WP10 OVERVIEW

David Brayshaw & Gerard van der Schrier

WP10 co-leads

Context: WP 10/11 objectives

"Outward":

- Climate risk assessment (converting climate to relevant user/sector information)
- User engagement and broadcast

"Inward"

- Identifying user/sector needs
- Informing, e.g., Stream 2 design

- Three modes:
  - Specific users: Engaging with specific users to address specific needs (champions)
  - Target sectors: Translation of "raw" climate information/data into sector-relevant information and narratives
  - Project legacy: Enabling future research through provision of climate data and methods

University of **Reading**

- Globally need to reduce carbon emissions. Rapid change in energy system:
  - Decarbonize electricity (more renewables)
  - Electrify other sources of emissions (e.g., heating)
  - ➔ More weather sensitivity in supply (wind, solar) and demand (heating/cooling)

- Sectoral research challenges informing industry and policy:
  - How to better manage the power system we have
  - How to design the "best" power system for the future
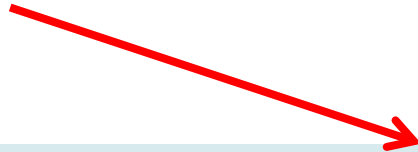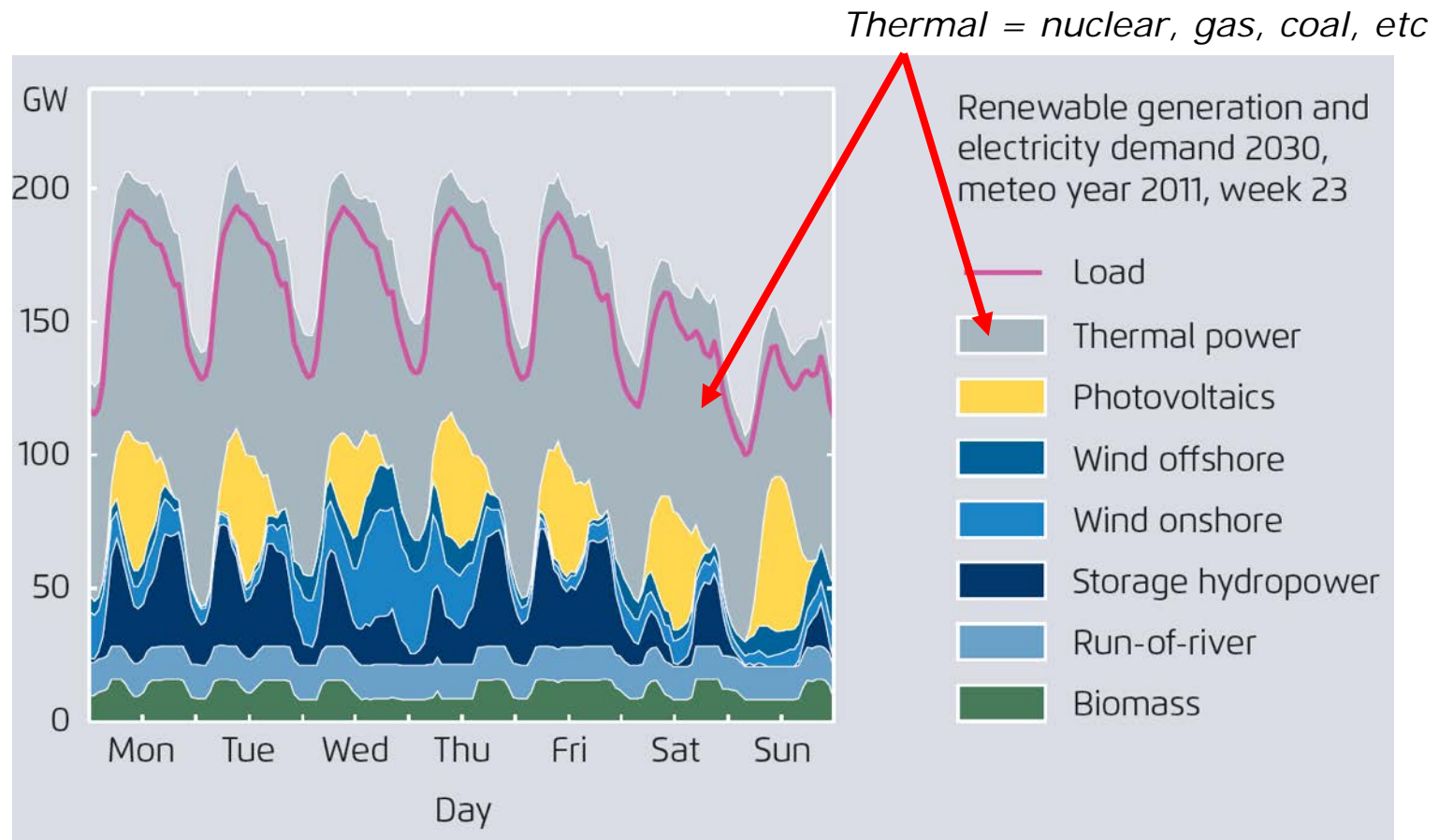
Aside on extreme and compound weather events:
- Important for system design…
- … but nature of event is not known *a priori*

Case sector: Energy
High frequency data

Whole sale day-ahead market: typically 48 x 30 min windows per day

Match generation with demand, cheapest marginal cost units first

Thermal = nuclear, gas, coal, etc

Renewable generation and electricity demand 2030, meteo year 2011, week 23

— Load
Thermal power
Photovoltaics
Wind offshore
Wind onshore
Storage hydropower
Run-of-river
Biomass

Case sector: Energy
High frequency data

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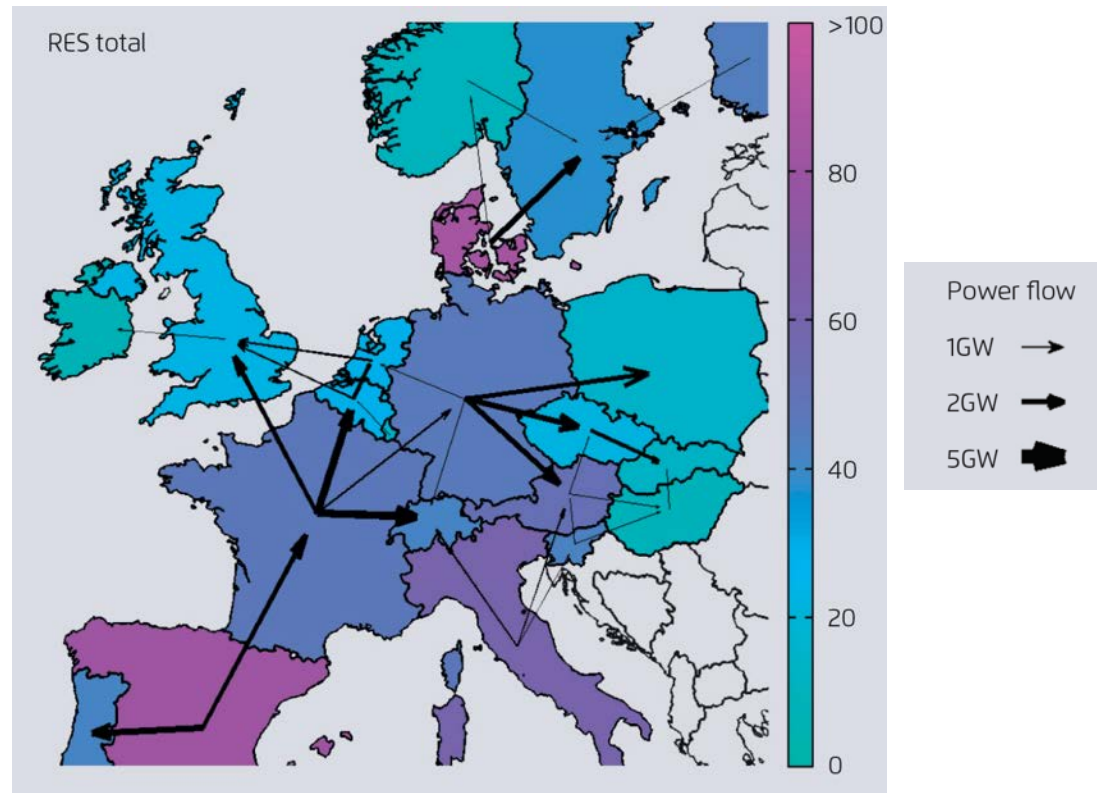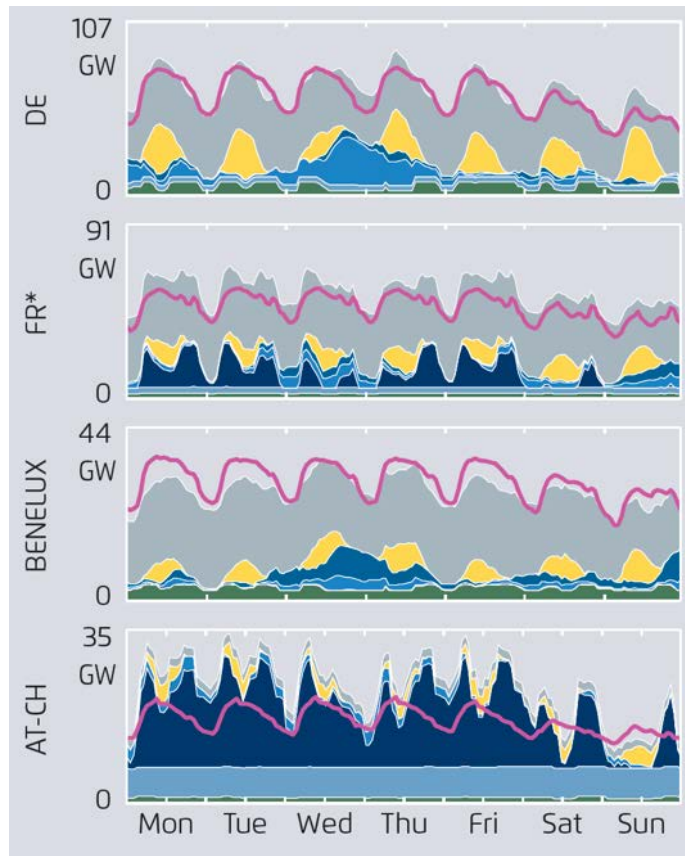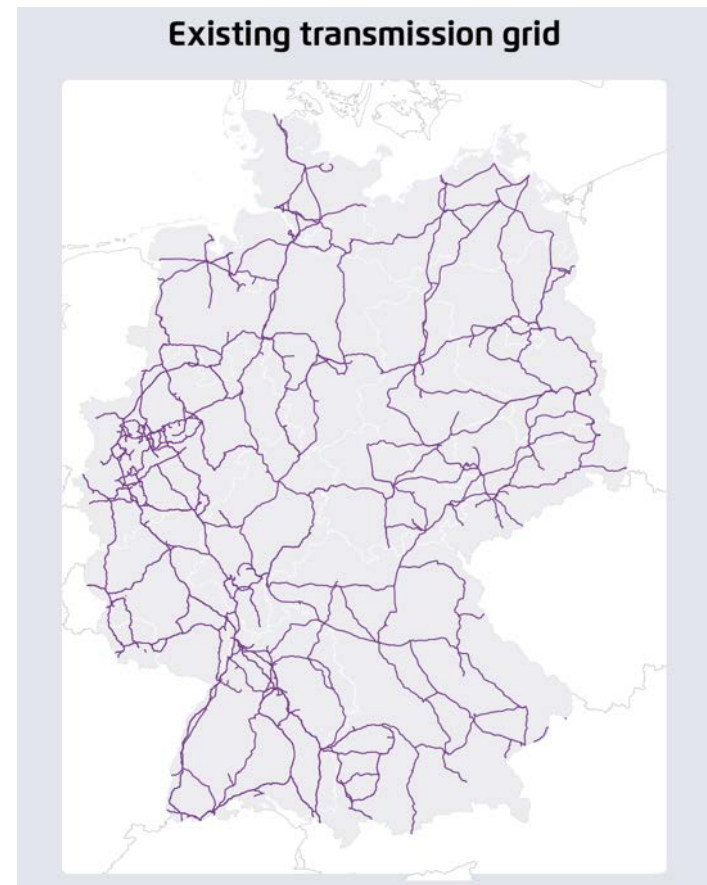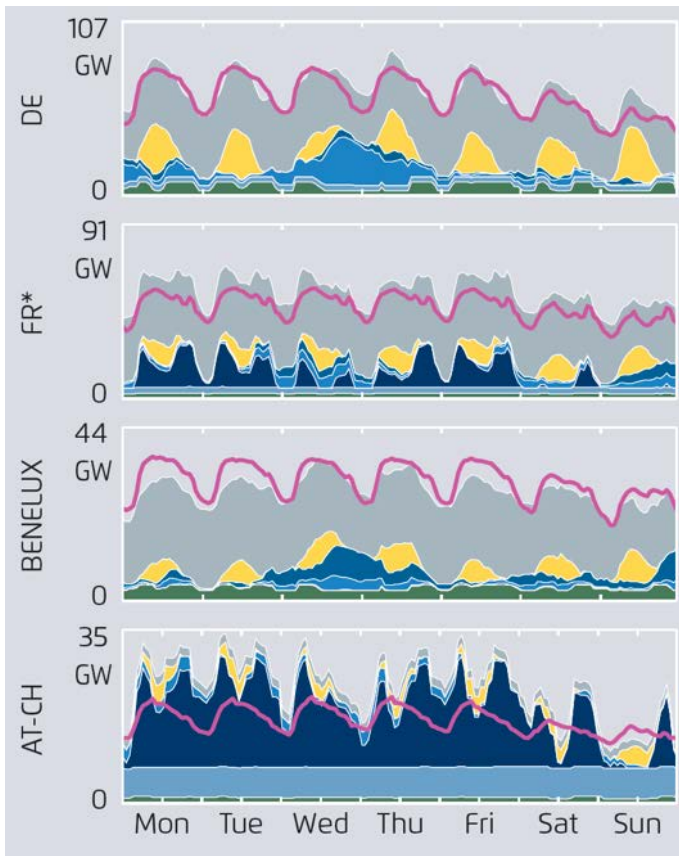Match generation with demand, cheapest marginal cost units first

But also a spatial network, with transmission between countries…

The European Power System in 2030: Flexibility Challenges and Integration Benefits (Agora, 2015)

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But also a spatial network, with transmission between countries…

And within countries…

Existing transmission grid

The European Power System in 2030: Flexibility Challenges and Integration Benefits (Agora, 2015)   Energiewende 2030: The Big Picture (Agora, 2018)
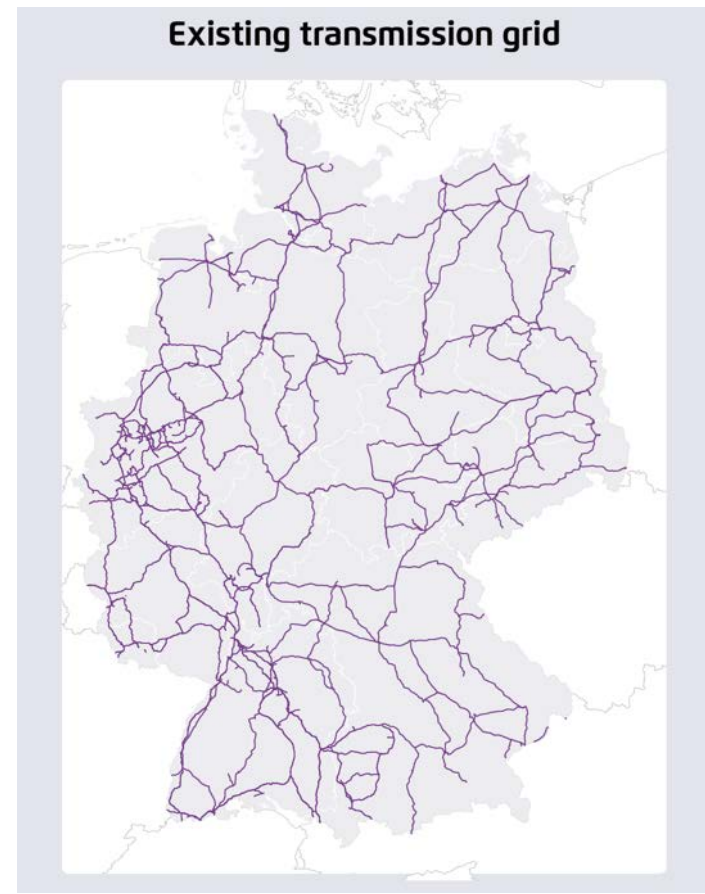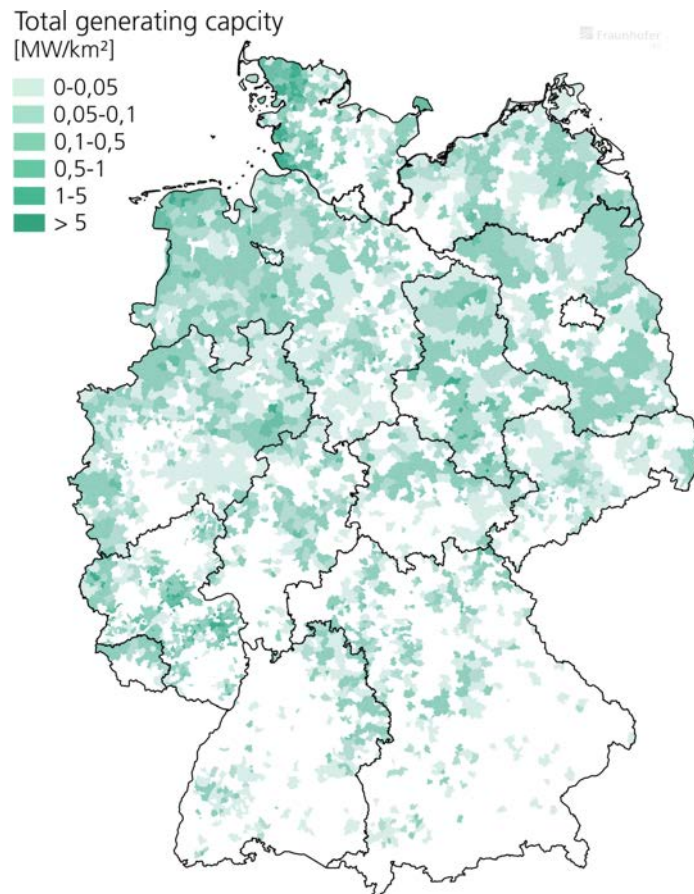
Whole sale day-ahead market: typically 48 x 30 min windows per day

Match generation with demand, cheapest marginal cost units first

But also a spatial network, with transmission between countries…

And within countries, connecting spatially distributed resources

Total generating capcity [MW/km²]
- 0-0,05
- 0,05-0,1
- 0,1-0,5
- 0,5-1
- 1-5
- > 5

Existing transmission grid

http://windmonitor.iee.fraunhofer.de/windmonitor_en/3_Onshore/7_karten/

Energiewende 2030: The Big Picture (Agora, 2018)

University of **Reading**

Whole sale

Match gen

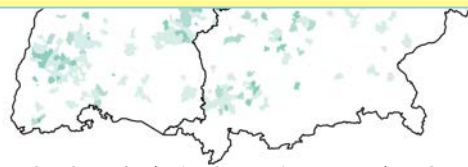But also a

And within

Tot
[M

Key points for weather/climate data:

- Spatio-temporal *correlations* matter

- *Cross-variable relationships* are critical (is it windy when cold?)

- Synoptic *time-trajectories* are important

- There *is "additional" information at sub-6h scales* in PRIMAVERA output (see poster outside)

Very difficult to create a weather-generator. Need for:

- self-consistent high frequency/resolution climate timeseries

- Multi-decadal/ensembles (for signal detection)

→ **Use requirements fed into Stream 2 specification**

http://windmonitor.iee.fraunhofer.de/windmonitor_en/3_Onshore/7_karten/

Energiewende 2030: The Big Picture (Agora, 2018)

Case sector: Energy
Examples of PRIMAVERA activity

Ongoing specific user collaborations:

- Poyry Austria (hydro)

- EDF natural hazards UK (wind)

- EDF research France (renewables, vs. results from COPERNICUS ECEM demonstrator)

- ACDC-ESM (PhD, Utrecht)

- Understanding Climate Uncertainty in Power System Planning (PhD, UREAD)

Wider sectoral relevant information, techniques and narratives, e.g.:

- Understanding uncertainty in CMIP5 wind power projections for Europe (paper in review)

- Information content in high-frequency GCM surface winds (see poster, paper in development)

- Low wind events (work in progress)

- Sectoral climate narrative (for D10.4)

- To explore: pull through of science from this GA (e.g., weather-regimes, …)

Enabling the energy research (legacy):

- Existence of high-frequency surface data from PRIMAVERA enabling energy research (Str 1 and 2)

  - *Multiple energy-research groups interest in developing projects: UCL, ICL, UOslo, UEdin, …)*

- To explore: provision of converted energy-impact data derived from PRIMAVERA GCMs (national wind, solar, demand; c.f. ECEM, S2S4E services); connections to VIACS/CMIP6

Spread the word! - Conference visits

- Presentations at ~30 conferences

- General science (EGU, AGU, WEGEX etc.)

- User-oriented (Food Security, Wind storms for insurance, Energy meteorology)

WP10/WP11 conference visits
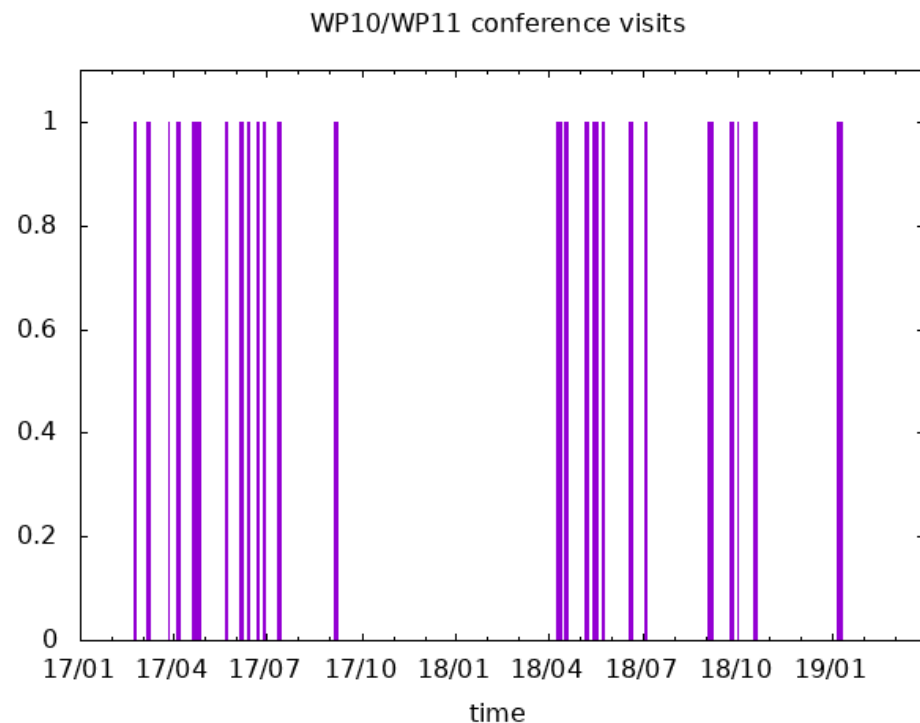
WP10 Deliverables

D10.1: Use case report ✅

D10.2: Comparison of statistics of selected events ✅

D10.3: Physics of extreme and compound events
                                                        (Jan '20)

D10.4: Scientific input for risk assessment
   (Jul '20)

CONFERENCE ATTENDANCE BY WP10/11

● Past
● Planned

Papers

- Van der Linden et al. (2019) https://doi.org/10.5194/hess-23-191-2019

- Van Garderen et al. (2019) Meteorologica

- A short article about UIP (planned)

- An article about user engagement activities in PRIMAVERA (planned)

- Sandberg et al. (2019) Comparing CMIP5, CORDEX and PRIMAVERA precipitation (in prep.)

- Squintu et al. (2019) Comparing CMIP5 and PRIMAVERA extreme temperature indices (in prep.)

- Gonzalez, Brayshaw & Zappa. The Contribution of North Atlantic Atmospheric Circulation Shifts to Future Wind Speed Projections over Europe. Climate Dynamics (in review)

- Gonzalez & Brayshaw, Exploring the added value of sub-6-hourly wind data from GCMs for energy applications. (in prep.)
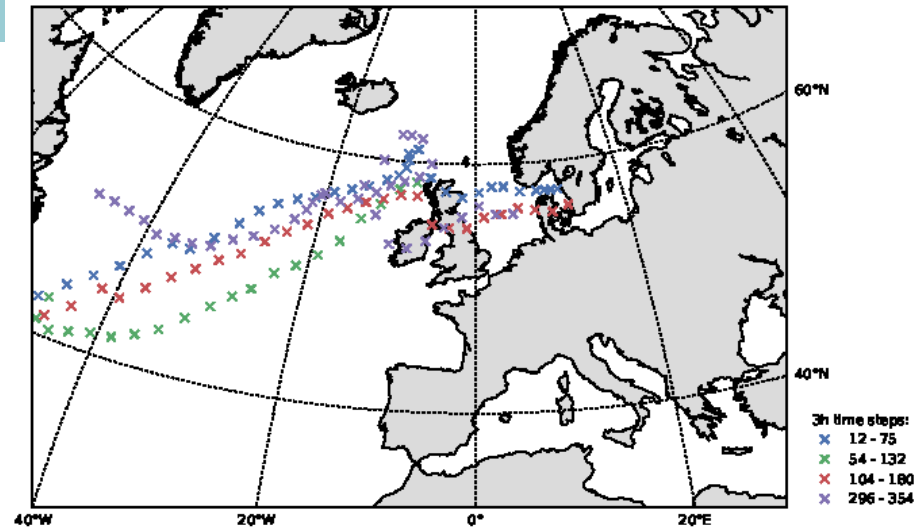
Climate change perspective for *Water disaster Museum*

- Part of permanent exhibition
- Clips of CMIP5 & Primavera simulations with images from the news
- ~100.000 visitors/year

WHY HOMOGENIZATION?

Step-like signals in series introduced by:

Geneva, Switzerland

Relocation of stations, often from the city center to the airport (urban heat island effect removed) or with change of altitude.

Change in the **instrumental features** (new screen, manual to automatic, analog to digital, etc.)
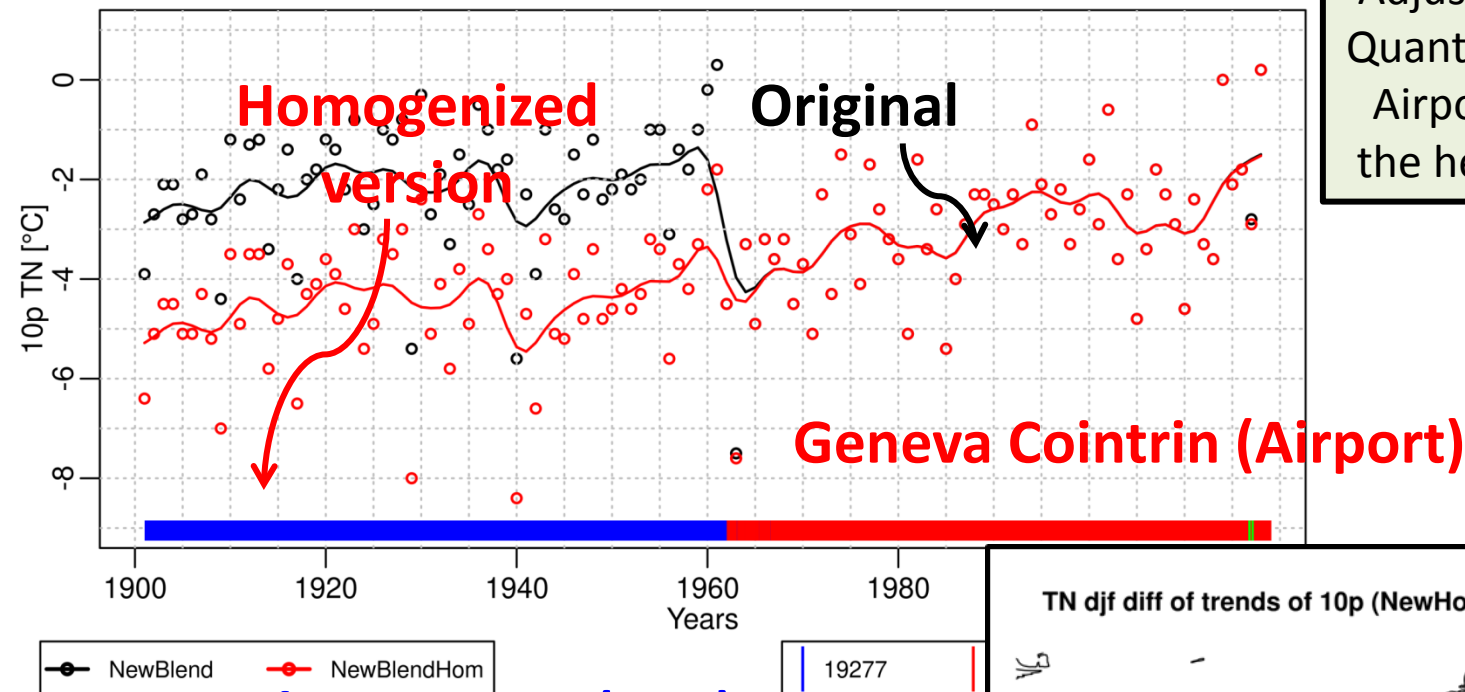
Gradual changes of the **surrounding** (growing vegetation, expansion of urban area)
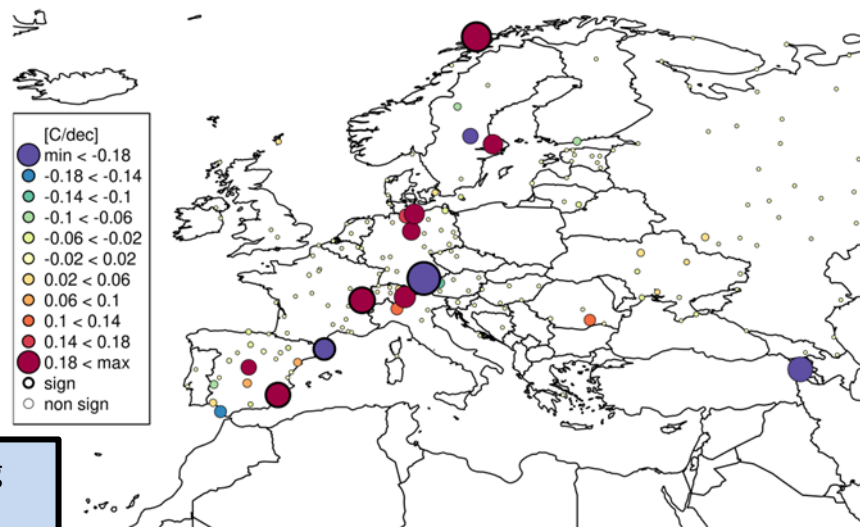
HOMOGENIZATION

10p TN Geneve Cointrin SWITZERLAND

Homogenized version

Original

Geneva Cointrin (Airport)

Geneva Observatoire (City)

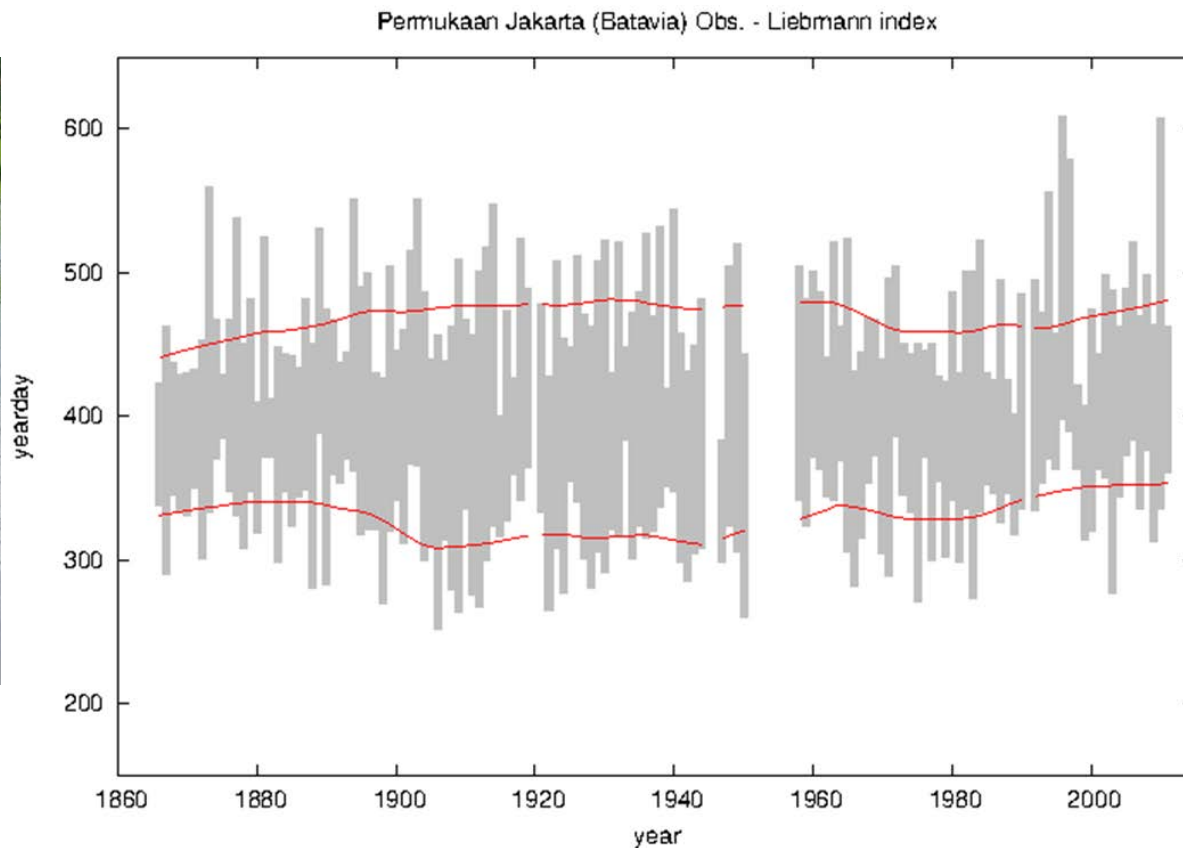Adjustments calculated via Quantile Matching between Airport and City pdf, with the help of hom. ref. series

TN 10p of Geneva (blended), original and homogenized with running mean. The lower band indicates the donating series.

EUSTACE

TN djf diff of trends of 10p (NewHomBlend-NewBlend), 1911-2010

[C/dec]
min < -0.18
-0.18 < -0.14
-0.14 < -0.1
-0.1 < -0.06
-0.06 < -0.02
-0.02 < 0.02
0.02 < 0.06
0.06 < 0.1
0.1 < 0.14
0.14 < 0.18
0.18 < max
sign
non sign

Start and end of the rainy season since 1866

relevant for rice production

Permukaan Jakarta (Batavia) Obs. - Liebmann index

March

December

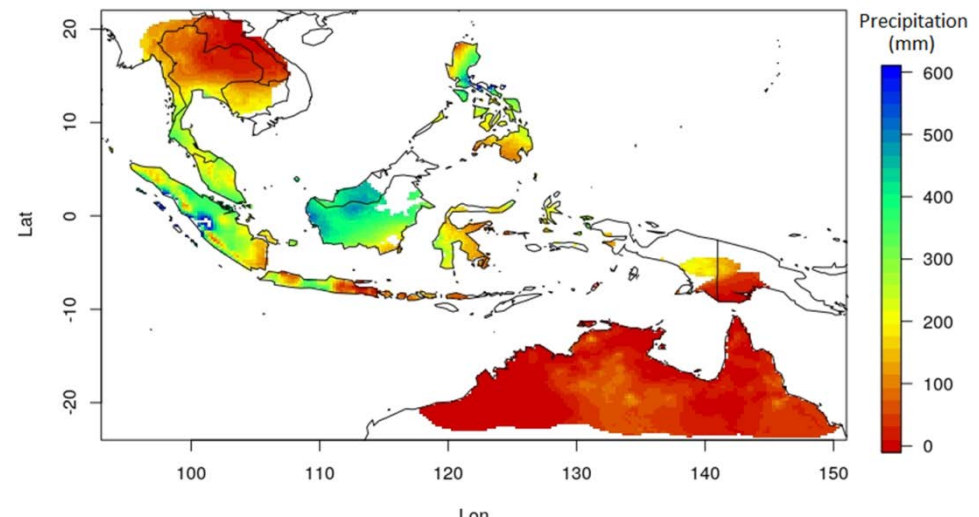Marjuki et al., J. Climate, 2016

- Can we reproduce the start & cessation of the rainy season over SE Asia?
- CMIP5 models indicate a *delay* in the onset
- Validation & bias correction using a newly developed observational dataset

Climatological mean in onset dates of rainy season for Southeast (period 1981-2010)
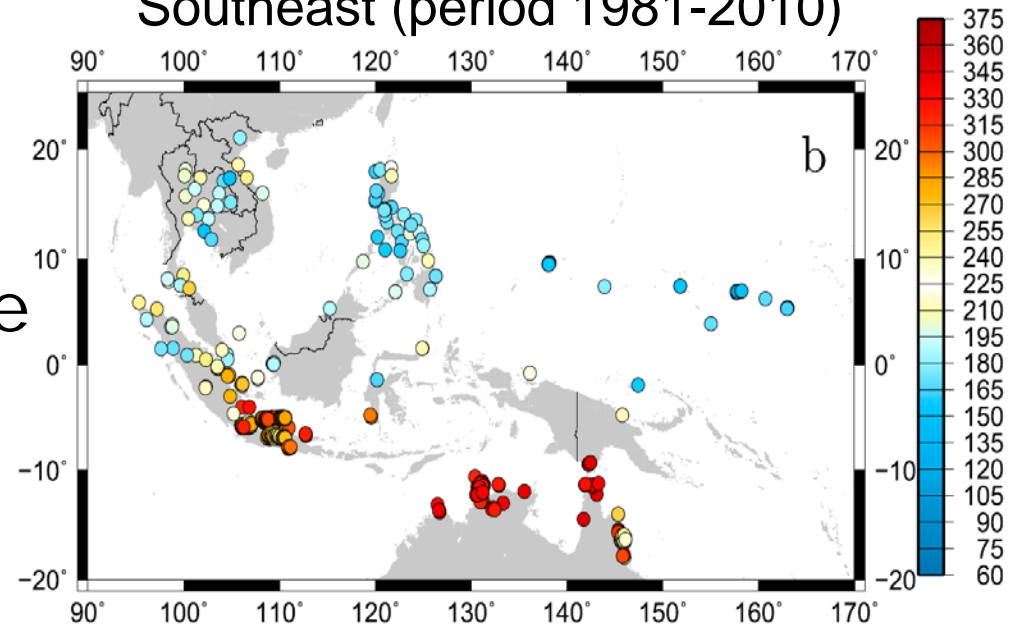
Marjuki et al., J. Climate, 2016

Van den Besselaar et al ., J. Climate, 2017

WP11 OVERVIEW

Dragana Bojović & Erika Palin
WP11 co-leads

*With thanks to all of our colleagues in the
PRIMAVERA user engagement and climate risk assessment teams*

OUTLINE

- What is WP11?

- Deliverables so far

- Summary of progress & issues
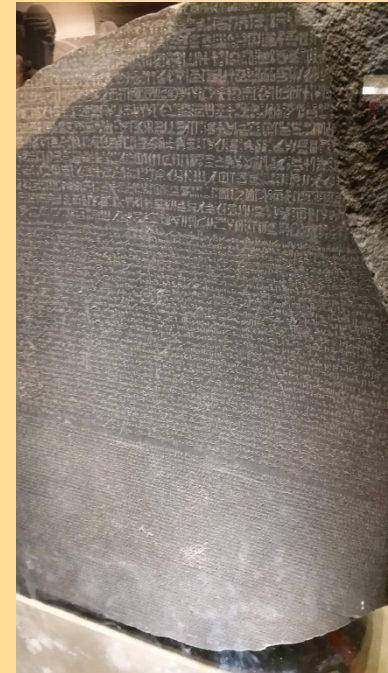
- Links across WPs

- What next?

WHAT IS WP11?

User engagement and dissemination – the "broadcast" WP
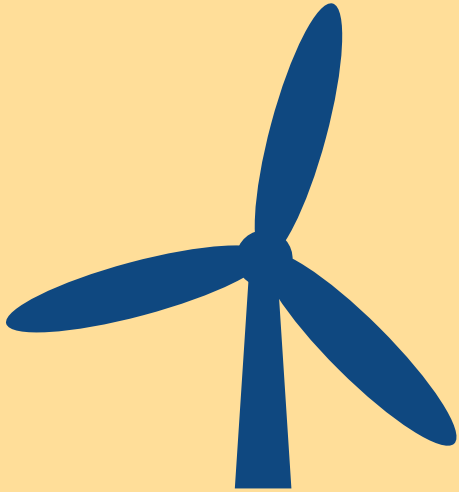

Liaising closely with WP10 (climate risk assessment – the "translation" WP)

❓ WHAT IS WP11?

Demonstrating the value of PRIMAVERA to the user community, mainly in three key sectors:

Energy   Transport   Insurance

DELIVERABLES SO FAR

Nov'15: **start of PRIMAVERA**

GA1, Exeter, GB

Nov'16: start of year 2

GA2, Utrecht, NL

Nov'17: start of year 3

GA3, Bologna, IT

Nov'18: start of year 4

GA4, Barcelona, ES

D11.1 (Feb'16)
- End-user dissemin'n & comm'n plan

➡

D11.2 (Jun'17)
- User Interface Platform

➡

D11.6 (Oct'17)
- Report on end-user req'ts

➡

D11.1a (Jan'19)
- Update to end-user dissemin'n & comm'n plan

PRIMAVERA
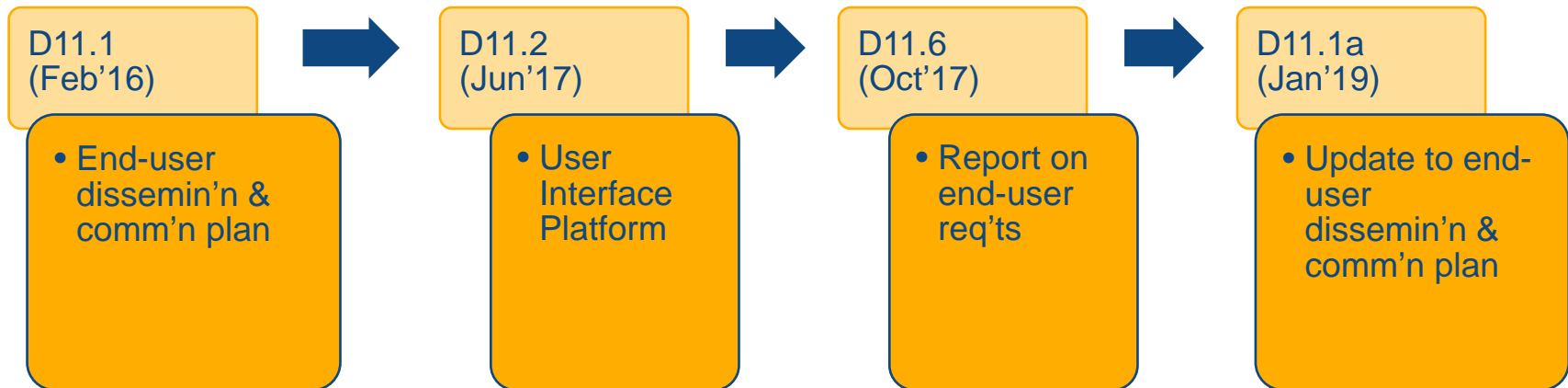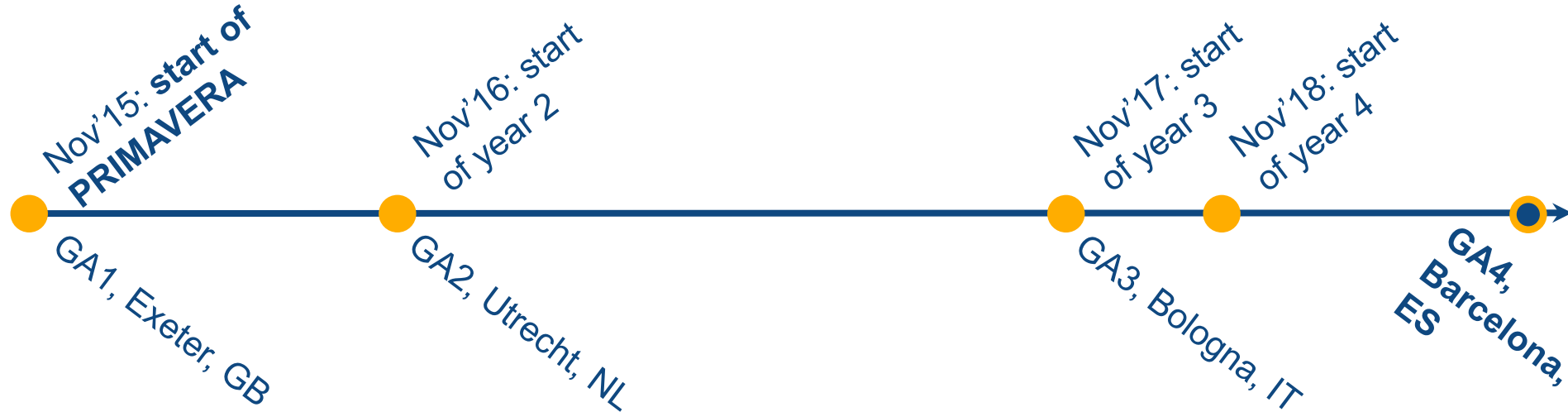
DELIVERABLES REMAINING

Nov'19: start of year 5

Jul'20: **end of PRIMAVERA**

GA4, Barcelona, ES

GA5, TBC

D11.3 (Apr'19)
- Sector-specific case studies & climate projections fact sheets

D11.4 (Jan'20)
- Energy sector visual prototype (to be renamed "Data viewer")

D11.5 (Jul'20)
- Evaluation report of project outcomes by end-users

D11.7 (Jul'20)
- Document detailing where PRIMAVERA outcomes have been presented to end-users

PRIMAVERA

FACT SHEETS

Climate-focused

- How do climate models work?
- Does hi-res global modelling matter?
- Quality of climate models
- *Uncertainty in climate modelling*
- *Types of uncertainties*
- *Climate model ensembles*

Sector-focused

- Blocking/energy
- Flooding/transport
- NAO/energy
- Heatwaves/energy
- ETCs/insurance (general)
- *ETCs/insurance (+ PRIMAVERA results)*

[Italics = pending]

- Janette (KNMI) is coordinating delivery of D11.3
- Further fact sheets will follow the formal deliverable

SUMMARY OF PROGRESS & ISSUES

- **Progress** since GA3

User engagement continues – some very effective collaborations in energy and insurance; transport sector somewhat behind (use cases less clear)

Conference presence – scientific *and* user-focused

Enhanced Twitter presence (129 followers as at 22/3)

UIP: fact sheets; data viewer (⇨ *Markel's talk*); UIP survey pending

Insurance sector webinar completed last week (11 attendees)

PRIMAVERA

SUMMARY OF PROGRESS & ISSUES

- **Issues**

⚠ CMIP6 forcings – simulation delays ↓ effectiveness of user engagement (not many future simulations available yet)

⚠ Changed scope of Stream 2 cf. original concept – need to think about communication thereof to users (need help from technical WPs to ensure correct representation of Stream 2)

⚠ Deliverable deadlines moved towards end of project (in WP11 & elsewhere) – careful planning needed!

LINKS ACROSS WPS

- WP11's major link is to **WP10**

- Increasingly, need to link to output from **other WPs**, to pull through science effectively to users

- Needs **proactive engagement from other WPs** as well as from WP10/11...

...what should we be telling users about YOUR work?

WHAT NEXT?

Continue communicating Str1 analysis to users (incl. future simulations, when more are available)

Plan communication of Str2 analysis to users

Develop further transport sector engagement (& perhaps others)

With WP10, plan remaining deliverables

PRIMAVERA

THANK YOU!

QUESTIONS?

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🐦 @PRIMAVERA_H2020

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