



# Saharan intrusions and heatwaves in Western Europe

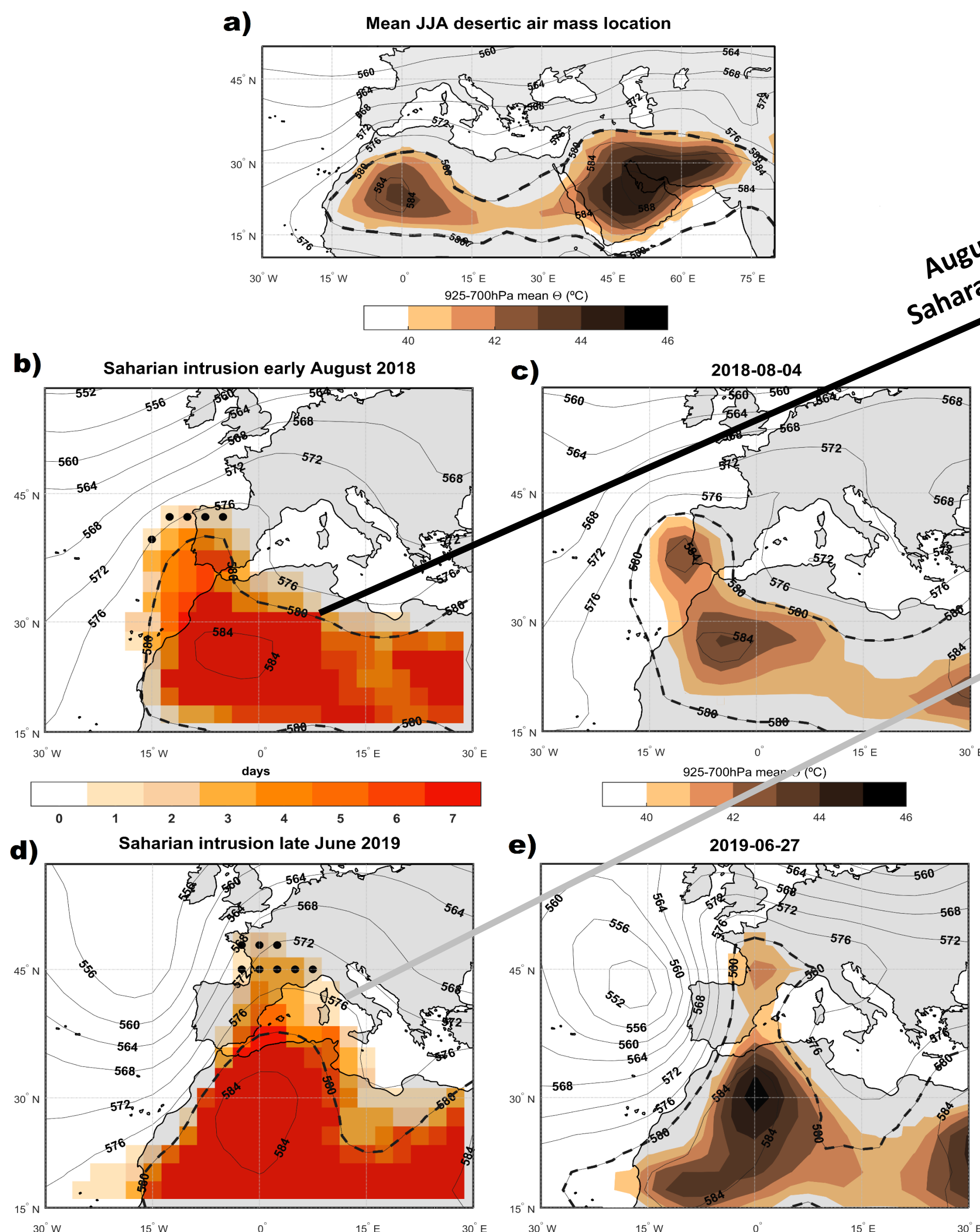
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R&D UNIT: IDL

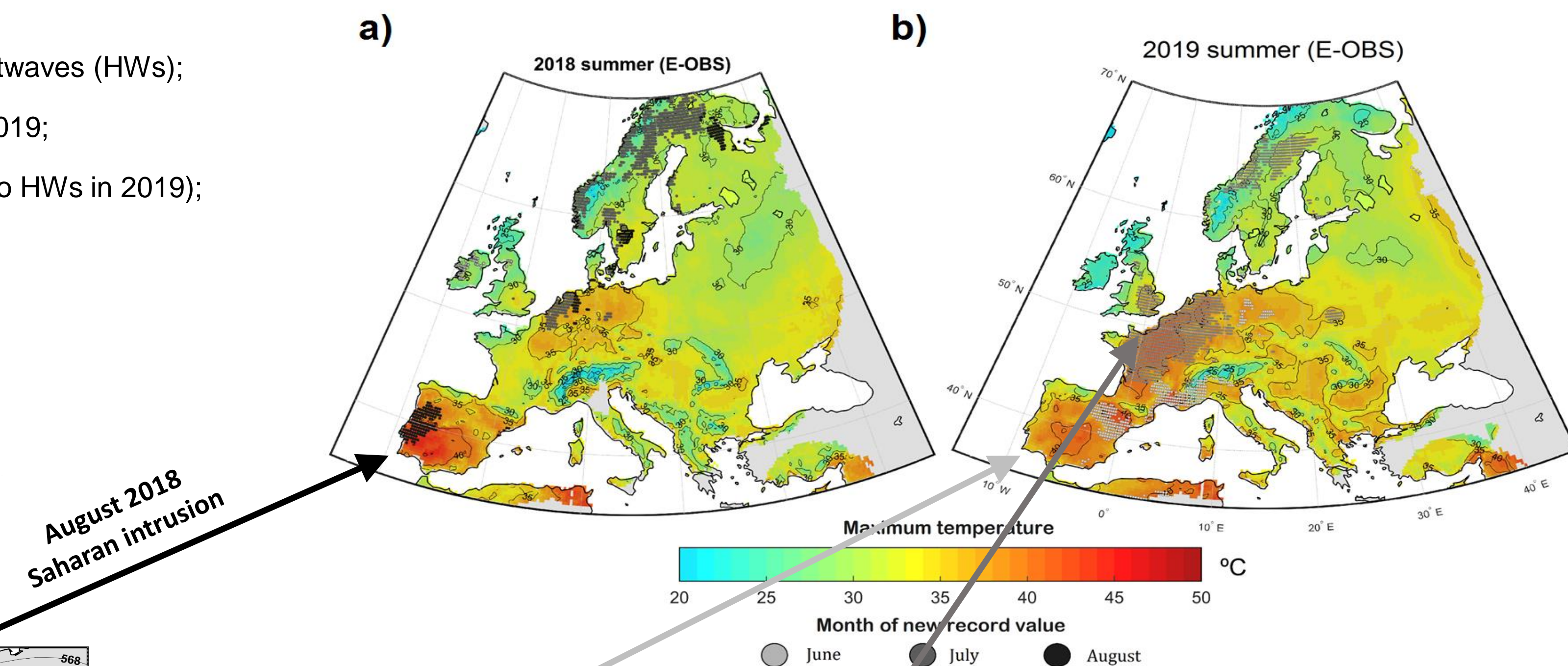
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## OBJECTIVES

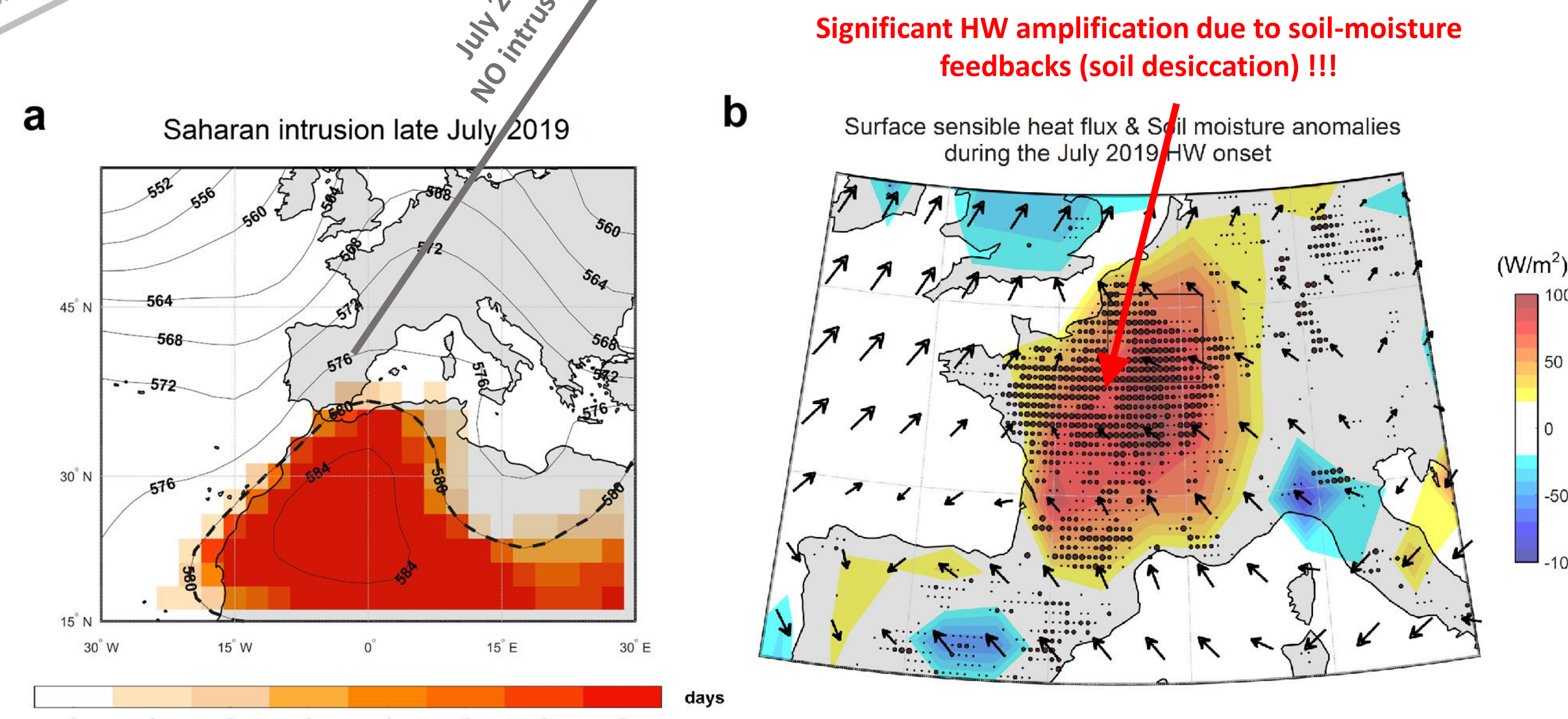
- Study the role of Saharan intrusions on Western Europe heatwaves (HWs);
- Analyze the outstanding recent HWs that occurred in 2018/2019;
- Compare examples driven (or not) by Saharan intrusions (two HWs in 2019);
- Check long-term trend in these intrusion events.



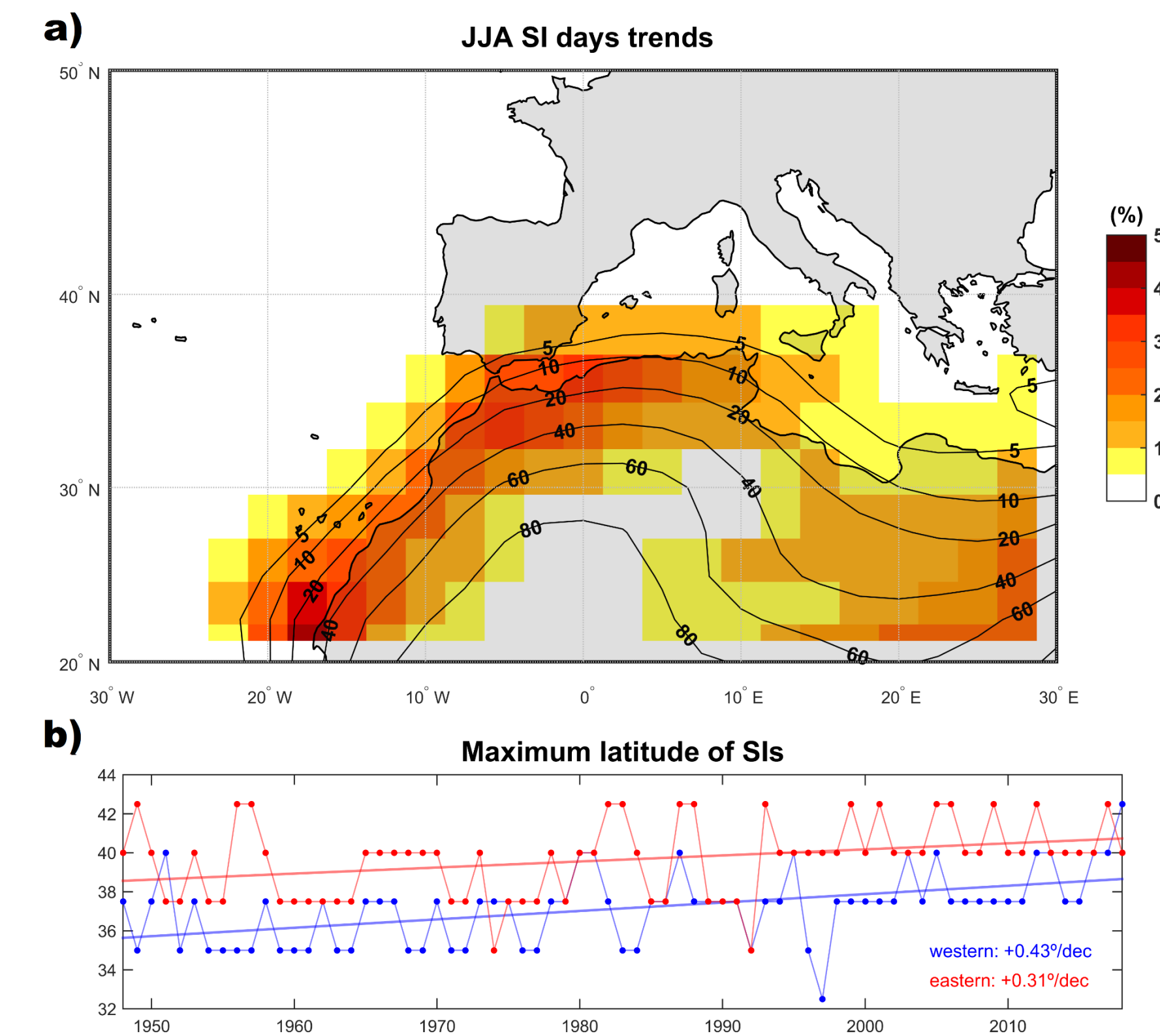
**Fig.1-** a) Climatological location and extension of desertic sub-tropical air masses during summer. b) Number of days (shaded) when the Saharan intrusion was detected in each gridpoint between b) 1 and 7 August 2018 and d) 24 and 30 June 2019. Black dots represent areas where such intrusions were unprecedented. d) and e) Same representation as in a) and b), but for the warmest day of each event.



**Fig.2-** Absolute maximum 2m temperature observed in Europe during: a) the 2018 summer (JJA); b) the 2019 summer. The E-OBS dataset was used here. Hatched areas in grey scale denote regions where new all-time maximum temperature records were set.



**Fig.3-** a) Same as in Fig.1, but for the late July 2019 event. b) Areas with anomalous sensible heat flux (shaded) and areas under significant drought conditions (dots) in the weeks prior to the July 2019 HW.



**Fig.4-** a) Changes in the frequency of days with Saharan air masses since 1948. Black lines represent the climatology. b) Trends for the yearly northernmost latitude of Saharan intrusions in western (blue) and eastern (red) sectors of Iberia.

## DISCUSSION

- Saharan intrusions are responsible for HW record-breaking events in Europe, such as the August 2018 and June 2019 events;
- These intrusions are getting stronger and reaching unprecedented areas further north, as a result of ;
- Not all HW events in Western Europe are linked to well defined Saharan Intrusions. While most of them depend from subtropical ridge patterns, some are generated and/or intensified locally due to intense soil-atmosphere feedback processes, such as the July 2019 event.
- The June 2018 HW (related to an intrusion) prompted a strong soil desiccation process, which by itself contributed to the amplification of the posterior July 2019 event.