ASSESSING COMPOUND EXTREME EVENTS USING EXPERT CROWDSOURCING FOR SEMANTIC ANNOTATION

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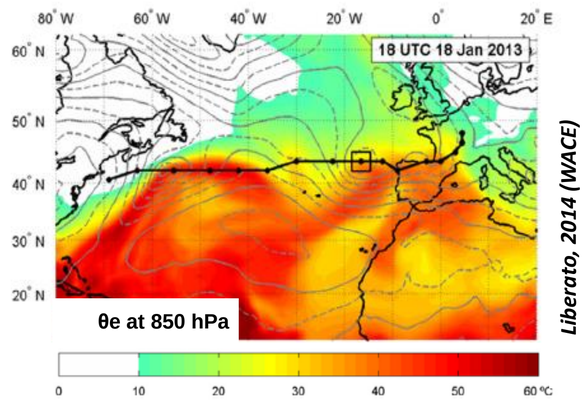
1. Motivation: compound extreme events Iberia

Extratropical cyclones (e.g. Liberato *et al.*, 2013; 2014)

Compound events leading to an impact

combination of physical processes: ECs, ARs, sting jet, flash-floods



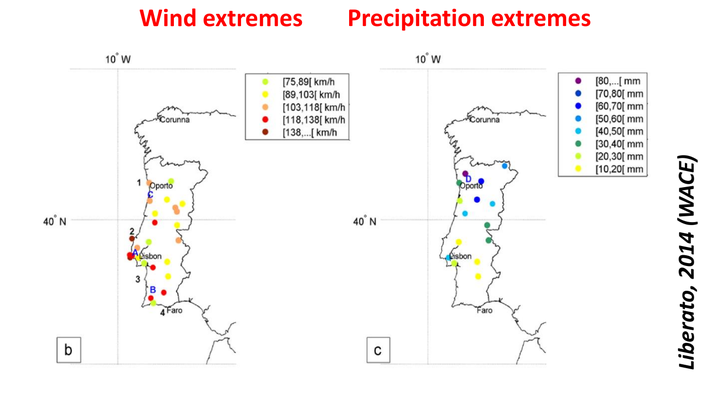


Fig. 7. (a) Small map of Europe. (b) Maximum wind gusts (in km h⁻¹) at meteorological stations in Portugal, for 19 January 2013. Only stations where recorded values surpassed Beaufort wind force 9 are marked. Colour scale represents the Beaufort wind force scale from 9 (strong gale; ≥ 75 km h⁻¹) to 12 (hurricane force; ≥ 118 km h⁻¹). The letters A, B and C identify locations of Fig. 10(a)–(c), respectively. The numbers 1–4 identify the buoy locations of Table 1. (c) Precipitation totals (in mm) measured between 09 UTC of 18 January and 09 UTC of 19 January at the Portuguese meteorological stations (IPMA, 2013).

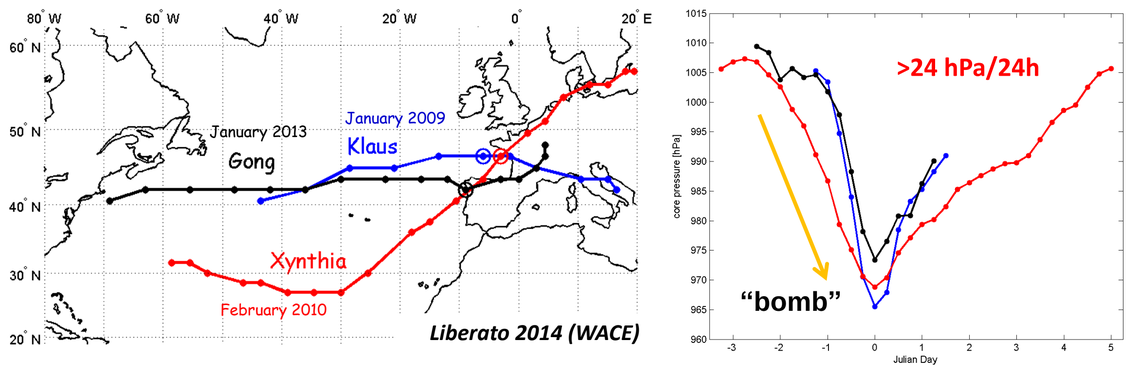
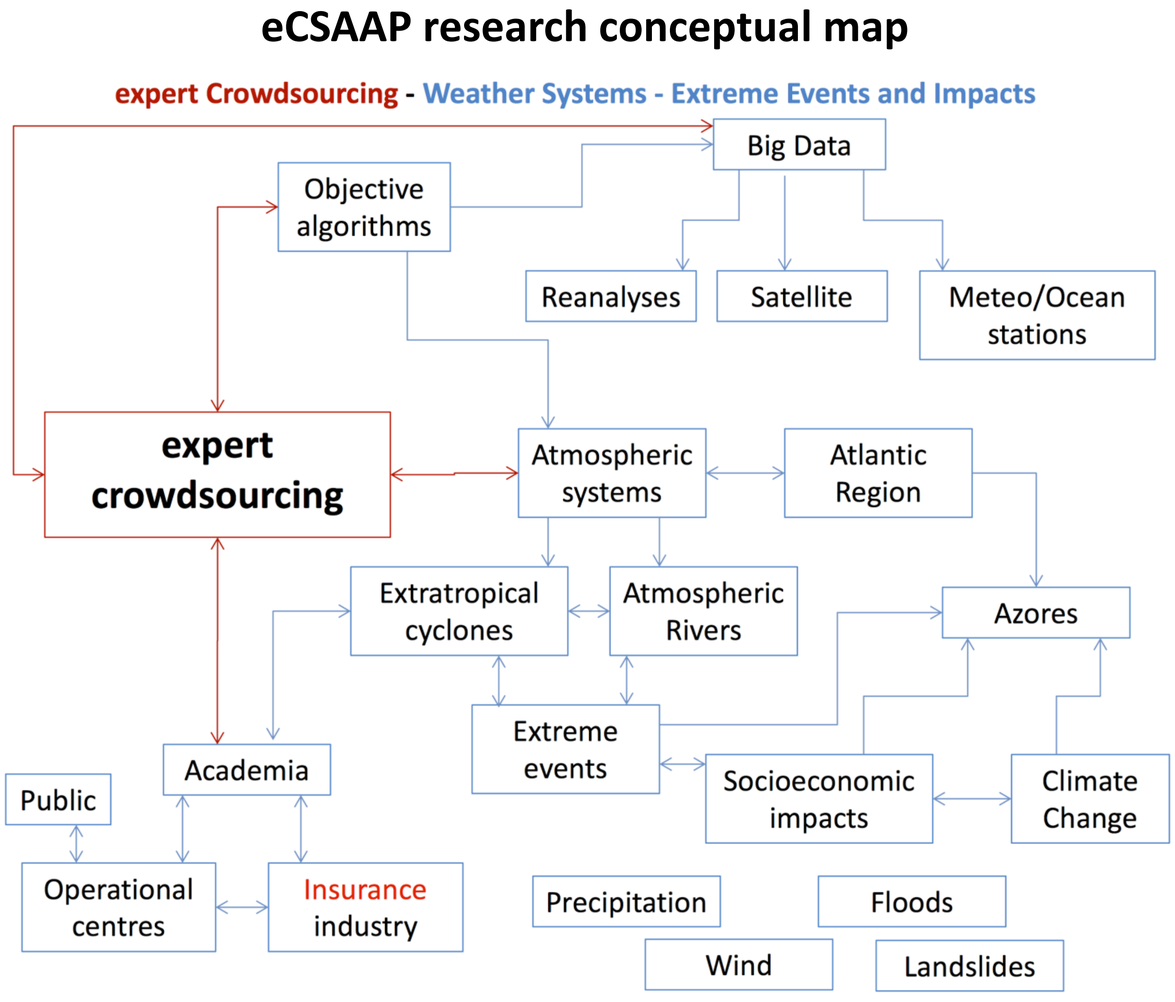


Fig. (a) Cyclone tracks of recent extreme storms over the North Atlantic based on ECMWF ERA-Interim reanalysis data with dots indicating storms' location at six hour intervals: Gong (January2013, in black), Klaus (January 2009, in blue) and Xynthia (February 2010, in red). The open circle marks the location of the minimum core pressure for each storm. (b) Core pressure evolution over the lifetime of each cyclone (core pressure in hPa). Dates are relative to the minimum core pressure time (zero Julian day).

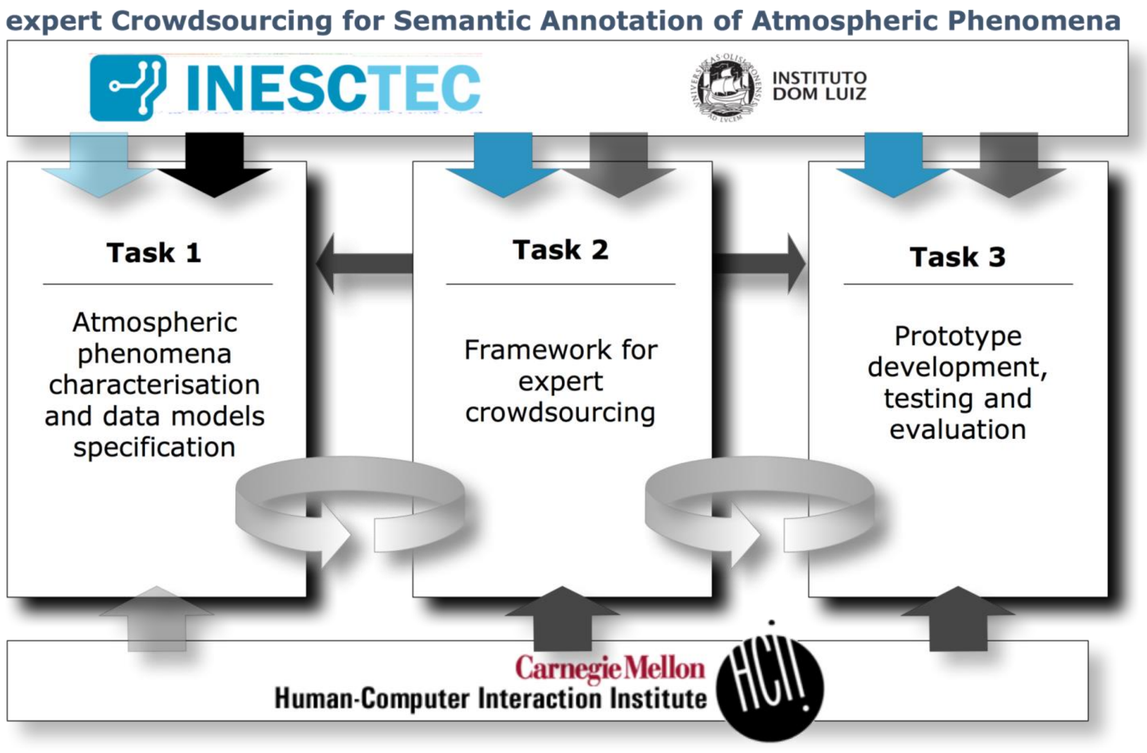
Fig. 10. Photos documenting the impact of storm Gong, 19 January 2013, showing: (a) Example of damage in Sintra, Portugal(courtesy of Emília Reis). (b) Greenhouses disruption at Odemira, Portugal (photograph of Tiago Canhoto/courtesy of Lusa). (c)The merchant ship "MERLE" stranding on the Torreira beach, Portugal (photograph of Paulo Novais/courtesy of Lusa). (d)–(e) The floods of Ave river at Amieiro Galego (courtesy of Carlos Valente). (f) Identification of previous floods levels at Amieiro Galego (courtesy of Américo Fernandes). The sites are identified with letters from "A" to "D" on the maps of Fig. 7.

2. Big data, multiple sources and objective algorithms



3. expert Crowdsourcing for Semantic Annotation

For atmospheric scientists, separating consecutive occurrences of such phenomena may be relative simple task. Therefore this task can be outsourced to an expert crowd and current algorithms may still be used, with clear benefits for the computational power required.



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