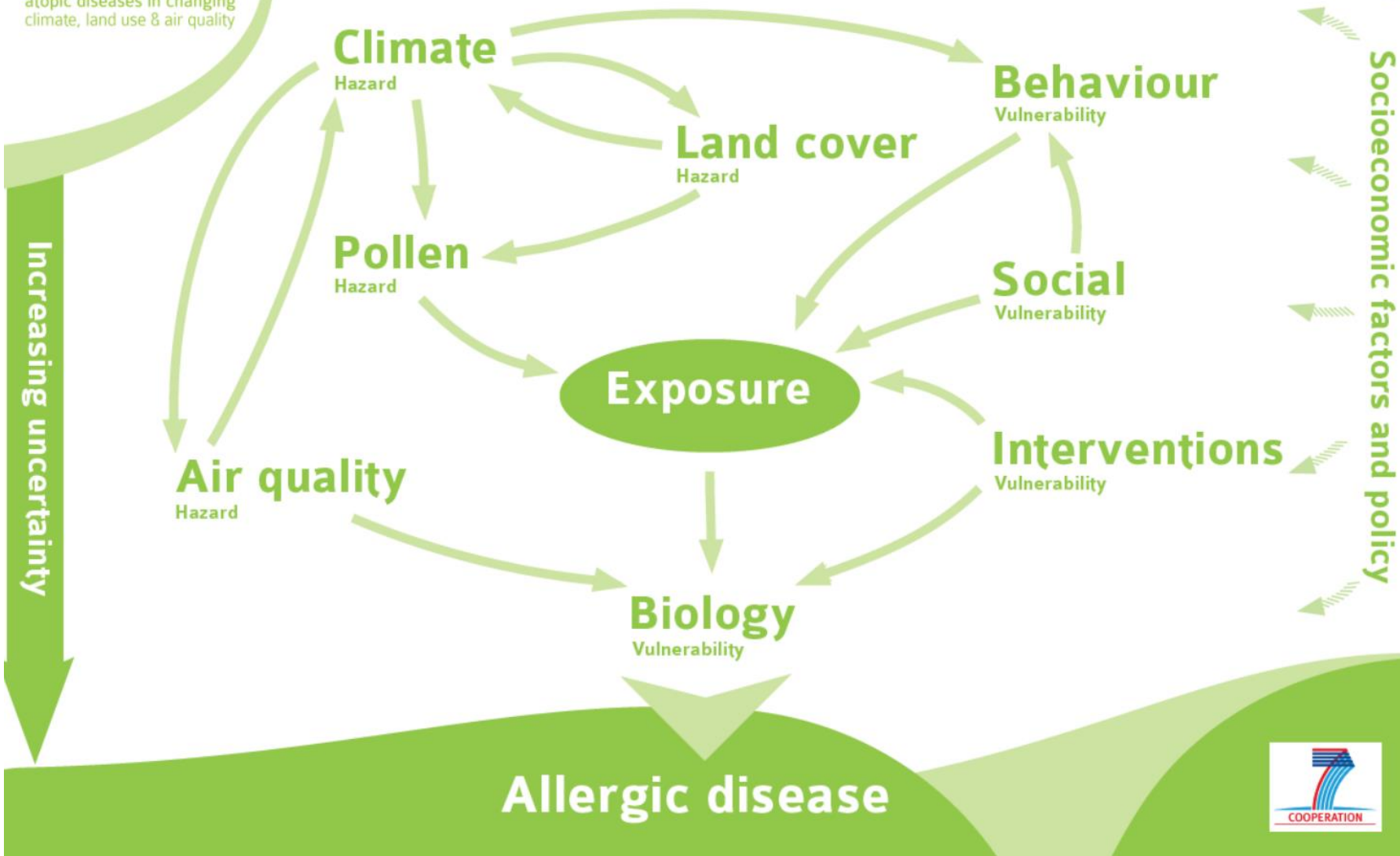atopica®
atopic diseases in changing
climate, land use & air quality

6 March 2015

Perspectives on the integrated assessment methodology and interdisciplinary working within ATOPICA
Clare Goodess

University of East Anglia

atopica is a project funded by the European Commission under the 7th FP

Key influences on the risk of allergic disease

Interdisciplinary working

The ATOPICA team:
- Climate scientists
- Plant and pollen experts
- Clinicians
- Statisticians
- Media and communications

Some of the challenges:
- Language/jargon

- Collecting 'real time' data

- Integrating very different types of data
  - Different time scales
  - Different spatial scales

Aeoroallergen	Scenario
Epigenetics	Projection
Atopic	RCP
IgE	SSP
eCRF	CHIMERE
ISAAC	PM10

To what extent can we extrapolate?


??????

E.g., Clinical studies

- The largest uncertainty is extrapolating from small areas and 2012-2014 diaries

  - Confounders:
    - Population distribution
    - Societal behaviour
    - Time spent outdoors
    - etc

For this reason, the dose-response curve used in the European assessment was derived from the literature covering 20 different countries

Assumptions: extrapolation

- All empirical relationships can be extrapolated and hold for the future

- Pollen and presence observations and potential distributions provide a reliable indication of the actual number of ambrosia plants

- Climate/pollen/air quality measured at nearest site are representative of conditions experienced by exposed individuals

- Empirical relationships:
- Ambrosia life-cycle model including germination rates, seed dispersal rate, plant phenology, biomass production and pollen release
- Bias correction used in air quality modelling
- Dose-response relationship
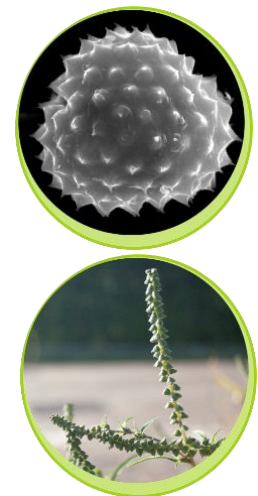
Assumptions: data biases & sampling

- Questionnaire/diary respondents have perfect recall

- No systematic biases in data sets (pollen, air quality, climate, genetic samples, serum samples, skin prick tests)

- Sampling is unbiased (clinical cohorts, location of climate/pollen/air quality monitoring stations)
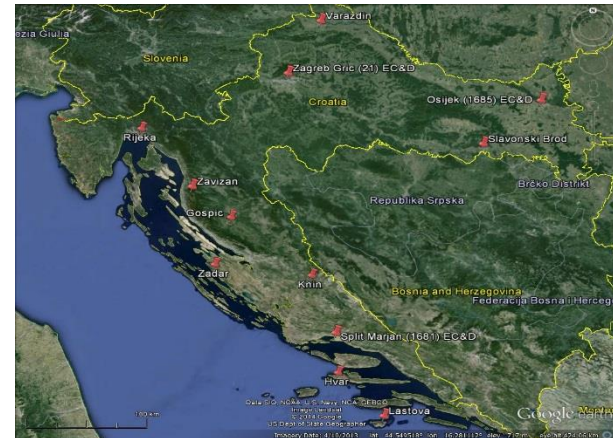
Assumptions: uncertainty

- The different variants provide some indication/reflection of the wider uncertainty range:
- Two climate and two transport/air quality models (RegCM & WRF/CHIMERE)
- Four assumptions on ragweed pollen invasion (Reference, Rapid, Slow, None)
- Two RCPs (Representative Concentration Pathways – RCP4.5 & RCP8.5)
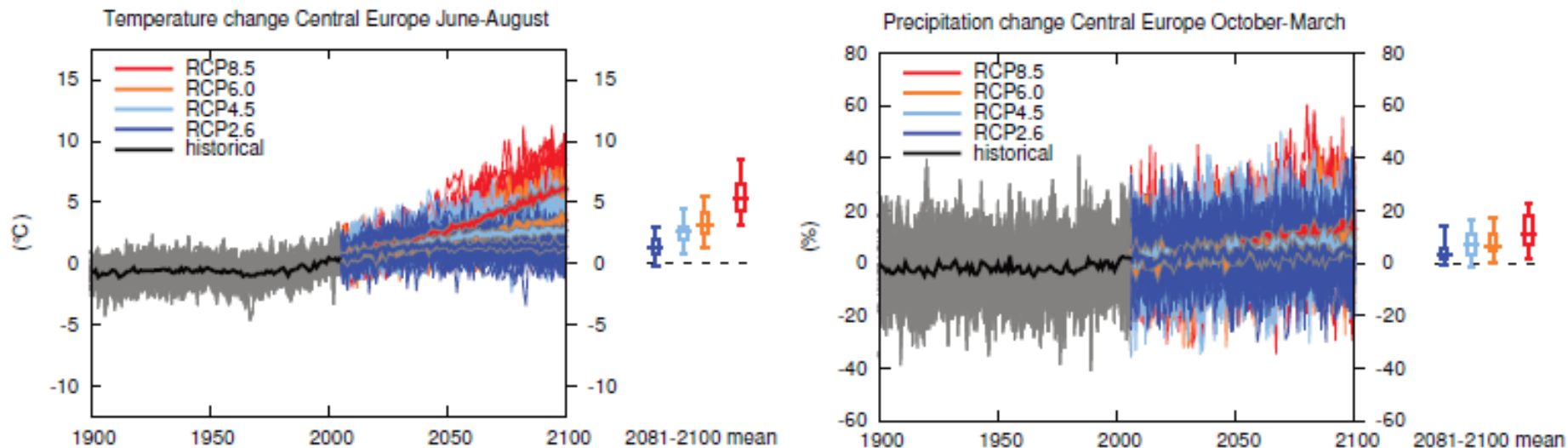
Implications for climate mitigation

IPCC AR5 WGI Regional Atlas (Appendix 1) – based on GCMs

IPCC WGII AR5 Summary for policy makers

"Uncertainties about future vulnerability, exposure and responses of interlinked human and natural systems are large (*high confidence*). This motivates exploration of a wide range of socioeconomic futures in assessments of risks."
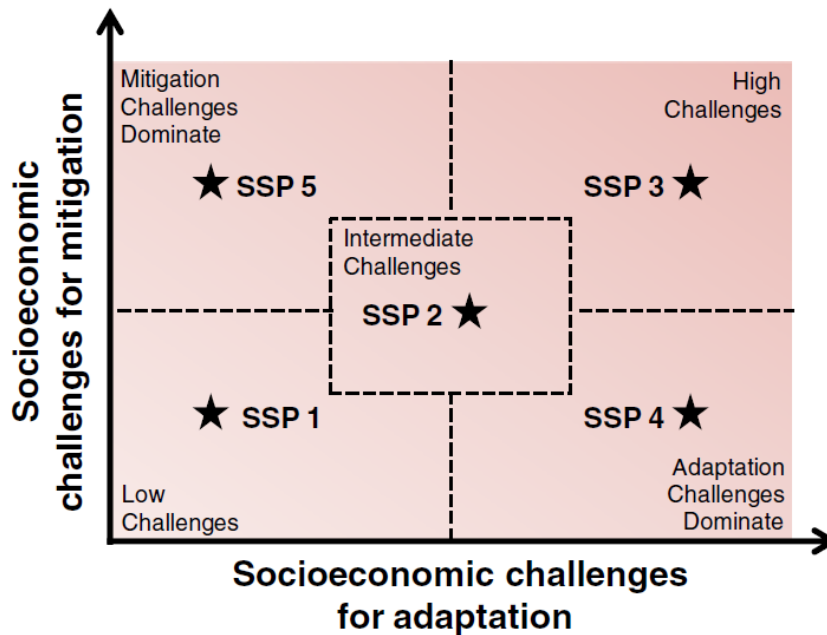
Health in the Shared Socioeconomic Pathways
Ebi et al., 2013: *Int. J. Environ. Res. Public Health*

SSP1: Sustainability
SSP2: Middle of the road
SSP3: Fragmentation
SSP4: Inequality
SSP5: Conventional development

We have assumed some things don't change (population, land use, intervention, behaviour etc) – but some narratives could be developed…...

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Key messages concerning uncertainty

- We have been transparent about the assumptions underlying our analyses and the fact that all stages of the integrated assessment are subject to uncertainties.

- Despite these assumptions and uncertainties we are confident that our key messages our robust.

- One of the most important of these messages is that, without a major reduction in greenhouse gas emissions, the number of individuals with symptoms of ambrosia allergy is likely to more than double by the middle of the century.

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Further analysis, & more data, would allow us to better understand & disentangle the underlying processes & factors & to make more detailed & quantitative assessments:
- More pollen & plant observations/monitoring
- More climate & air quality simulations
- More years of cohort data
- ……………………………….

University of East Anglia