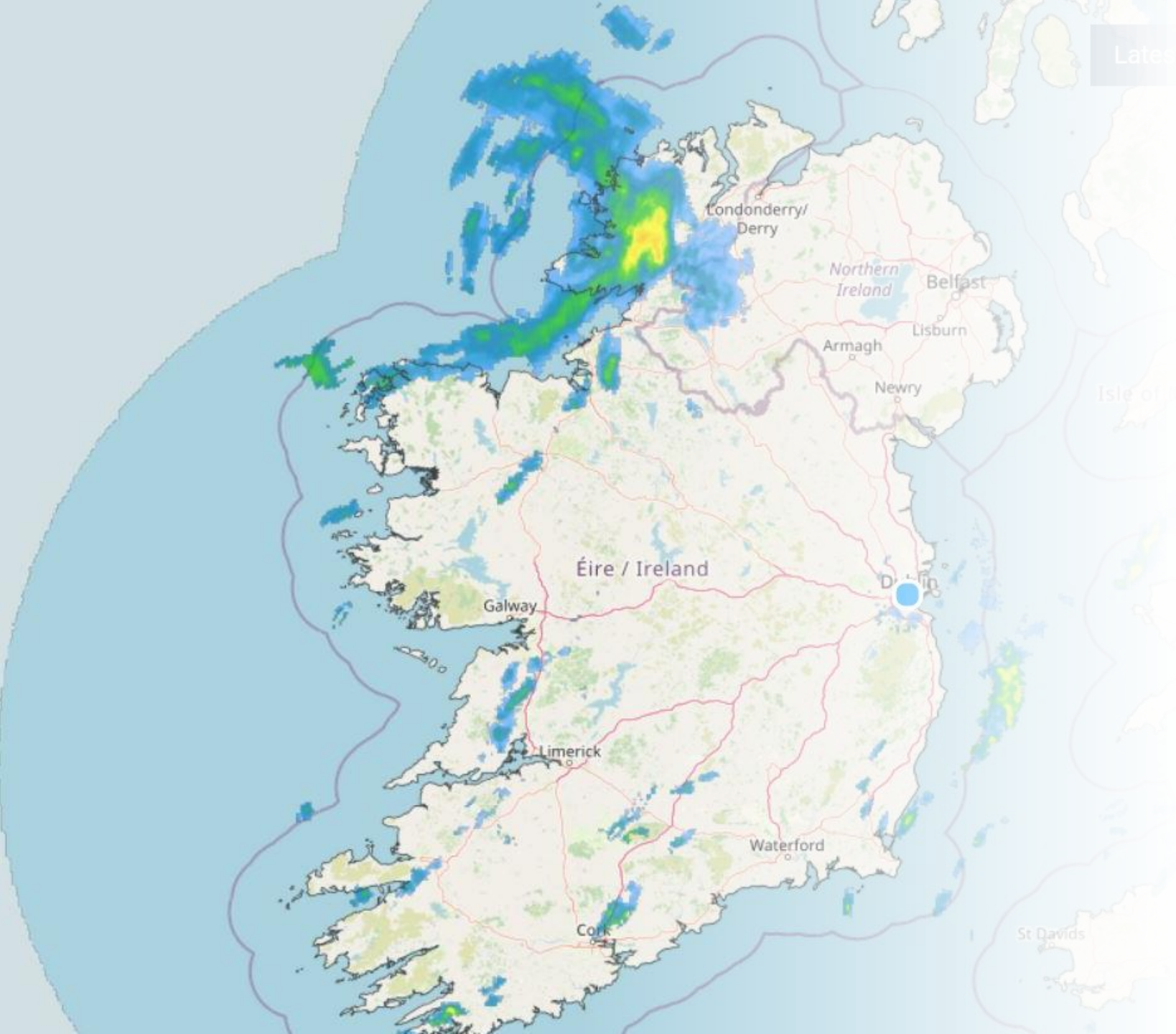


Weather Radar

TII Winter Maintenance Conference

17th October 2023

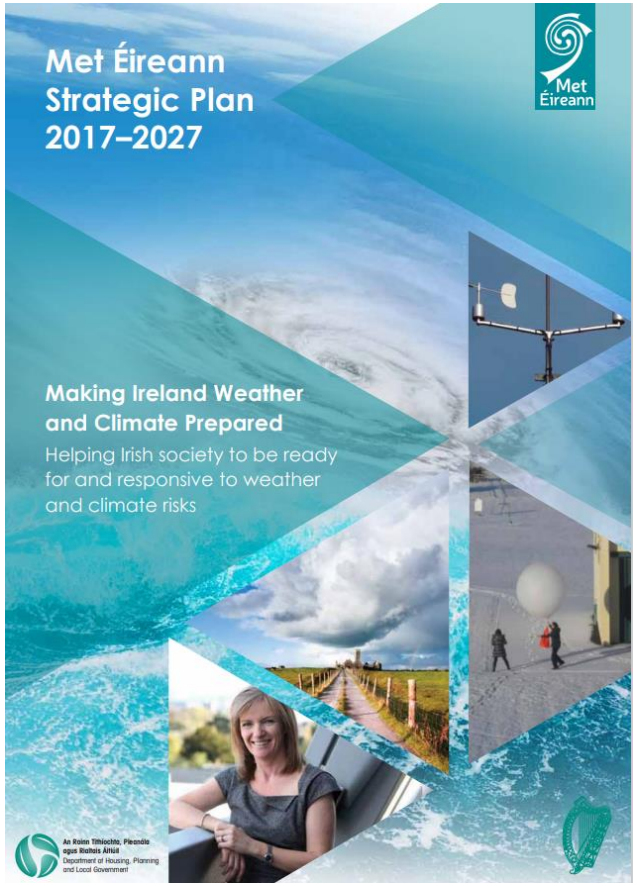
Sinéad Duffy

Radar Meteorologist / Project Manager of Shannon Weather Radar Replacement Project

Observations Division, Met Éireann

sinead.duffy@met.ie

Making Ireland Climate & Weather Prepared



Goals

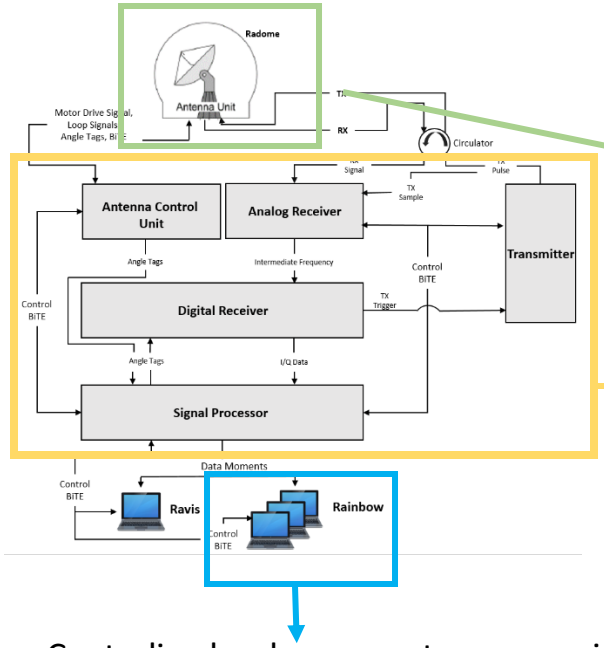
- **Enhance support for impact-based decision making for weather events**
- Provide climate information services which promote the safety of citizens and supports economic and environmental resilience
- Deliver a high quality national flood forecasting service
- Continue to provide an effective authoritative voice on meteorology in Ireland
- Maintain and support an expert, professional workforce
- **Lead a modern, integrated meteorological infrastructure and support an enterprise environment for weather and climate services**

Met Éireann Weather Radar Network

- Two radars: Dublin and Shannon
- C-band (both 5640 MHz)
- MÉ using radar since the early 1960s.
- First radar was manually operated with reports every 3 hours.
- Shannon radar. Upgraded over summer/autumn 2023.
- Dublin radar installed 1991 & upgraded 2010. Replacement in planning stages.
- Strategic plan to triple network to 6 weather radars

How do weather radars work?

- How radars work: https://youtu.be/NZ7rNeQck2A
  (Australian Bureau of Meteorology)



Centralised radar computer processing

Met Éireann Radar team - What we do

1. Maintain weather radar operations [Ongoing]
2. Shannon radar replacement [Completed]
3. Relocation of Dublin radar [Planning stages]
4. Expansion of radar network [Planning stages]
5. Monitor interference to radar [Ongoing]
6. National & international collaboration [Ongoing]
7. Research & development [Planning stages]

Maintenance keeps radars running

- Preventative maintenance on radars every 6 months.

- Radar Calibration
- ‘Getting to know’ the radar
- Part & component replacement
- Troubleshooting errors

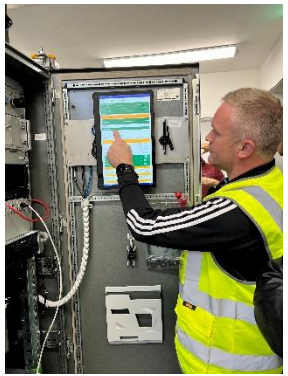
- Upkeep of air conditioning, UPS, etc.

- Corrective maintenance when needed.

Shannon Radar Replacement 1/

Shannon Radar Replacement 3/

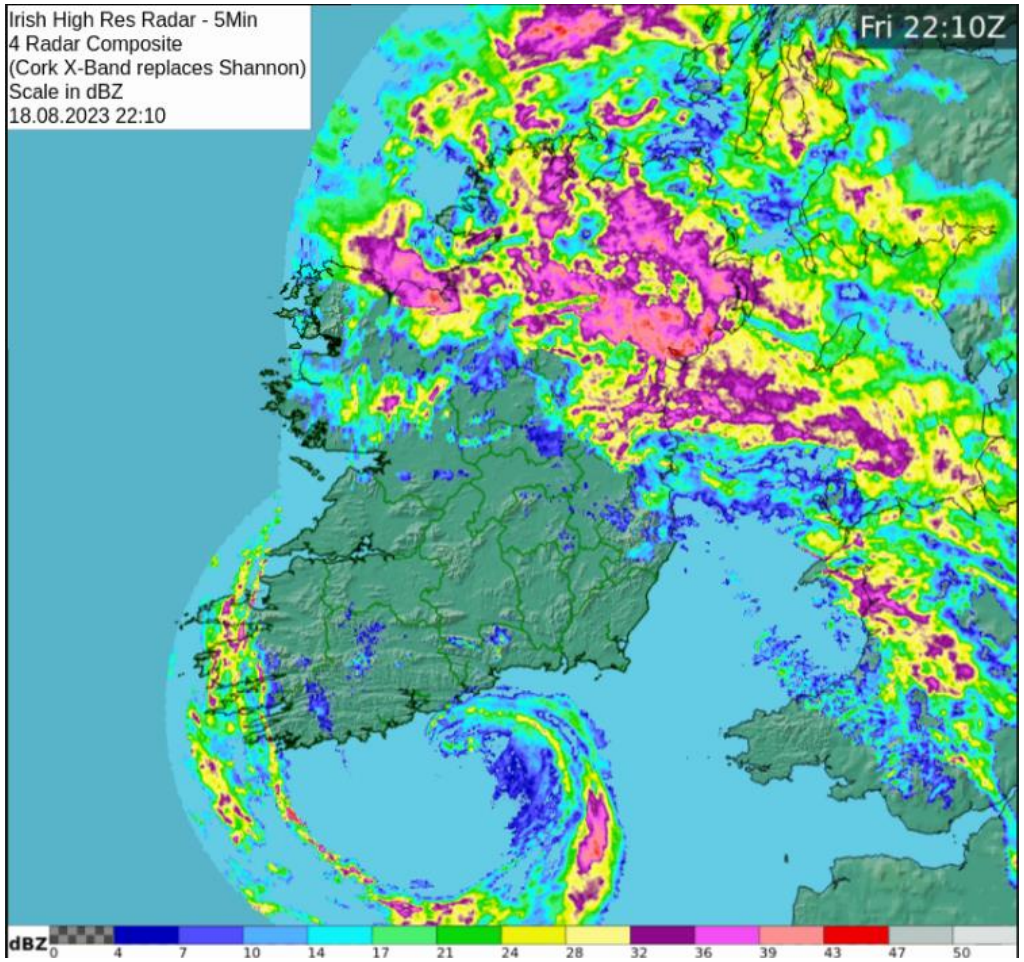
Task	Start	Finish
Crane Lift of Radar Components	Wed 16th Aug	Wed 16th Aug
Mechanical installation of Radar Components	Thurs 17th Aug	Tues 22nd Aug
----------RADAR RUNNING (PRE-OPERATIONAL) ---------- Commissioning of Radar Hardware/Ravis software	Wed 23rd Aug	Tues 29th Aug
Radar Hardware Site Acceptance Test	Wed 30th Aug	Thurs 31st Aug
----------RADAR RUNNING (OPERATIONAL TEST) ---------- Radar Operational Test Part 1	Fri 1st Sept	Sun 10th Sept
----------RADAR SHUTDOWN REQUIRED ---------- Completion of site works (roof, cladding, etc)	Mon 11th Sept	Fri 22nd Sept
----------RADAR RUNNING (OPERATIONAL TEST) ---------- Radar Operational Test Part 2	Sat 23rd Sept	Fri 13th Oct
Radar Software training	Mon 25th Sept	Fri 29th Sept
Radar Hardware training	Mon 9th Oct	Fri 13th Oct
---------- RADAR FULLY OPERATIONAL ---------- - Shannon radar data included on www.met.ie & Met Éireann apps	Fri 13th Oct	2033 & beyond



Reminder: Timelapse

Shannon Radar Replacement 2/

X-band Radar in Cork

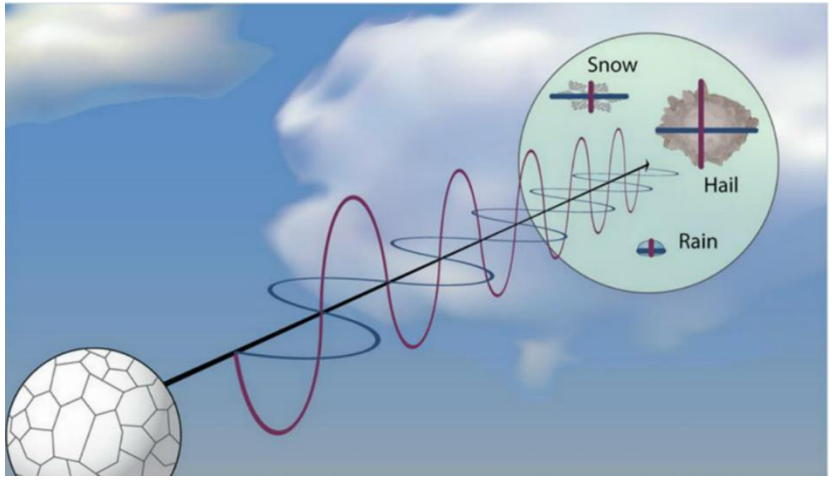


Shannon Radar Replacement 4/

It takes a team ….

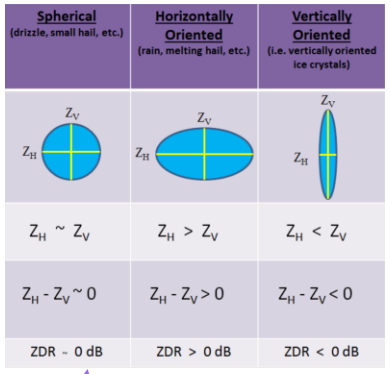
Met Éireann
+ Leonardo Germany GmbH
+ OPW design team
+ Shannon Airport Group
+ M. Fitzgibbon Contractors & a multitude of sub-contractors
+ IAA/Airnav
+ Clare County Council
+ ComReg
+ Norwegian Met Service
+ Irish Water
+ …..

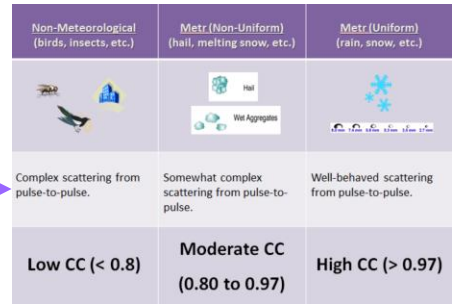
Dual-Polarisation radars



- Improved ability to identify areas of heavy rainfall. Also, better estimation of total precipitation, leading to better flash flood detection.
- Can distinguish different precipitation types.
- Better clutter detection
- Ability to discern between precipitation and non-meteorological echoes such as ground clutter, chaff, anomalous propagation, and birds.

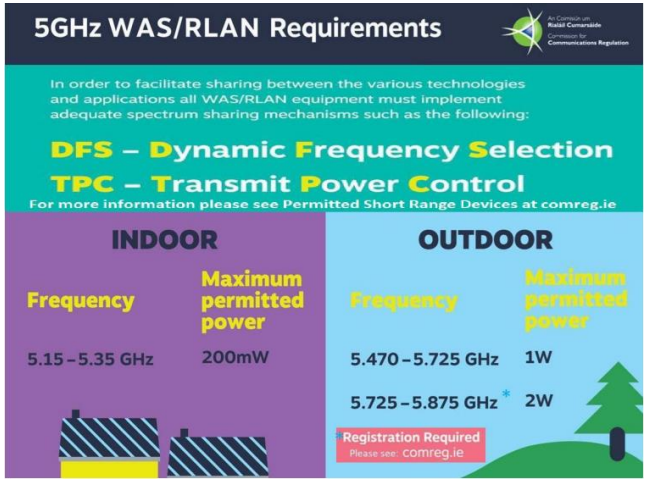
Dual-Polarisation Variables
Differential Reflectivity (ZDR)
Correlation Coefficient (CC)
Specific Differential Reflectivity (KDP)



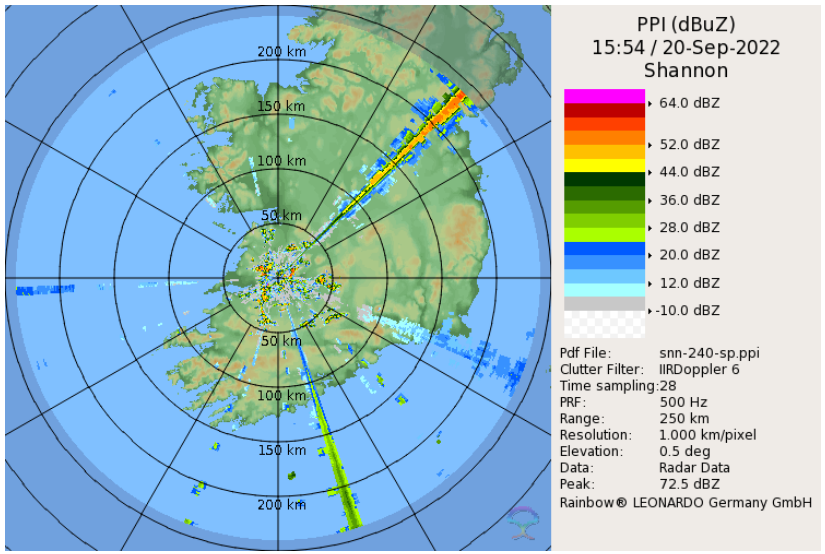


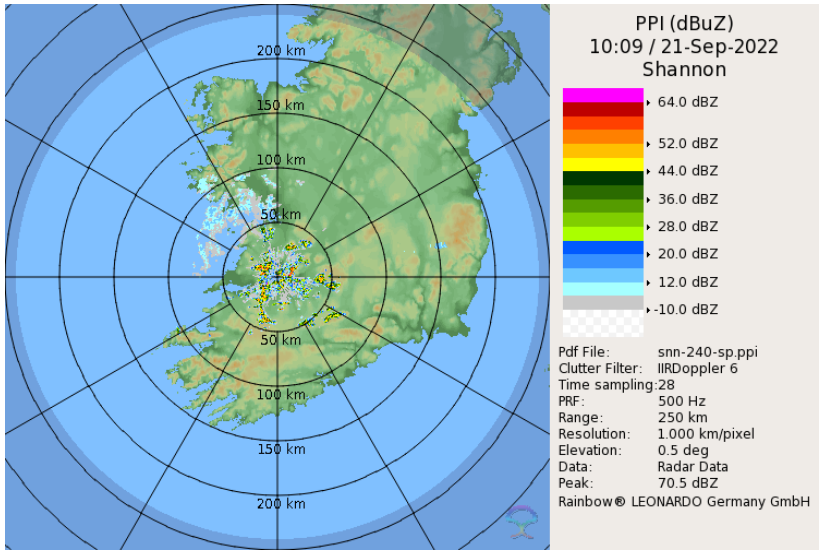
Interference to Weather Radars

- **RLAN**
  - Mainly Wireless ISPs not using DFS and appropriate power thresholds
  - Working with ComReg and Dept of the Environment, Climate & Comms



- **Wind turbines**
  - Blockage & reflection of radar beam causes disruption to precipitation and wind measurements
  - Growing issue with more wind energy developments planned





Expansion of weather radar network

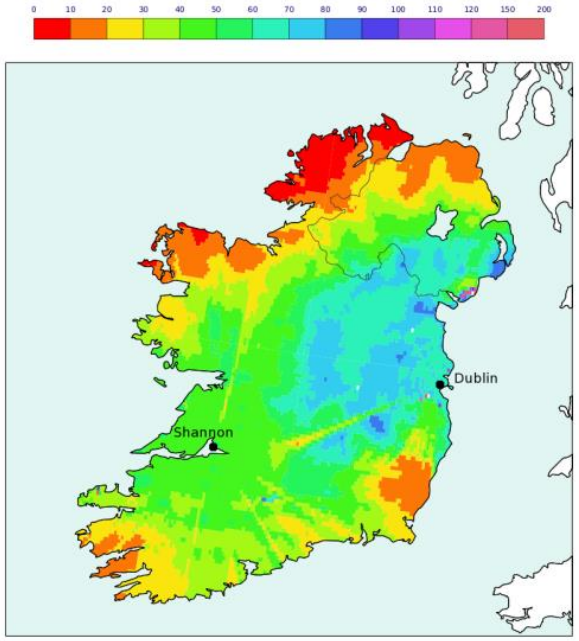


Figure 4.1: Irish radar performance for 2012. The total annual radar-detected rainfall is shown expressed as a percentage of the total annual gauge-observed rainfall.

Noel Fitzpatrick, 'Verification of Met Éireann weather radar', [report], Met Éireann, 62, Technical Note, 2013, Available at: http://edepositireland.ie/handle/2262/70547

- Strategic upgrade and expansion of Irish weather radar network
- Improve rainfall detection, precipitation estimation & NWP
- Next steps:
  - Upgrade Dublin radar
  - Four new radars -> tripling capacity of current network