



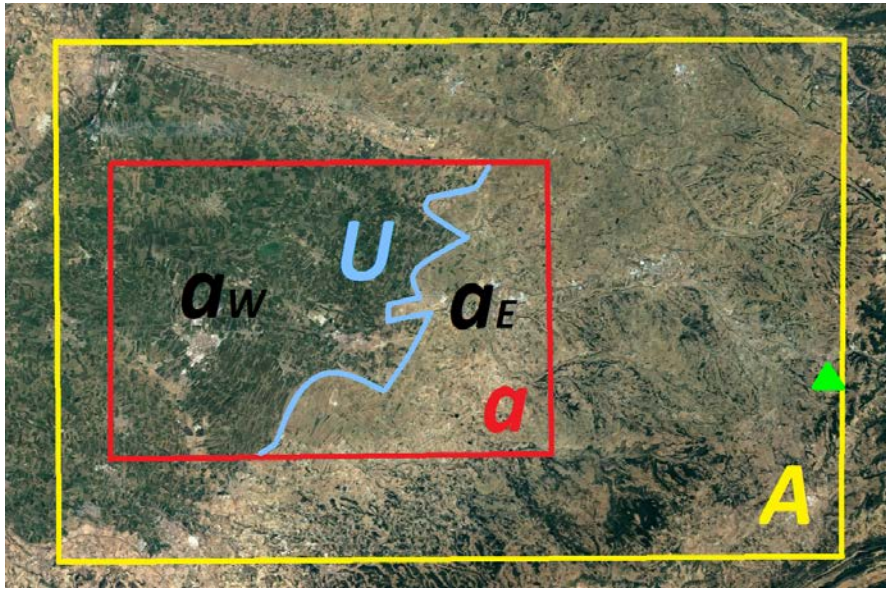
Analysis of Precipitation Processes in the Eastern Ebro Subbasin Project (WISE-PreP) RTI2018-098693-B-C32

Joan Bech¹, Mireia Udina¹, Bernat Codina¹, Sergi Gonzalez², Albert Garcia^{1,3}, Patricia Altube⁴, Jordi Mercader⁴, Alfons Callado², Joan Arús², Oriol Rodríguez¹, Enric Casellas¹, Francesc Roura-Adserias¹, Àngela Rosell¹, Francesc Polls¹, Branko Kosovic⁵, Àlex Montornès⁶, Pau Escribà², Laura Traperó⁷, Alexandre Paci⁸, Brice Boudevillain⁹, Ali Tokay¹⁰

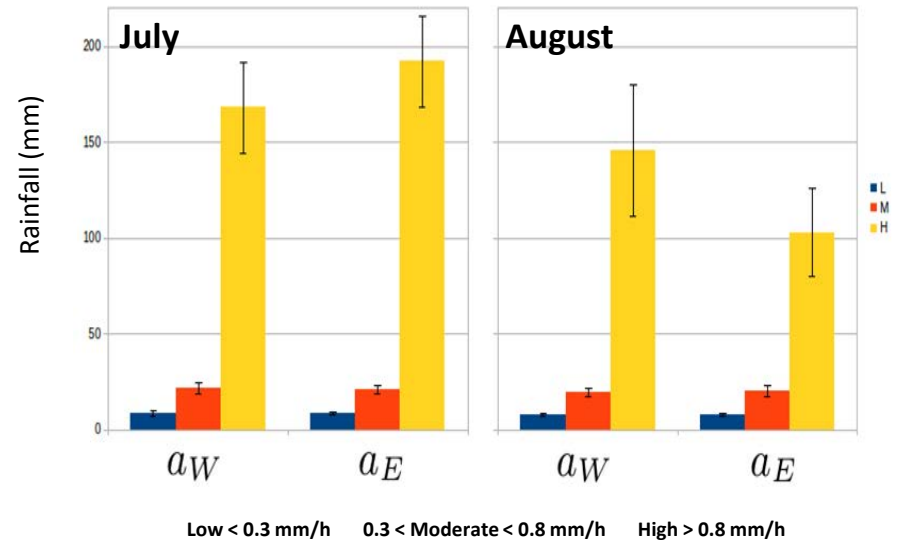
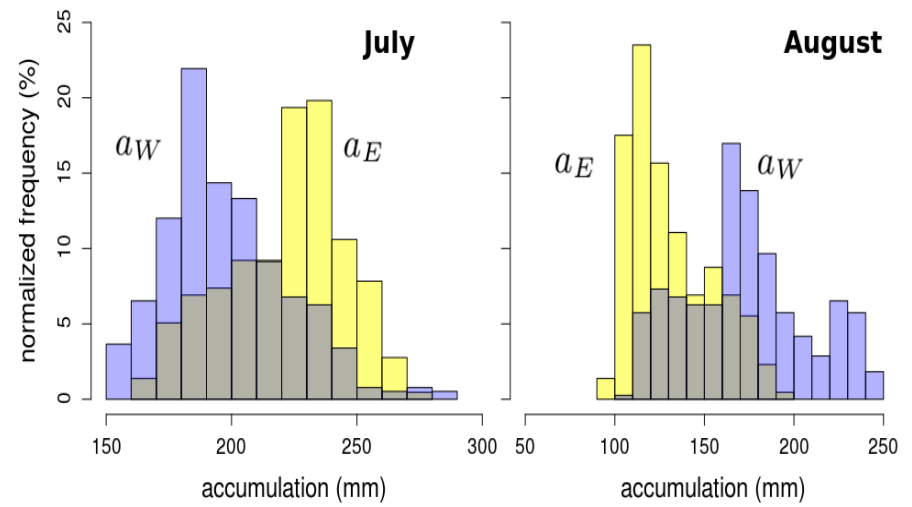
(1) Universitat de Barcelona, Spain; (2) AEMET, Spain; (3) Universitat Politècnica de Catalunya, Spain; (4) Servei Meteorològic de Catalunya, Spain; (5) NCAR/UCAR, USA; (6) Vortex, SL, Spain; (7) CENMA/IEA, Andorra; (8) Centre National de Recherches Météorologiques (CNRM), Université de Toulouse, METEO-FRANCE, CNRS, France; (9) Université Grenoble Alpes, France; (10) NASA/GSFC, USA

Research Questions

- What is the impact of surface (irrigated vs non-irrigated) and subsequent low level atmospheric conditions upon precipitation processes (frequency, intensity, stratiform vs convective regime, precipitation microphysics dominant processes, etc.)?
 - *Impact at seasonal temporal scale (subdaily patterns at $\Delta t \sim 1h$, $\Delta x \sim 1$ km over the LIAISE region of study)*
 - *Impact at individual event scale - analysis of high resolution precipitation profiles ($\Delta t \sim 1min$, $\Delta z \sim 100$ m, 3/6 km AGL)*



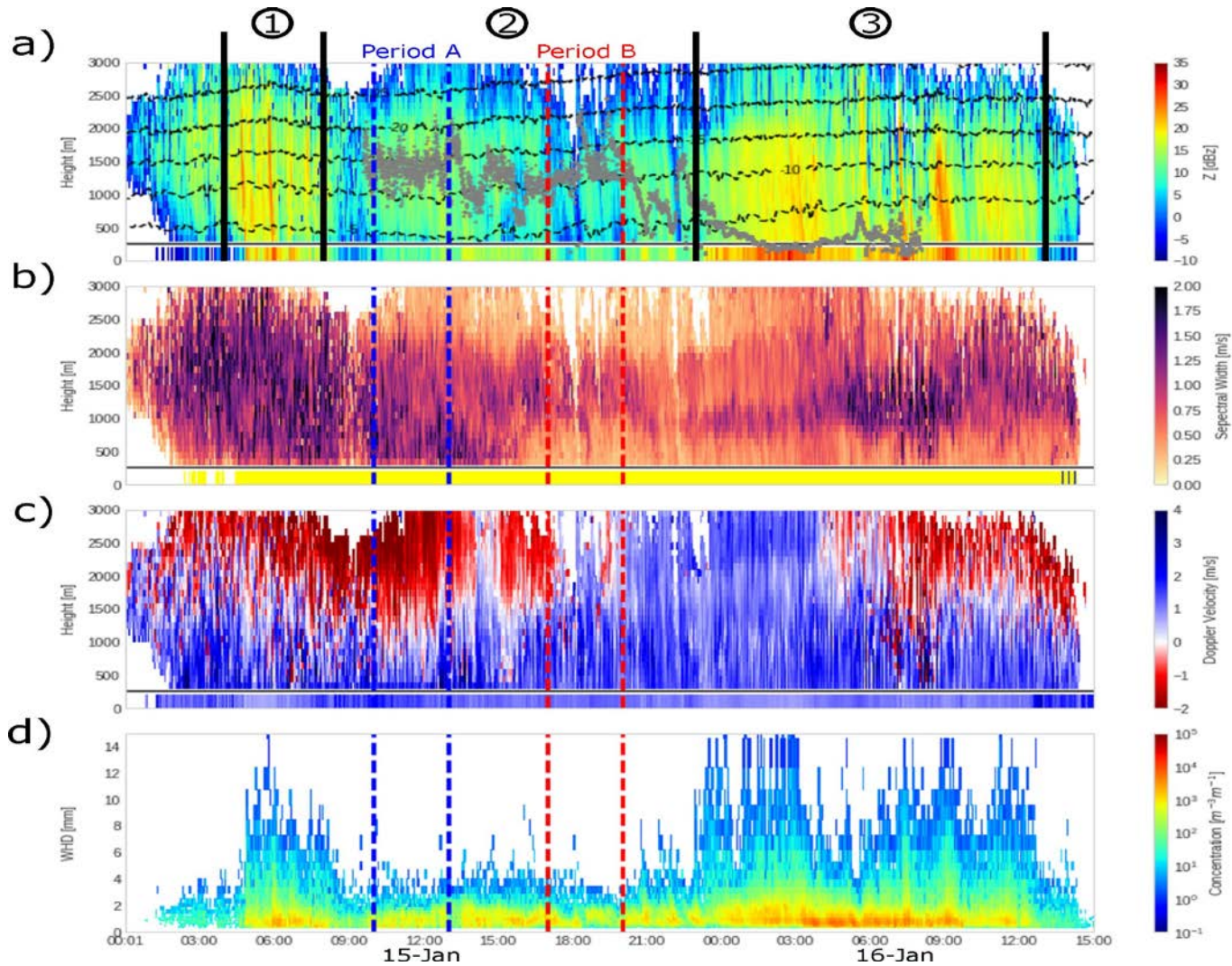
Preliminary analysis 2014-2018 weather radar precipitation estimates (hourly, 1 km x 1km) TFG Roura-Adserias



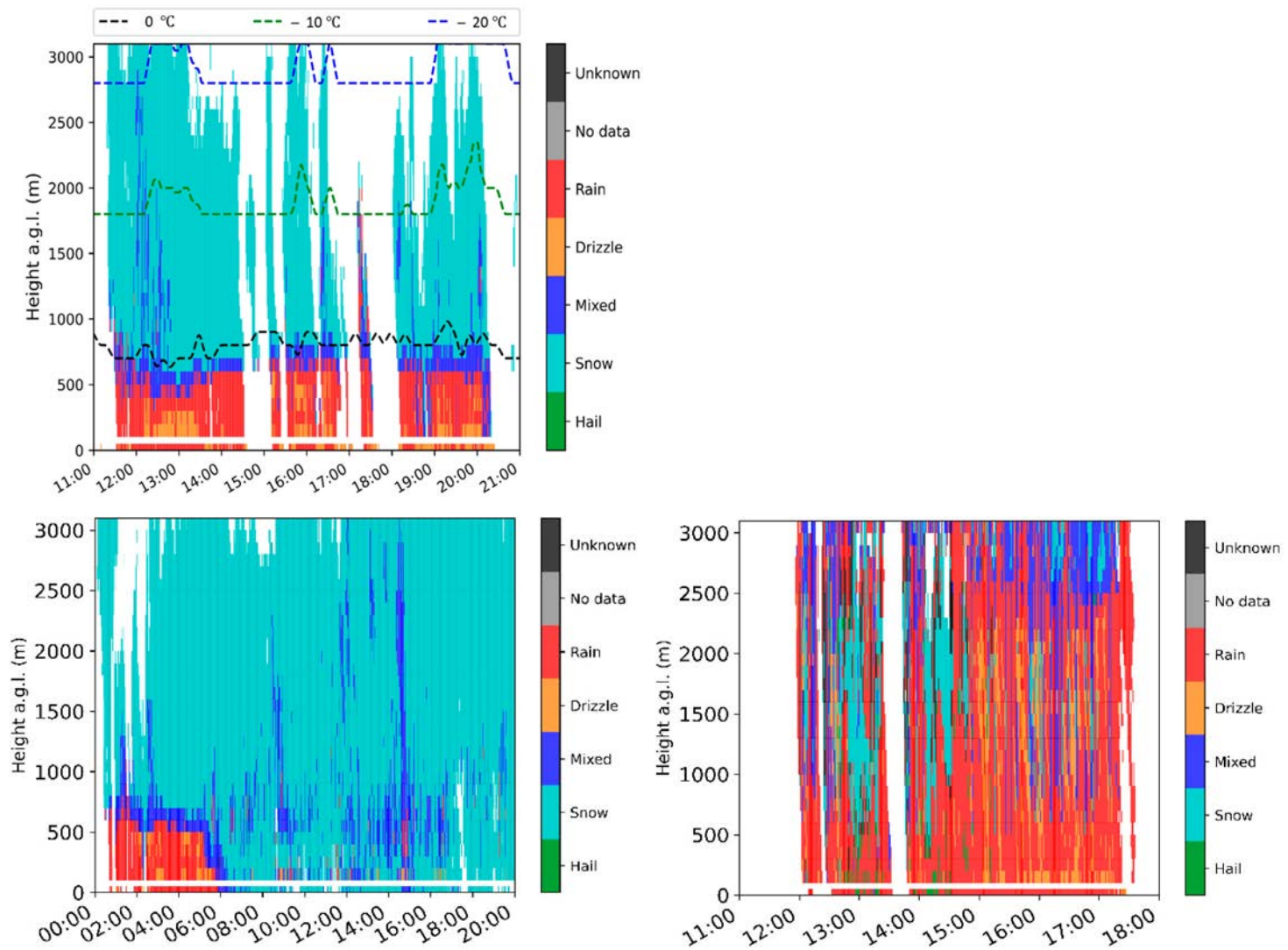


Instrumentation

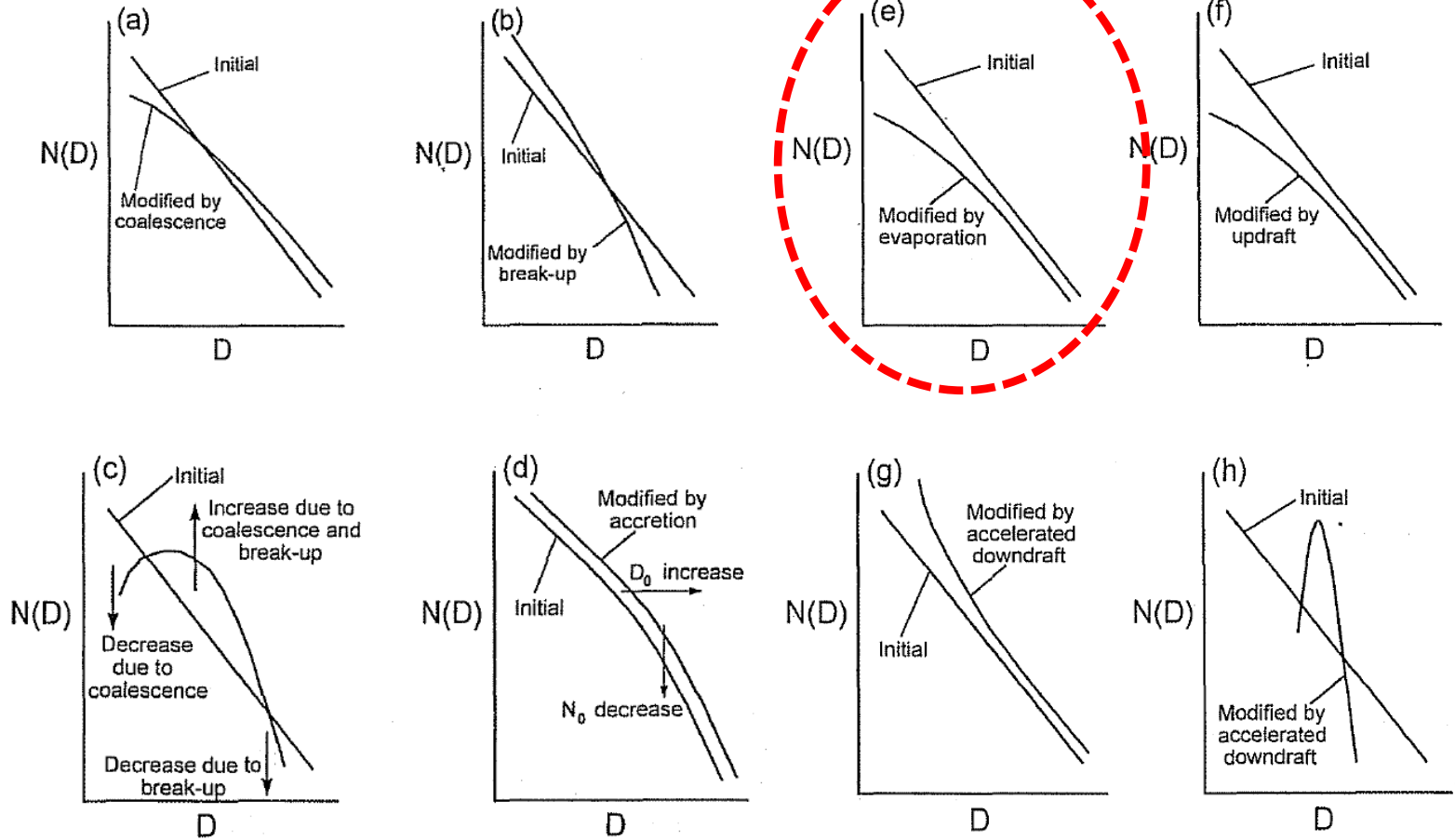
Micro Rain Radar (Vertically Doppler K band radar) & disdrometer (PARSIVEL)



15-16 Jan 2017 Cerdanya-2017 case study Gonzalez et al (2019), Udina et al (2020)



Hydrometeor type profiles (HTP) and rainfall type (27 March 2017, Cerdanya-2017 field campaign, top), and HTP for 24 March 2018 and 28 June 2018 (bottom).
García-Benadí et al (2020).



Rosenfeld & Ulbrich (2003)



Observational strategy

Install 3 MRR+Parsivel stations
(irrigated, non-irrigated, transition)

1 MRR-2 (CNRM), 1 Parsivel2 (UGA),
2 MRR-PRO, 2 Parsivel2 UB

Examine possible differences in frequency,
intensity, rainfall regime, hydrometeor
type, virga cases, etc.

Case studies with WRF-ARW ($\Delta x \sim 1$ km)
and AEMET γ -SREPS (EPS).



Interaction with LIAISE partners

Precipitation microphysics – windprofilers, MW radiometers, soundings and tower data not affected by precipitation.

Interest with other LIAISE data (temperature and humidity) at the onset or end of precipitation events.



References

- Garcia-Benadi, A., Bech, J., Gonzalez, S., Udina, M., Codina, B., & Georgis, J. F. (2020). Precipitation type classification of micro rain radar data using an improved doppler spectral processing methodology. *Remote Sensing*, 12(24), 4113.
- Gonzalez, S., Bech, J., Udina, M., Codina, B., Paci, A., Trapero, L. (2019). Decoupling between precipitation processes and mountain wave induced circulations observed with a vertically pointing K-band doppler radar. *Remote Sensing*, 11(9), 1034.
- Rosenfeld, D., & Ulbrich, C. W. (2003). Cloud microphysical properties, processes, and rainfall estimation opportunities. In *Radar and Atmospheric Science: A Collection of Essays in Honor of David Atlas* (pp. 237-258). American Meteorological Society, Boston, MA.
- Soula, S., Pineda, N., Georgis, J. F., Leroy, A., Vanpoucke, I., Montanyà, J., Casellas, E., Gonzalez, S., Bech, J. (2021). On the conditions for winter lightning at the Eagle Nest Tower (2537 m asl) during the Cerdanya-2017 field experiment. *Atmospheric Research*, 247, 105208.
- Udina, M., Bech, J., Gonzalez, S., Soler, M. R., Paci, A., Miró, J. R., Trapero, L., Donier, J.M., Douffet, T., Codina, B., Pineda, N. (2020). Multi-sensor observations of an elevated rotor during a mountain wave event in the Eastern Pyrenees. *Atmospheric Research*, 234, 104698.
- Valmassoi, A., Dudhia, J., Di Sabatino, S., Pilla, F. (2020). Irrigation impact on precipitation during a heatwave event using WRF-ARW: The summer 2015 Po Valley case. *Atmospheric Research*, 241, 104951.