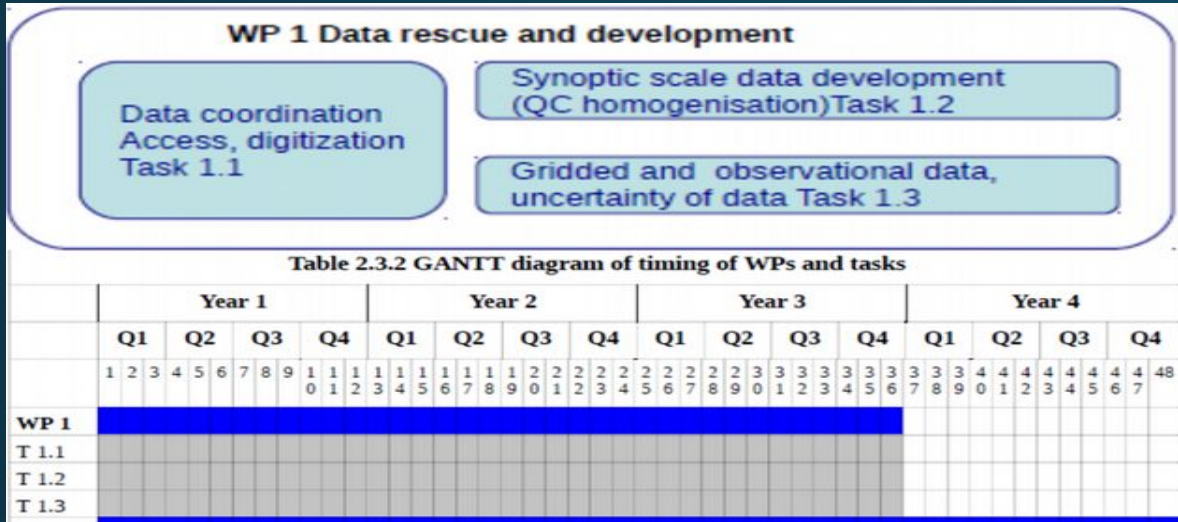


By Manola Brunet, Linden Ashcroft, Joan Coll, Alba Gilabert and many other C3 researchers and digitisers
Centre for Climate Change (C3), University Rovira i Virgili, Tarragona, Catalonia

Summary of WP1 DARE activities and its outcomes

Refreshing you on WP1 tasks and deliverables with the focus on UERRA data rescue (DARE) effort



- T1.1 - Data coordination, inventory and access to national archives [Months: 1-36] – URV (3.7M hourly observations), NMA-RO (~ 300K) D1.1 to D1.4 □ Manola
- T1.2 - High-quality synoptic-scale data development [Months: 1-36] - URV, UEA D1.5 to D1.8 □ Joan Coll
- T1.3 - Gridded and Observational Datasets [Months: 1-36] - KNMI, UEA, EDI D1.9 to D1.14 □ Phil, Richard, Christoph

To be delivered by the end of this year & early 2017:

D1.6 : Homogeneity and homogenisation assessments of station data as they are collected from the NMHSs and from other sources (UEA 10 pm, URV 10 pm) [month 36]

D1.7 : All the quality assessed sub-daily data made available to WP2 and publicly available through WP4. This will include additional datasets of daily and monthly averages and totals as some will likely be of use in this form in Task 1.3 and in WP3 (URV 1 pm, UEA 1 pm) [month 36]

D1.8 : Inclusion of D1.3, D1.4, D1.5, D1.6 data in the ECA&D system and MARS archive (URV 2 pm, UEA 1 pm) [month 36]

| Deliverable Number ⁶¹ | Deliverable Title | WP number ² | Lead beneficiary number | Estimated indicative person-months | Nature ⁶² | Dissemination level ⁶³ | Delivery date ⁶⁴ |
|----------------------------------|---------------------------|------------------------|-------------------------|------------------------------------|----------------------|-----------------------------------|-----------------------------|
| D1.1 | DARE list of sources | WP1 | 7 | 4.00 | Report | PU | 6 |
| D1.2 | DARE station locations | WP1 | 7 | 2.00 | Report | PU | 10 |
| D1.3 | DARE gaps post 1950 | WP1 | 7 | 15.00 | Report | PU | 18 |
| D1.4 | DARE gaps pre 1950 | WP1 | 7 | 12.00 | Report | PU | 24 |
| D1.5 | DARE Quality control | WP1 | 7 | 11.00 | Other | PU | 30 |
| D1.6 | DARE homogenisation | WP1 | 5 | 20.00 | Other | PU | 36 |
| D1.7 | DARE QC data use in UERRA | WP1 | 7 | 2.00 | Other | PU | 36 |
| D1.8 | DARE data archives | WP1 | 7 | 3.00 | Other | PU | 36 |

Already delivered:

D1.1 : A comprehensive list of possible additional sources that can be accessed for digitisation and encoding (URV 4 pm) [month 6]

D1.2 : Report on the locations of the station data: digitised and to be digitised (URV 2 pm) [month 10]

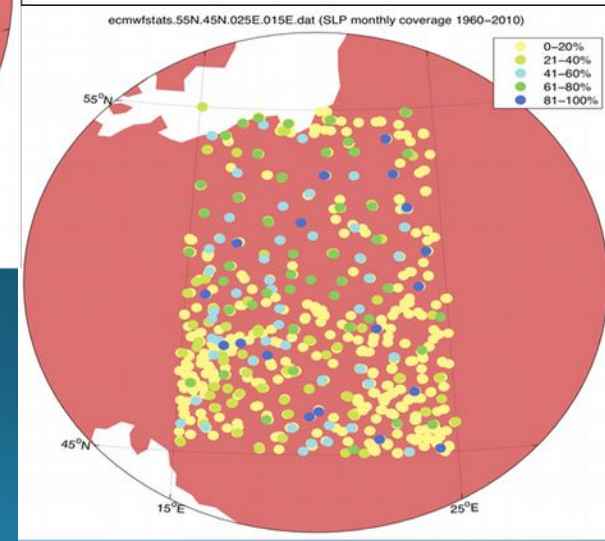
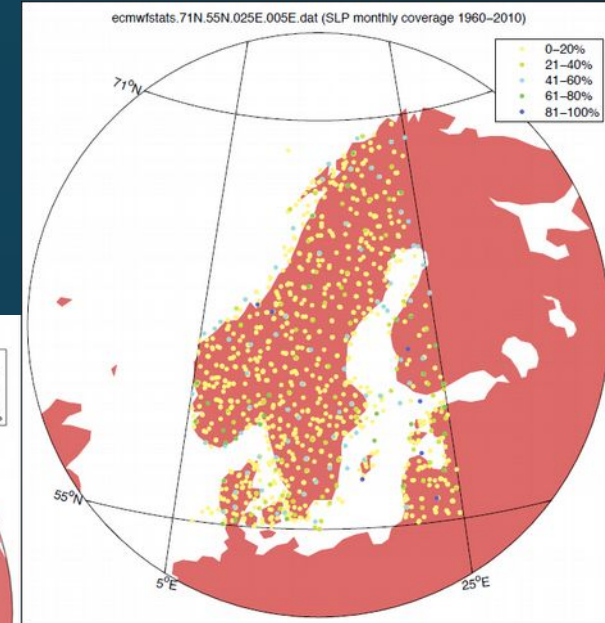
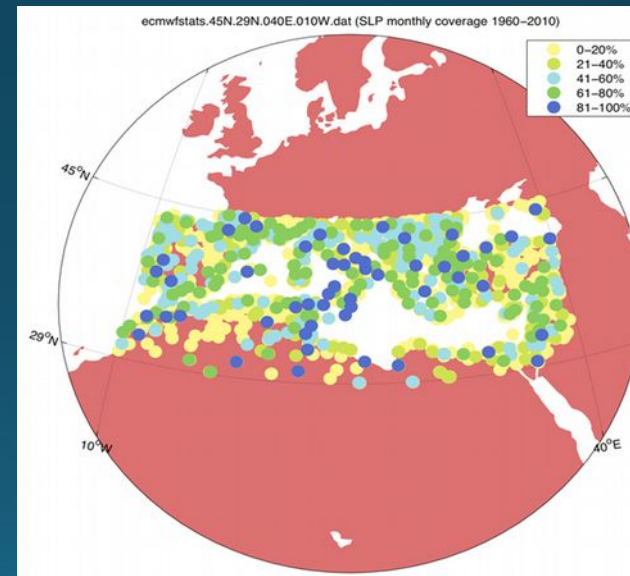
D1.3 : Infilling in temporal and spatial gaps for the post-1950 period in Europe and its borders. Data subset (URV 14 pm, NMA-RO 1 pm) [month 18]

D1.4 : Infilling in European temporal and spatial gaps for the pre-1950 period. Data subset (URV 11 pm, NMARO 1 pm) [month 24]

D1.5 : Quality controlled time-series of synoptic observations for the post- and pre-1950 periods in Europe and its borders (URV 10 pm, NMA-RO 1 pm) [month 30]

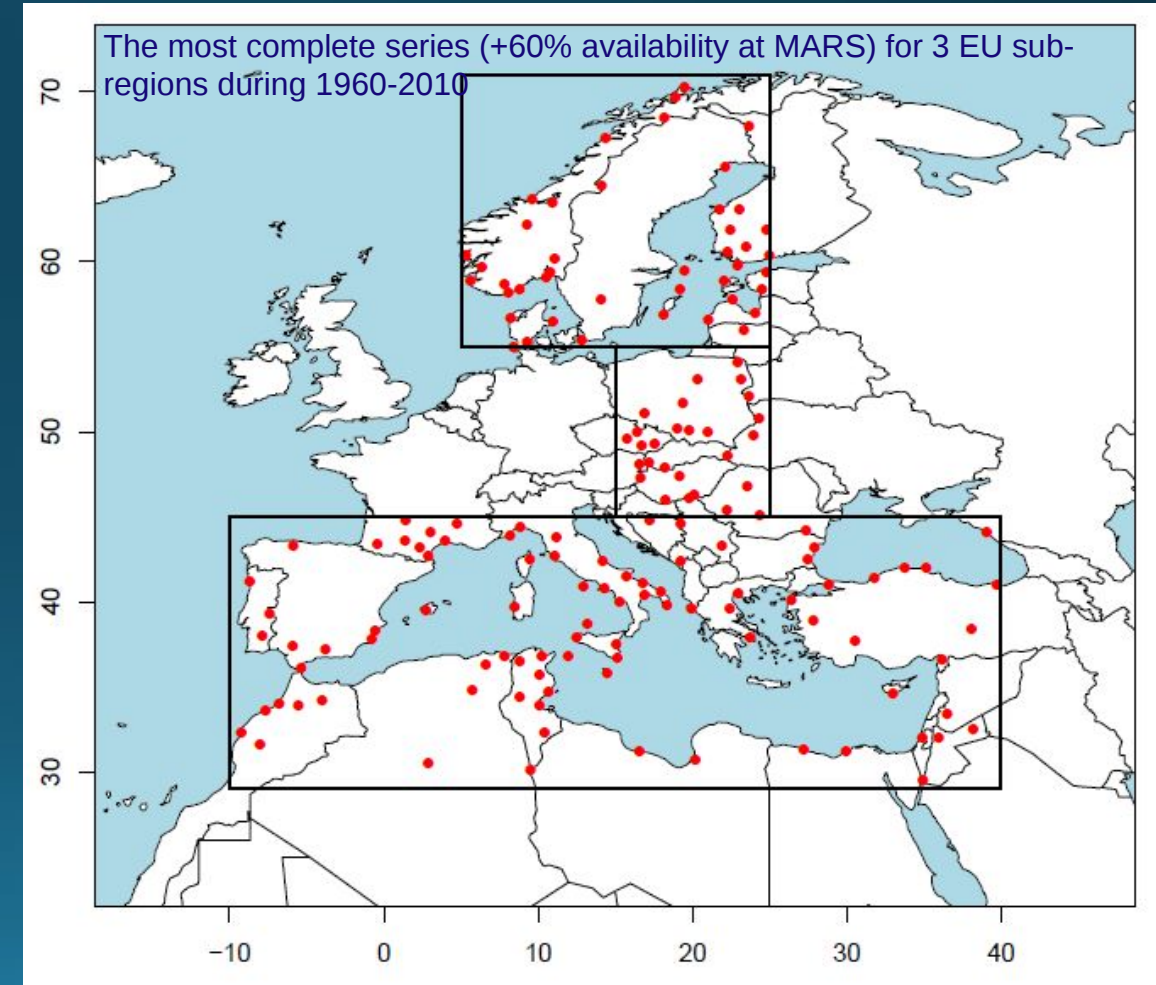
WP1 data rescue (DARE) strategy: setting the targets, accessing national archives and DARE coordination

- Setting the targets:
 - Involving UERRA partners to identify climatic variables and locations that can have a higher impact to enhance RRA in Europe
 - Building upon the EURO4M gathered data sources/holders to identify new sources & produce a comprehensive list of historical climate data holders and sources with relevant undigitised, but imaged data over Europe (D.1.1)
 - Exploring MARS (CRU) & crosschecking (URV) against the gathered imaged data-sources to set the spatial-temporal gaps in climatic variables at the synoptic scale to be targeted (D1.2)
- The targets for digitisation:
 - Variables: SLP, TMP, WS, WD, RH, DP, SD, FS, RR at the hourly and daily scales
 - For post-1950 (the target) and also pre-1950 (data sources availability constrain)
 - Southern part of Med, Eastern Europe & Balkans



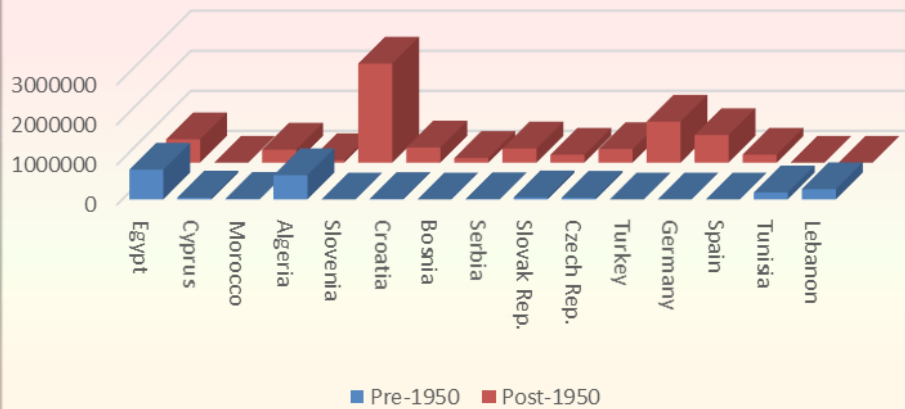
WP1 data rescue (DARE) strategy: setting the targets, accessing national archives and DARE coordination

- The UERRA/DARE double strategy:
 - Digitising data from available data sources & from scanned data to be provided by NMSs: an exercise proposed to Catalonia, Egypt, Jordan, Libya, Germany, Macedonia the FYR, Montenegro, Norway, Romania, Serbia, Slovenia, Spain and Sweden NMS. Positive responses from most of them, but only proposals to Catalonia, Germany and Slovenia succeeded due to internal data policies & difficulties to have scanned - duplicated their recent obs. by several of the NMSs contacted (D1.3, D1.4)
 - Accessing digitised data from Catalonia, Norway & Sweden resulted successful, but unsuccessful in the other NMSs
- Data coordination efforts
 - Built upon EURO4M & C3 contacts
 - Examination of the ERACLIM2 global repository & ISPD
 - Coordination with ISTI-DARE, Meteo-France, ACRE, UBERN, JLU Giessen
 - While under UERRA the focus has been land surface observations at the synoptic scale and over European sub-regions (the Mediterranean, Central Europe and the Balkan regions), in ERACLIM2 the focus has been placed at the global scale (e.g. Africa, South America, India, Asia) for land surface data and upper air data for Europe, ensuring that there are none DARE activities

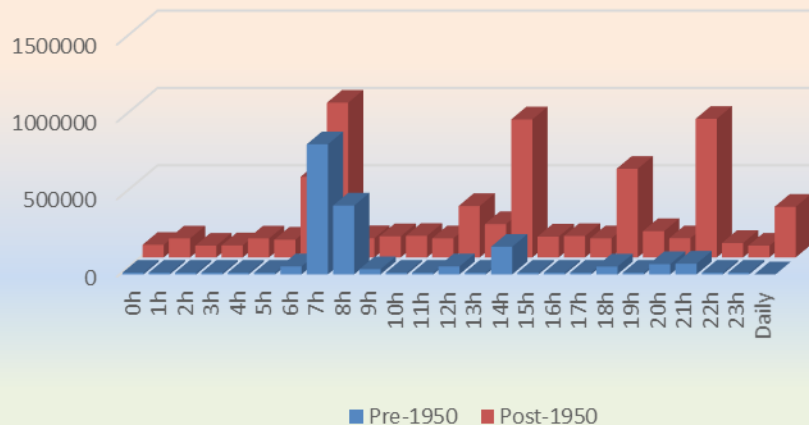


Summarising URV's digitisation efforts: ~8.7M of new recovered station-values to be added to the archives to enhance ERRAs

Data volumes by country for pre-1950 (1.94M) & post-1950 (6.74M) periods



Most popular observing times for pre-1950 (1.94M) & post-1950 (6.74M) periods

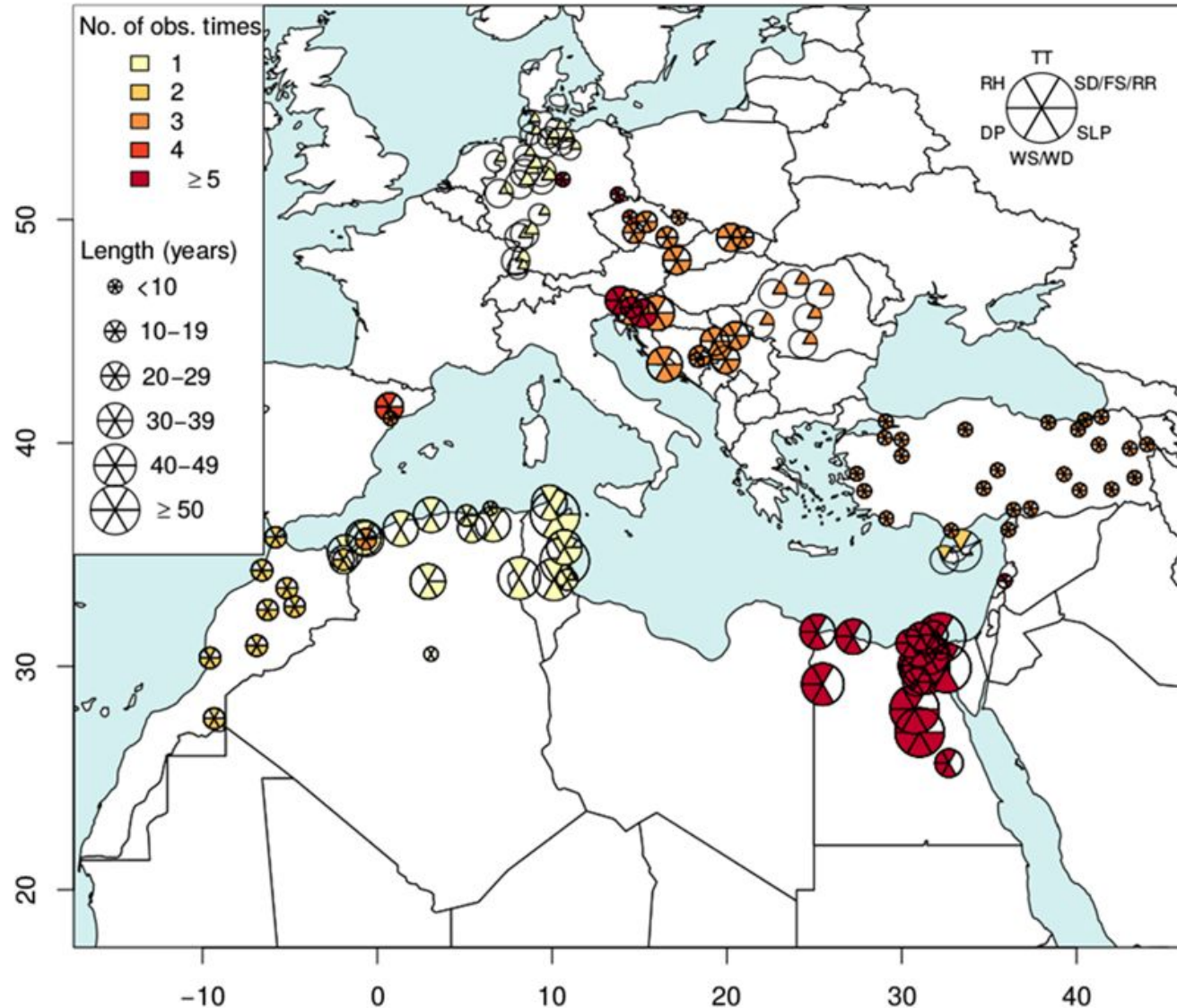


- **Spatial effort:** Balkans (Slovenia, B&H, Serbia), Turkey, Germany, Egypt & Morocco for post-1950 & Southern Med (Egypt, Algeria, Tunisia) for pre-1950
- **Most popular observing times:** morning (7am), afternoon (2pm), evening (9pm & 6pm) for post-1950 & 7am & 8m, 2pm, 9pm and 8pm for pre-1950
- **Most popular climate variables:** TMP, SLP, RH, WD, WS for both periods

UEFPA new recovered data by variables for pre-1950 (1.94M) & post-1950 (6.74M) periods

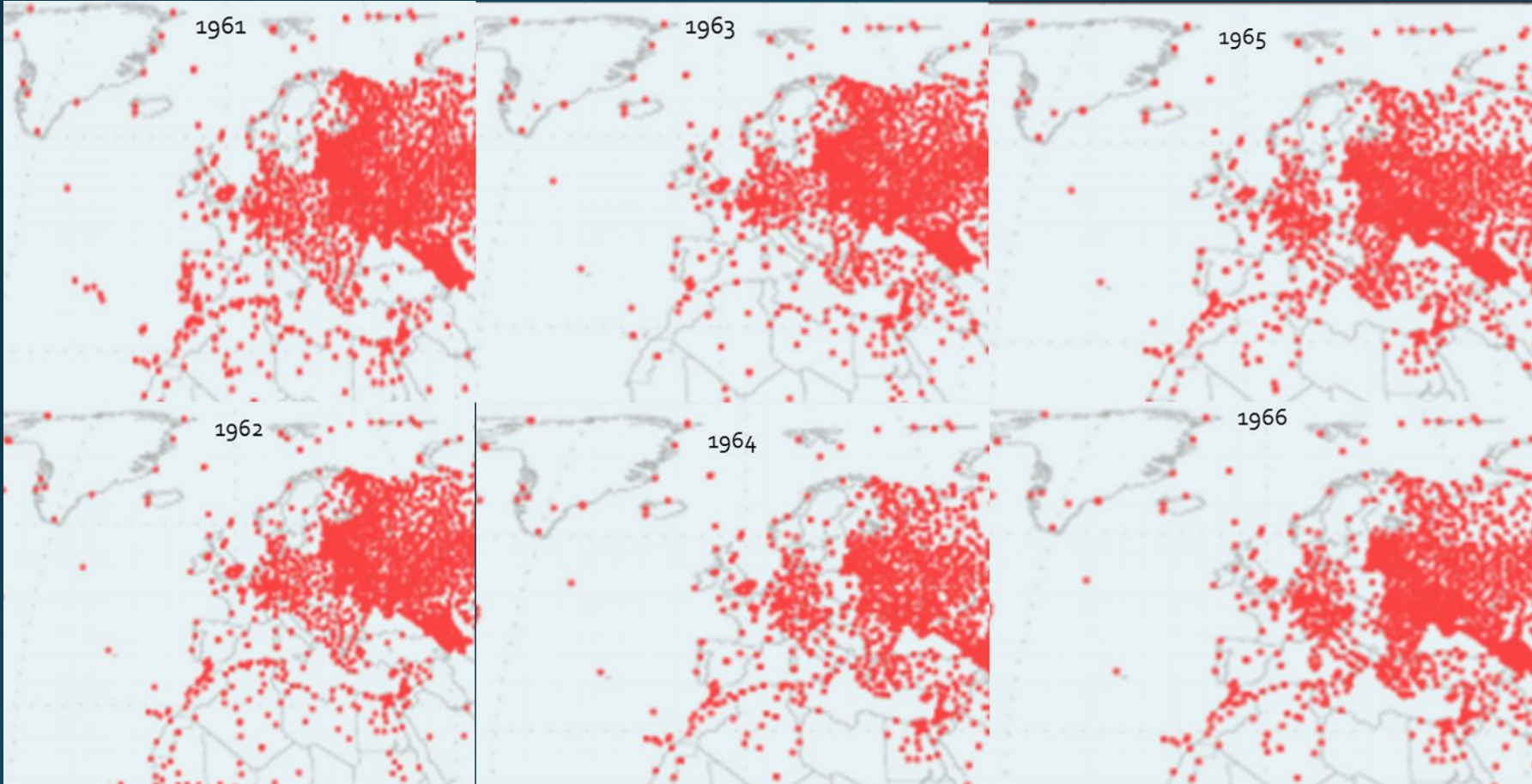


Summarising UERRA's digitisation efforts : a general overview of URV (8.7M obs.) + NMA-RO (300K obs.)



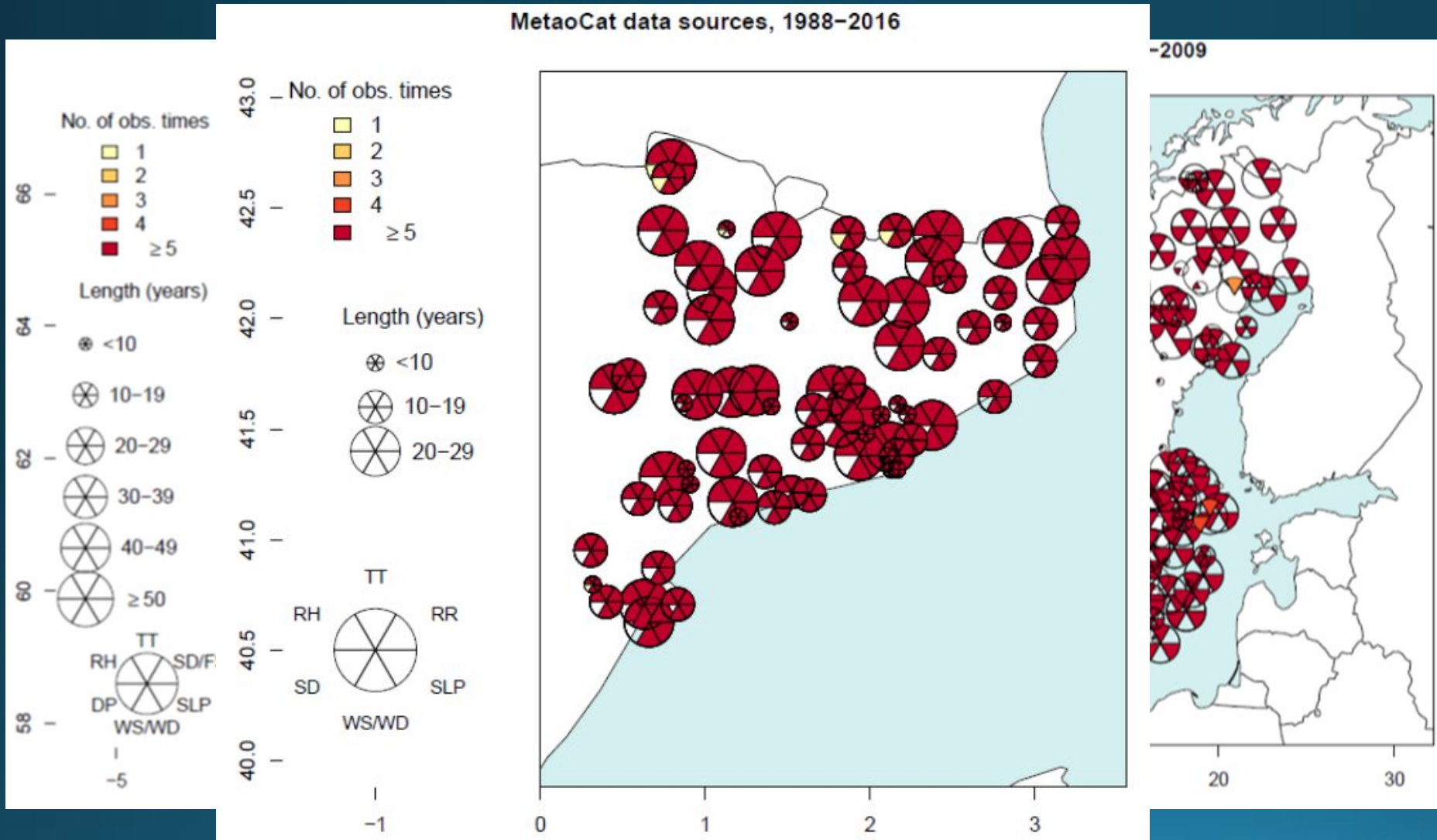
| Country | No. of stations | Period covered | Variables | Number of observations per day | Total number of values in QCed database |
|------------------------|-----------------|----------------|-------------------------------|--------------------------------|---|
| Algeria | 21 | 1877–1968 | DP,WS,WD,SLP,T T | 4 | 666408 |
| Bosnia and Herzegovina | 2 | 1953–1984 | WS,WD,SLP,RH,T T | 3 | 116695 |
| Croatia | 2 | 1949–1984 | WS,WD,SLP,RH,T T | 3 | 391752 |
| Cyprus | 2 | 1881–1922 | TT | 2 | 45068 |
| Czech Republic | 7 | 1948–1968 | WS,WD,SLP,RH,T T | 6 | 379168 |
| Egypt | 18 | 1907–1957 | DP,WS,WD,SLP, RH,TT | 6 | 1325151 |
| Germany | 23 | 1958–1978 | WS,WD,FS,SLP,RH, RR, SD,TT,WB | Up to 24 | 686440 |
| Lebanon | 1 | 1930–1939 | SLP,RH,TT | 24 | 256210 |
| Morocco | 8 | 1910–1968 | DP,WS,WD,SLP,T T | 4 | 340456 |
| Romania | 6 | 1974–2002 | RR | 6-hourly | 300000 |
| Serbia | 3 | 1949–2012 | WS,WD,SLP,RH,T T | 3 | 358716 |
| Slovak Republic | 2 | 1940–1967 | WS,WD,SLP,RH,T T | 6 | 248064 |
| Slovenia | 3 | 1950–1978 | DP,WS,WD,FS,SLP, RH, RR,SD,TT | Up to 24 | 2532380 |
| Spain | 5 | 1954–1984 | WS,WD,SLP,RH,T T | 5 | 198174 |
| Tunisia | 5 | 1886–1938 | WS,WD,SLP,TT | 1 | 174880 |
| Turkey | 25 | 1962–1971 | WS,WD,SLP,RH,T T | 3 | 1025517 |
| Total | 127 | | | | 9045070 |

Overview on the UERRA gathering effort: bringing 178.1M of digitised & publicly available data to support ERRAs



Key spatial gaps in reanalysis input data for early decades (from 50s to 70s):
Scandinavia, western (the UK, France, Spain) & eastern Europe
NMHS with open data policies (e.g. Norway, Sweden & Catalonia)
Accessing digitised data from those countries with open data policies to fill in spatial & temporal gaps thanks to the help of UERRA colleagues

Overview on the UERRA gathering effort: bringing 178.1M of digitised & publicly available data to support ERRAs



Infilling in Scandinavian gaps:

Norway: 7.2M of TMP, WD/WS, RR obs. from 93 stations for 1960-1980

Sweden: 42M of TMP, SLP, RR, RH, SD, CC obs. from 146 stations for 1945-2009

Catalonia: ~129M of TMP, SLP, WD/WS, RR, RH, SD from 76 stations for 1988-2015

Overview on the whole UERRA's gathering digitised data effort: 178.1M of station values from 315 stations covering the 1945-2015 period

Table 1. Statistics of data provided by MetNo, SMHI and MeteoCat for UERRA WP1. Variable acronyms represent air temperature (TT), atmospheric pressure (SLP), rainfall (RR) relative humidity (RH), cloud cover (CC), snow depth (SD), wind direction (WD) and wind speed (WS).

| Provider | Number of stations | Time period covered | Variables provided | Frequency of observations | Number of total observations |
|----------|--------------------|---------------------|-------------------------|--|------------------------------|
| SMHI | 146 | 1945–2009 | TT, SLP, RR, RH, SD, CC | Precipitation daily, other observations from 3 times daily to hourly | 42.0 million |
| MetNo | 93 | 1960–1980 | TT, WD, WS, RR | Generally 3-4 times a day, some stations hourly | 7.2 million |
| MeteoCat | 76 | 1988–2015 | TT, SLP, WD, WS, RR, RH | Hourly (SD daily) | 128.9 million |
| Total | 315 | | | | 178.1M |

Next steps & Summary

- Data development come next (D1.5 & D1.6 in Joan's talk)
- Data delivery (D1.7): to provide the digitised plus gathered data to WP2 partners to be in use this coming year
- Making publicly available the whole UERRA dataset to MARS Archive & ECA&D (D1.8) & through other global databanks and data centres on early 2017:
 - International Surface Pressure Databank (ISPD),
 - ZENODO
 - The Met Office Hadley Centre observations datasets: the HadISDH dataset
 - The International Surface Temperature Initiative (ISTI) databank
- Providing the recovered data to the relevant NMHSs: an exercise to show them the benefits of cooperating with DARE players, to promote the recovery of their national assets
- Enhanced availability & accessibility of climate data at the synoptic scale to support high-resolution RRAs in Europe:
 - 9M of observations recovered: URV 8.7M & NMA-RO 300K station-values
 - Largely exceeding the project targets: URV 3.7M & NMA-RO 300K station-values, what has had an impact in the production of D1.5 (the QC'ed dataset), delaying its delivery a couple of months
 - 178.1M of observations in digital format gathered from Catalonia, Norway & Sweden NMSs
- Improved cooperation with some NMSs (Catalonia, Germany, Slovenia) by providing URV access to their scanned, but undigitised, data that have been digitised for them under UERRA
- Making use of the few open data policies in European NMSs to increase the data input from Catalonia, Norway & Sweden & thanking those NMSs for opening their archives & providing their digitised data

**Thanks 4 attention
&
questions**