Survey Results:

“ECMWF’s extended range (Day-16 to Day-45) graphical products”

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ECMWF

Survey Motivation

- Major update to Extended Range Forecasting System planned for late 2022 / early 2023

- So ECMWF wants to prepare for the update, and also take stock of external impressions of our current product offerings:
  - New items have been introduced in recent years, relating to e.g. regimes and extremes
  - “Open Charts” began providing output to a much wider audience than hitherto in Oct 2020

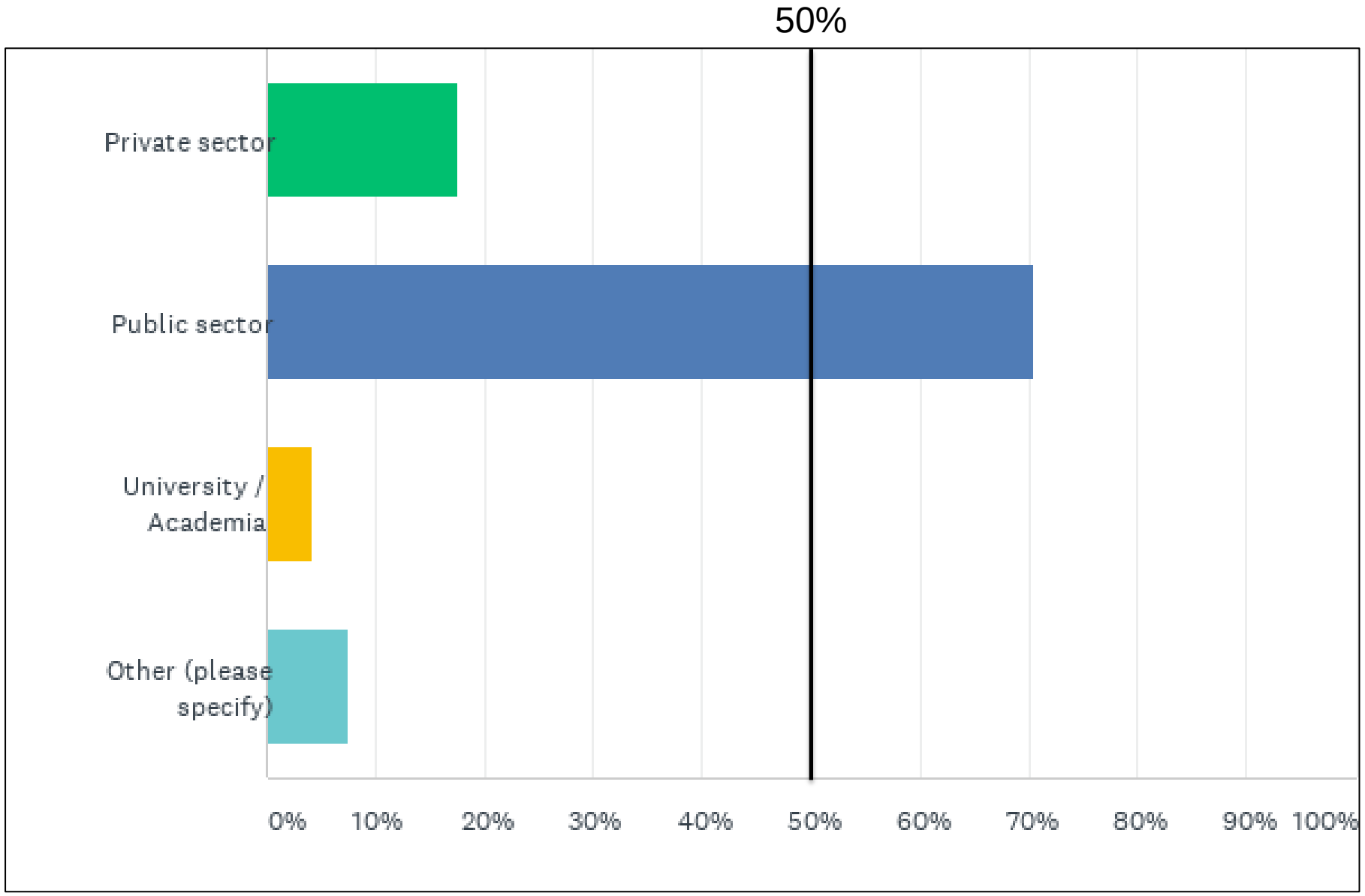
Number of Responses

120

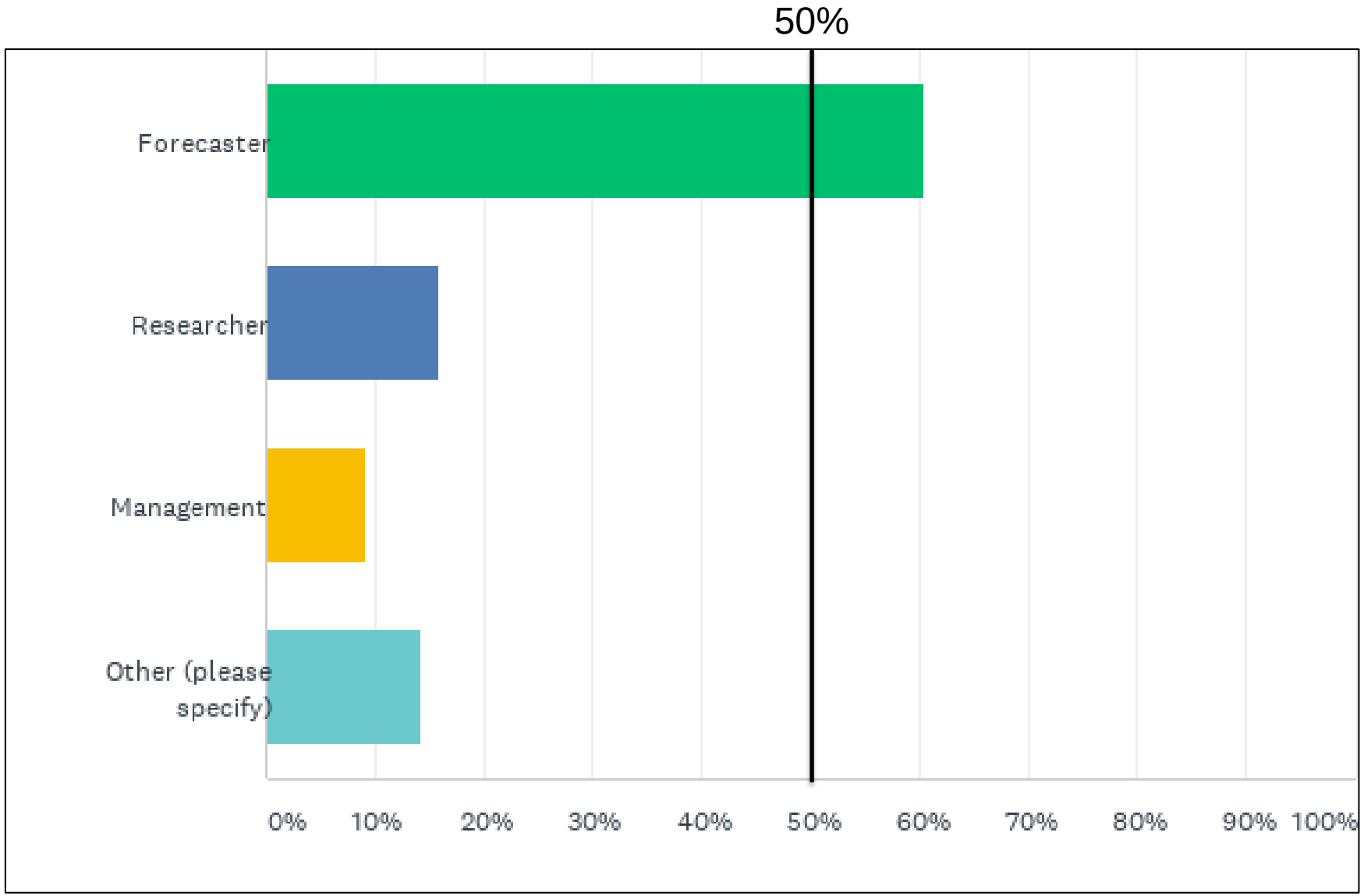
Q1-Q3: Background Information

- Organisation
- Roles
- Frequency of use / reference for products in general

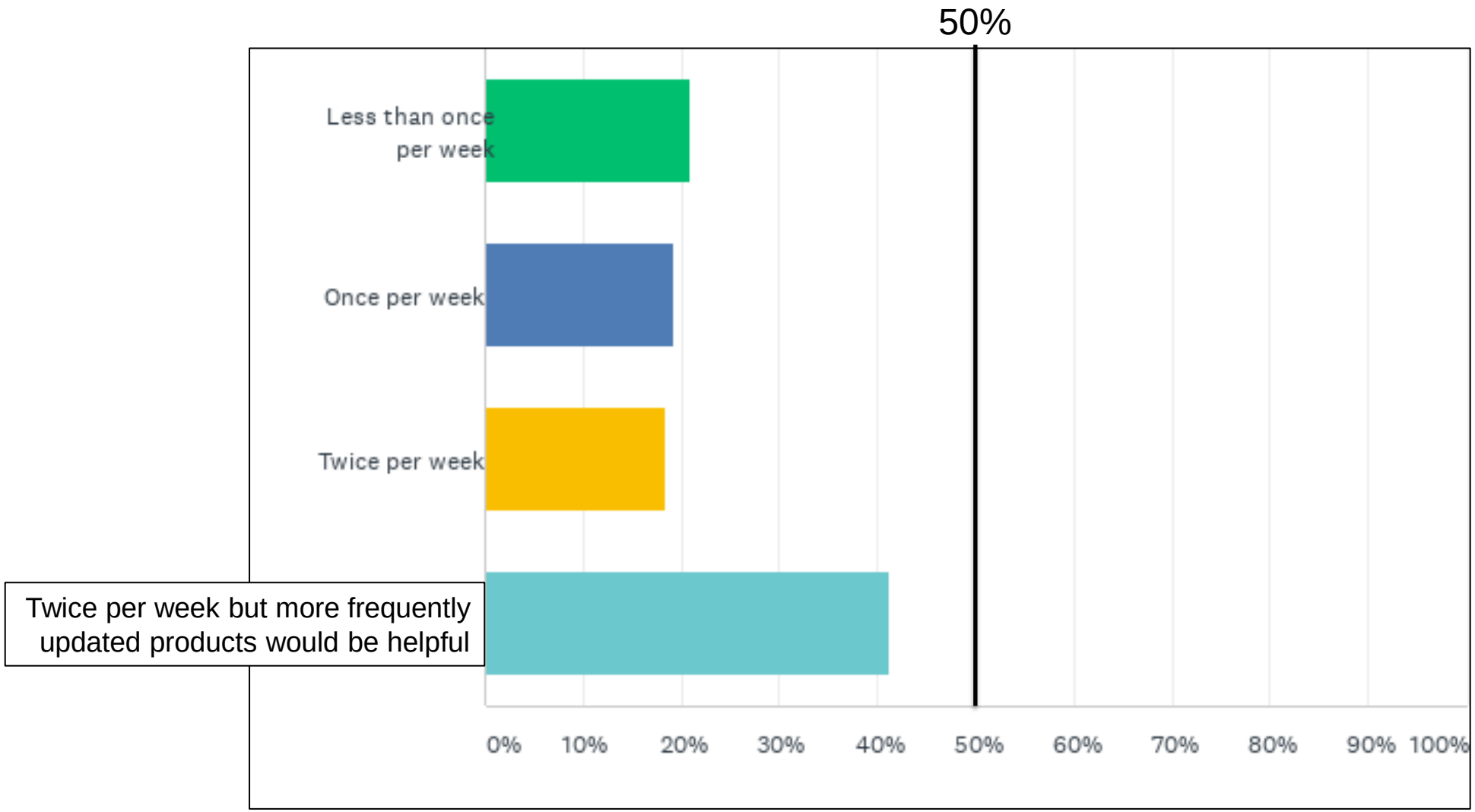
Q1: Respondent's Background



Q1: Respondent's Role



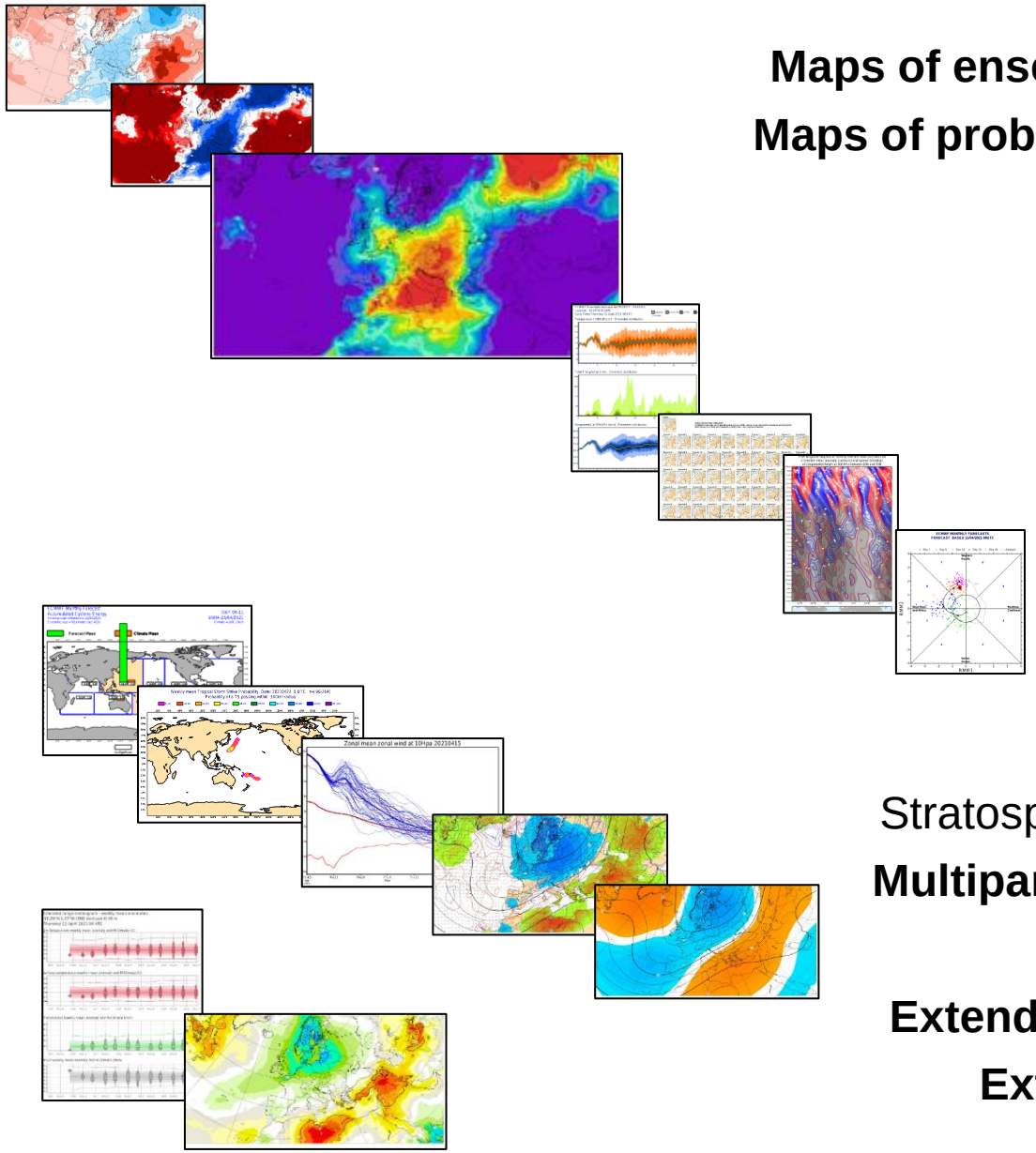
Q3: “How often do you look at ECMWF Extended Range graphical products?”



Q4-Q10 – Current System

- Use and comprehension of specific products
- Focus on Regime-related products
- Drivers of Predictability
- Layout of Products
- Options for aggregating together consecutive forecast days
- Interactive definition of aggregation?
- Comprehension and use of Verification metrics

Q4: Which of these Products do you use regularly?



Maps of ensemble mean anomalies

Maps of probabilities for anomaly>0

Maps of terciles

Maps of quintiles

Maps of deciles

Plumes

Postage stamps

Hovmoeller of Z500

MJO-related products

TC basin predictions

TC strike probabilities

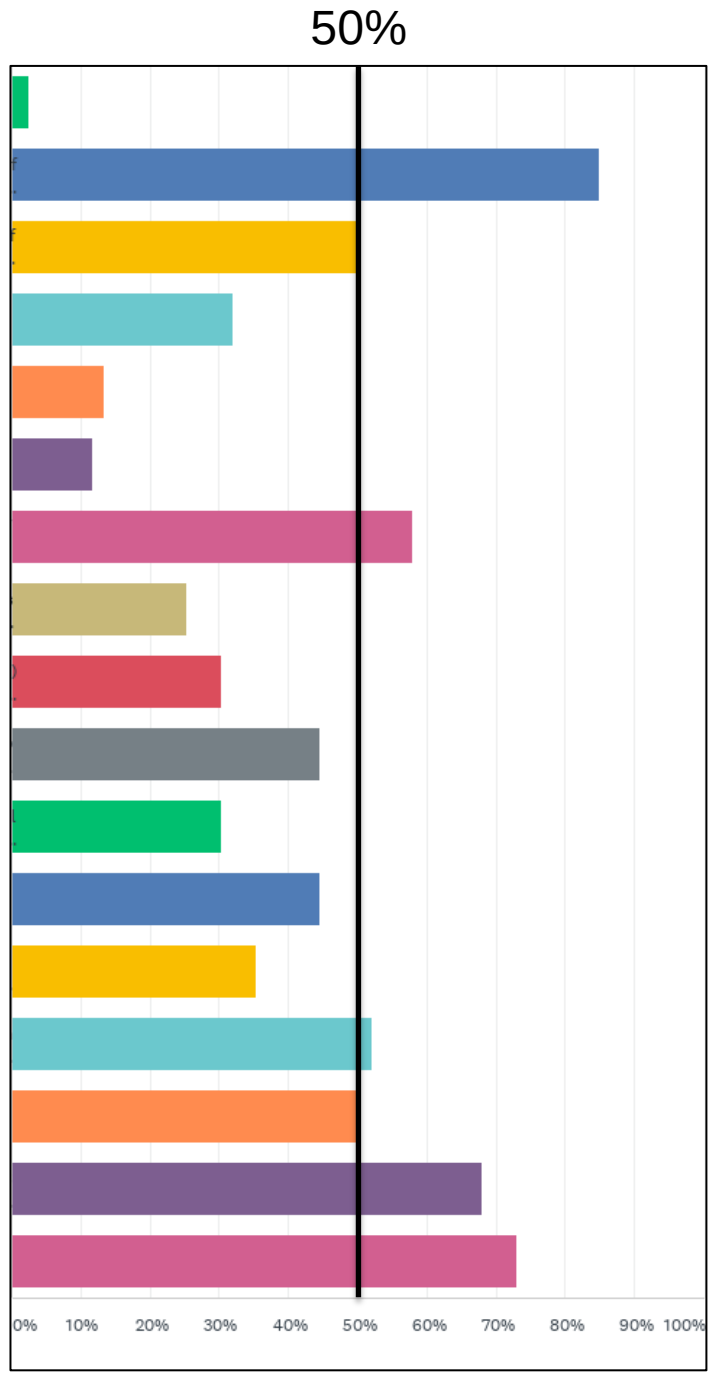
Stratospheric zonal wind at 60N

Multiparameter anomaly maps

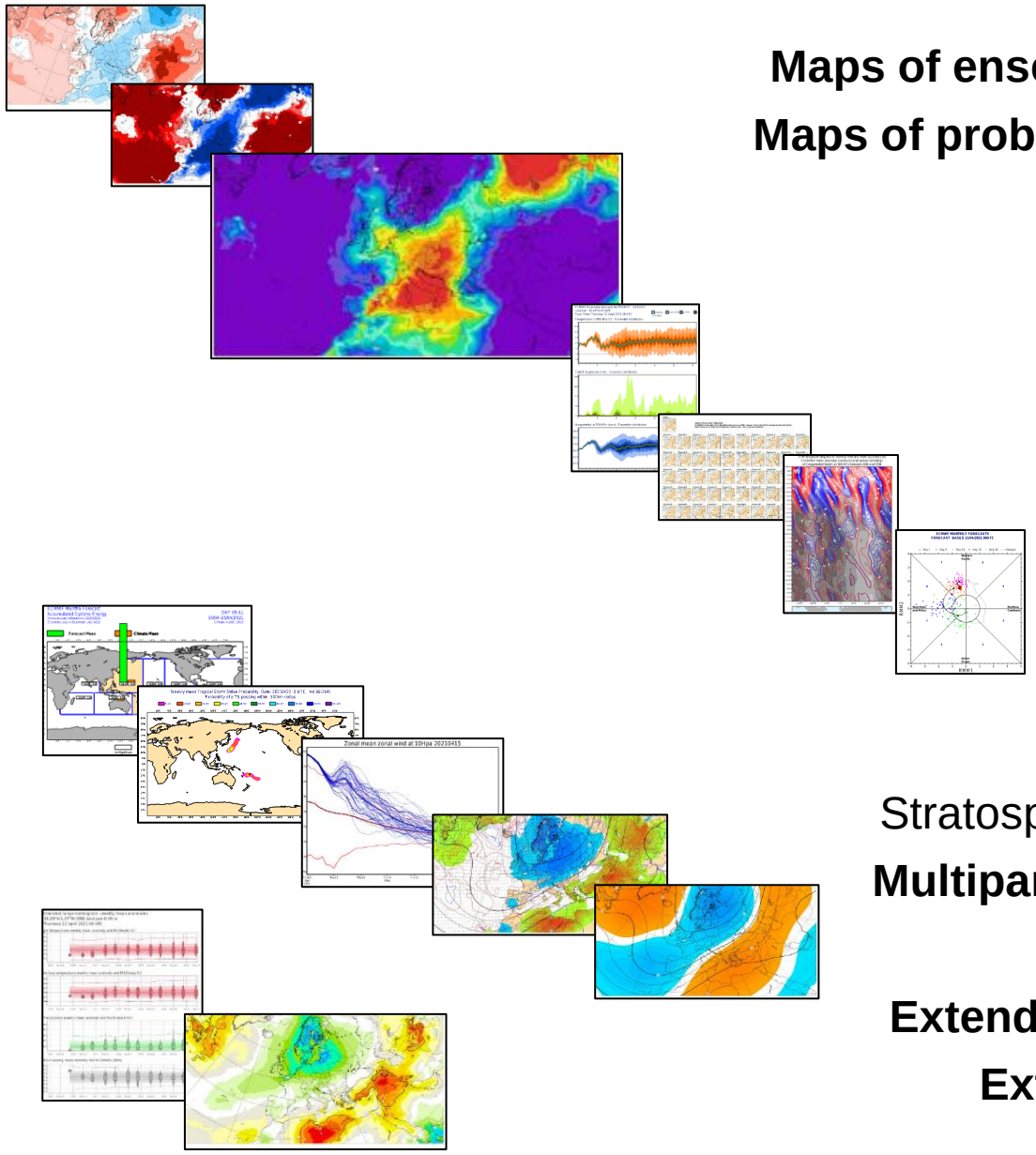
Z500 anomaly maps

Extended Range meteograms

Extended Range EFI/SOT



Q4: Which of these Products would you like to understand better?



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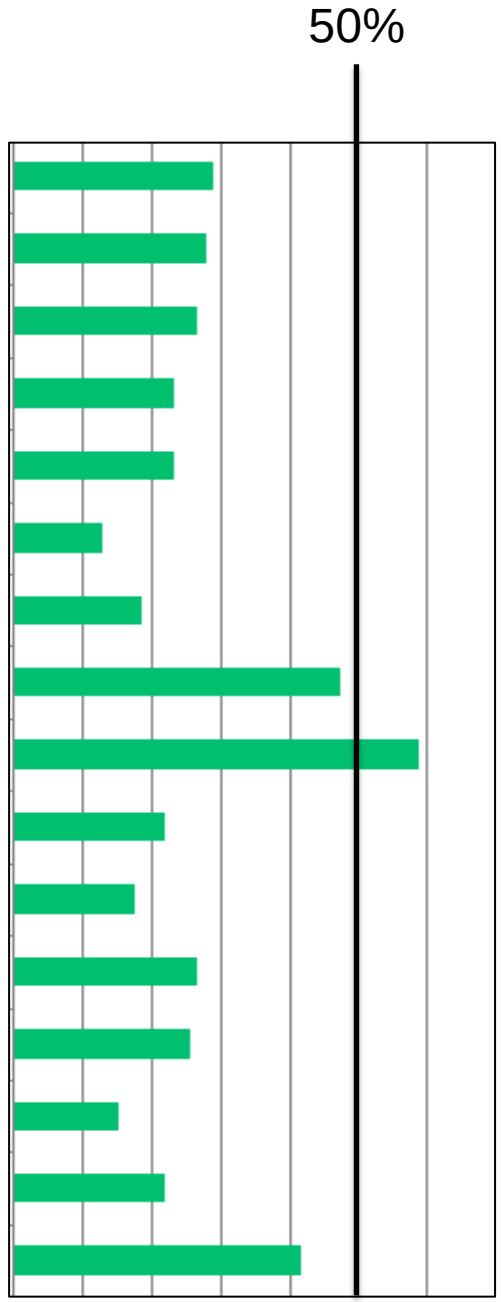
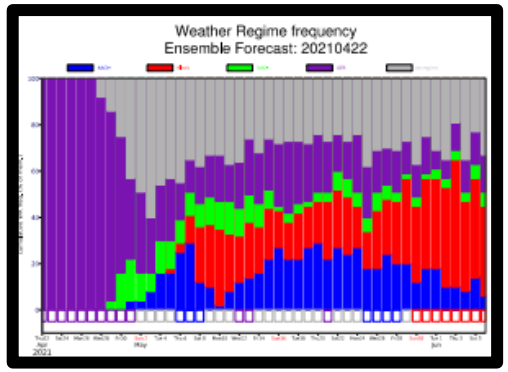


Q4: New Products Wanted ?

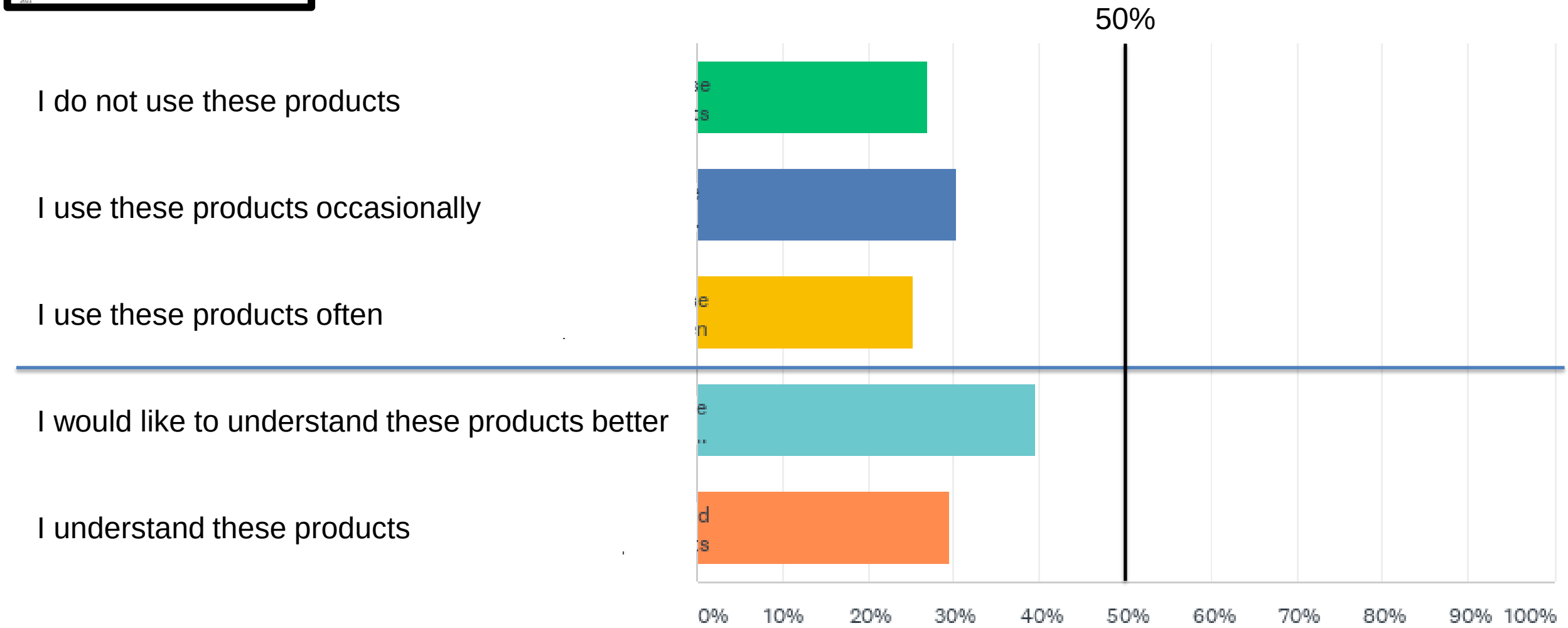
- Too many proposals to list in full here
- Some requested products already available

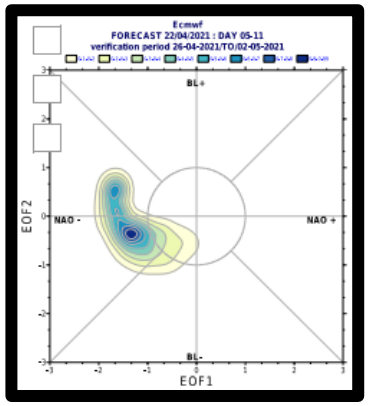
- Clustering on temp/ppn
- Composites of temp/ppn/100m-wind anomalies for each cluster
- Historical reference points for clusters and their associated weather anomalies
- Skew-T plots
- Interactive Hovmoeller **3**
- More on Weather Regime change timings
- Spatial averages (plumes/meteograms) for countries/regions (more reliable?)
- Population-weighted spatial averages
- Extended range wave products **2**
- Stratosphere stamp maps
- Convectively-coupled equatorial waves
- Wind and cloud on meteograms
- Daily stamp maps of mslp (for TC identification)
- Climatology on plumes (e.g. T850 from ERA5)
- 100m winds instead of 10m winds
- Soil moisture
- Northern/southern annular modes
- Plumes for user-selected points
- Sea ice products for the Baltic
- Ensemble *trajectories*
- Snow plumes
- OLR maps for MJO forecasts
- Output covering “missing” parameters like snow cover, cloud cover
- Radiation variables (renewables sector)
- Zonal wind anomalies for El Nino triggering
- EcPoint-rainfall for weekly accumulations
- 10m wind EFI
- EP fluxes
- Bias-corrected MJO / velocity potential



5-class Regime probs

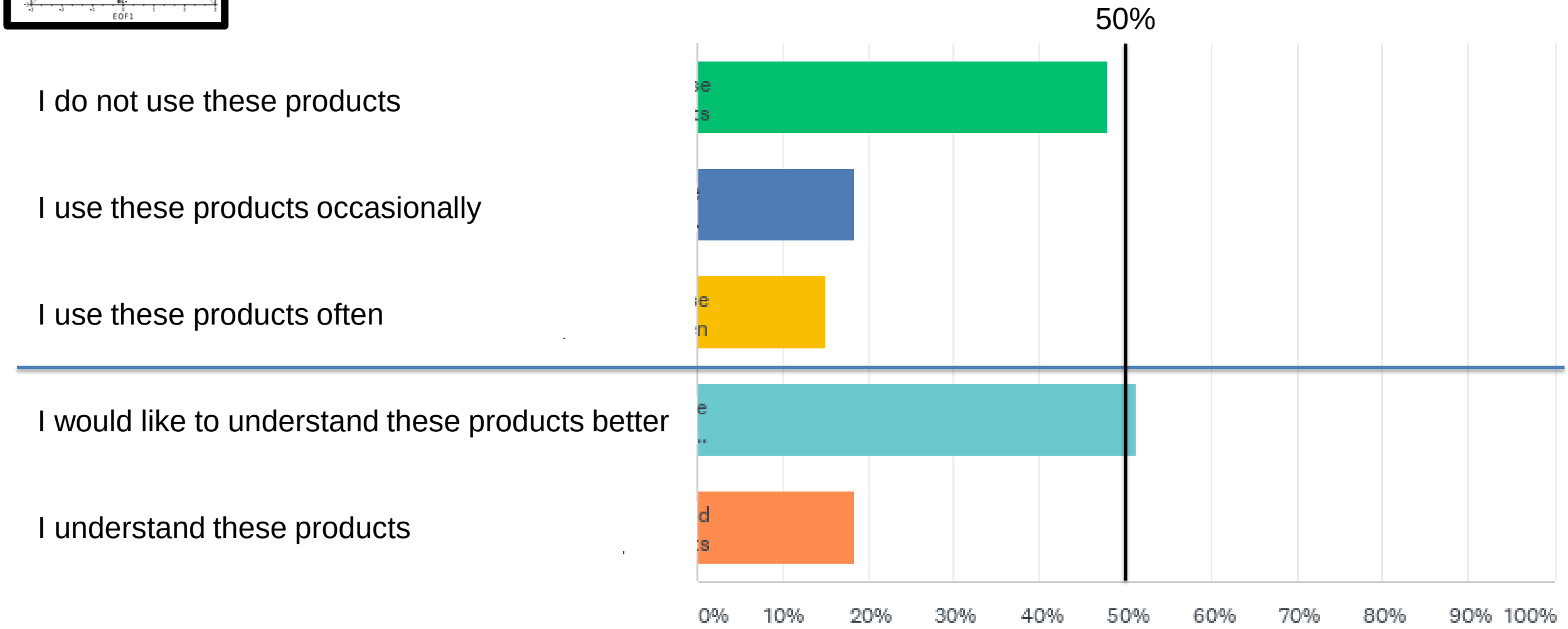
Q5: Use and Comprehension of different Weather-regime-related products





Q5: Use and Comprehension of different Weather-regime-related products

4-class 2-D regime PDFs



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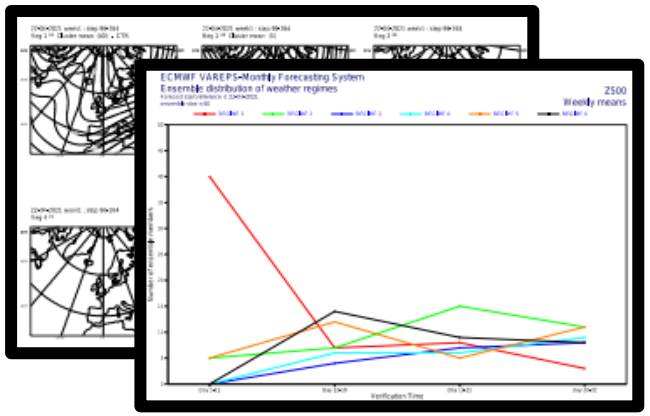
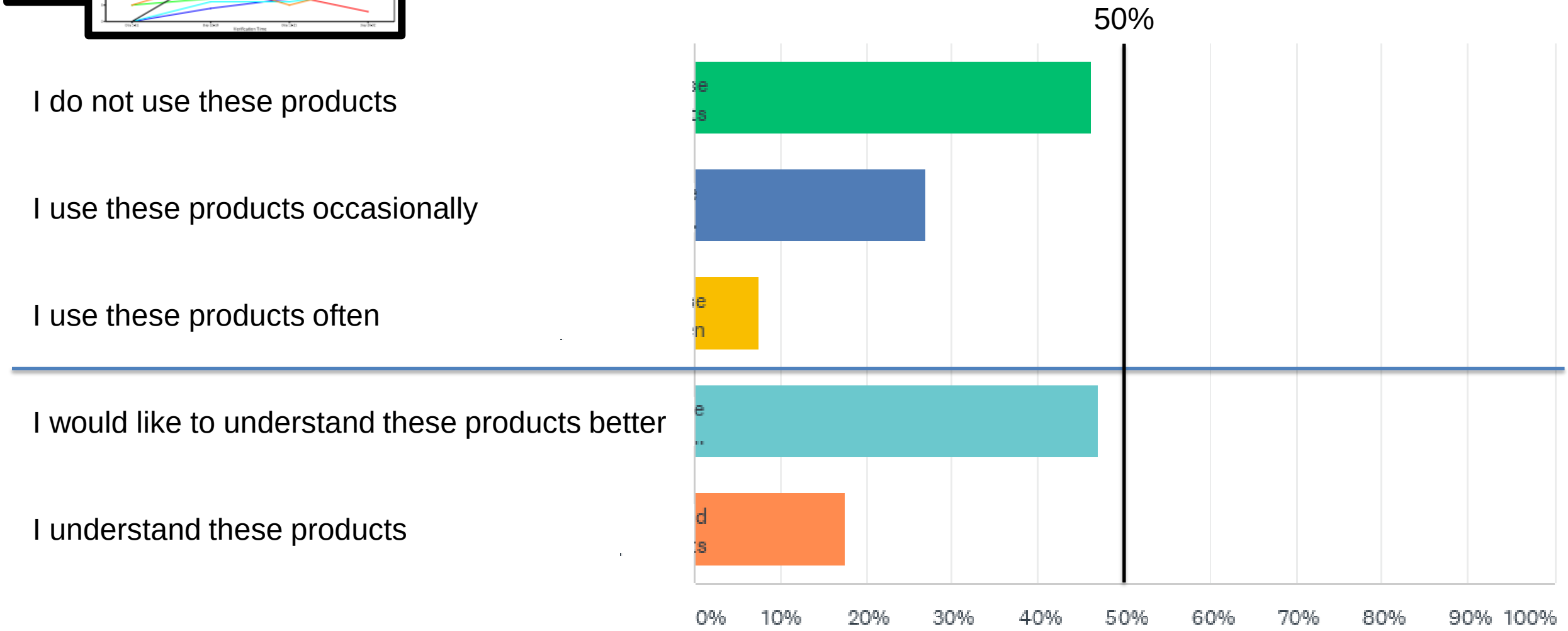


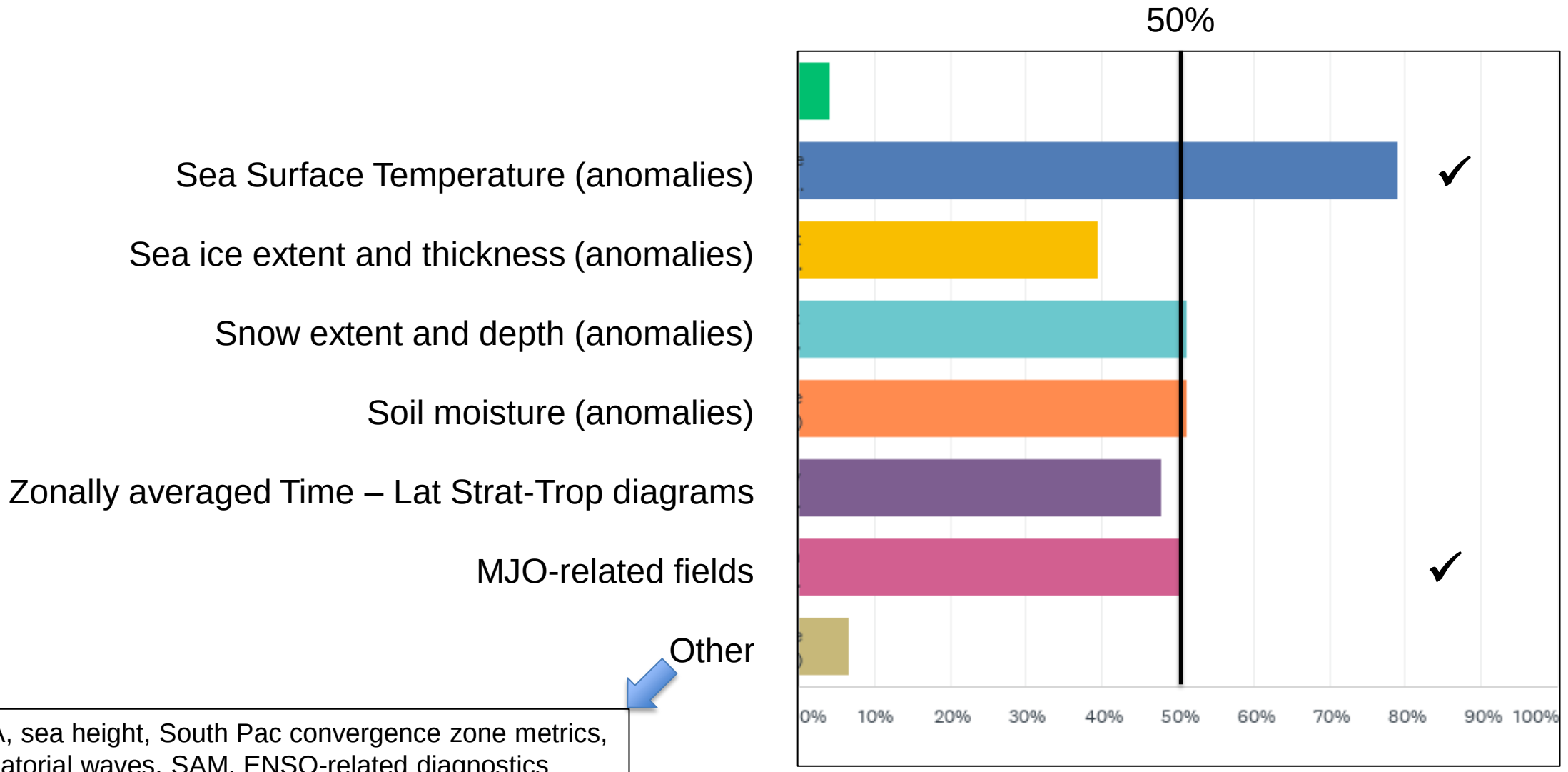
Regime Clusters / Time series



Q5: Use and Comprehension of different Weather-regime-related products – OTHER COMMENTS

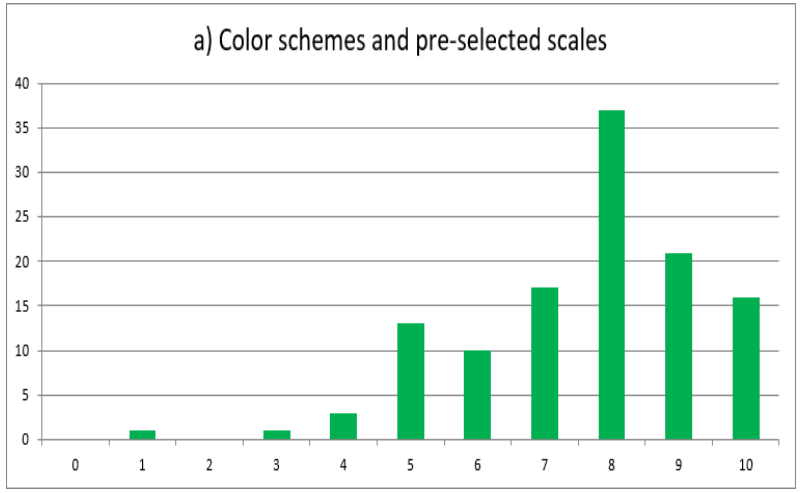
- Hard to comprehend all these / outstanding questions **3**
- Include the Christian Grams 7-regime decomposition **3**
- How valid are these for different parts of Europe ?
- Relevance for 2m temp / precipitation anomalies
- Stratospheric polar vortex regimes ?
- Regimes for other parts of the world! **4**

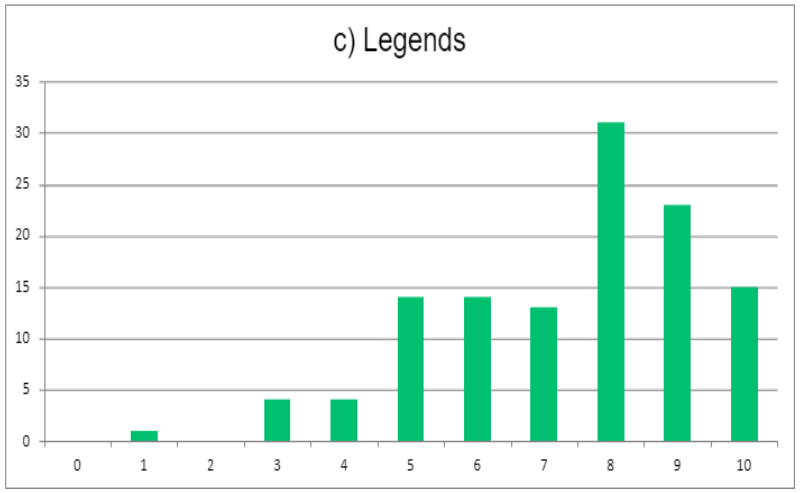
Q6. There are several sources/drivers of predictability for extended forecast ranges. Which of the following monitoring/forecast products would you consult (assuming all were made available)? (Select as many as you like)

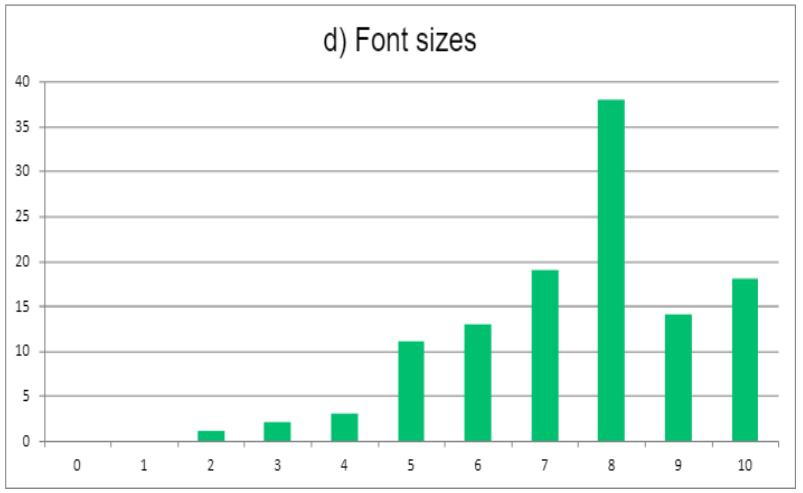


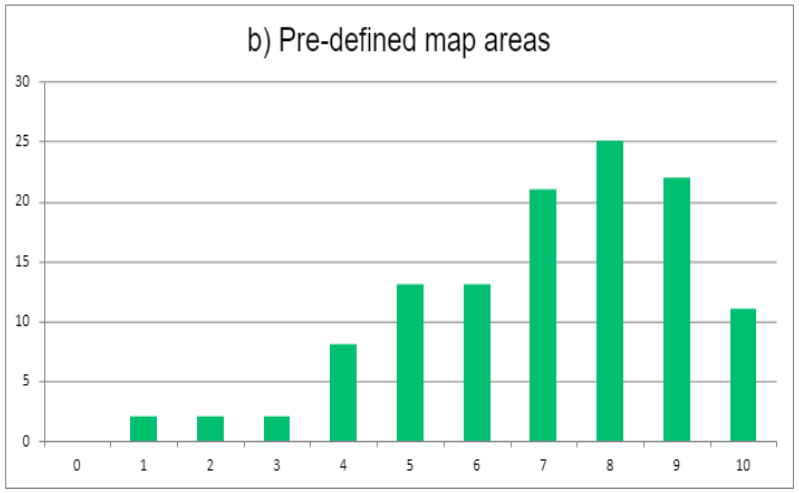
IOD/PDA, sea height, South Pac convergence zone metrics, Equatorial waves, SAM, ENSO-related diagnostics

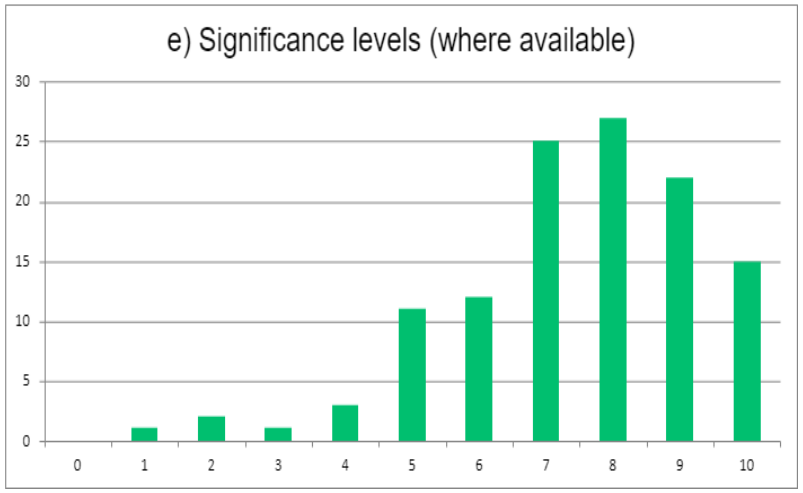
Q7. On a scale from 0 – 10, with 10 being optimal, how happy are you, in general, with the following layout aspects for ECMWF's Extended Range Products (i.e. how well do they convey the forecast information you need):

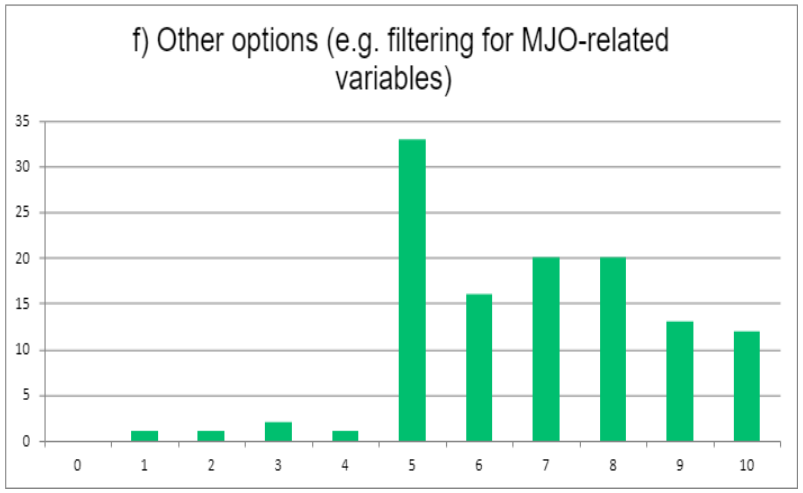






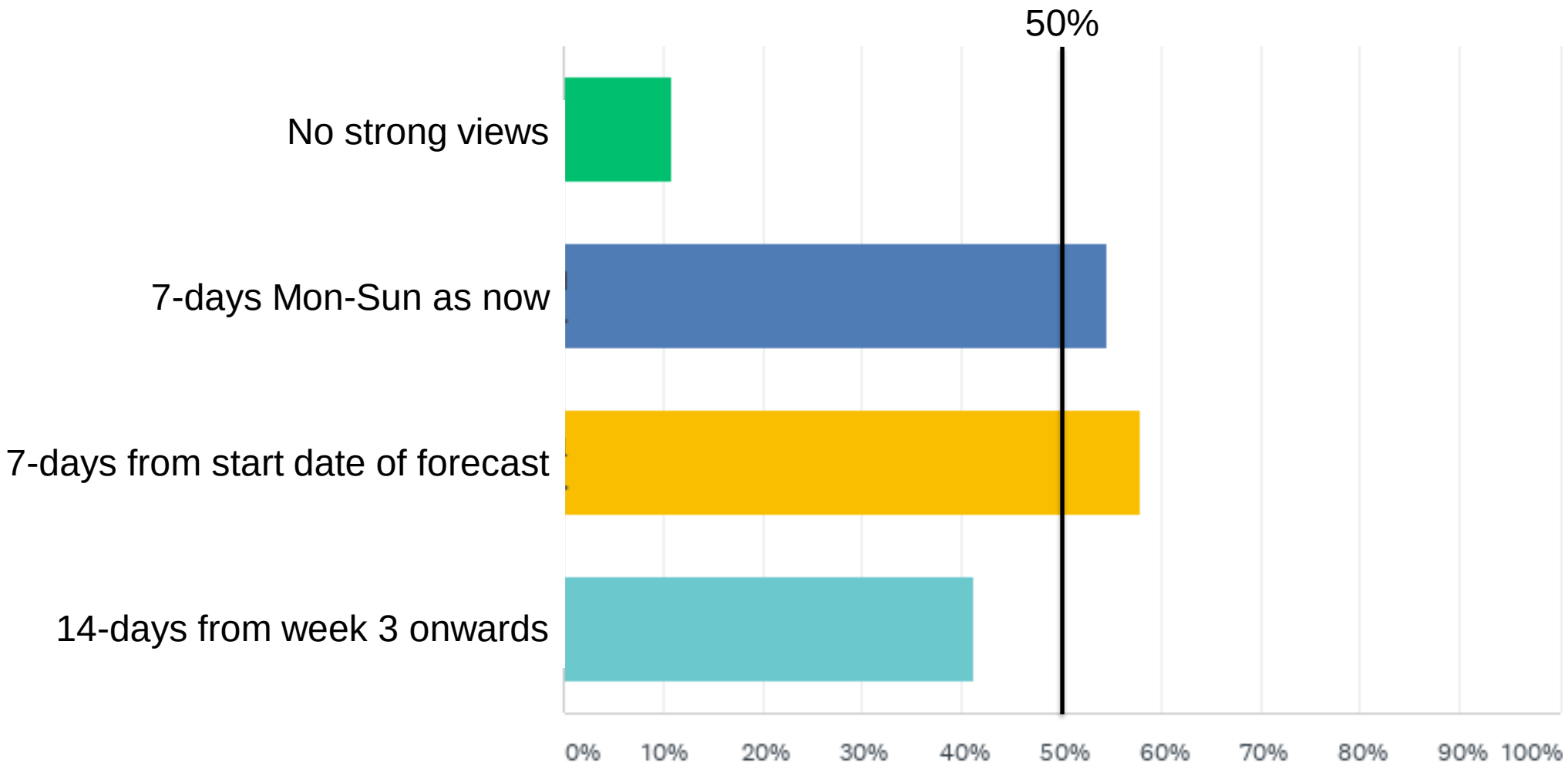




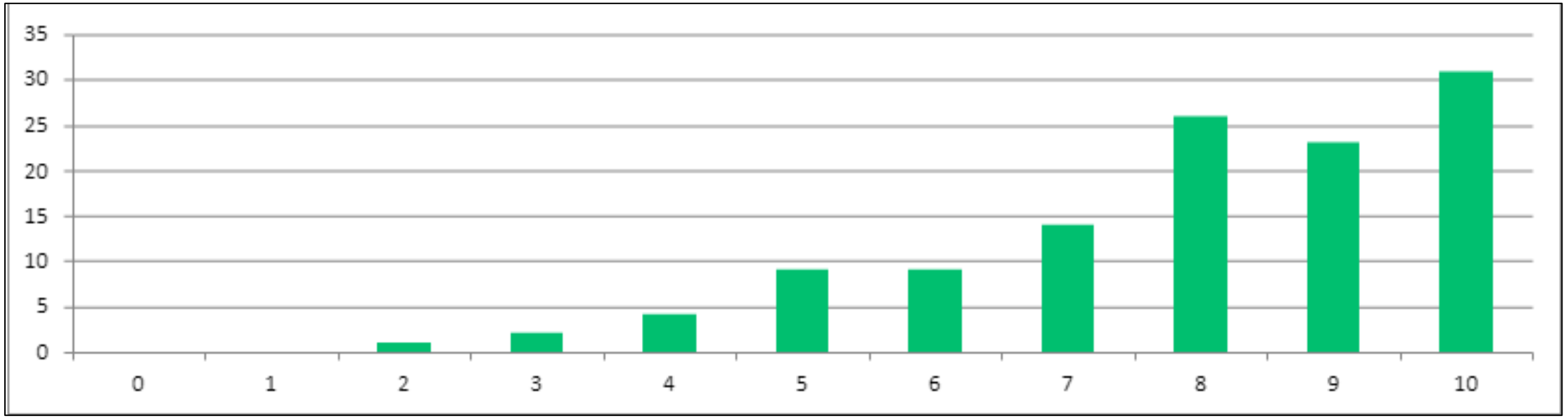


Negative Comments : On pre-defined areas (**3**), On legend issues (**2**), On understanding of significance levels

Q8. Preferred options for aggregating forecast days together

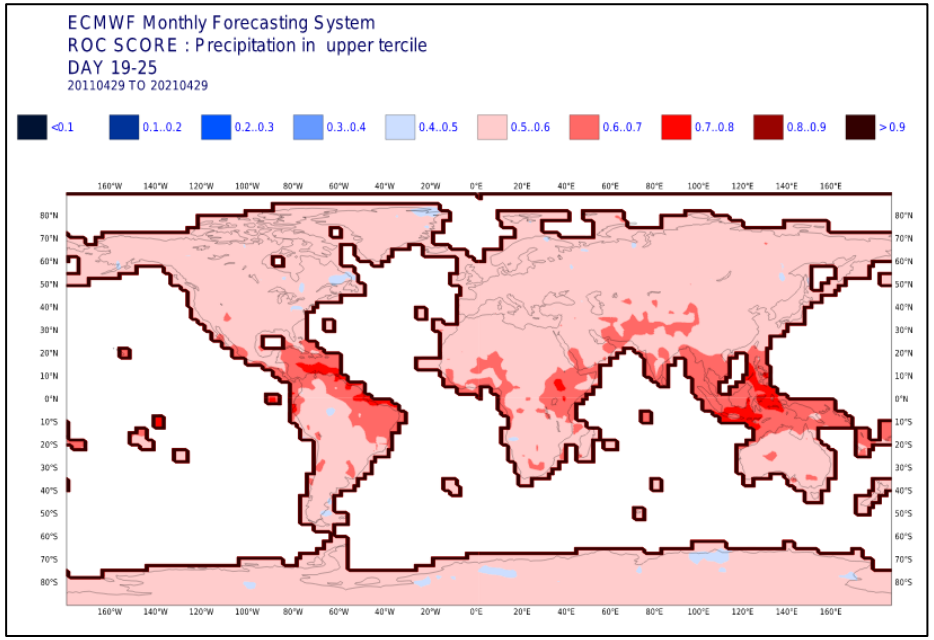


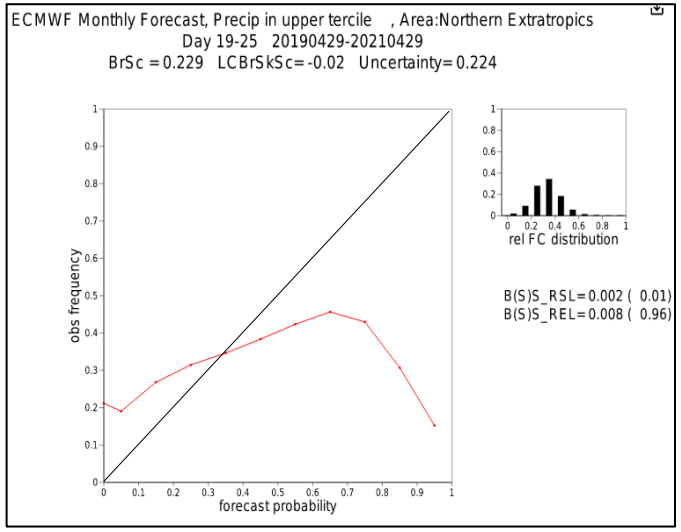
9. On a scale of 0 – 10, with 10 indicating very interested indeed, how interested would you be in an option to interactively define temporal and (possibly) spatial aggregation scales?

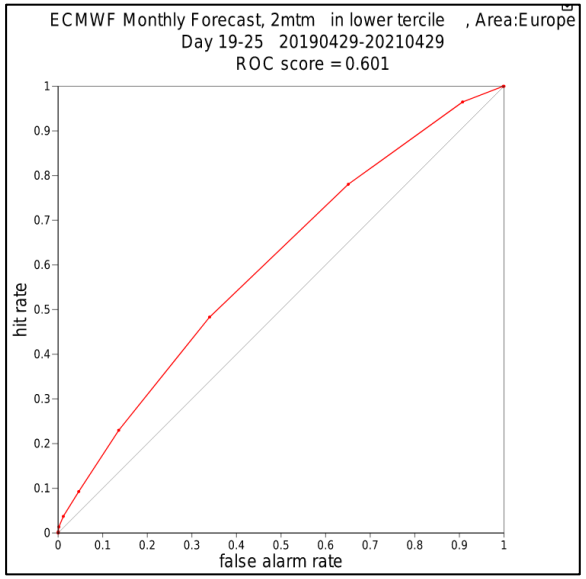


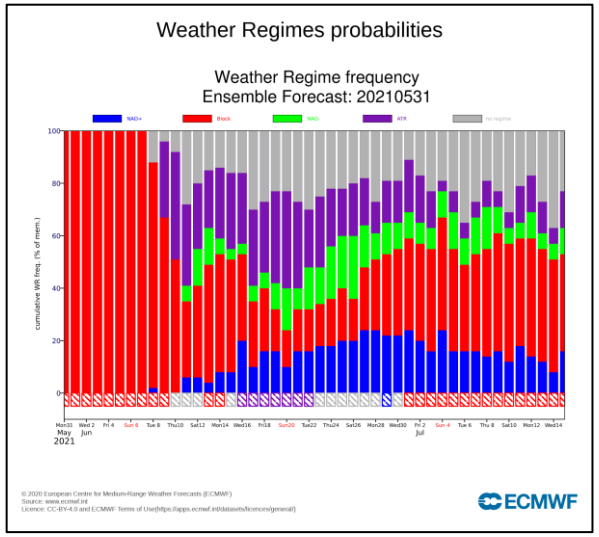
- Like the extra flexibility this would bring to help meet different customers' needs (**7**)
- Could an ML method adapt the averaging period to the situation
- Adding such choices might be too much for users to handle!

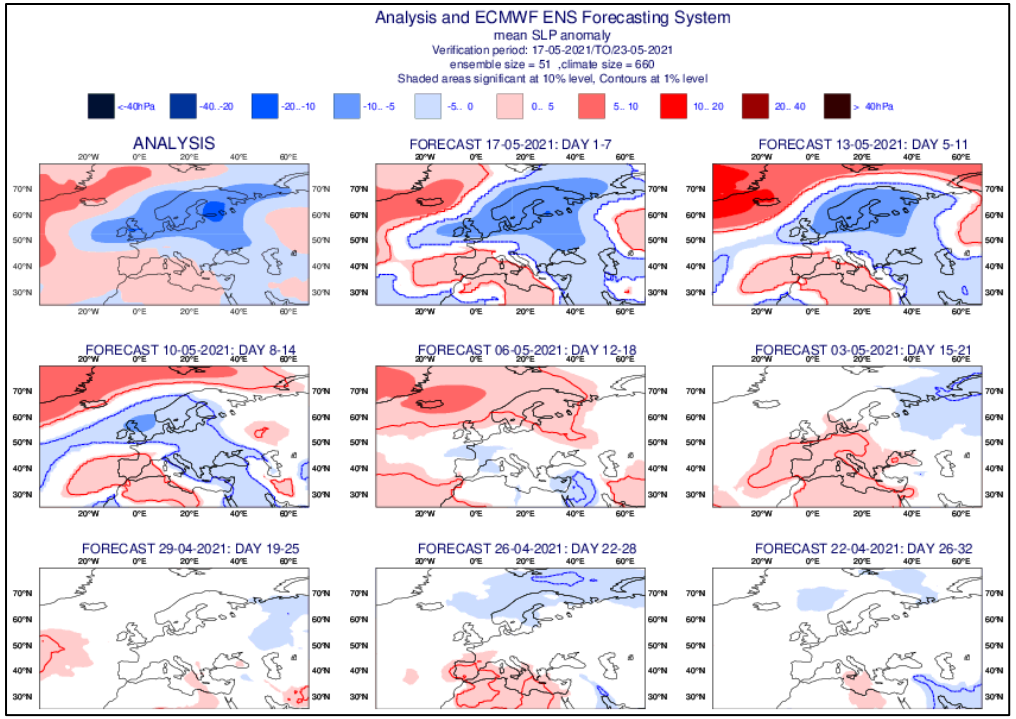
Verification





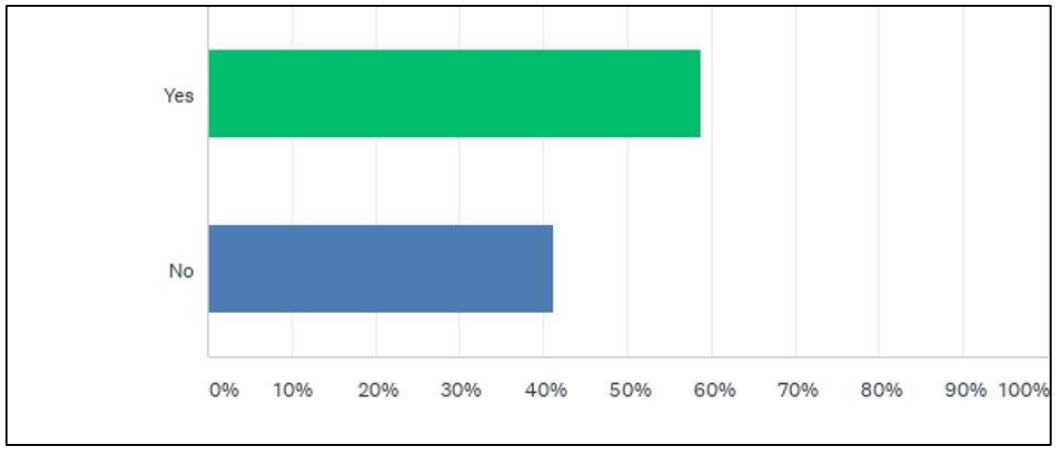




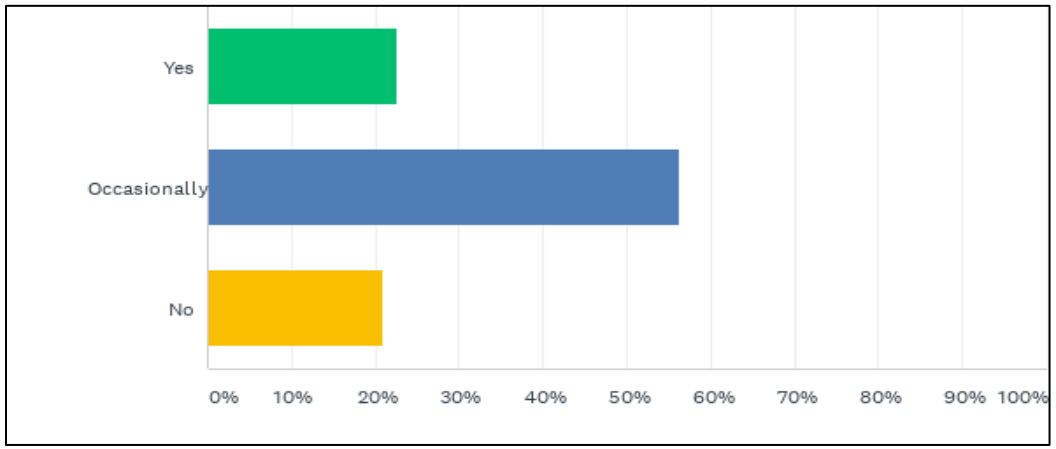


Q10. ECMWF plans to expand the range of Extended Range verification/skill charts on the web. Indeed we strongly recommend users to reference verification metrics whenever they use extended range forecast products.

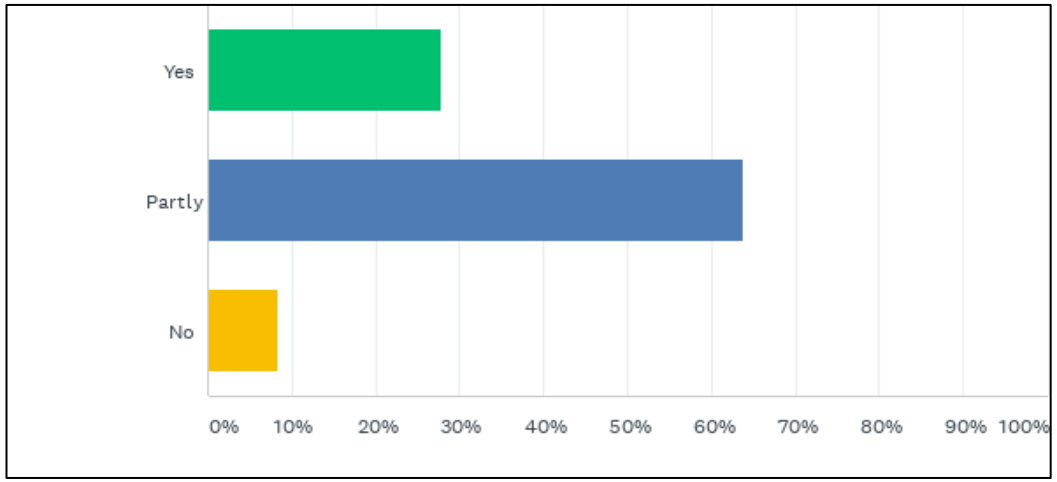
Are you aware of this general recommendation?



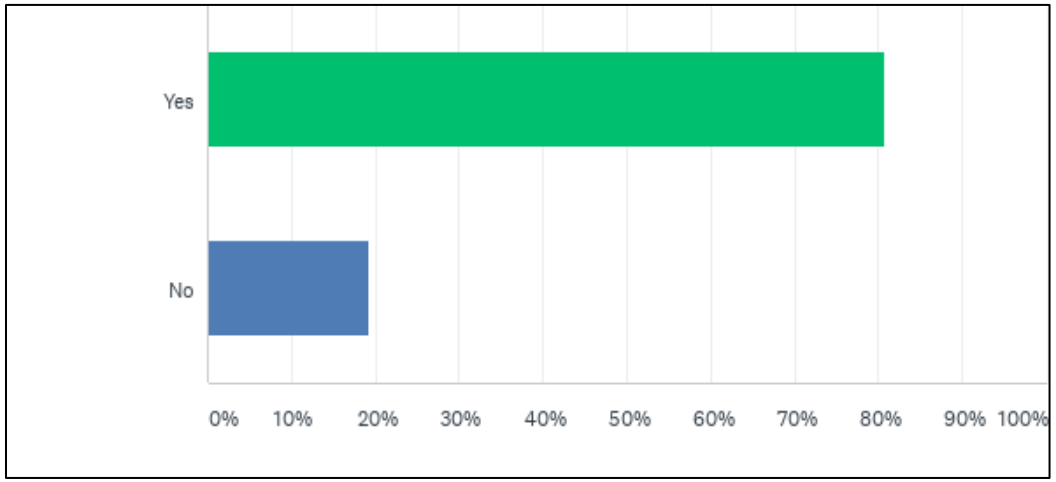
Do you look at our Extended Range verification charts?



Do you understand our Extended Range verification metrics?



Would you like to see more/better verification measures?



TC strike prob / genesis verification requested (**2**), How does rainfall prediction skill vary with MJO/ENSO states? What is the probability of getting the tercile forecast correct, as a function of lead time? More localised verification.

Q11-12 New System

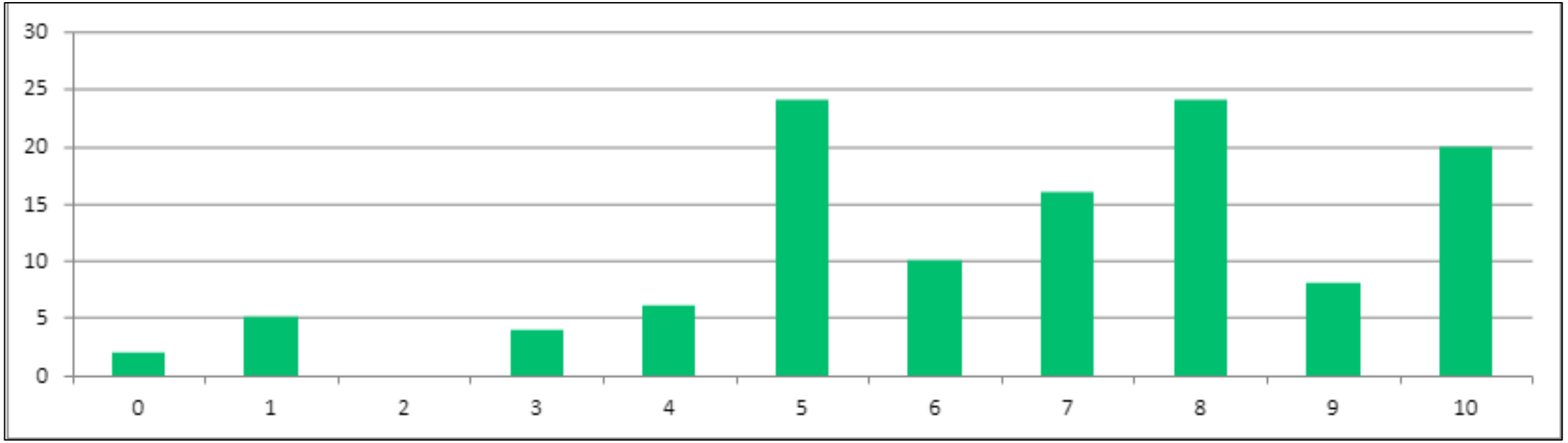
- What new opportunities will arise?
- Options for “lagged ensemble” output

Q11. The new system will be separated from the system delivering medium-range forecasts, meaning no resolution change during the integration of the model. Although horizontal resolution will be unchanged, instead of running 51 members twice per week we will instead run 101 members daily. This new strategy can facilitate new applications. Please describe (in a few sentences) what you see as the product enhancements, or new product developments, that could be used to best exploit this new structure. Please try to consider your current or potential future customers' needs.

36 replies

- Long awaited improvement / good step to more agile product **3**
- Evidence of utility of 100 over 50 members? **3**
- Will facilitate visualisation of forecast trends – please also provide such visualisations **7**
- Needs linking to clustering / regime classification to make less cumbersome **3**
- Potential for better indication of lower prob extreme events (e.g. TC-related) **3**
- What will be the perturbation scheme?
- Want time-lagged *and* non-time-lagged
- Plot run-to-run ENS mean differences
- Want to avoid jumpiness for customers
- CDFs for user-defined time window
- Too complicated!
- "Chiclet plots" ???
- Want to visualise the two systems together, to D15, in single products (e.g. plumes)

Q12. The new daily initialization frequency allows for aggregation using the “lagged ensemble” technique. For example, statistics for Week-3 could be computed on a 303-member ensemble using the forecasts from Day(0), Day(-1), and Day(-2). On a scale from 0 – 10, with 10 showing the greatest usefulness, how interested would you be in interactively defining how the lagged ensemble is constructed?



Q12. If you see this option as potentially useful what type of lagging would you envisage typically using?

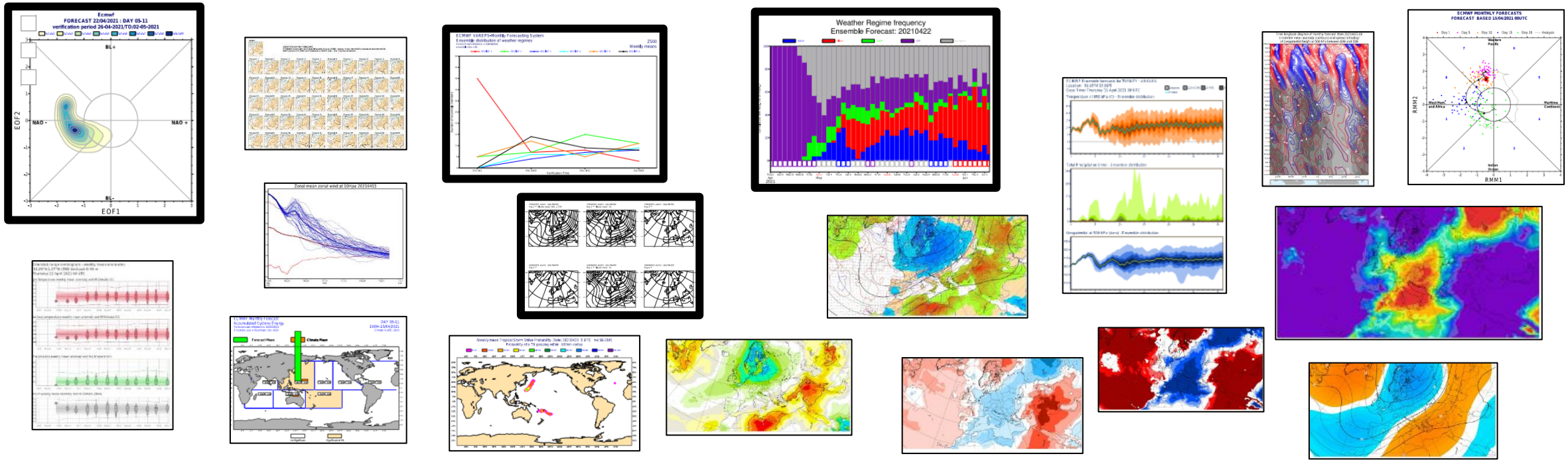
24 replies

- Hard to say! **4**
- Often only the last run would be referenced
- Last 2 runs **2**
- Last 3 runs **8**
- Last 4 or 5 runs

- Benefit would be seen for summer precipitation forecasts in particular
- Interactive lagging (e.g. select out SSW members)
- Lagging as a function of weather regimes
- Deselect out already-poorly-performing members
- Relates, of course, to product (day) aggregation strategy
- Need to see related verification scores to decide

Q13. Any additional comments?

- Congratulations ECMWF – great service! (**4**)
- Beware of providing too many products!
- Clarify anomaly reference period (*always the last 20y, from re-forecasts, 1 week spanning valid time*)
- Would like numbers not just colour bars on maps (*use ecCharts*)
- Can we have more pre-computed ERM-Climate data (e.g. for 6/12h periods)?



Summary of Main Messages – Extended Range Products

- 120 **Respondents**: 70% public, 20% private with 60% forecasters : could 'skew' results…
- Most **Popular** products - *Maps*: Ensemble mean & EFI/SOT; *Gridpoint*: meteograms & plumes
- All our **regime** products are used. Other options wanted (e.g. outside Europe).
- **Comprehension** levels ought to be improved! – e.g. EFI/SOT, MJO, Hovmoeller, Regime offerings in general.
- Many product **requests**, focal points being new (regime-style) indices, and different parameters
- A lot of interest in "**drivers of predictability**" – ECMWF only delivers 2/6 options at present
- Regarding graphical **chart styles** - although there are some irritations, overall most users are happy
- Some general dissatisfaction with calendar-week **aggregation**, users have a strong desire for more flexibility
- Clear interest in more than twice-weekly **updates** (80% view products at least weekly)
- Upcoming system with **daily runs** welcomed – strong interest in identifying run-to-run trends
- An option for **lagged runs** in the new system would be welcome; 3-run lagging seen as optimal
- More extended range **verification** is wanted (e.g. for TCs), but metrics need to be better explained/understood