



Making Ireland Weather  
and Climate Prepared

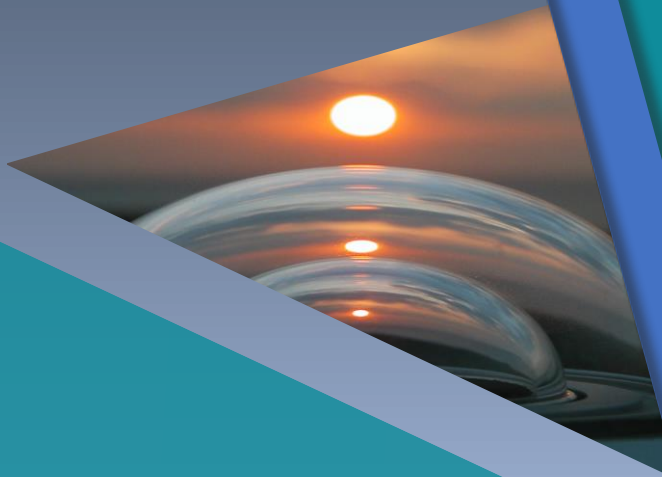
# Roadice Winter 2022/23

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With thanks to Liz Walsh



An Roinn Tithíochta,  
Rialtais Áitiúil agus Oidhreachta  
Department of Housing,  
Local Government and Heritage





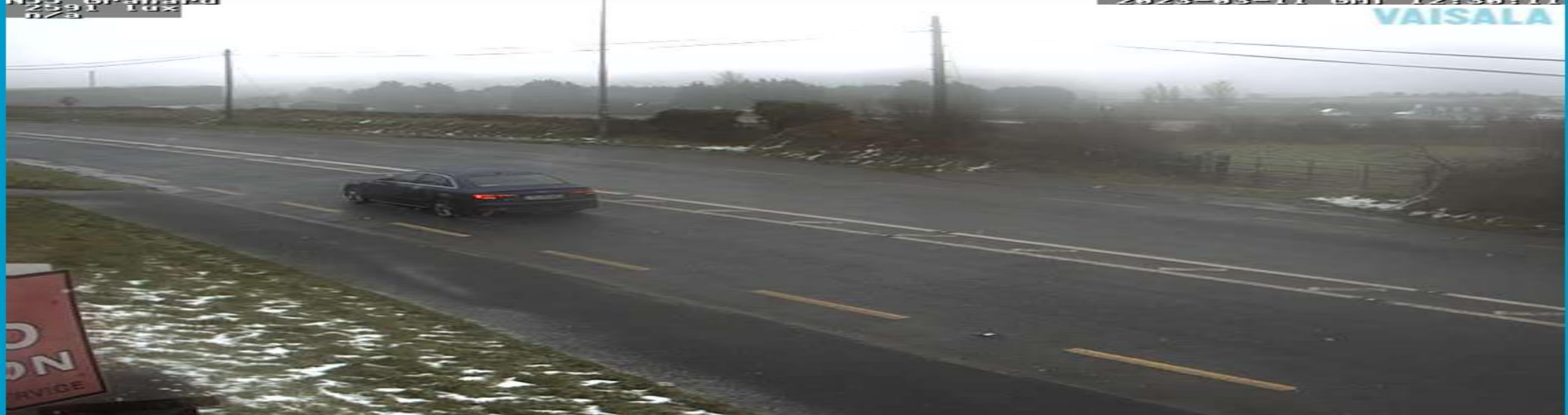


# What was the Meteorological Winter of 2022/23 like?

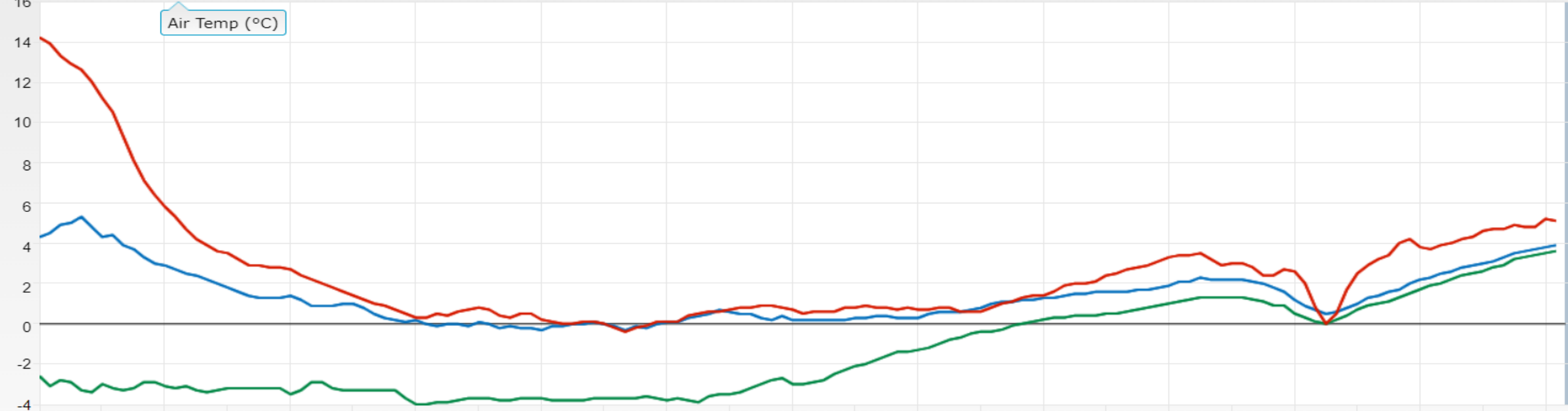


- Dry and mild overall but that's not the complete story
- Very cold airmass initially and cold blast later January
- Particularly mild in first half of January and much of February



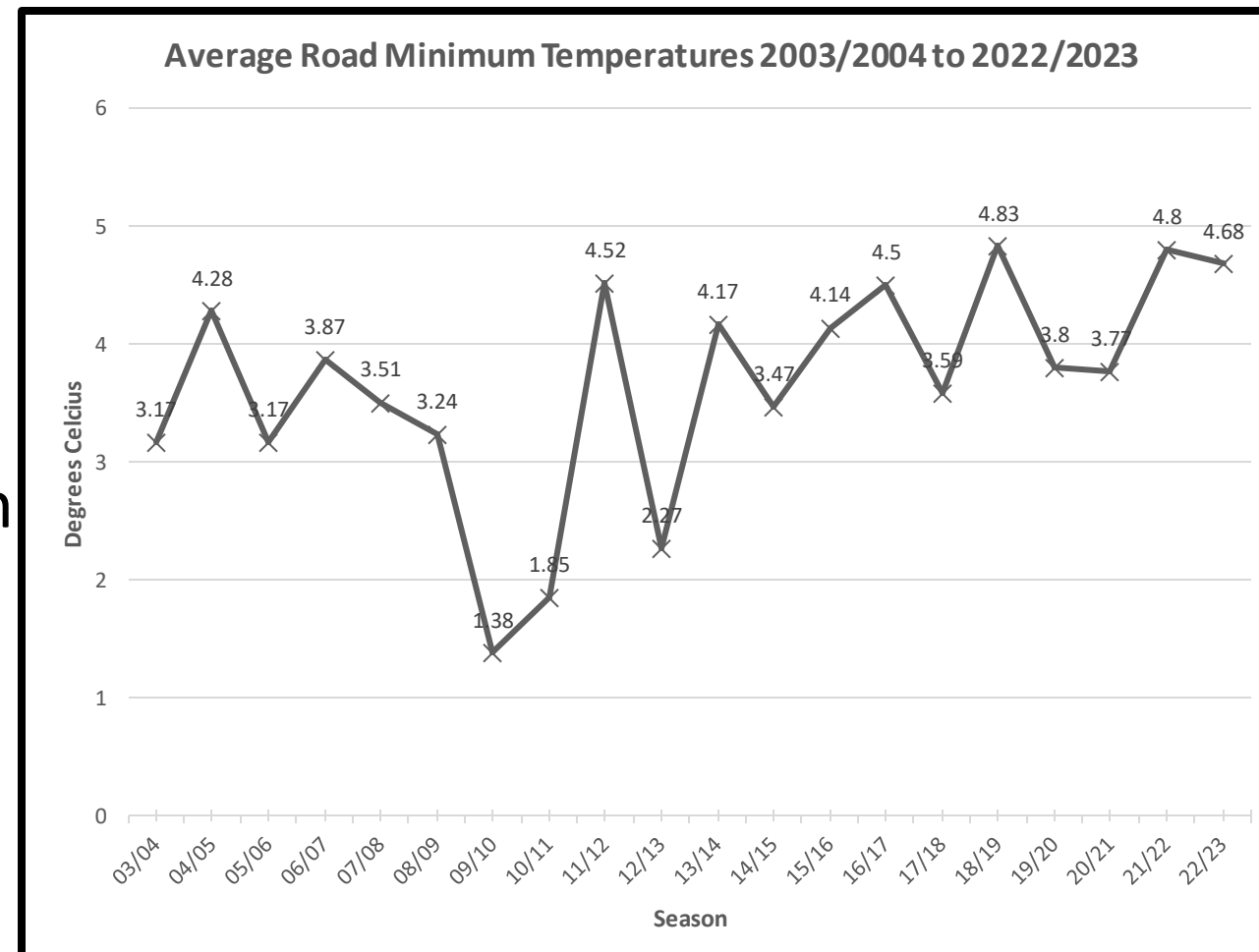


°C Air Temp - Atmospheric site Dew Temp - Atmospheric site Surf Temp - Surface site   Show Forecast



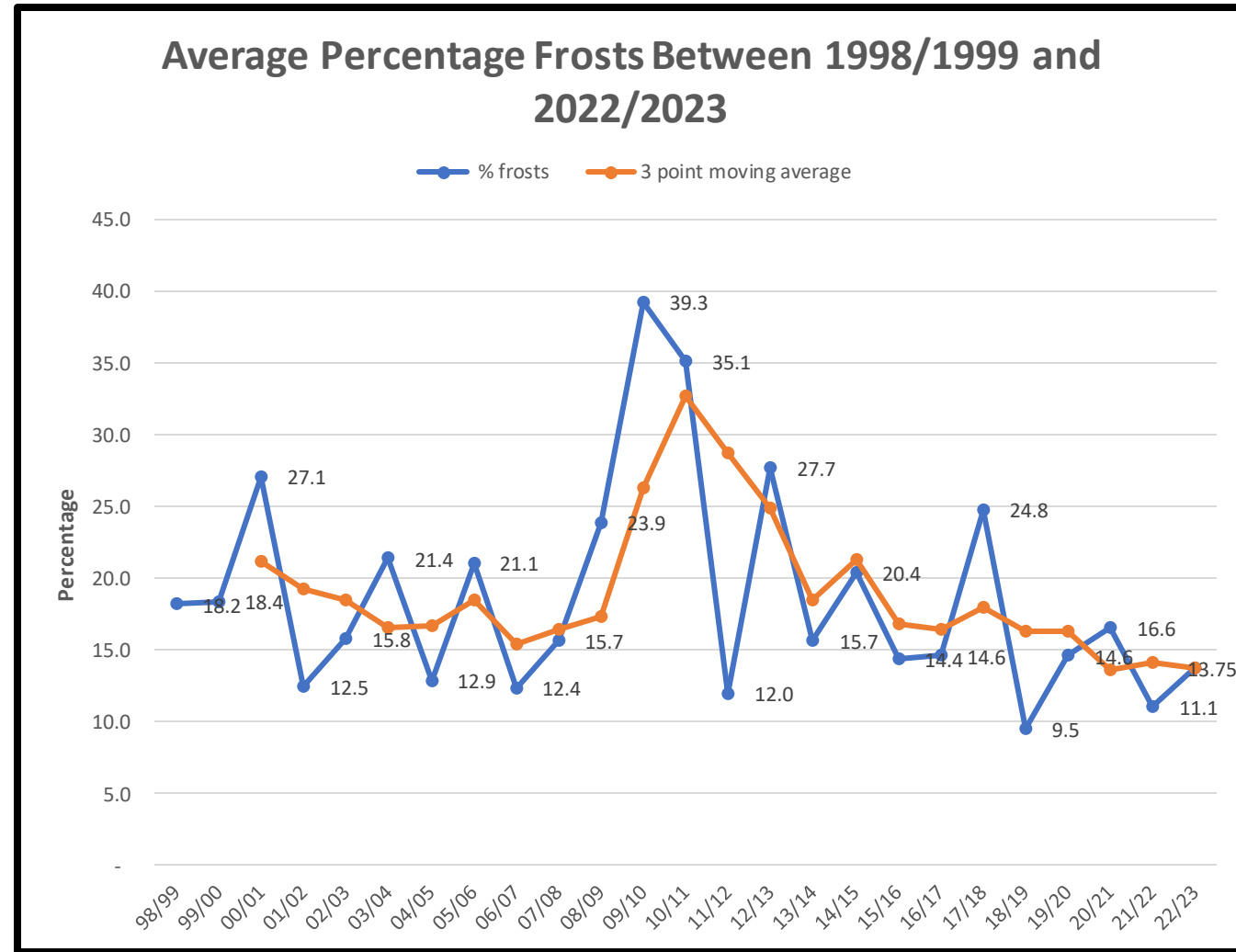
# How did that translate to road conditions?

- Third mildest season based on average min RST
- Average min RST: 4.68°C
- Just 0.12°C lower than last year
- Mildest season 2018/19 season had average min RST 4.83°C



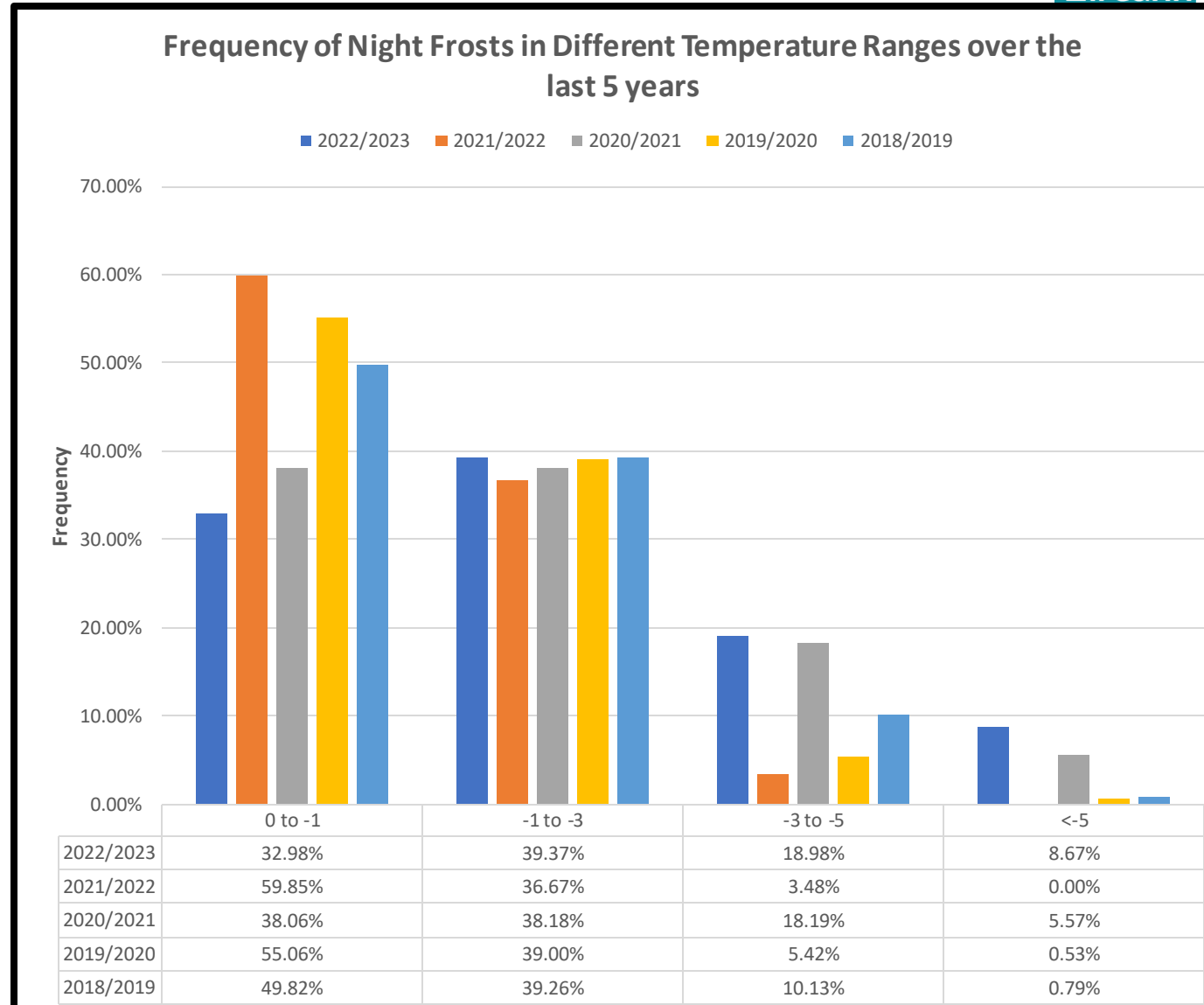
# How did that translate to road conditions?

- Holds looking at average % of frosts over 25 seasons
- Average % frost: 13.27%
- Seventh lowest overall
- But there's more to it...



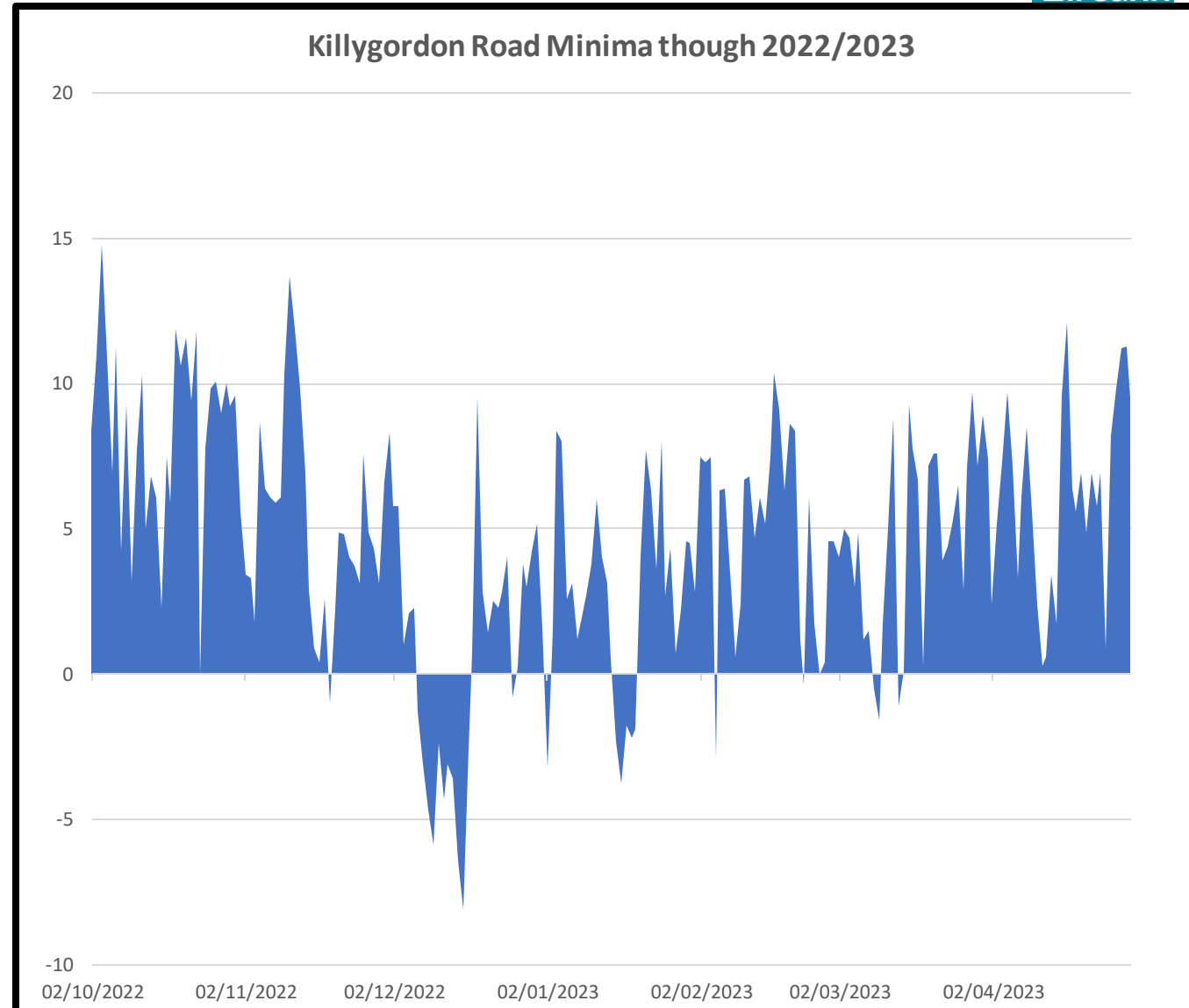
# How did that translate to road conditions?

- Less “slight” frosts
- Higher “severe” frosts



# Seasonal Minima

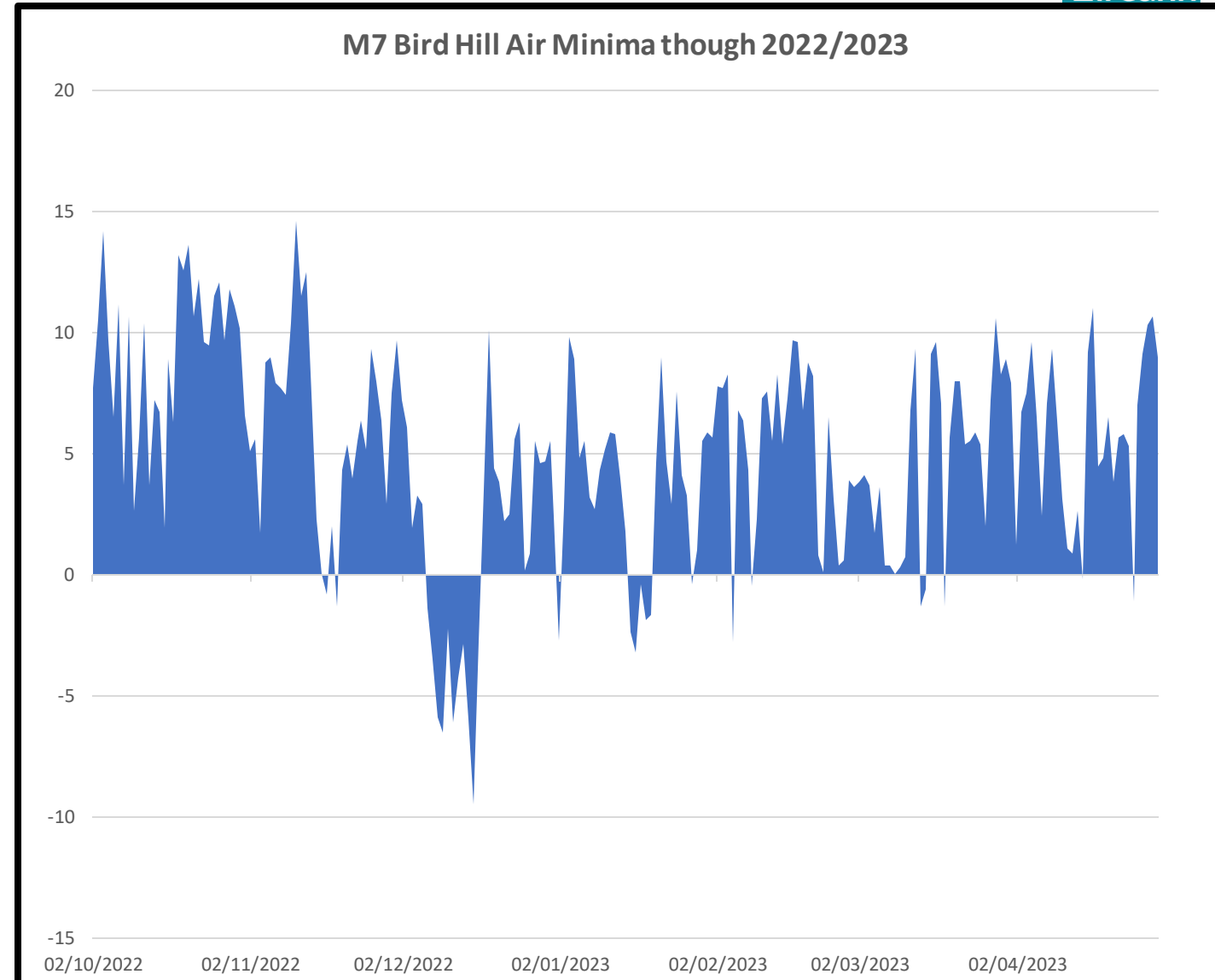
- Lowest RST:  $-8.4^{\circ}\text{C}$
- 14<sup>th</sup> & 15<sup>th</sup> Dec
- Significant change from last season





# Seasonal Minima

- Lowest Air Temp:  $-9.5^{\circ}\text{C}$
- 16<sup>th</sup> December



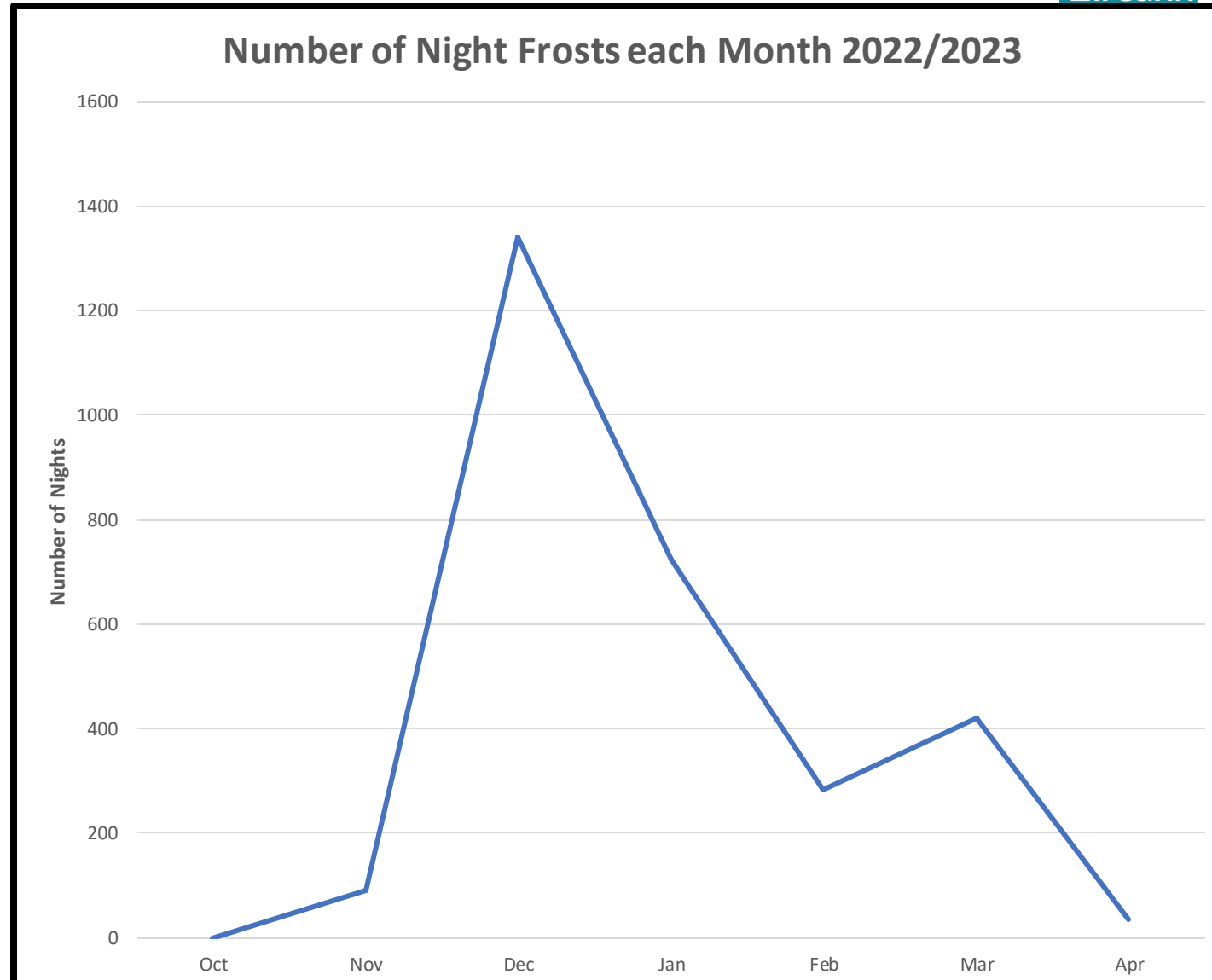
# Instances of Frost

- 69 nights out of 211
- 46% of frosts were in December
- 71% of frosts in December & January
- 81% in meteorological Winter
- Emyvale: 44 frost nights
- 21 stations < 10% frost nights



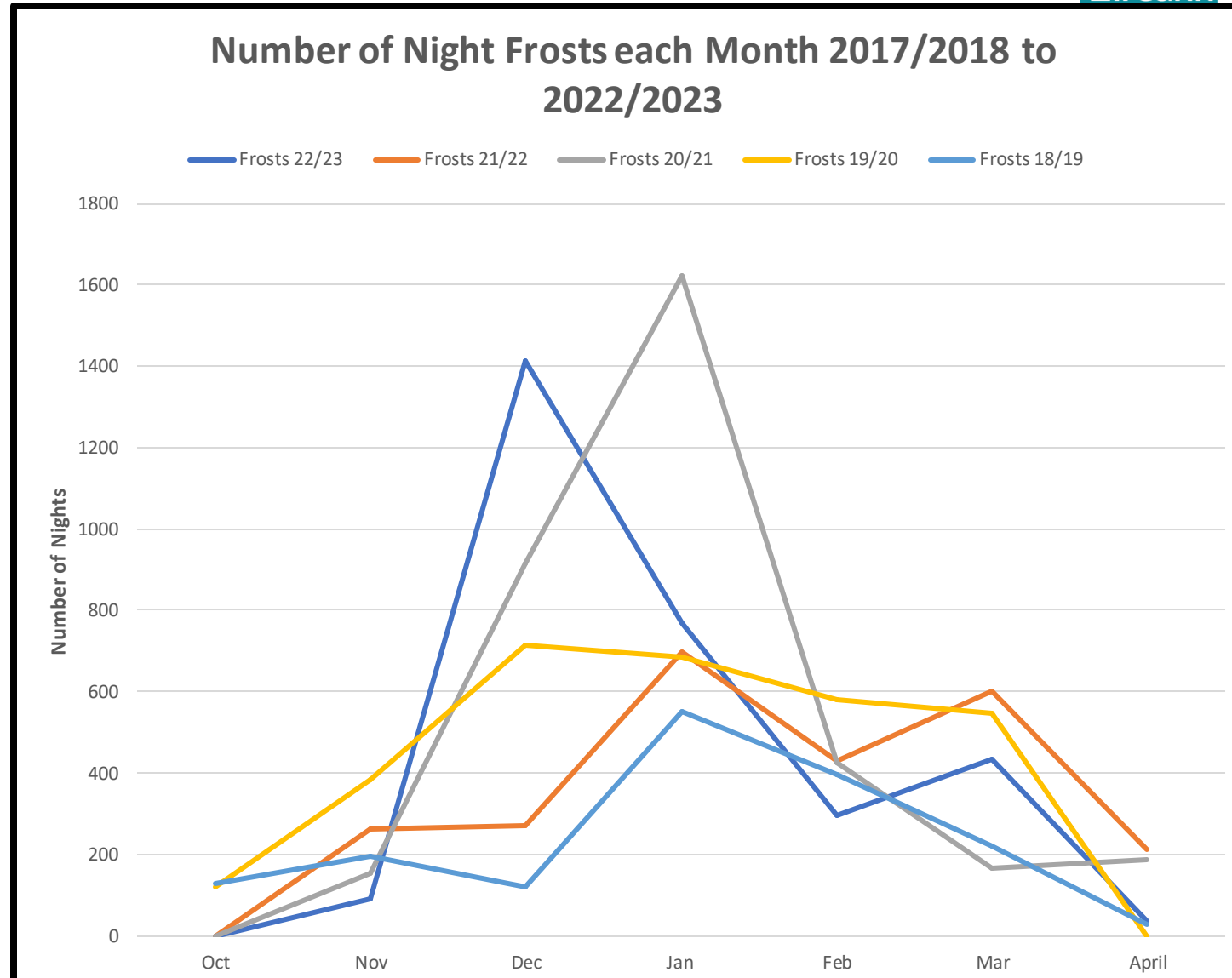
# Frosts by Month

- December by far the coldest
- Most contained in Dec & Jan



# Frosts by Month Historical

- Coldest Dec
- 2<sup>nd</sup> coldest January





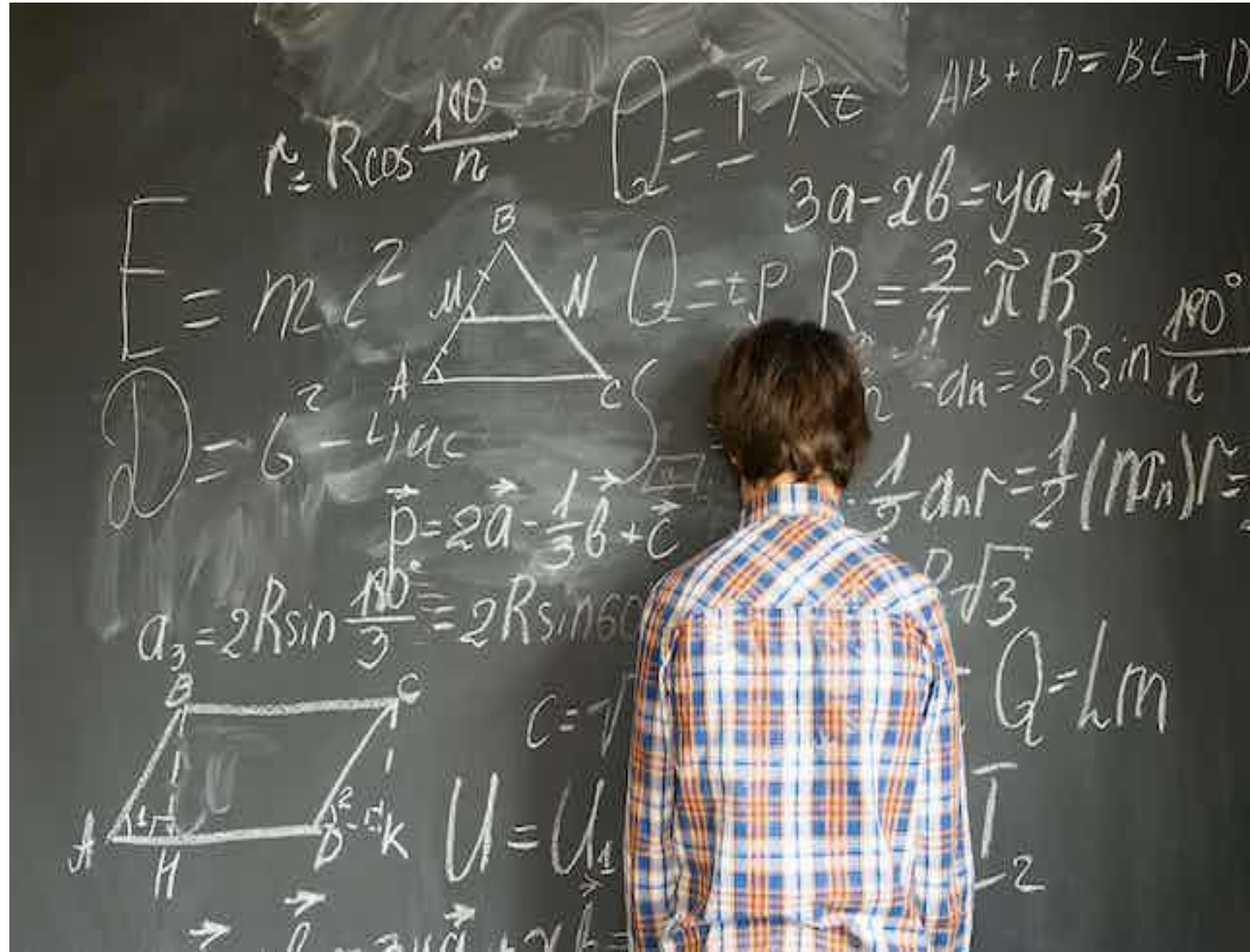
# Average Min RST by Month vs Last Year

- A more horizontal line for winter months
- Quite a difference in Jan



# And now for the number heavy part...

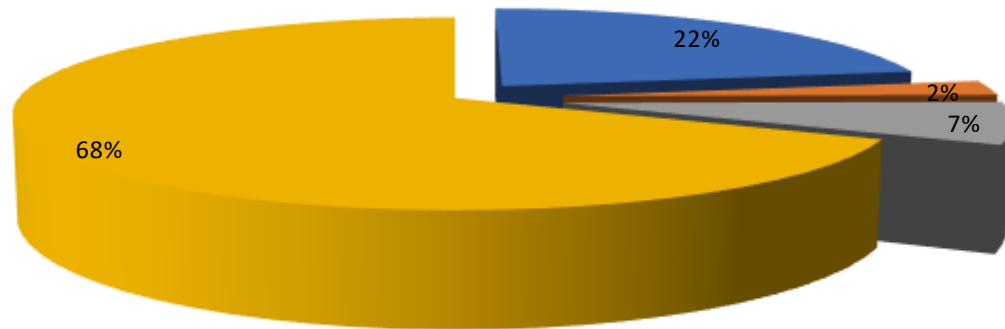
- Critical days:  $RST \leq 5^\circ\text{C}$
- 11,661 Critical days  
or 53.4%
- Marginal:  $0^\circ\text{C} < RST < 2^\circ\text{C}$
- 2,537 marginal nights  
or 11.6%



# Model Forecast vs Persistence

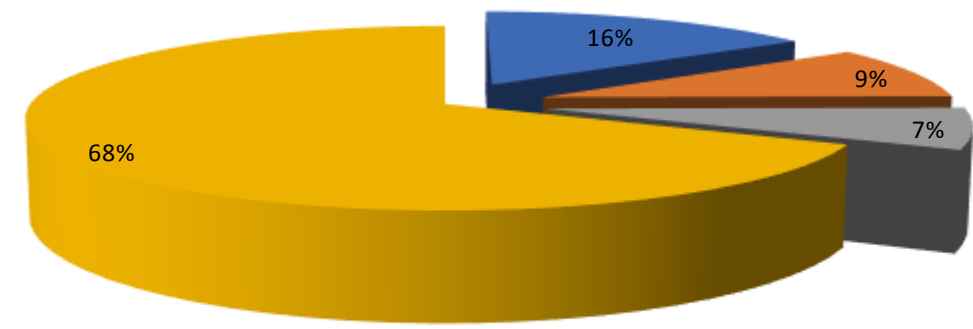
## Observed Vs Forecast 2022/2023

■ O/F ■ O/NF ■ NO/F ■ NO/NF



## Observed Vs Persistence 2022/2023

■ O/F ■ O/NF ■ NO/F ■ NO/NF



# Mean Error

- Used to signify how similar forecast was to observations
- Also can be an indication of bias
- Average Forecast Mean Error = -0.36
- 23 stations: Forecast Mean Error > 0
- 82 stations: Forecast Mean Error < 0





# Bias Scores in 2021/22

- Avg 1.23 across 108 stations
- 75% between 0.7 and 1.3, close to optimal of 1
- 87 stations  $> 1$  (over forecasting frost)
- 11 stations  $< 1$  (under forecasting of frost)
- 7 station = 1 (no bias)

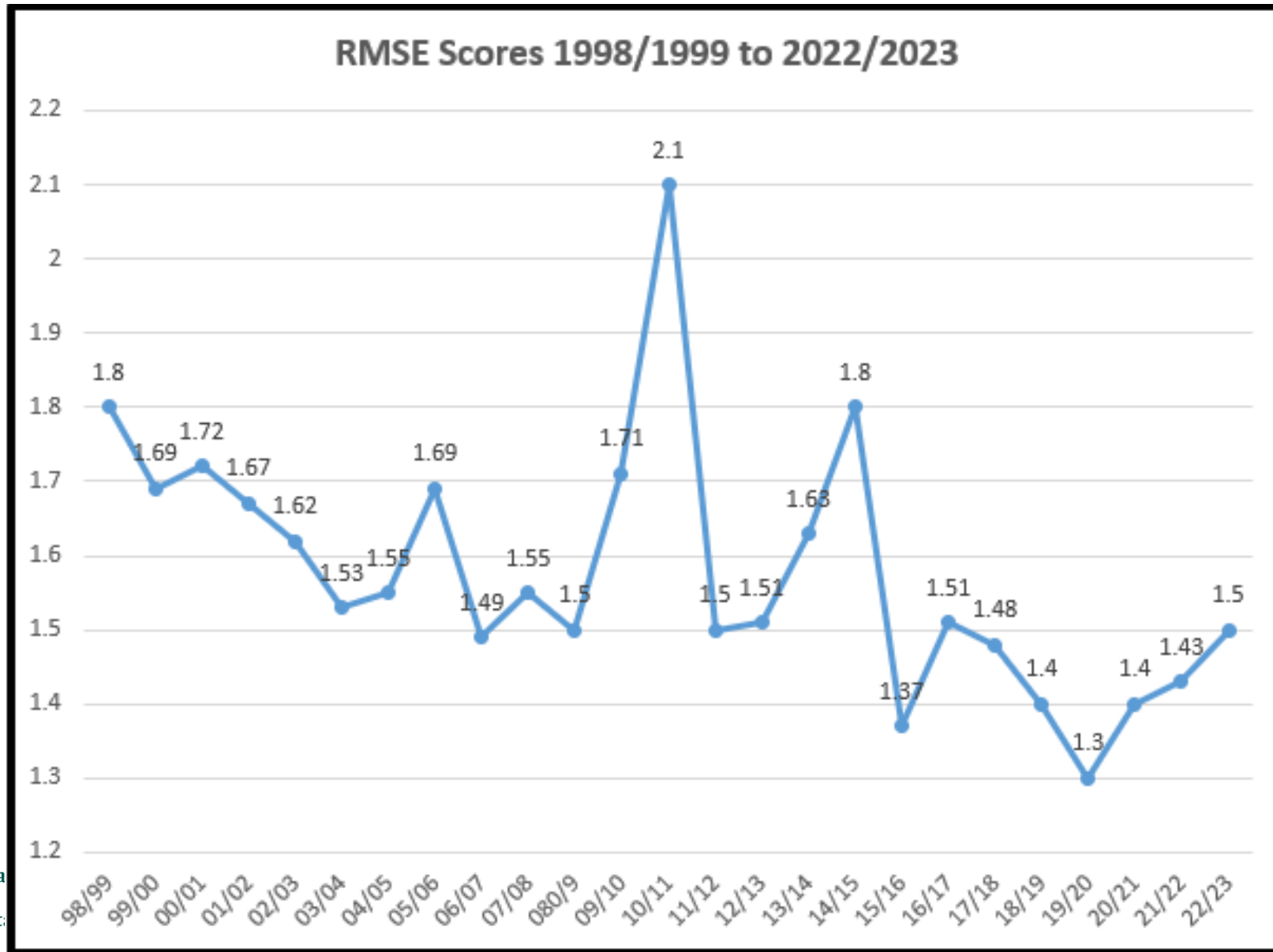


# Zero Crossing Time Error

- Difference between time first RST  $< 0^{\circ}\text{C}$  reported and observed
- 82 sites: Time error  $> 0$
- 20 sites: Time error  $< 0$
- 3 sites: Time error  $= 0$
- Trend is similar to last year ie. onset of frost too late in model output



# RMSE Scores by Season



# Other Scores

- Percentage correct: 90.48%
- POD: 90.6%
- FAR: 9.3%
- TSS: 81.3%
- ORSS: 98.070%
- CSI: 70%



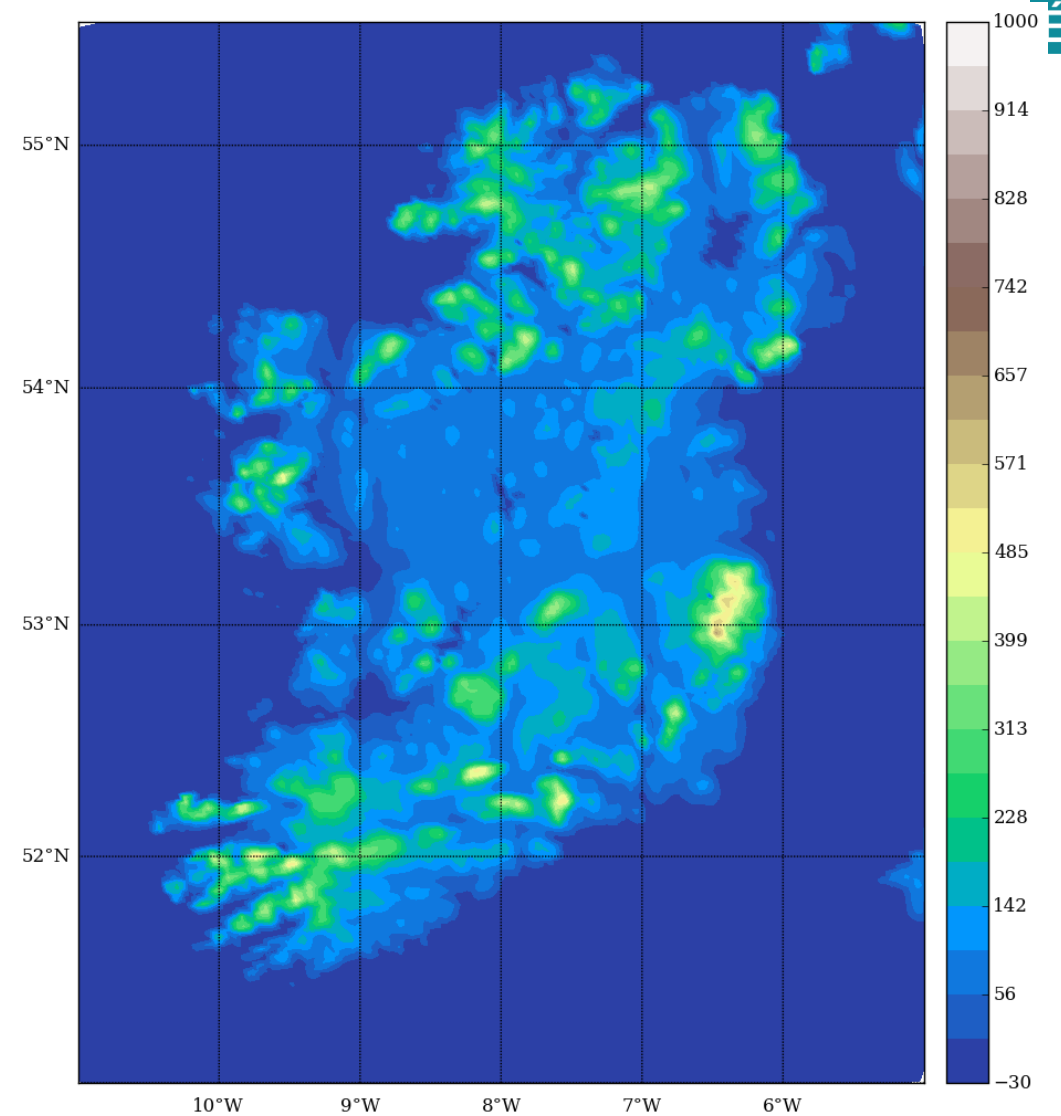
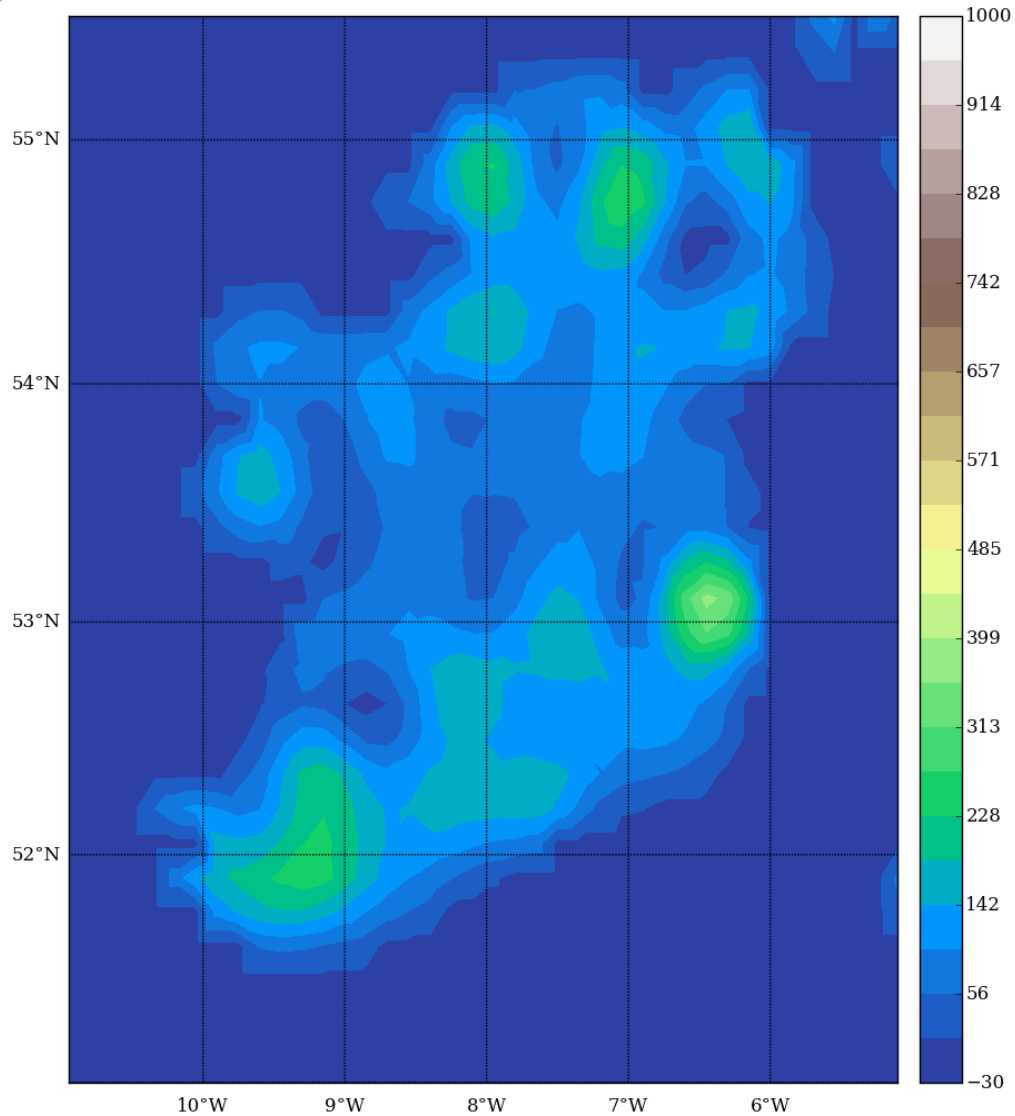


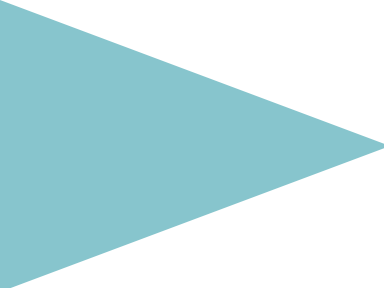
# Factors to keep in mind

- Frequency of events
- No evaluation of tabular hazard matrices and text forecast
- No evaluation of the consultancy service
- No validation was made of the thermal maps

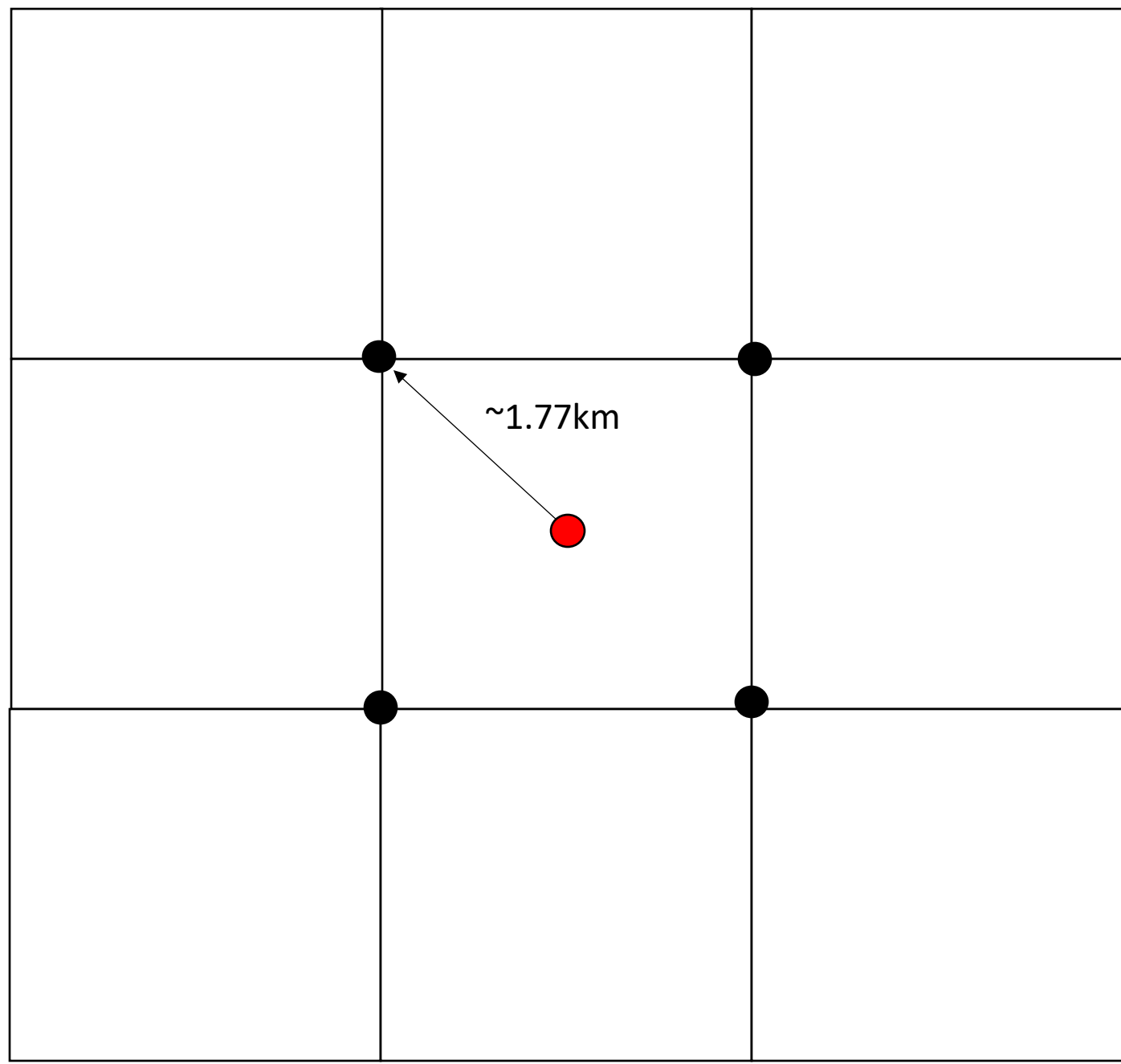


# 9km vs 2.5km Resolution





2.5km



~1.77km



# Upcoming Weather



- Seasonal Forecast last issued covers October, November & December
- Indicates it'll be milder and wetter than average
- Mean air temps between 0.5 and 1.0°C above average nationwide, slight decreasing likelihood as the period progresses
- BUT.... Seasonal forecasts have a very low skill score for Ireland at present and they don't help us with individual nights



# Climate Change

- What does a globally warming climate mean for us?
- Dec 2021 – Feb 2022 was the 6<sup>th</sup> warmest meteorological winter on record (length 123 years), Dec 2020 – Feb 2021 was the 52<sup>nd</sup> coldest
- The 4<sup>th</sup> coldest was Dec 2010 – Feb 2011
- While there is a warming trend generally, it does not exclude extremely cold winters



# Our Forecast Services



- Streamlined forecast for mild nights
- Probabilistic ranges, temporal & spatial variations
- Wind:  $v = [v_{ref} \cdot \ln(z/z_0)] / \ln(z_{ref}/z_0)$
- More temperature band focussed
- Survey



Thank you for  
listening!



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