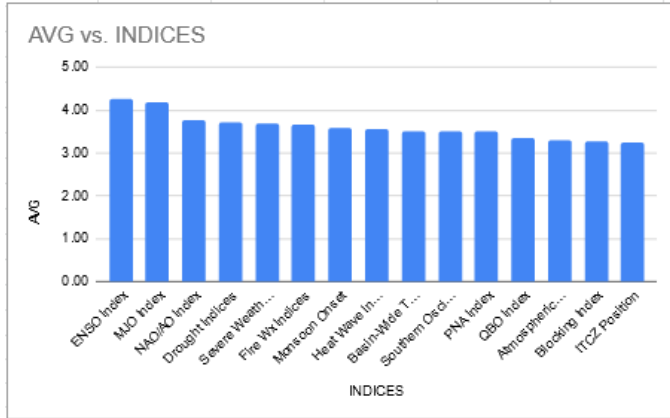
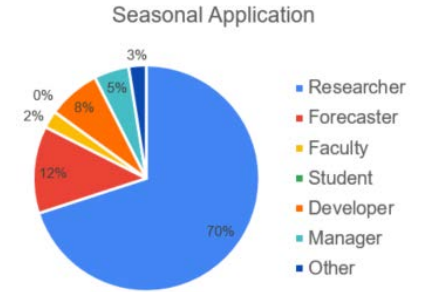
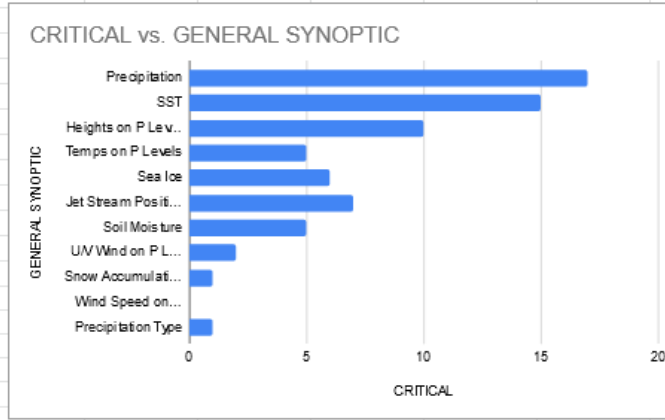
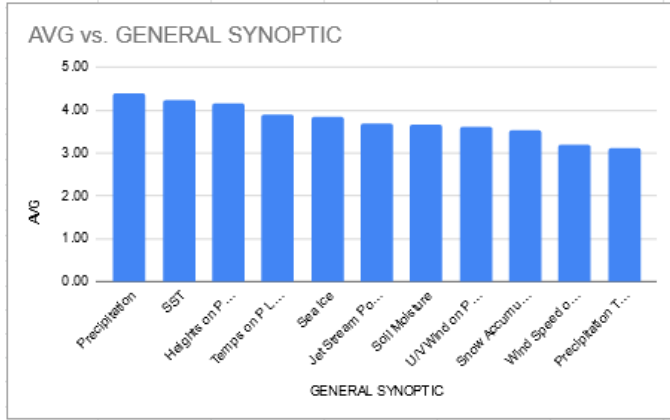


Top 3 fields for each subsection (**mean rating**; **number of criticals**)

- General Synoptic (33 responses):
 1. Precipitation (4.41; 17)
 2. SST (4.24; 15)
 3. Geopotential Heights on Pressure Levels (4.16; 10)
- Seasonal Indices (31 responses):
 1. ENSO Index (4.27; 16)
 2. Drought Indices (4.16; 7)
 3. MJO Index (3.76; 8)
 4. NAO/AO Index (3.76; 5)

Seasonal Application, cont.

With which of these job descriptions do you most identify?



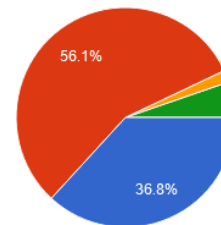
Seasonal Application, cont.

- Additional Fields: (* denotes more than one mention)
 - Synoptic: soil temperature*, sfc temperature*, precip and temperature anomalies*, multiple marine parameters, storm tracks, greenness fraction, PW
 - Indices: OLR Index, MJO propagation, Indian Ocean Dipole Index
- Key Takeaways
 - For synoptic, the top three stood out very cleanly
 - For indices, the top choice was very obvious, and it was fairly clear for second place too. It was far more complicated after that, with numerous fields falling between 3.5 and 3.8

Air Quality Application (57 responses)

57 responses (1 duplicate)

Top 3/6 fields for each subsection (**mean**, **number of criticals**)



For CHEM (40 responses)

Top 3 fields among 7 fields

Ozone	4.8	36
NO2	4.15	16
VOC	3.95	4

For AEROSOL (43 responses)

Top 3 fields among 13 fields

PM2.5	4.74	34
AOD	4.15	14
...	4.10	10

For SFC FLD (37 responses)

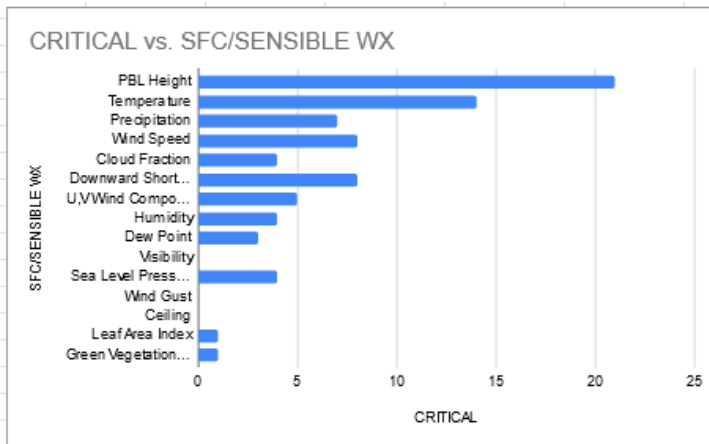
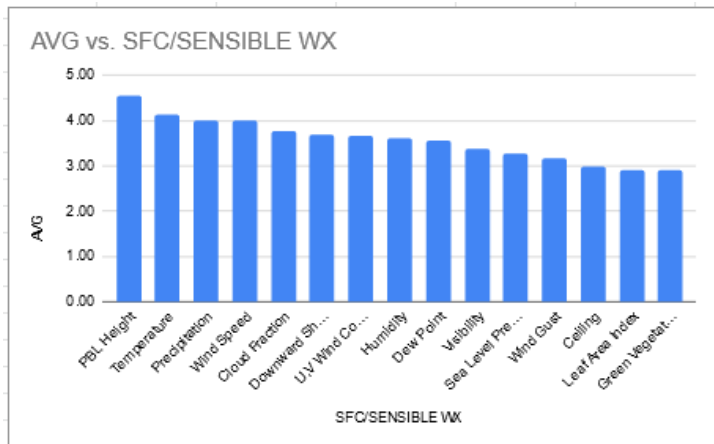
Top 6 fields among 15 fields

PBHL	4.56
21	
Temp	4.11
14	
WindSpd	4
8	
Precip	4
7	
CldFraction	3.76
4	

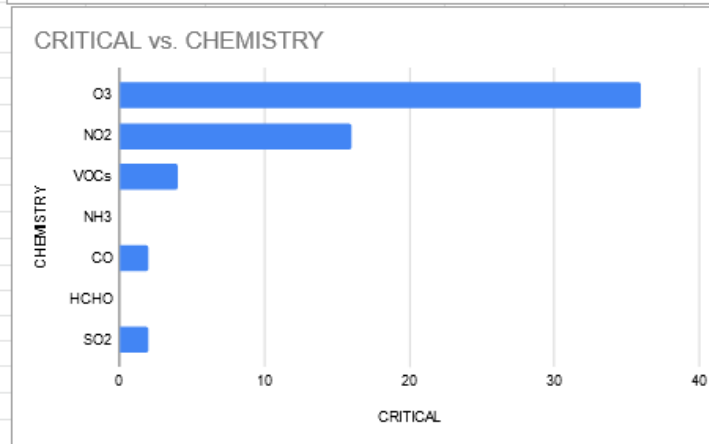
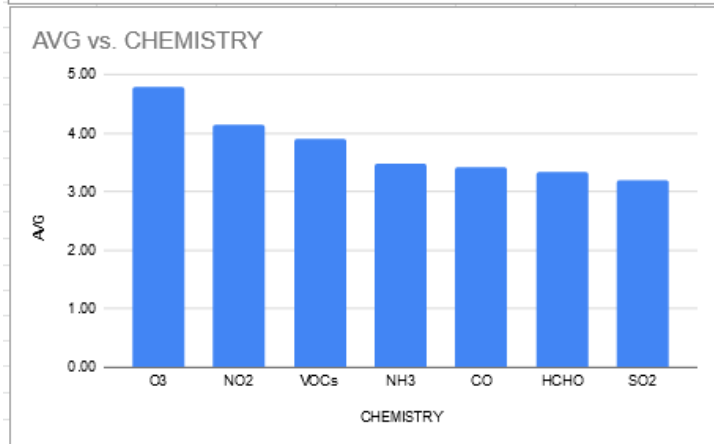
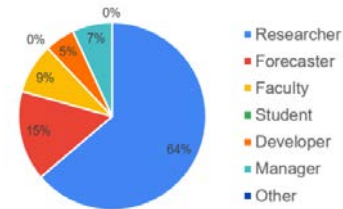
9/32 forecasters

Air Quality Application

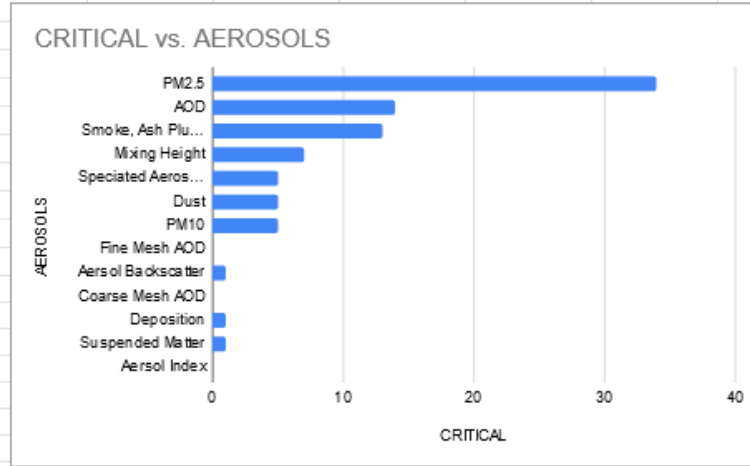
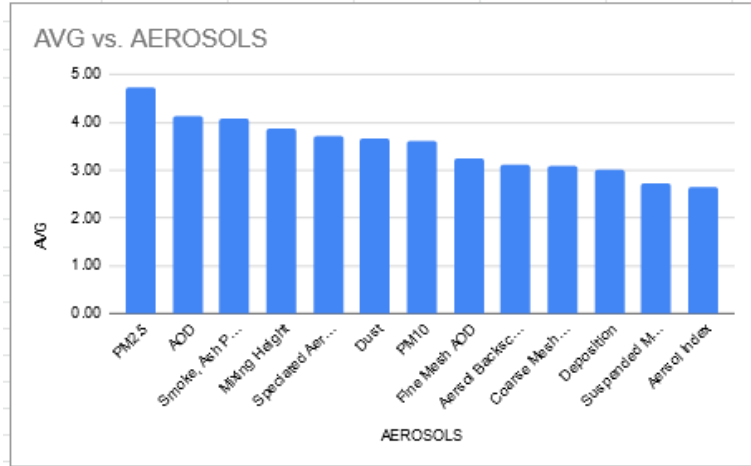
With which of these job descriptions do you most identify?



Air Quality and Composition Application



Air Quality Application



Air Quality Application (cont'd)

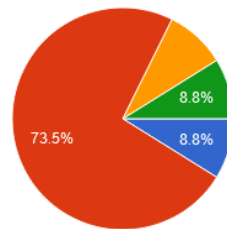
For SFC FLD: (1) wide range of 'nice-to-have' fields, such as canopy height, high-resol land use, cloud hydrometers, LCL, sensible/latent heat flux (2) derived products are mentioned, such as lake effect products, weather alerts, (3) AQ fields are mentioned, such as AQI, daily tropospheric columns of air quality relevant gases (NO₂, HCHO, CO...) and aerosols (and/or AOD, AAOD, etc), 3D daily ozone.

For AEROSOL: 'nice-to-have' optical properties (extinction profiles, asymmetry parameter), speciated information (PM₁, aerosol precursor, OA/BC), physical properties (size distribution), and volcanic ash

For CHEM: 'nice-to-have' profile information (ozone, PM profile) and speciated information (organic N, specific VOCs), and fire-related emissions

Key takeaways: (1) parameters identified in SFC FLD are mostly available, (2) for CHEM and AEROSOL, information to resolve chemical & physical properties are of interest, (3) information on episode event (dust, smoke) is also of interest

Coastal Application (32 responses)



Top 3 fields for each subsection (**mean**, **number of criticals**)

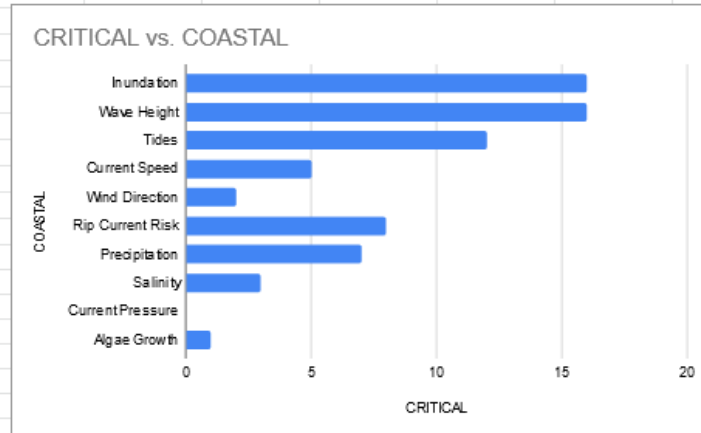
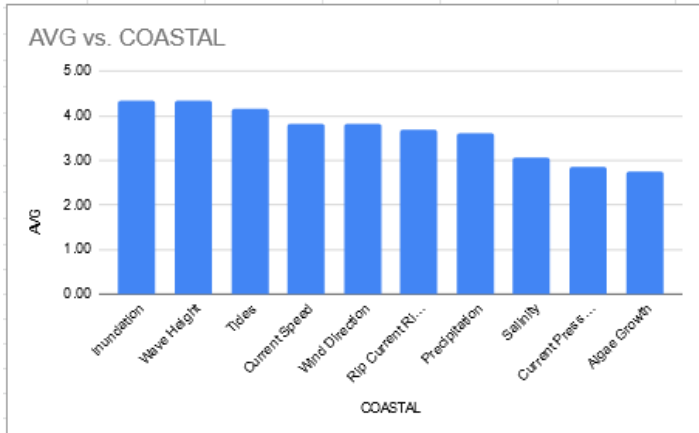
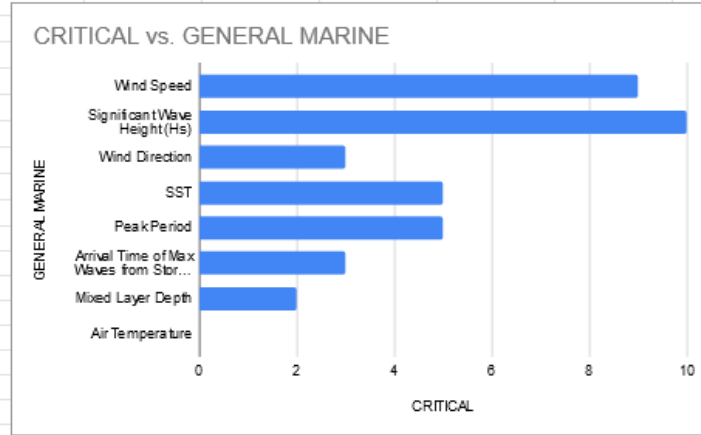
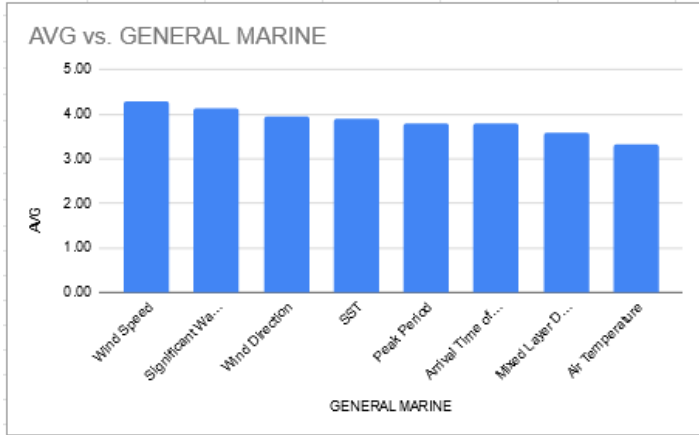
- General Marine (22 responses)
 1. Wind Speed (4.29, 9)
 2. Significant Wave Height (4.13, 10)
 3. Wind Direction (3.95, 3)

- Coastal (28 responses)
 1. Inundation (4.34, 16)
 2. Wave Height (4.33, 16)
 3. Tides (4.17, 12)

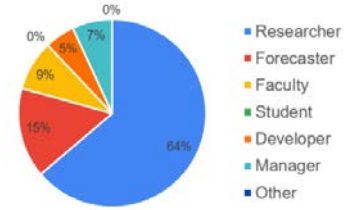
Other fields: several from the marine survey, bathymetry, chlorophyll/other biogeochemical measures, sea level pressure, and subsurface temperature profile

Coastal Application

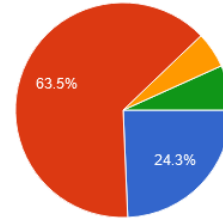
With which of these job descriptions do you most identify?



Air Quality and Composition Application



Hurricane Application (73 responses)



Top 5 fields (of 10 in each subsection) (mean rating; number of criticals)

- **Environmental** (55 responses):

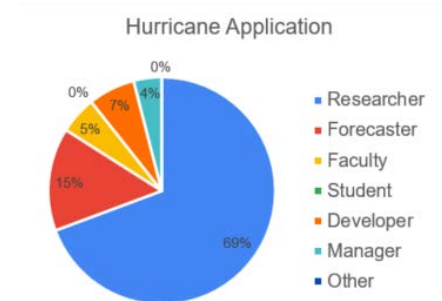
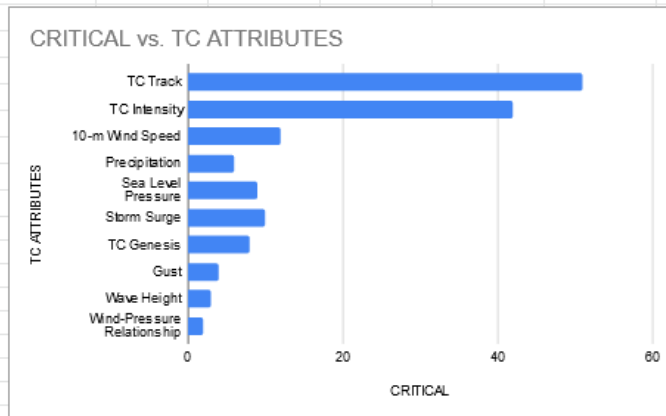
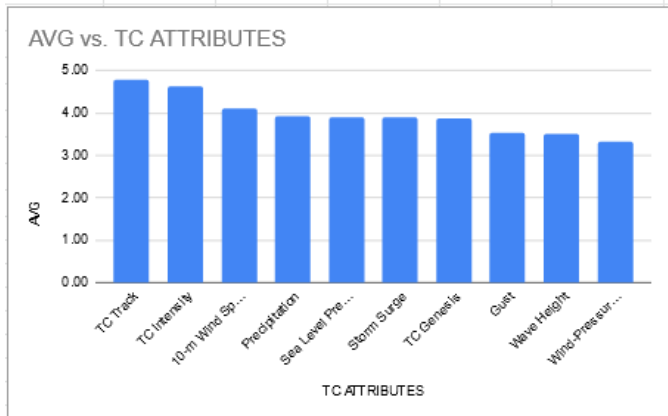
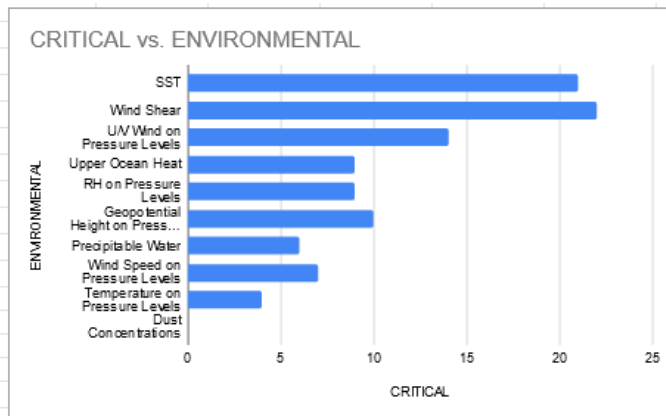
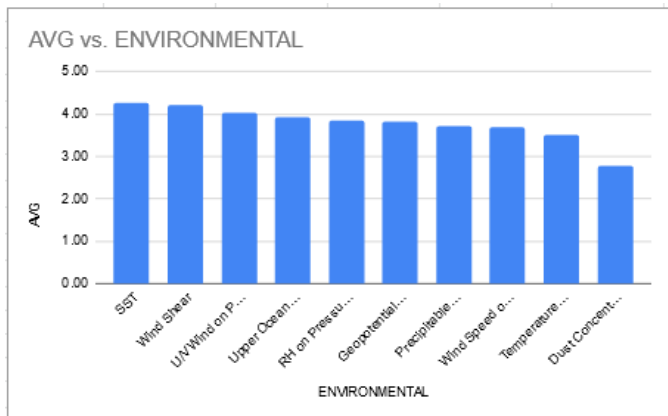
1. SST (4.25; 21)
2. Wind Shear (4.20; 22)
3. U/V Wind on Pressure Levels (4.04; 14)
4. Upper Ocean Heat Content (3.93, 9)
5. RH on Pressure Levels (3.85; 9)

- **TC Attributes** (63 responses):

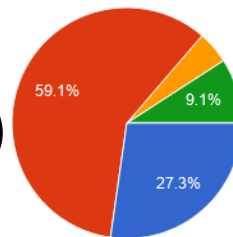
1. TC Track (4.79; 51)
2. TC Intensity (4.63; 42)
3. 10-m Wind Speed (4.10; 12)
4. Precipitation (3.92; 6)
5. Storm Surge (3.90; 10)

Hurricane Application

With which of these job descriptions do you most identify?



Marine/Cryo Application (42 responses)



Top 3 fields for each subsection (**mean**, **number of criticals**)

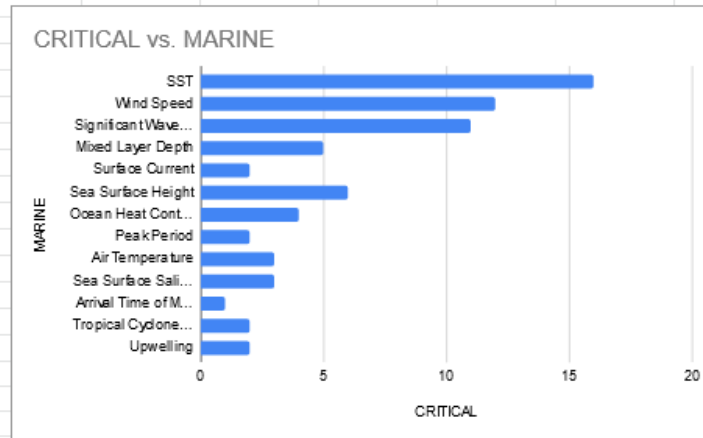
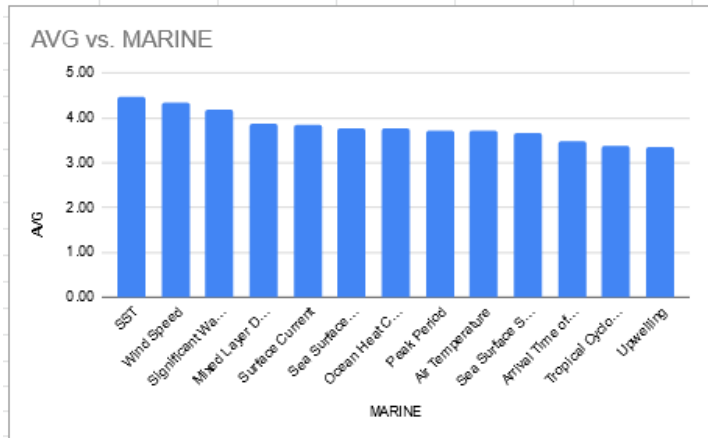
- Marine: 32 responses
 1. SST (4.48, 16)
 2. Wind Speed (4.33, 12)
 3. Significant Wave Height (4.18, 11)

- Cryosphere: 29 responses
 1. Sea Ice Thickness (4.30, 13)
 2. Sea Ice Edge (4.15, 8)
 3. Sea Ice Concentration (4.15, 8)

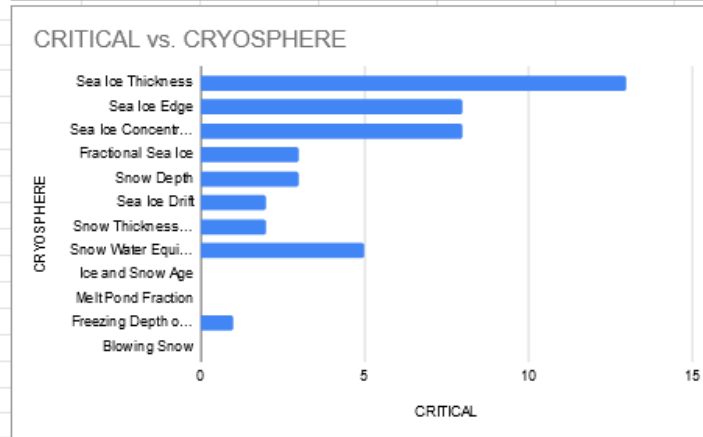
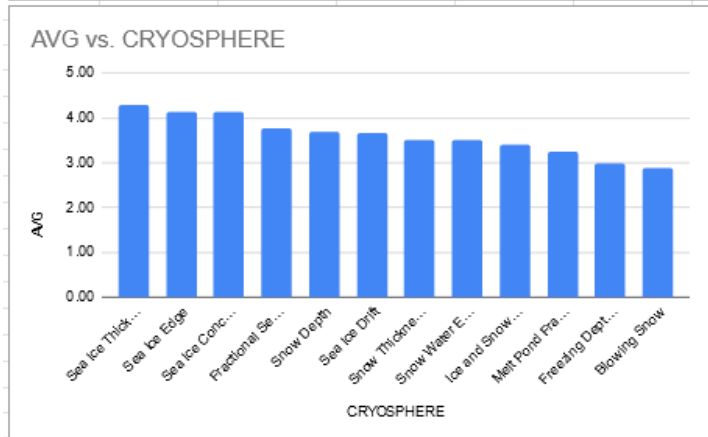
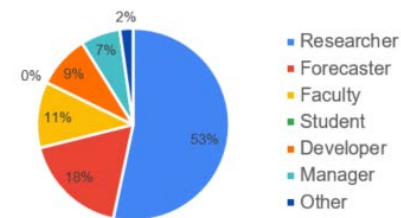
Other fields: temperature/salinity profiles, below ice water properties, fractional snow cover, ice pressure, permafrost stats

Marine & Cryo Application

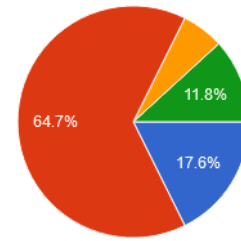
With which of these job descriptions do you most identify?



Marine and Cryosphere Application



Space Wx Application (16 responses)



Top 3 fields for each subsection (**mean**, **number of criticals**)

- Tropospheric Weather (6 responses)
 1. Geopotential Height (4.17, 3)
 2. Temperature (3.67, 2)
 3. Vertical Motion/Tropopause Height/(3.5, 3.5, 0,0) [tie]
- Upper Atmosphere (10-11)
 1. Total Electron Count (4.45, 5)
 2. Electron Density (4.36, 6)
 3. Scintillation (4.09, 4)

- Ions and Molecules (7 responses)
 1. O/N2 ratio (4.86, 6)
 2. O+ (4.33, 3)
 3. O (3.67, 1)

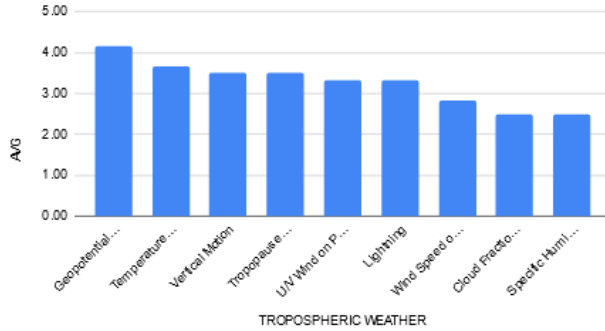
Additional Fields: Aurora Indices and Disturbance storm time index

- Indices and Other Parameters (10-11 responses)
 1. Ionospheric Indices (4.36, 6)
 2. F10.7 Flux (4.33, 4)
 3. Kp/Geomagnetic Index (4.10/4.09, 2/4)

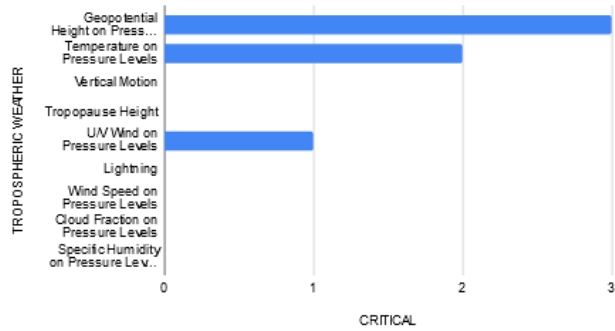
With which of these job descriptions do you most identify?

Space Weather Application (16 responses)

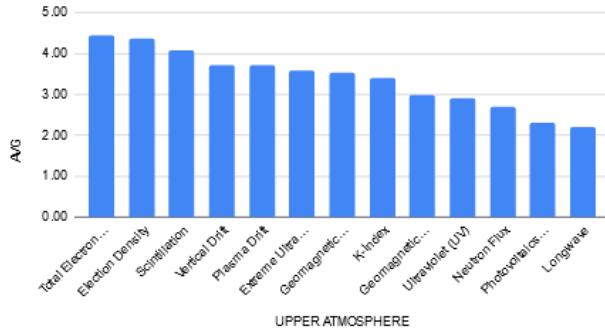
AVG vs. TROPOSPHERIC WEATHER



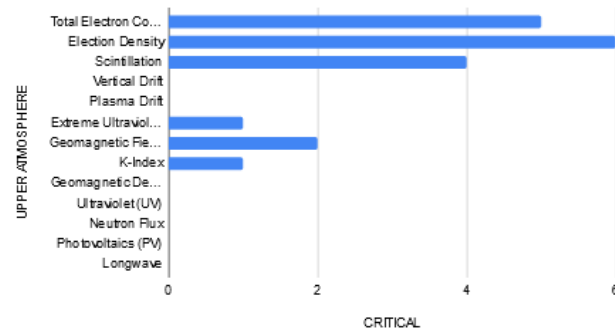
CRITICAL vs. TROPOSPHERIC WEATHER



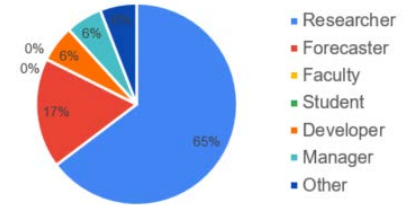
AVG vs. UPPER ATMOSPHERE



CRITICAL vs. UPPER ATMOSPHERE

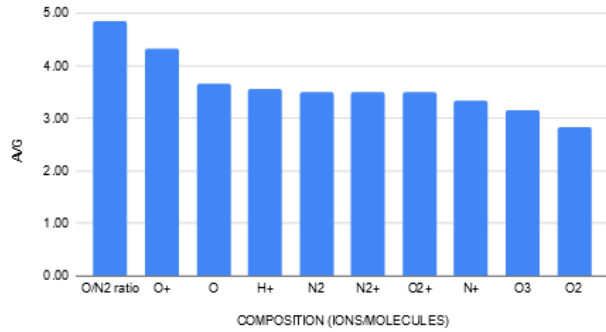


Space Weather Application

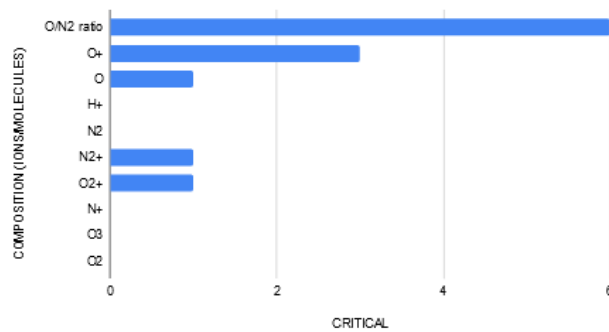


Space Weather Application (16 responses)

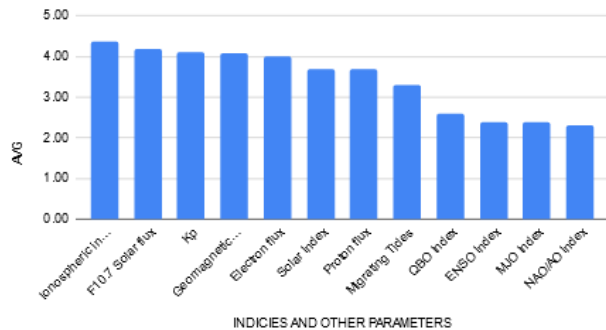
AVG vs. COMPOSITION (IONS/MOLECULES)



CRITICAL vs. COMPOSITION (IONS/MOLECULES)



AVG vs. INDICIES AND OTHER PARAMETERS



CRITICAL vs. INDICIES AND OTHER PARAMETERS

