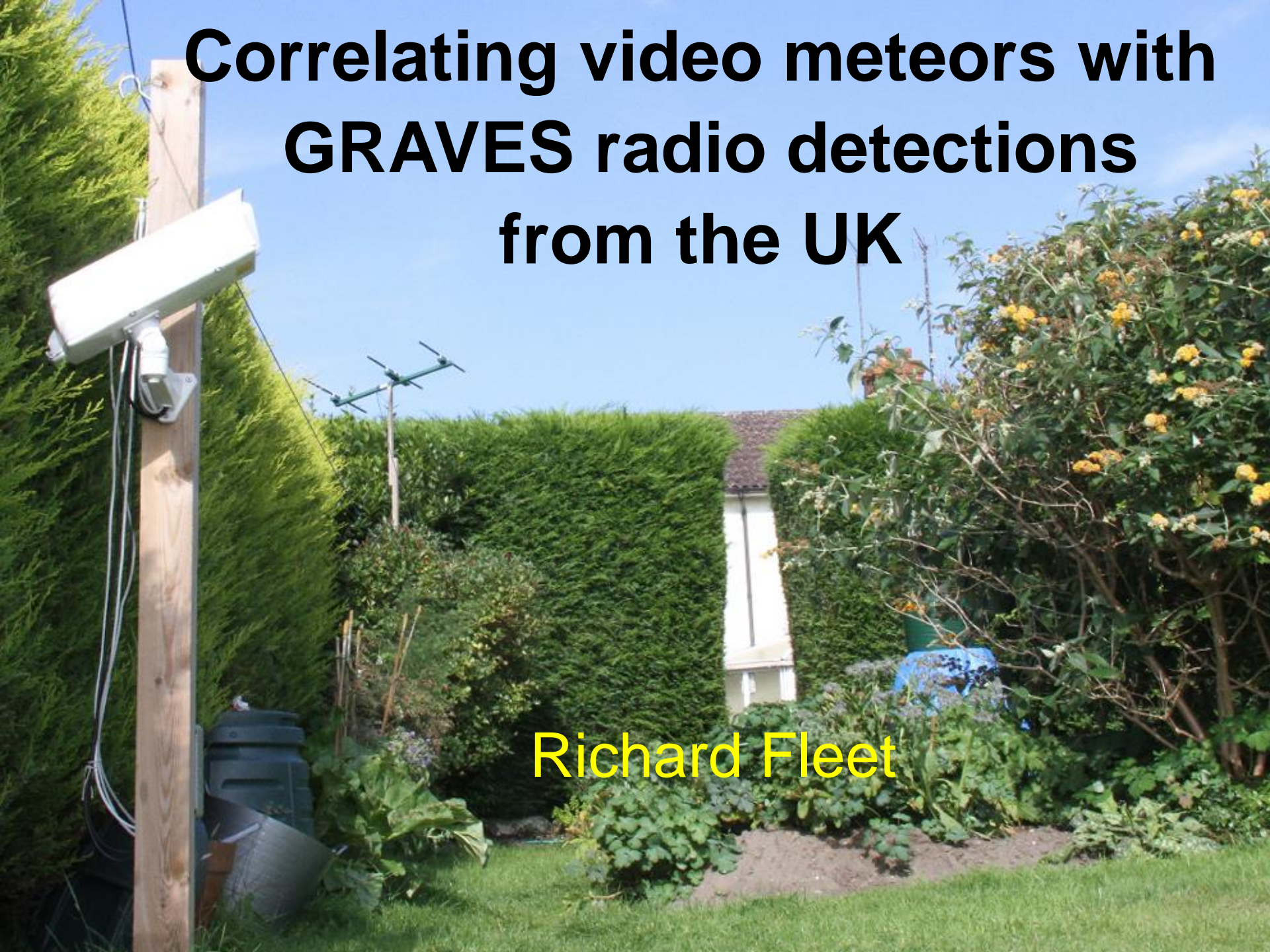
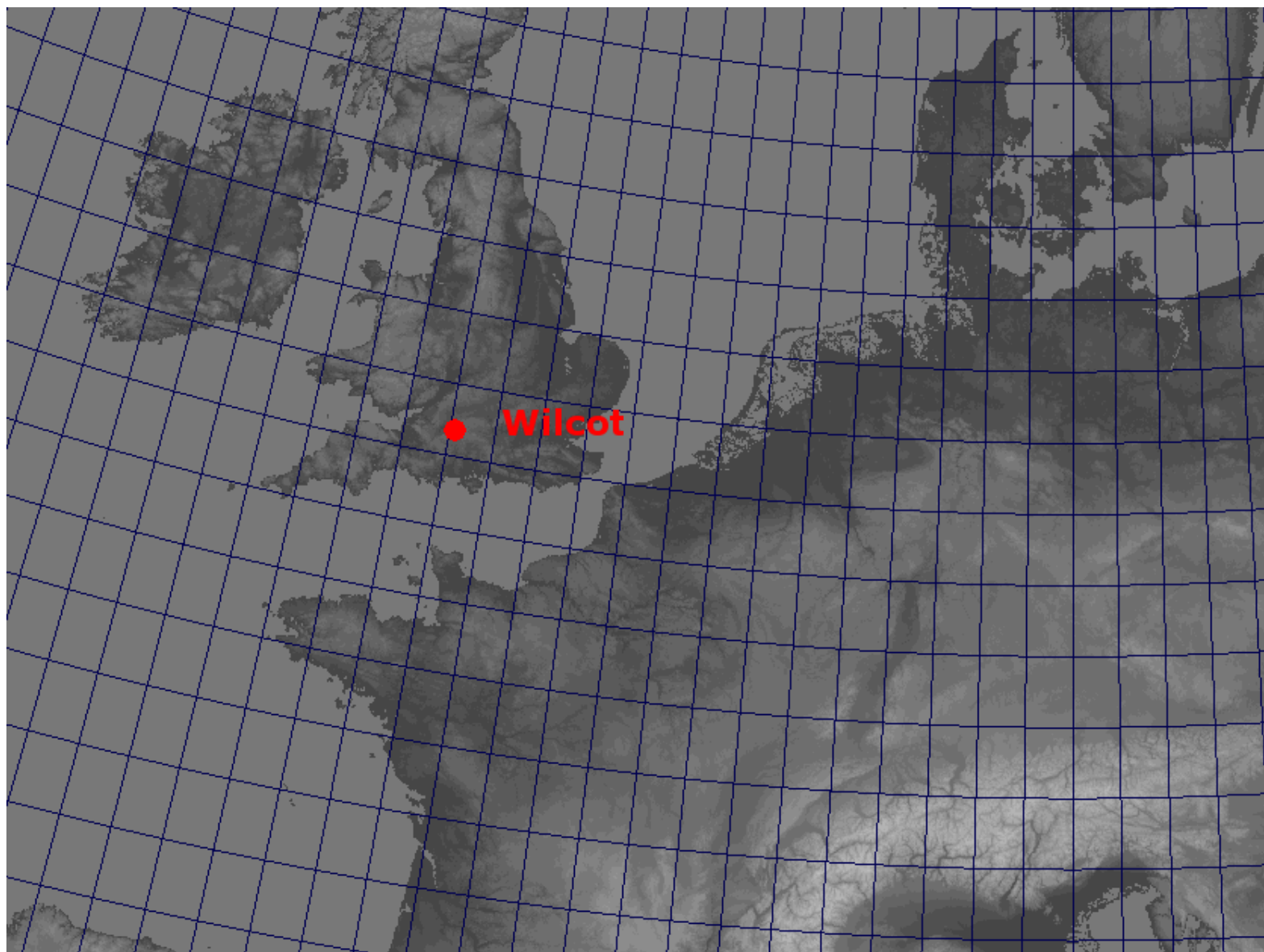


# Correlating video meteors with **GRAVES** radio detections from the UK

Richard Fleet

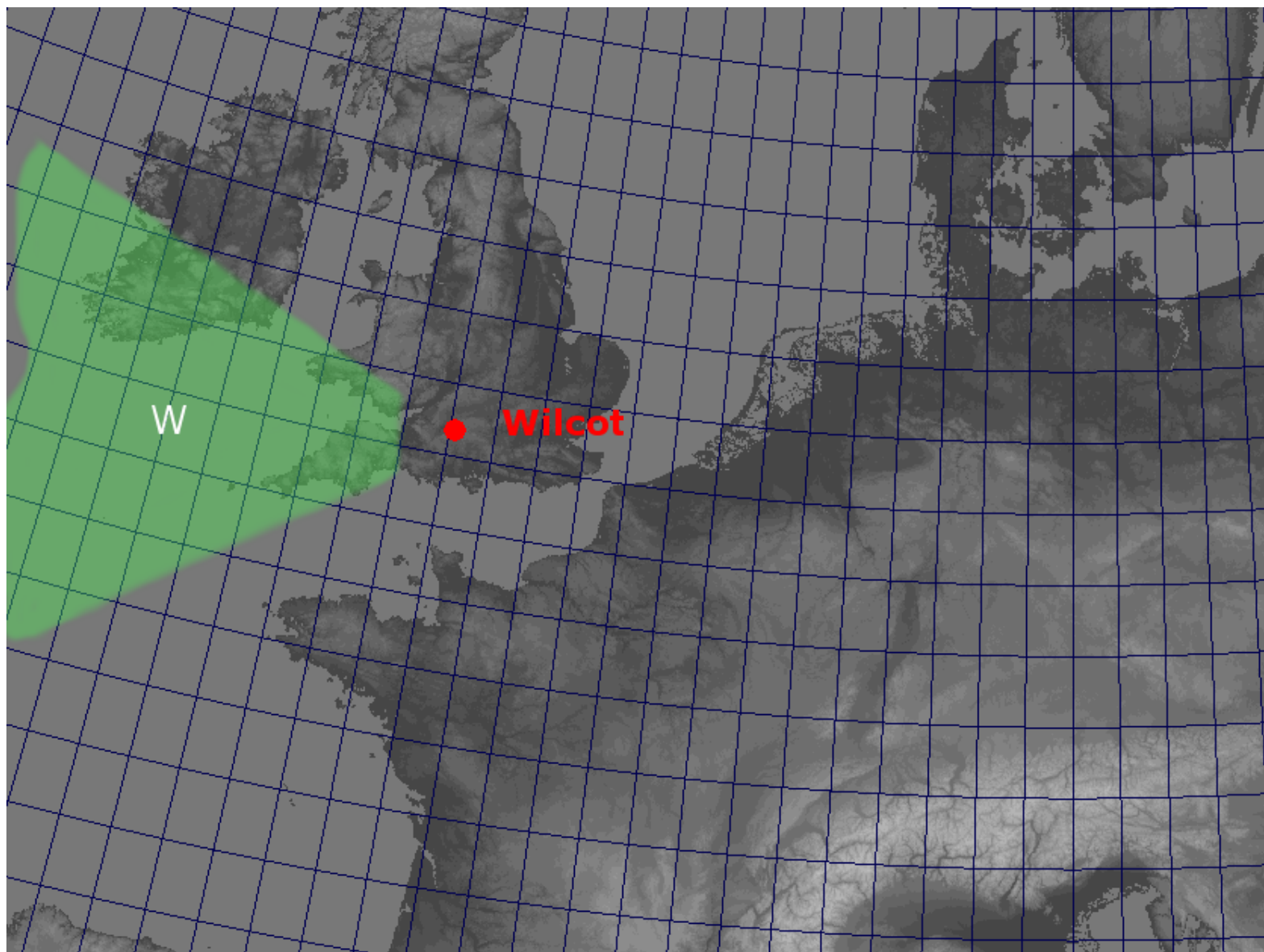


# Wilcot video camera coverage

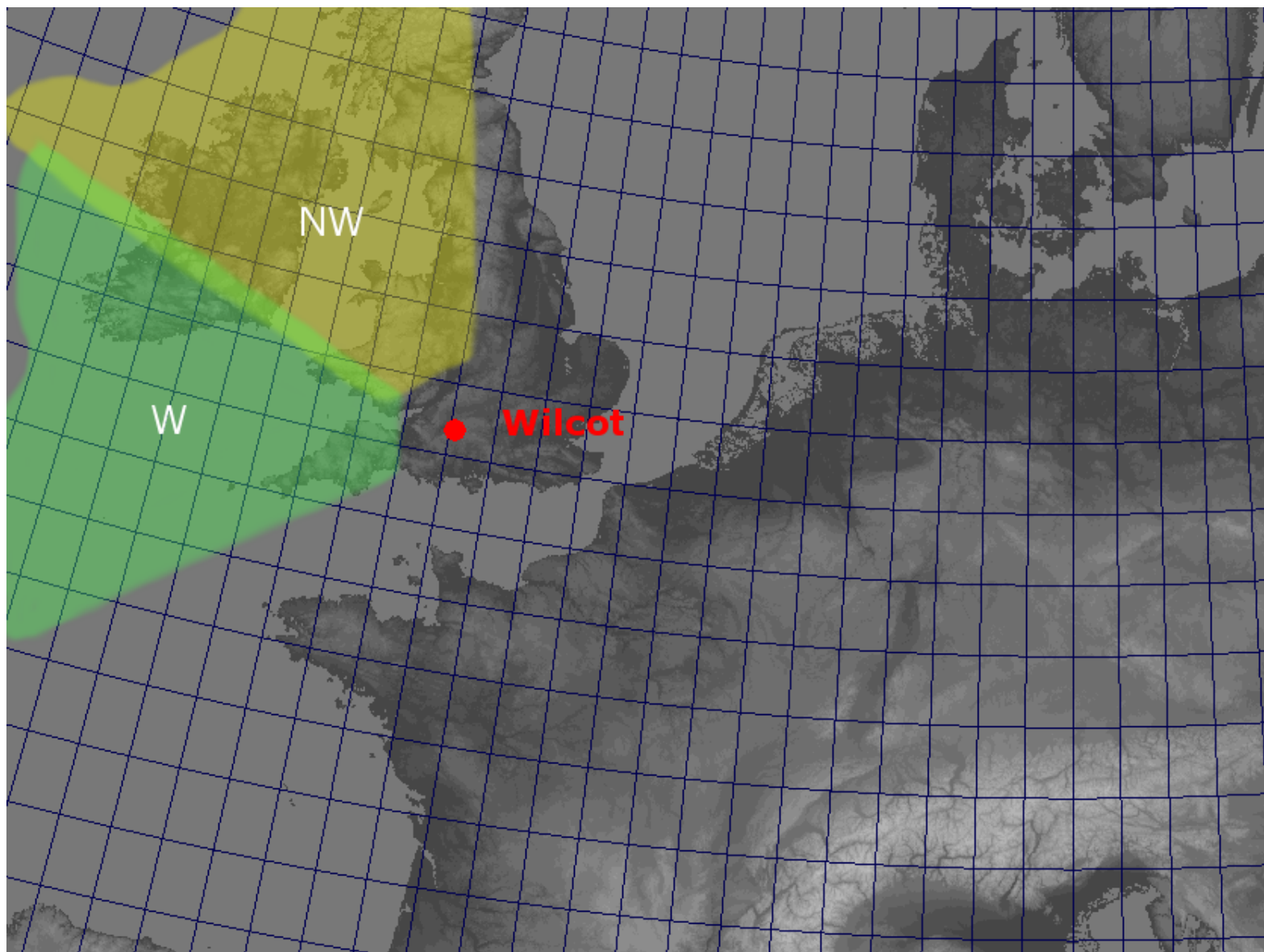




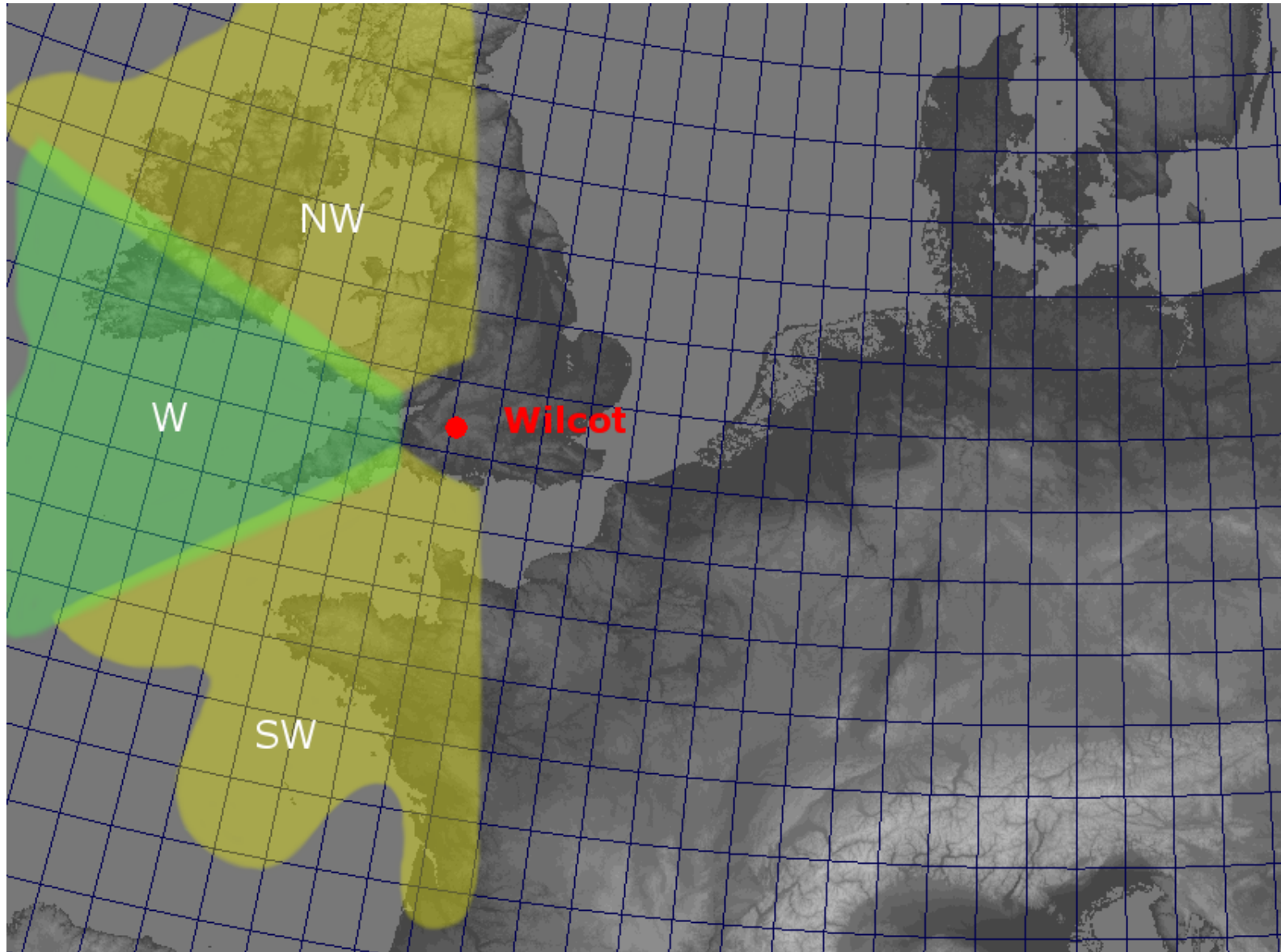
# Wilcot video camera coverage



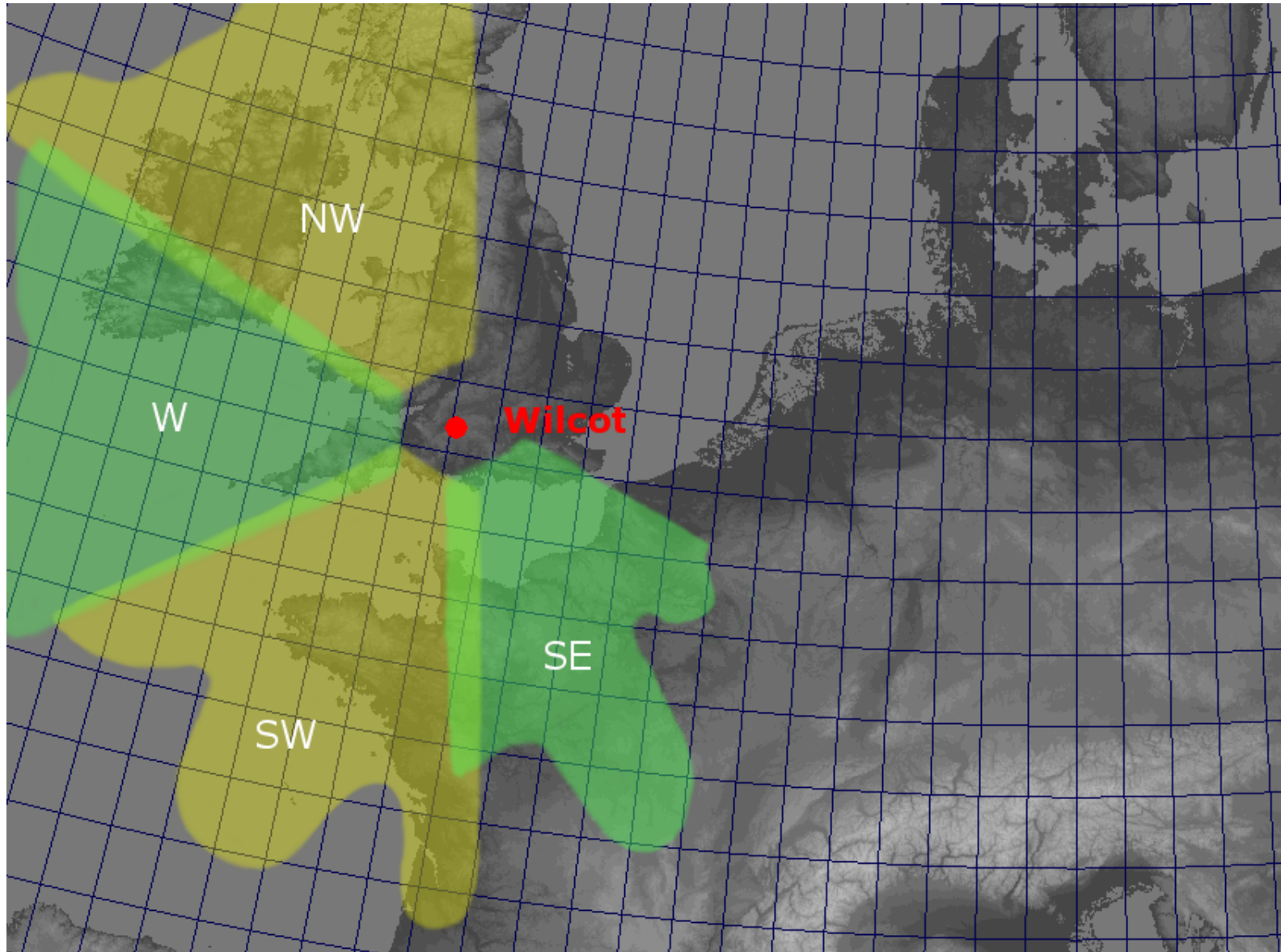
# Wilcot video camera coverage



# Wilcot video camera coverage

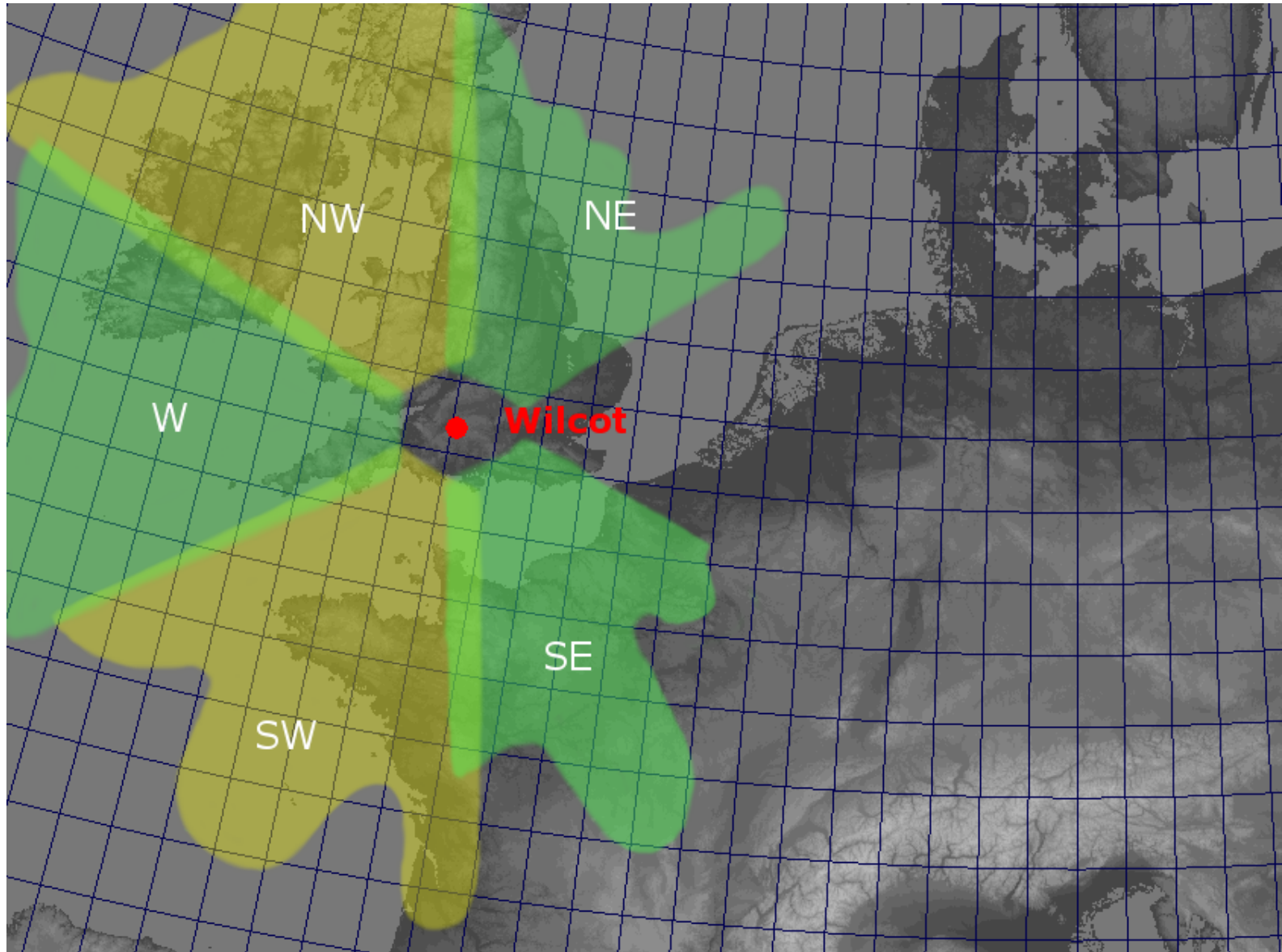


# Wilcot video camera coverage

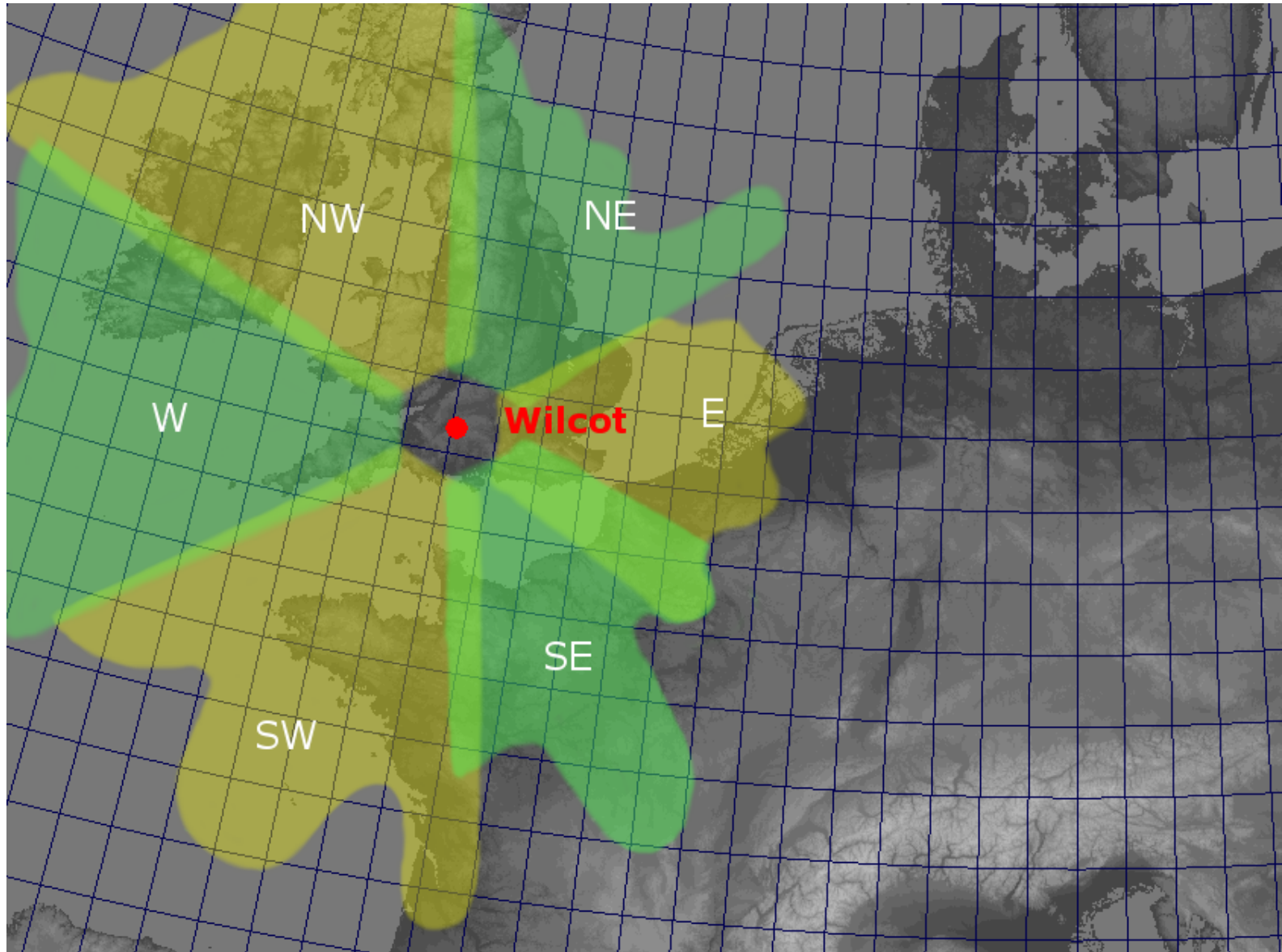




# Wilcot video camera coverage



# Wilcot video camera coverage





## Meteor Radar SDR Receiver (FUNcube Dongle)

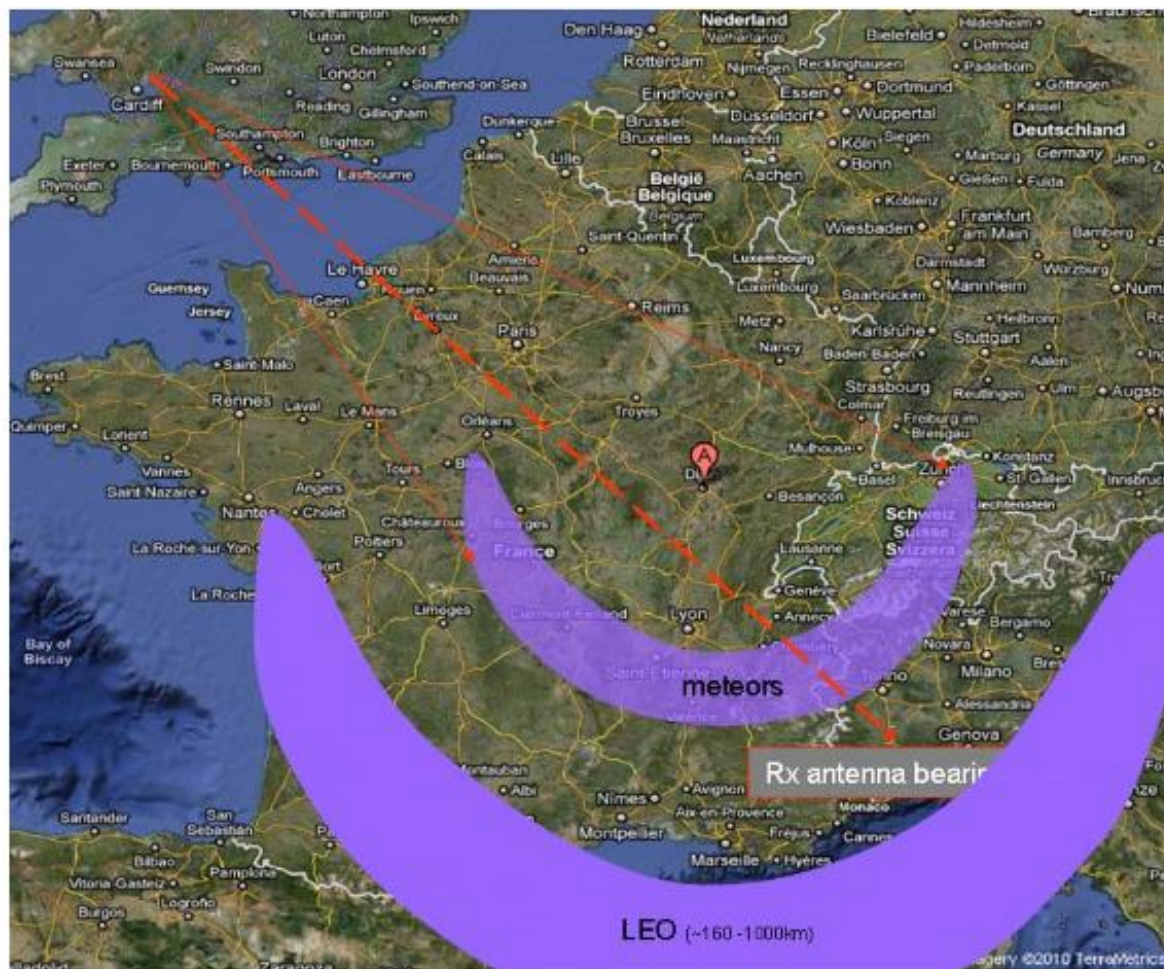
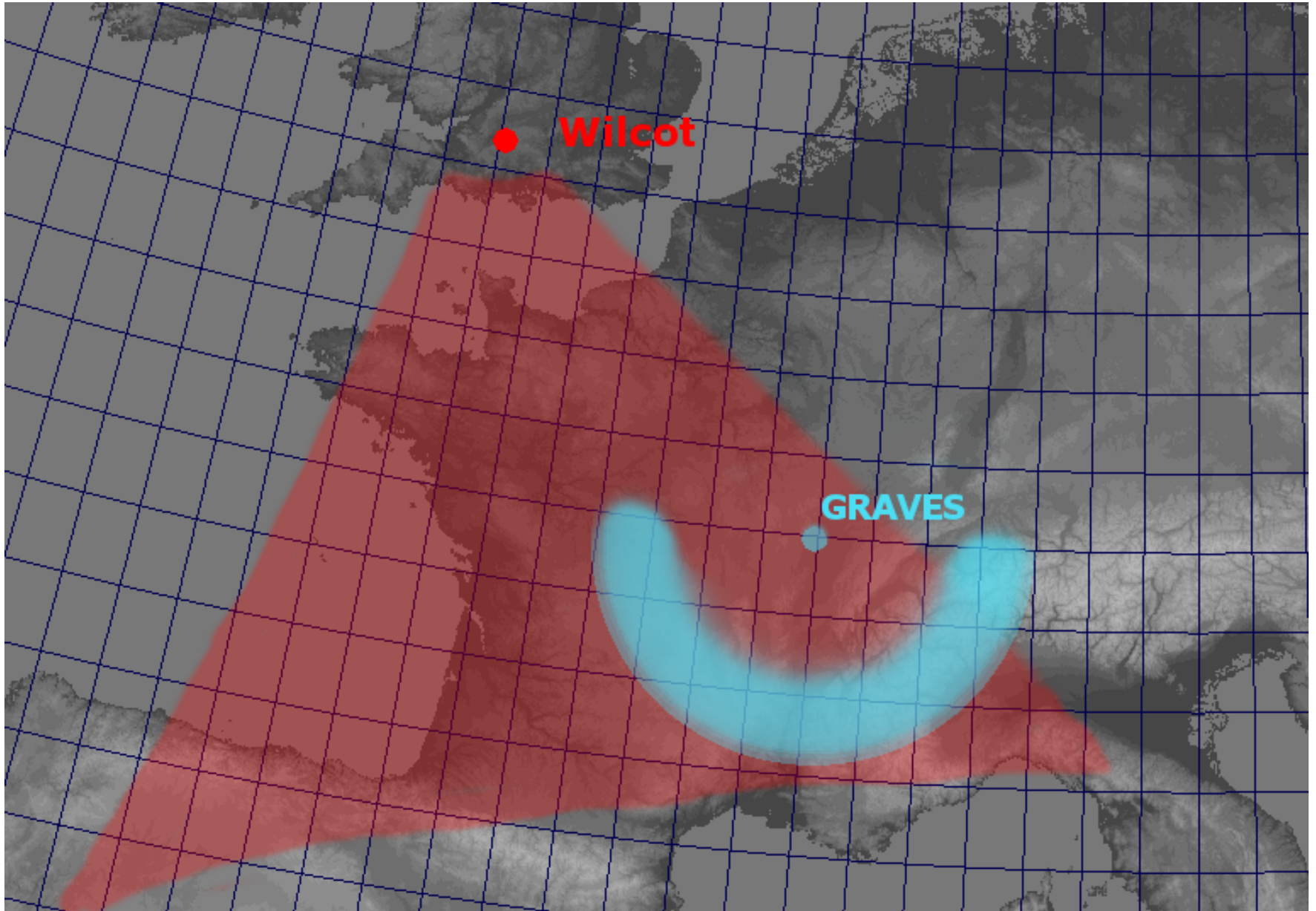


Figure 3.3 Azimuthal Geometry – Graves Radar

# Approximate Wilcot radio coverage

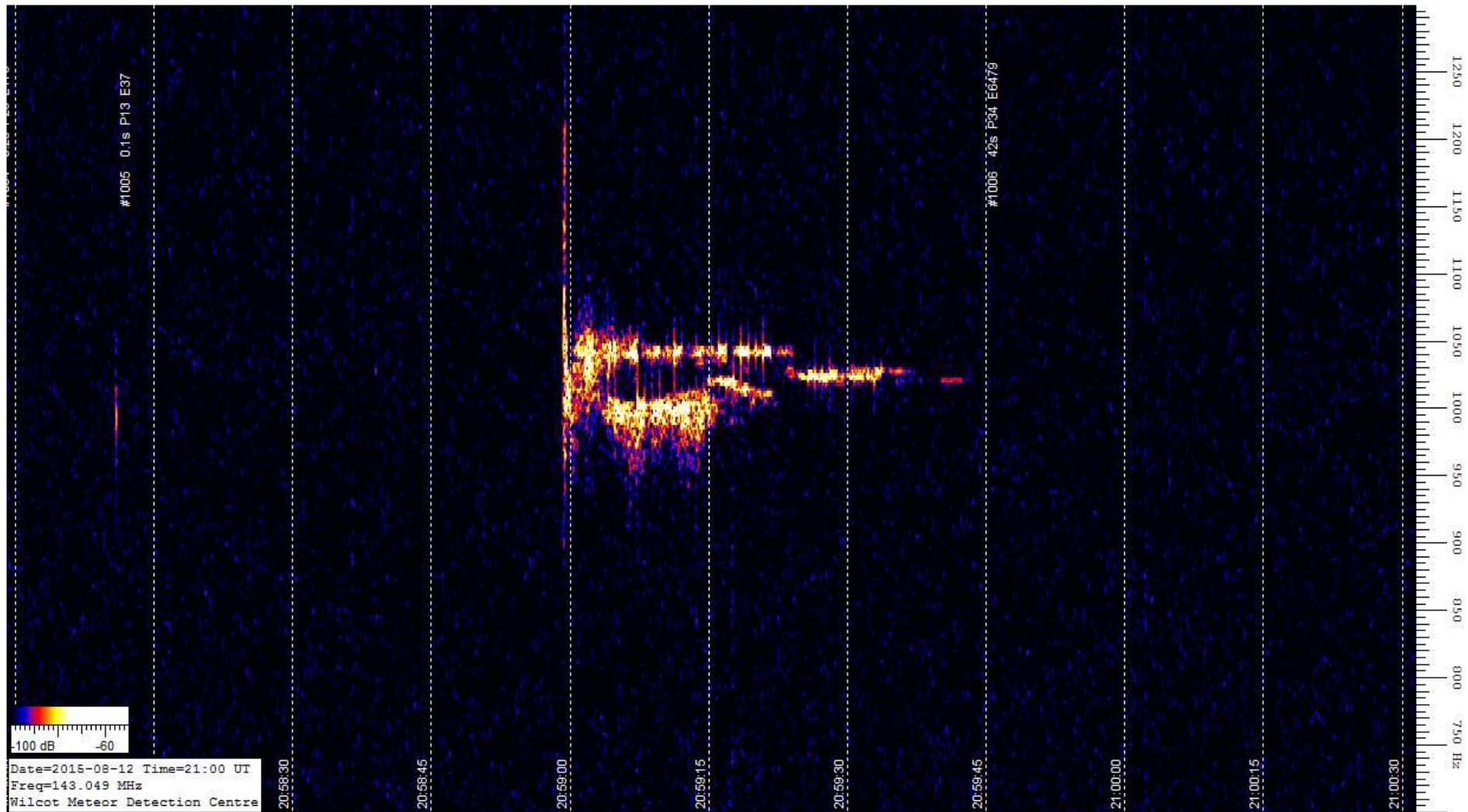


12<sup>th</sup> August 2015 20:58:59 UT - Very bright Perseid

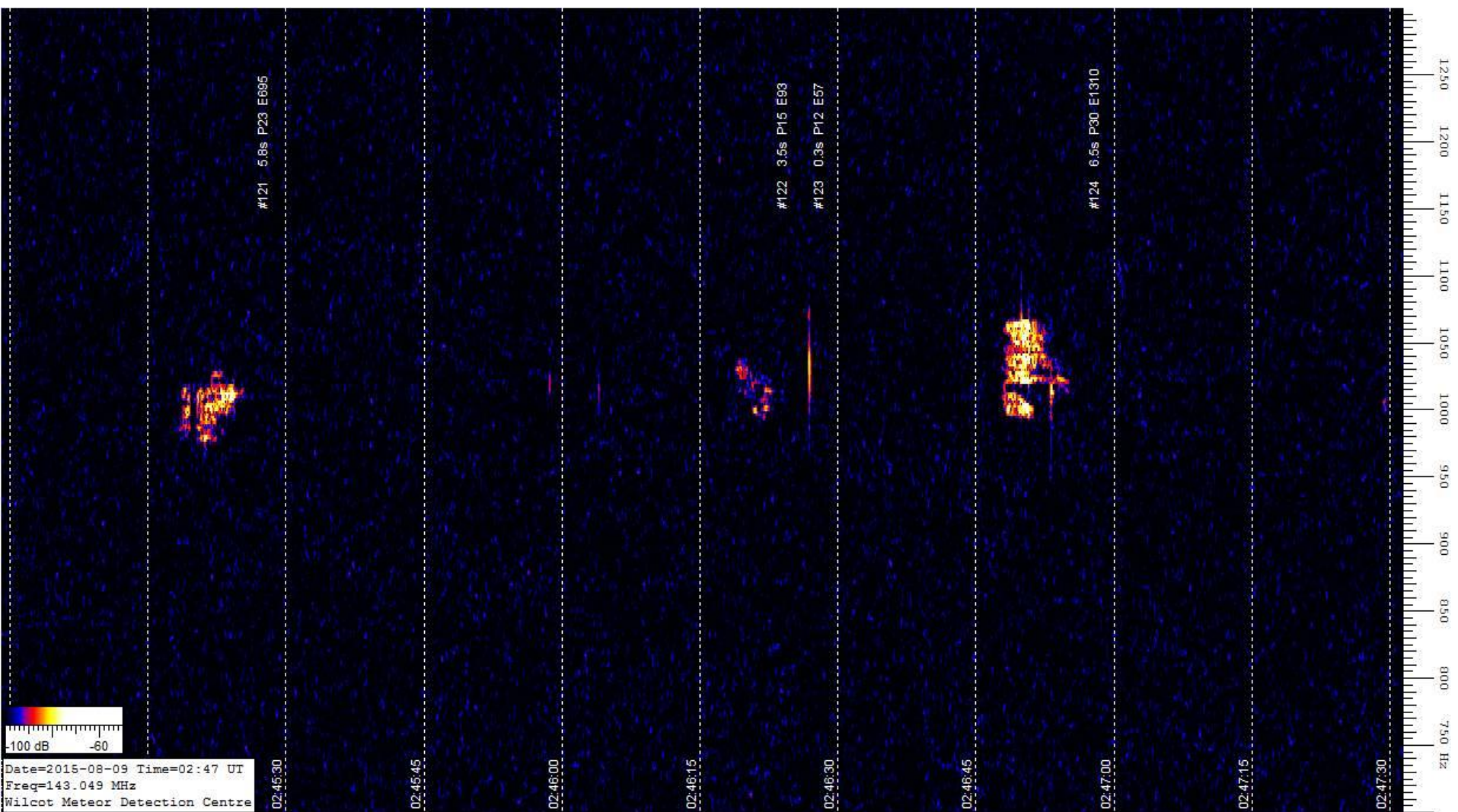




# 12<sup>th</sup> August 2015 20:58:59 UT - Strong radio event



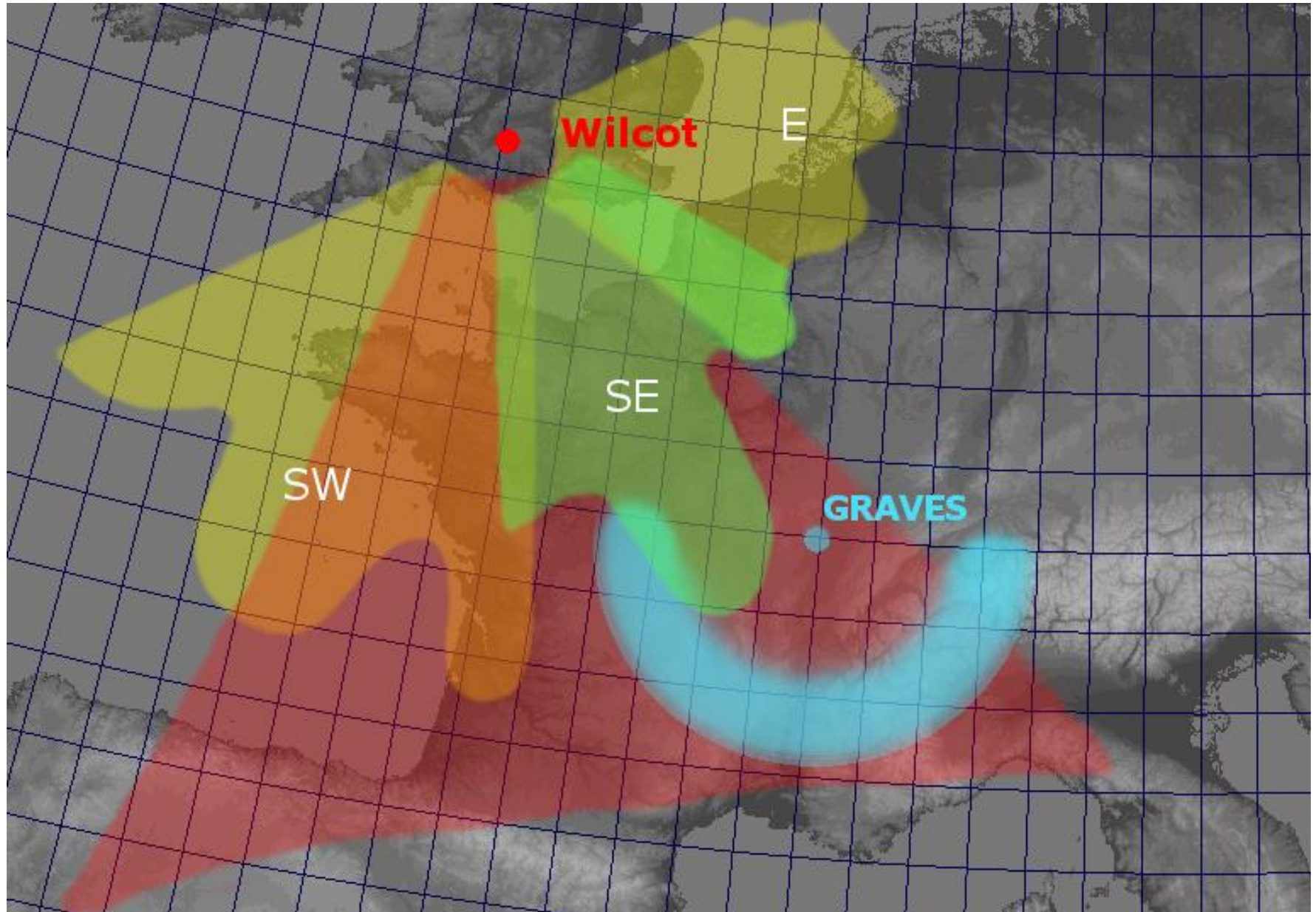
# Spectrum Lab waterfall plot during the Perseids



Plot spans 150 seconds



# Approximate Wilcot radio coverage plus overlapping camera coverage

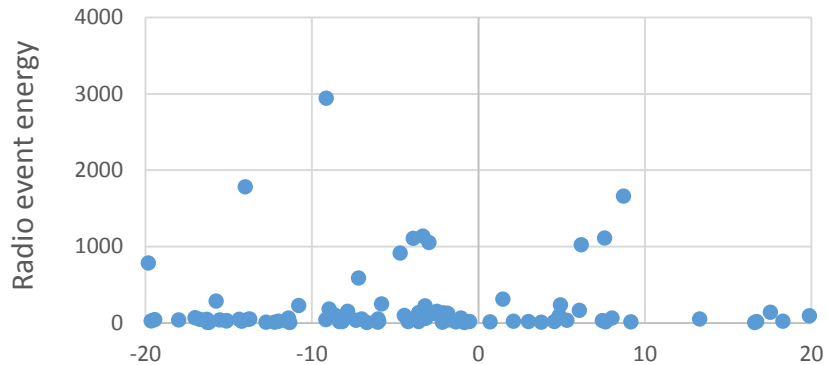




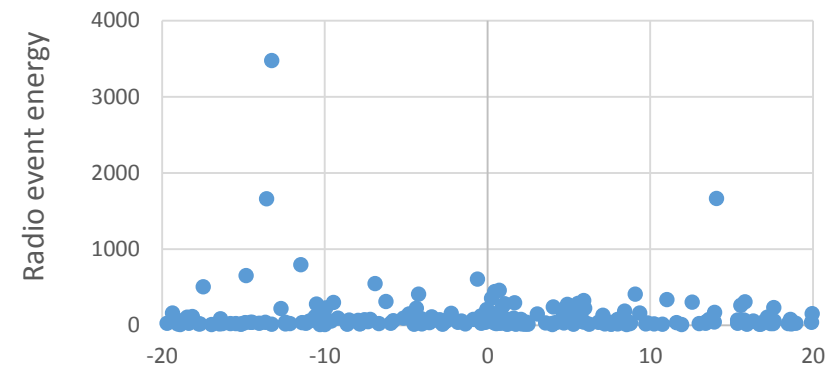
# Analysis

- Logs from Spectrum Lab script
- UFOAnalyzer Mcsv files
- 1<sup>st</sup> July 2015 to 12<sup>th</sup> August 2015
- 21,010 radio events
- 3,076 meteor events
- Each camera processed separately
- Merged and sorted by time in Excel
- Video events compared with nearest radio events
- Selected
  - energy > 500
  - 1 second before up to 5 seconds after video time
  - 52 candidates

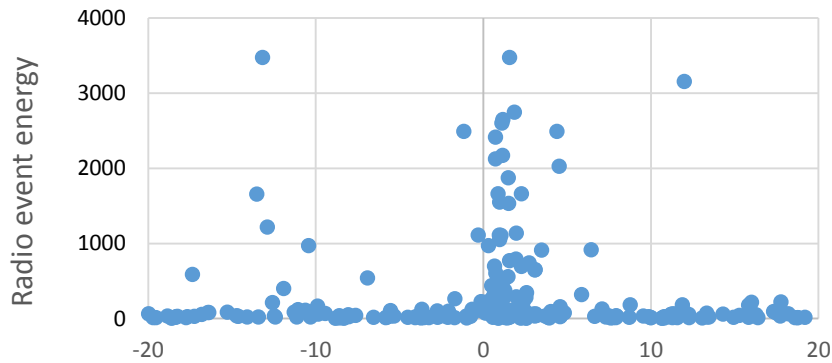
# Comparison of video times with the nearest radio event



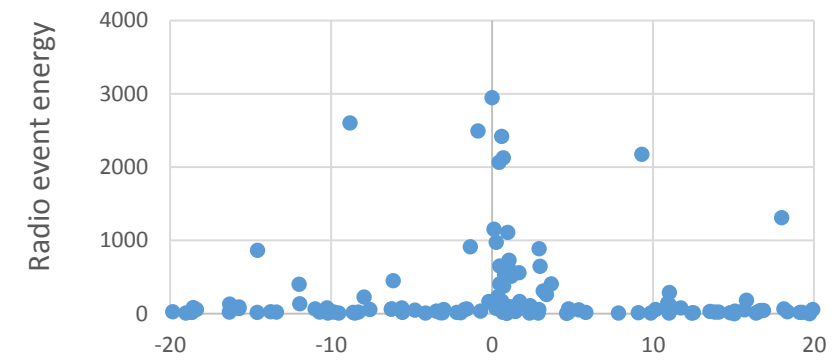
**Camera NE** Seconds from video



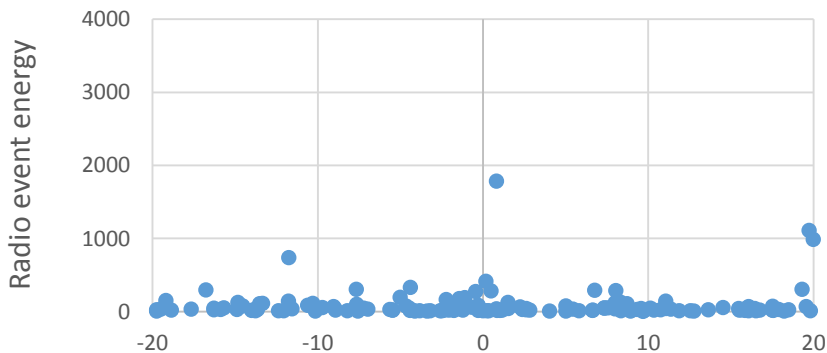
**Camera E** Seconds from video



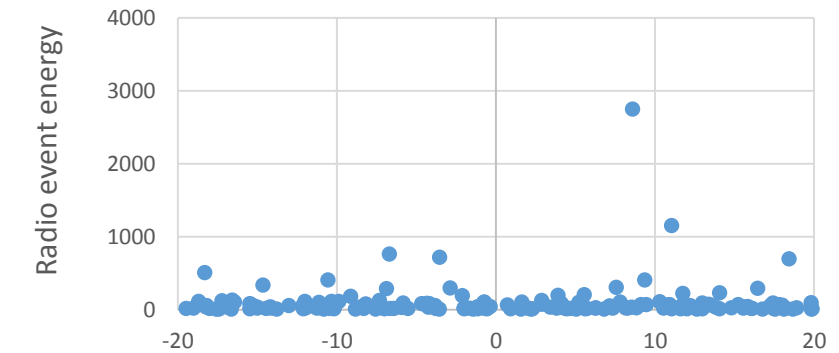
**Camera SE** Seconds from video



**Camera SW** Seconds from video

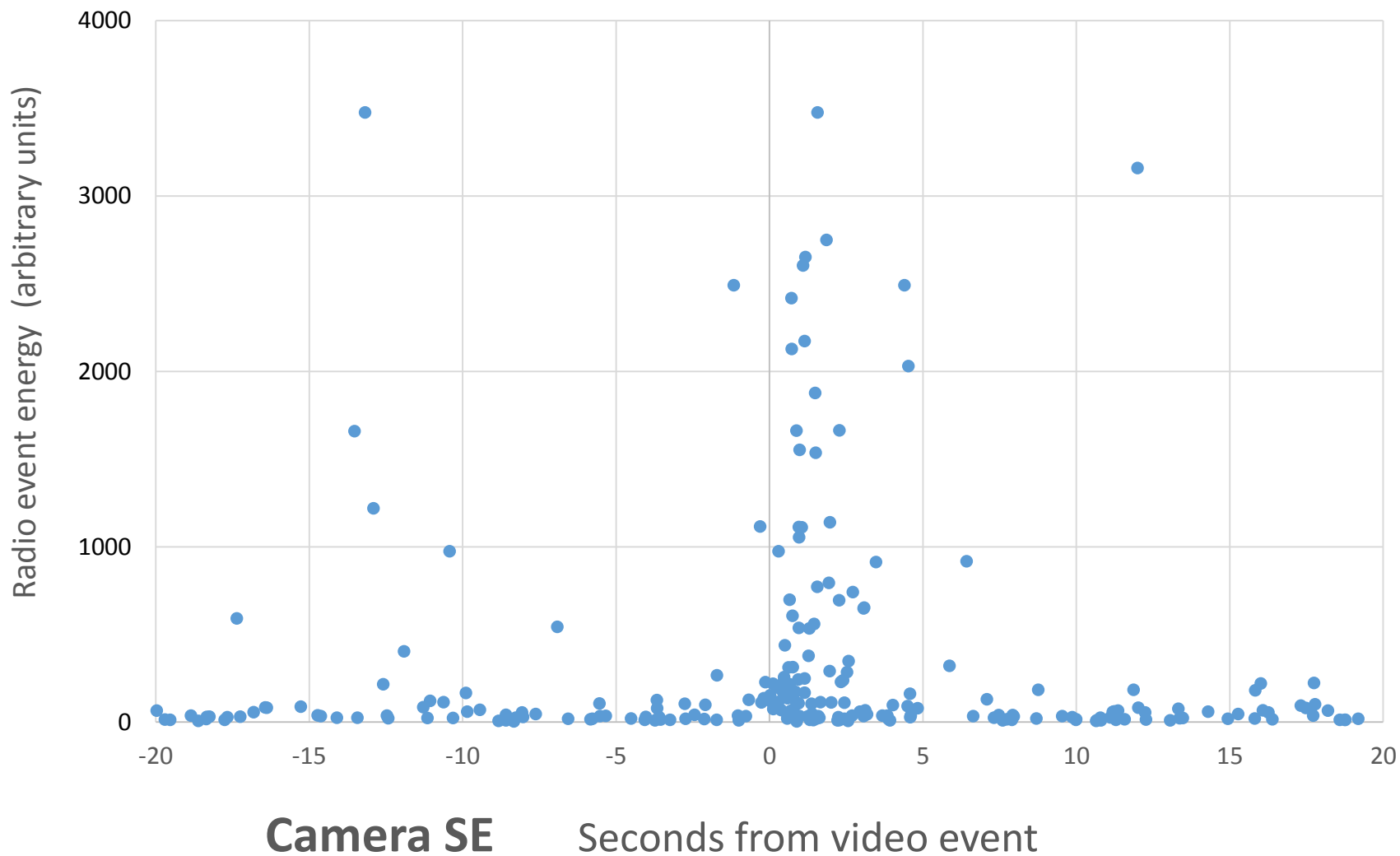


**Camera W** Seconds from video



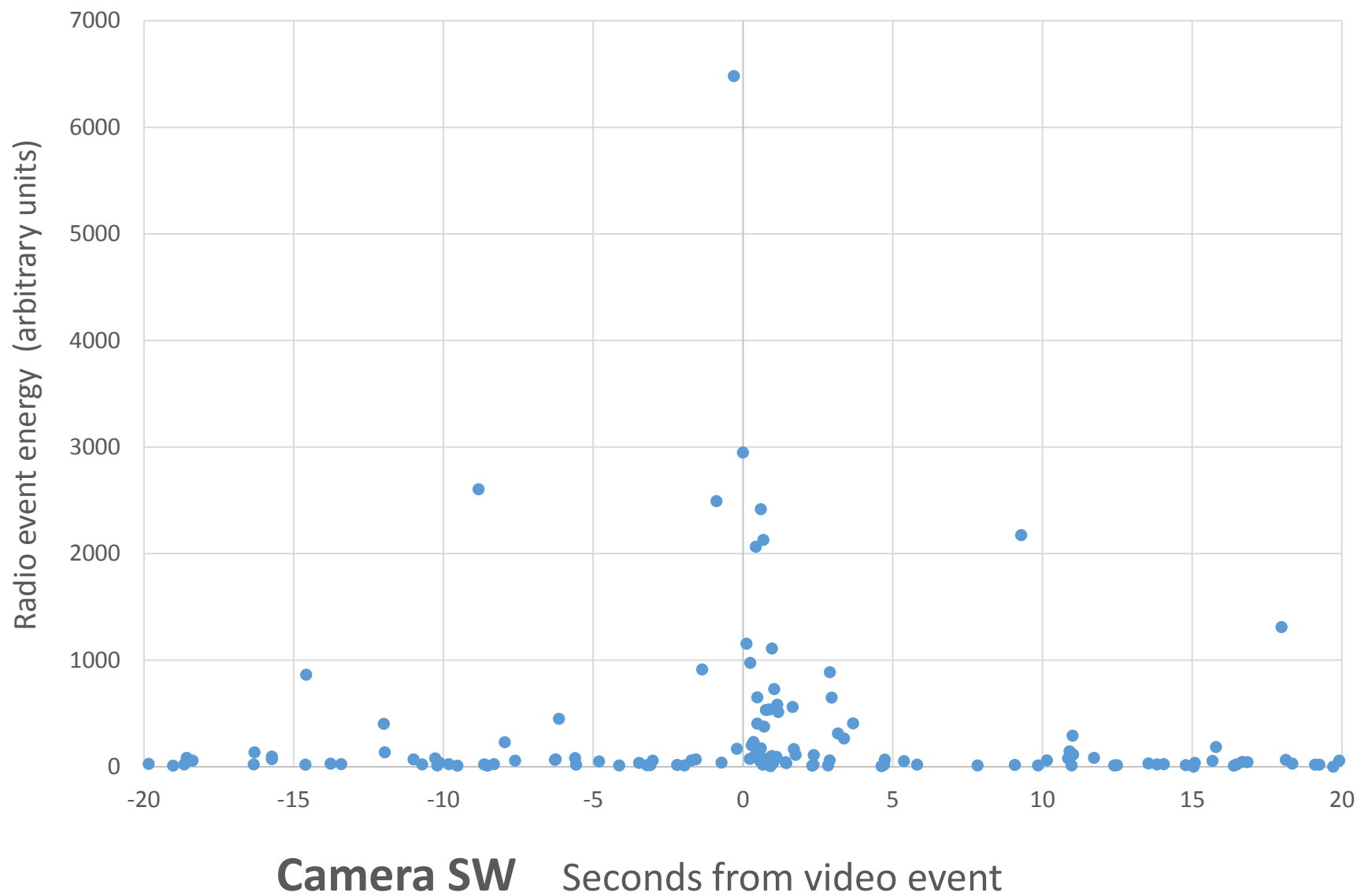
**Camera NW** Seconds from video

# Video and radio time differences





# Video and radio time differences



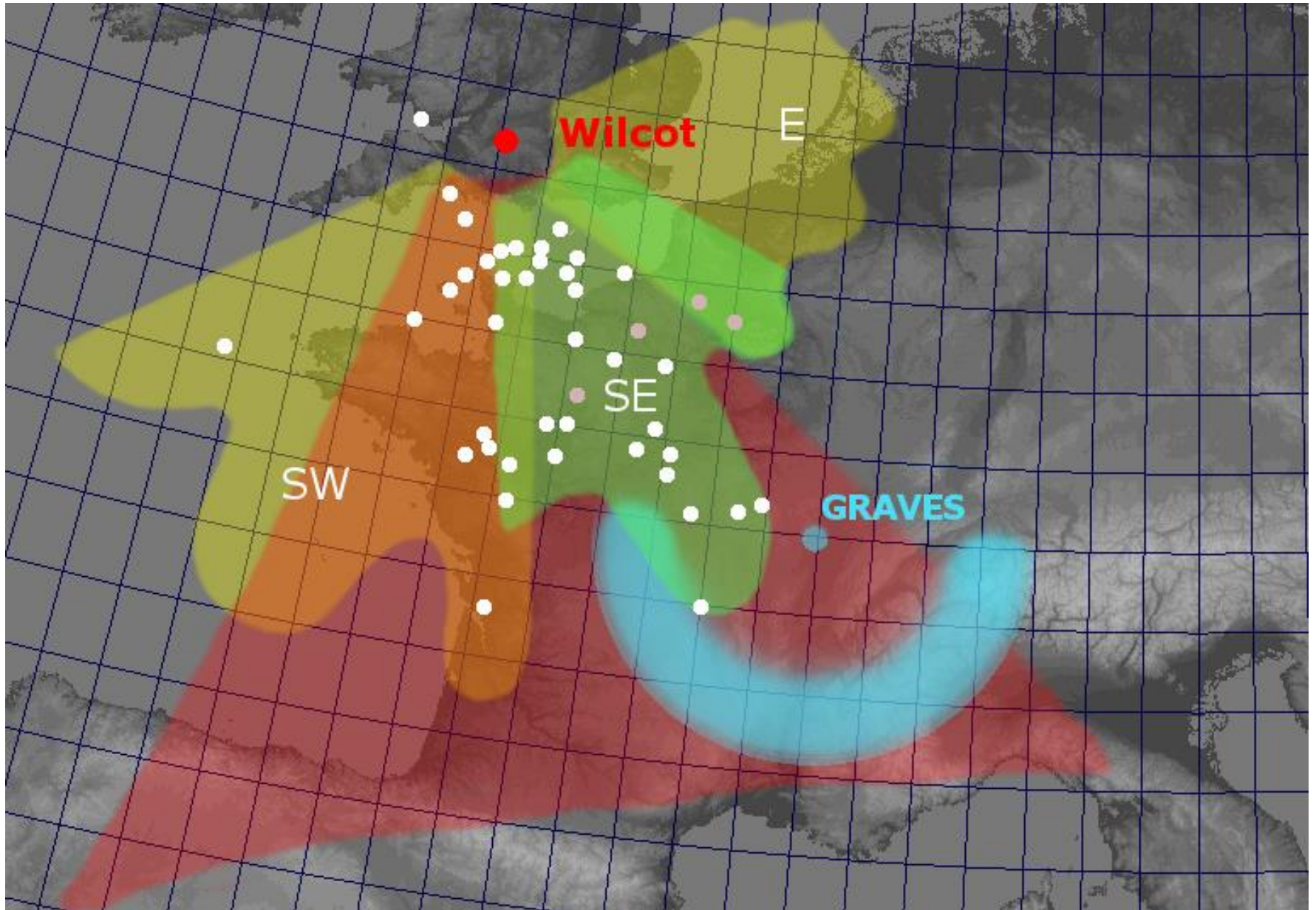
## Composite of candidate events



## Composite of all video meteors



# Locations of match candidates





# Conclusions

- The initial expectation was too pessimistic
- GRAVES radar echoes detected from the UK are not limited to meteors over southern France
- Meteors over the English Channel were detected by radio reflection from GRAVES
- Stations further north in the UK should be able to do the same
- A simple timing comparison using spreadsheets is sufficient to identify the brighter events
- Enough events can be identified to make further investigation worthwhile