Introduction to SimCLIM

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What is SimCLIM?

- A research product from New Zealand Climate Change Impact Studies (CLIMPACTS)
- An integrated computer model for climate change impact assessment
- Build-in customised GIS system to support multi-level spatial analysis
- Based on IPCC guidelines and upgradeable with latest scientific research information.

Why Develop integrated assessment model ?

Some Background:

- Climate change is REAL and its impact has been felt by people all over the world
- High demand from the stakeholders to include climate change impact information into their decision making

Why Develop integrated assessment model ?

Some Background:

- Model based approach have helped study the global warming, its impact and evaluate the possibility of mitigation and adaptation possibility in the past and in the foreseeable future
- GCMs are the most comprehensive tools for estimating the response of climate to radiation forcing
- It has been a challenge to mainstream such scientific information into action, due to the uncertainties of the model and the complexity to reflect such uncertainties in policy-making process

What is the challenge?

Uncertainties!!!

What is the challenge?

- Uncertainties in future greenhouse gas and aerosol emissions
- Uncertainties in global climate sensitivity, due to differences in the way physical processes and feedbacks are simulated in different models
- Uncertainties in regional climate changes, which are apparent from the differences in regional estimates of climate

How to tackle the problem in assessment models ?

IPCC Task Group on Data and Scenario Support for Impact and Climate Assessment (TGICA)

General guidelines on the use of scenario data for climate impact and adaptation assessment

- The IPCC Data Distribution Centre (DDC)
- Methods of impact assessment

How to tackle the problem in assessment models ?

- Direct using GCM simulation result in impact assessment
  - ✓ Keep model's physical/mathematical consistency
  - ✓ Provide transient simulation output
  - ❖ Computationally and resource demanding
  - ❖ Provide only one possible scenario of the future that can not cover the full range of the uncertainties
- Normalised Pattern Scaling method
  - ✓ Possibility to represent the whole range of uncertainties involved in future climate change projection
  - ✓ simple to operate and computationally fast

Steps of the method

1. The standardised pattern of climate change from the GCM is estimated by dividing individual grid box changes by the global mean warming of that model experiment, yielding a ratio
2. The magnitude of global warming by a specified date in the future is estimated from the simple model for a given emissions scenario and a given climate sensitivity
3. The patterns of changes in different climatic variables are multiplied by the global warming value from stage 2

$$\Delta T_{gcm} = (T_{gcm(2070/2099)} - T_{gcm(1960/1990)}) /\cdot (\Sigma GMT_{gcm(2070/2099)} - \Sigma GMT_{gcm(1960/1990)})$$

$$T_{gcm(1)} = T_{gcm(0)} + \Delta T_{gcm} \cdot \Delta GMT_{sebm(1)}$$

Weakness?

A fundamental assumption of the scaling approach is that while the magnitude of climate change alters over time in proportion to the global warming, the pattern of change from the GCM remains constant

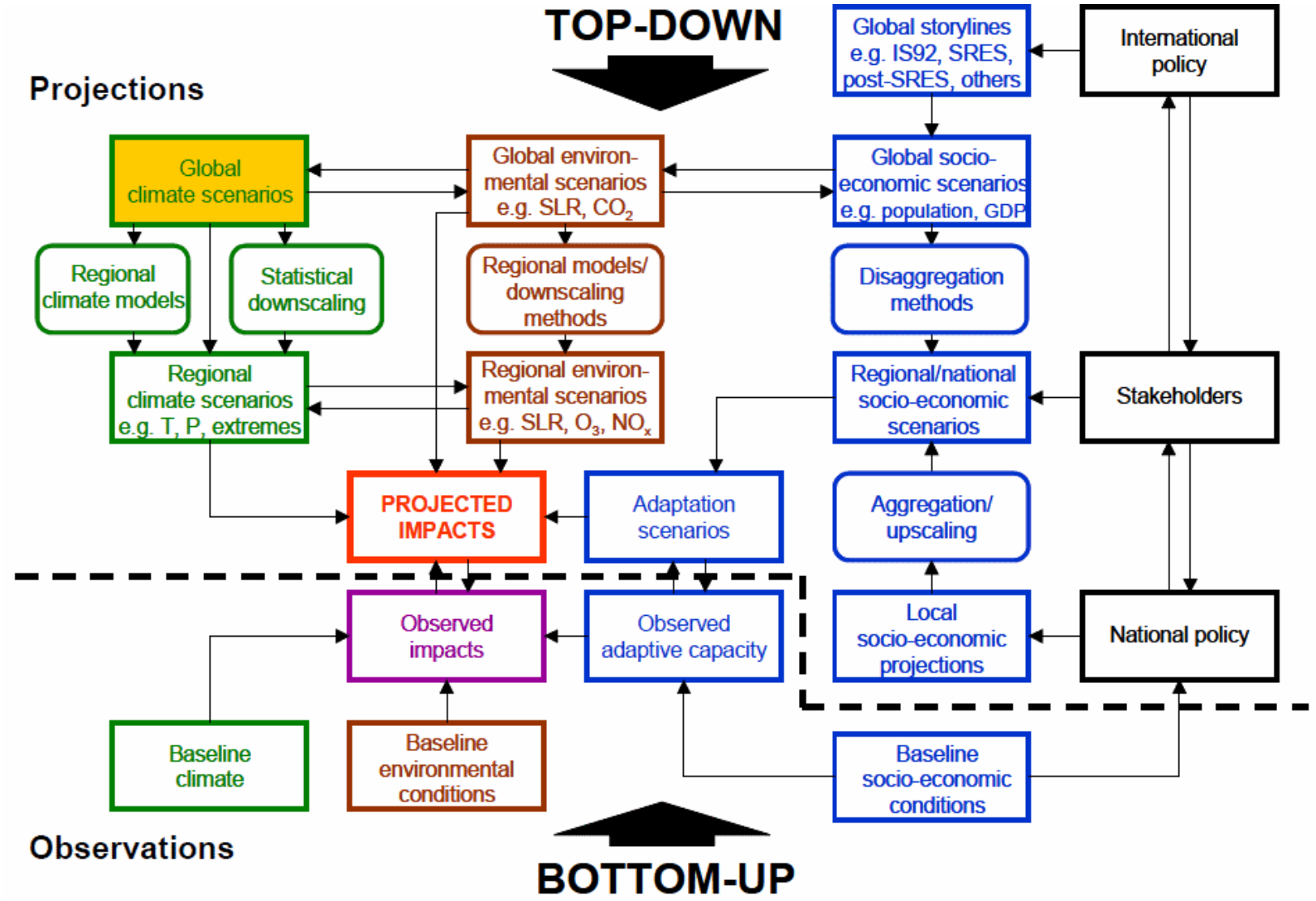
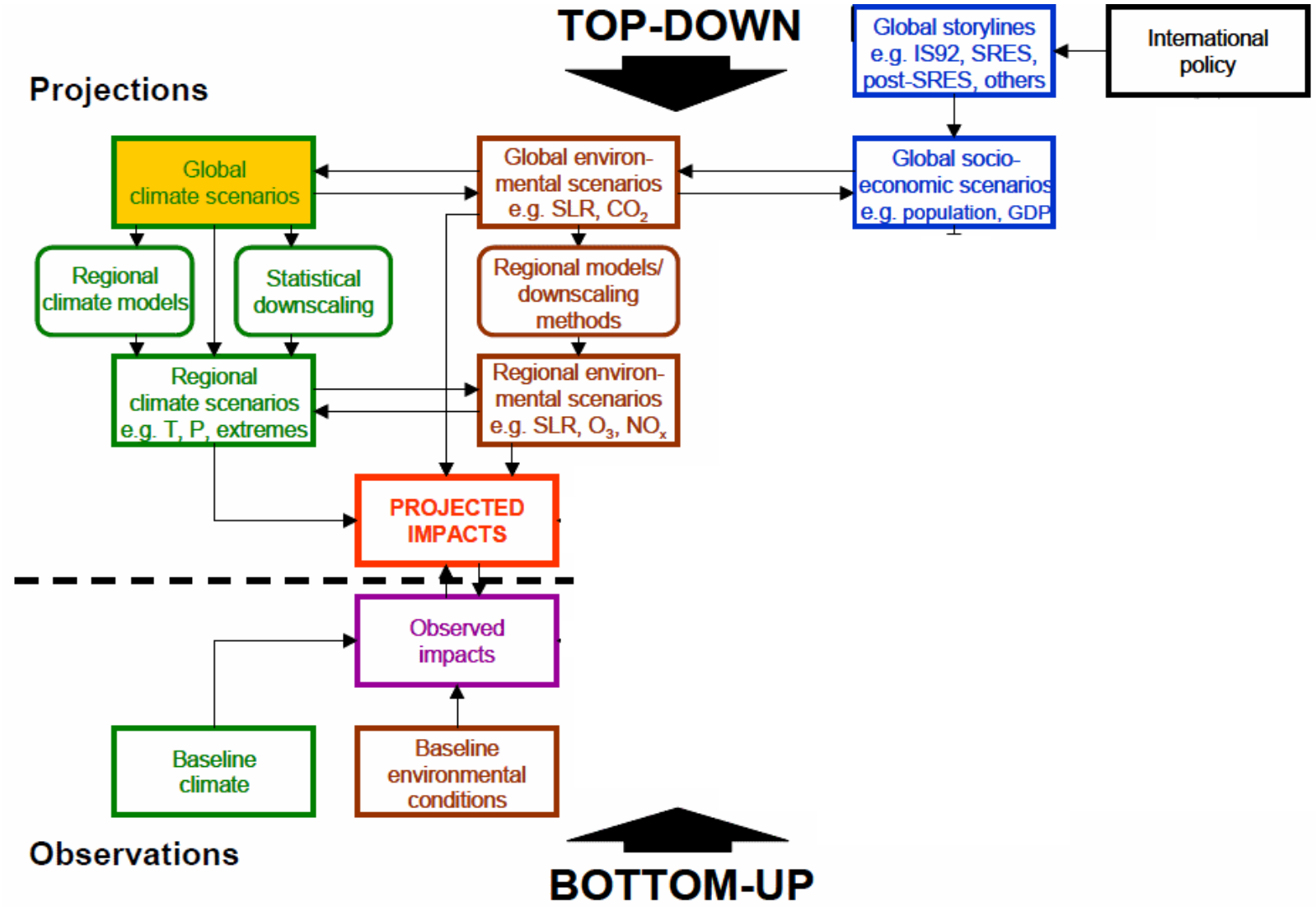


Figure 1. Schema of the main scenario elements and guidance material available from the IPCC Data Distribution Centre (DDC). Information above the dashed line comprises projections; below the line observations. For explanation, see text.



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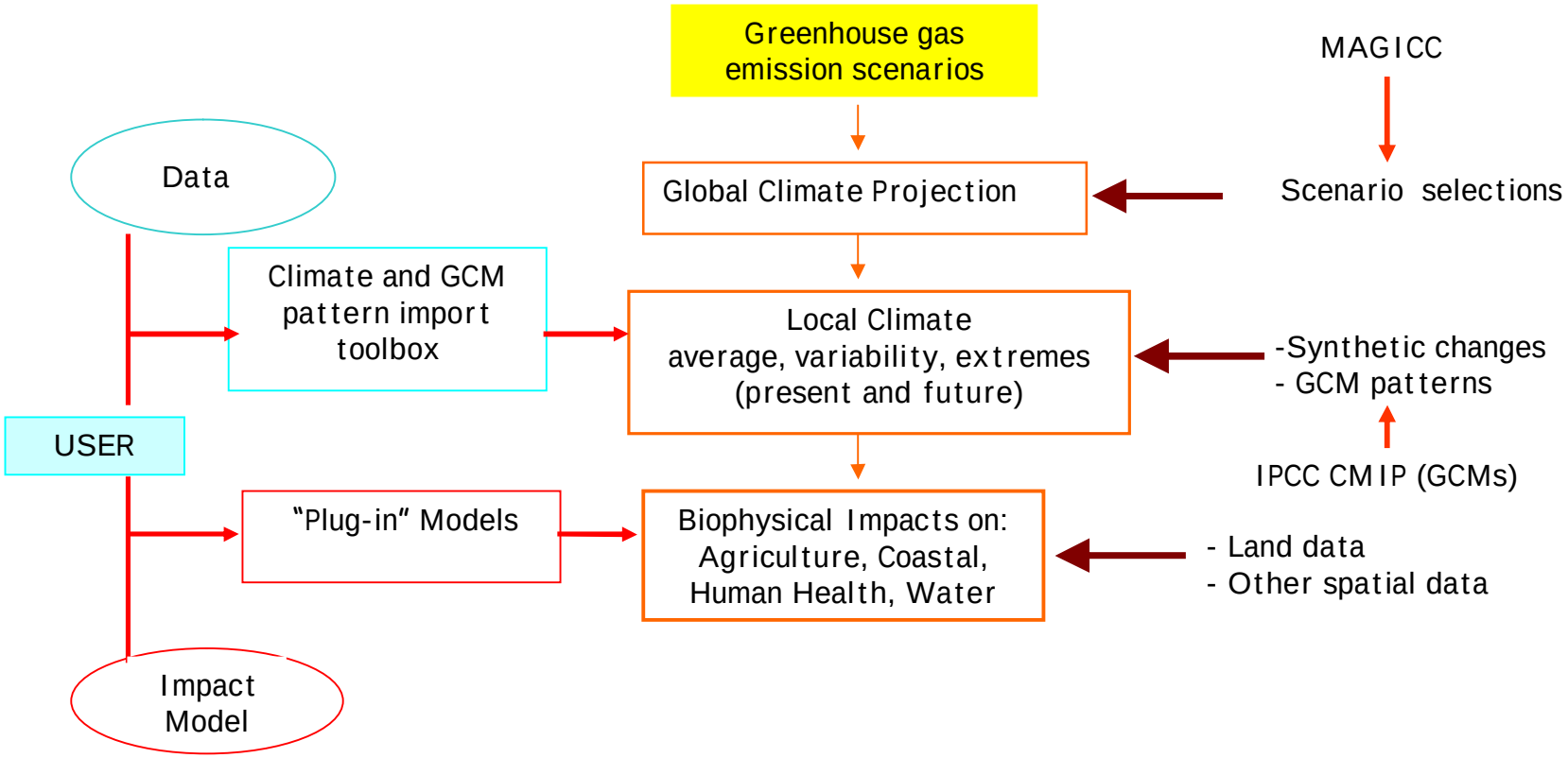
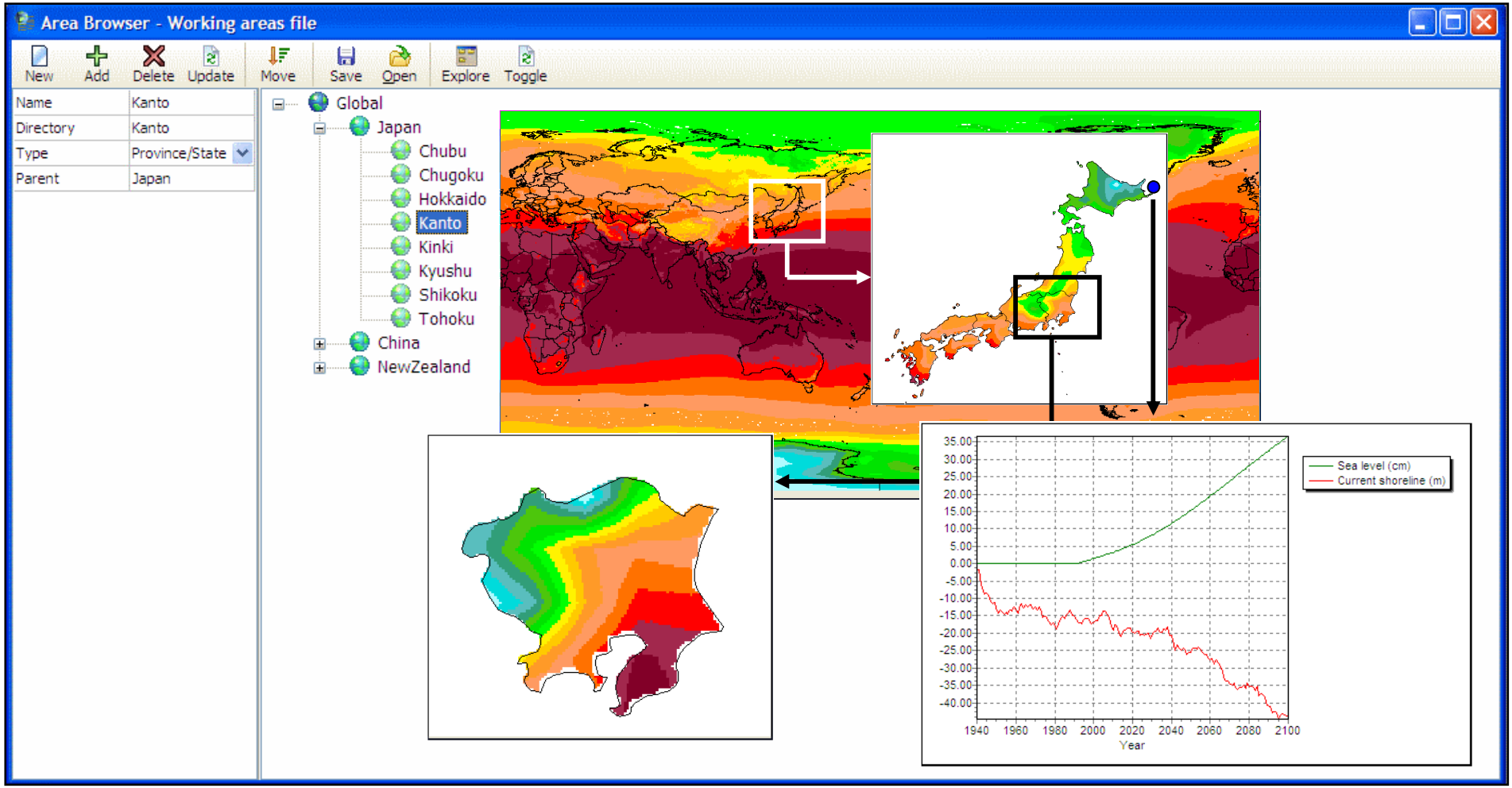
SimCLIM structure



Advantages of the SimCLIM modelling approach

- quick running and flexible
- spatial and temporal analyses
- multi-scale - national, regional, sites
- Training – for awareness raising
- easily updated

Multi-scale, open-framework system

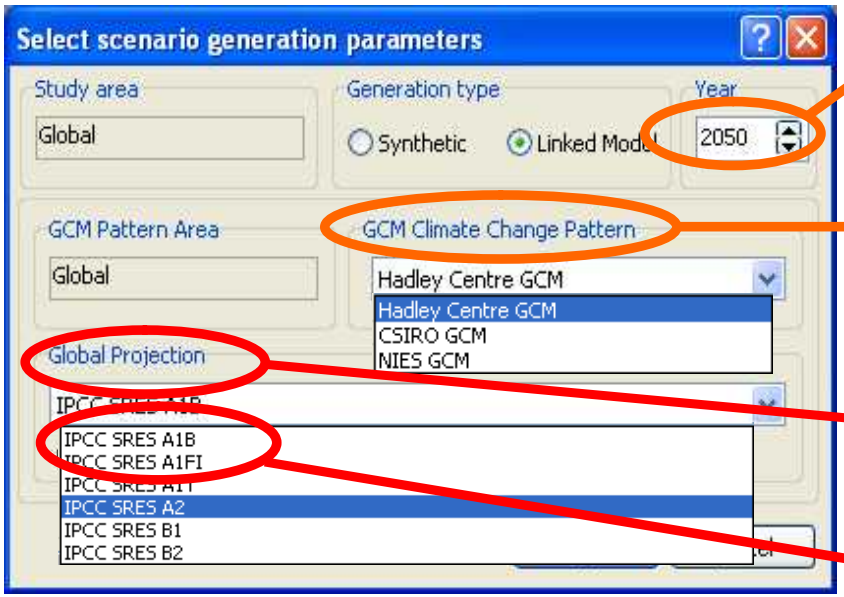


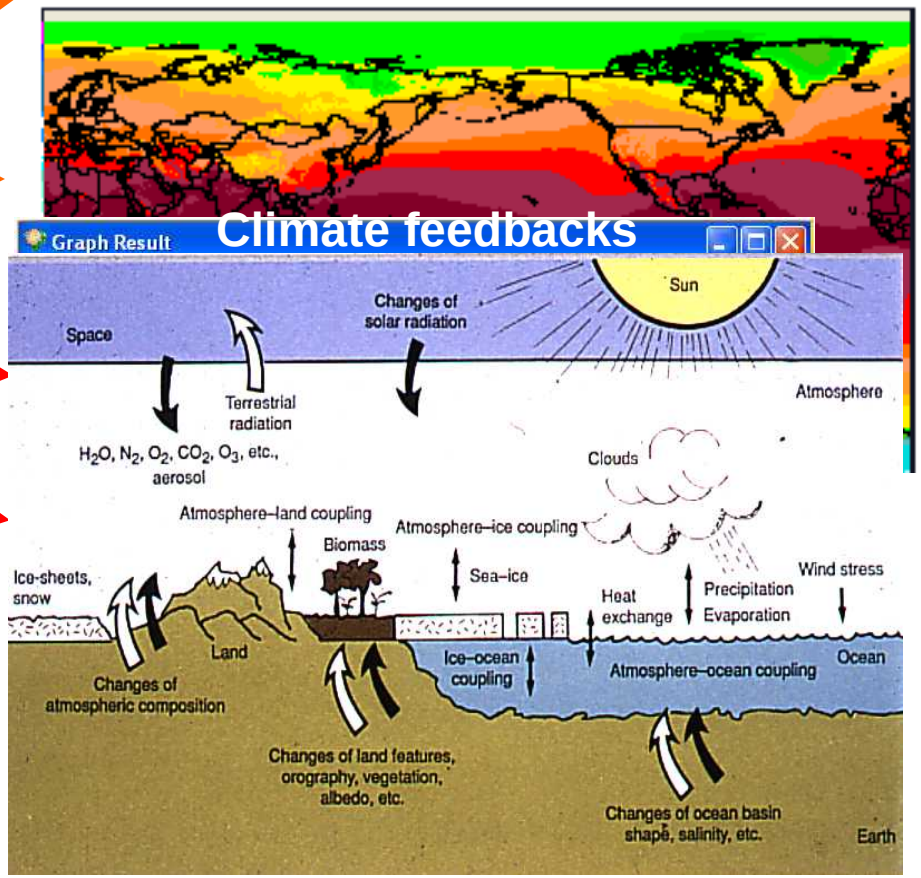
Constructing Climate Change Scenarios: spatial

Key uncertainties:
- Regional variations
- Emission scenario
- Climate sensitivity

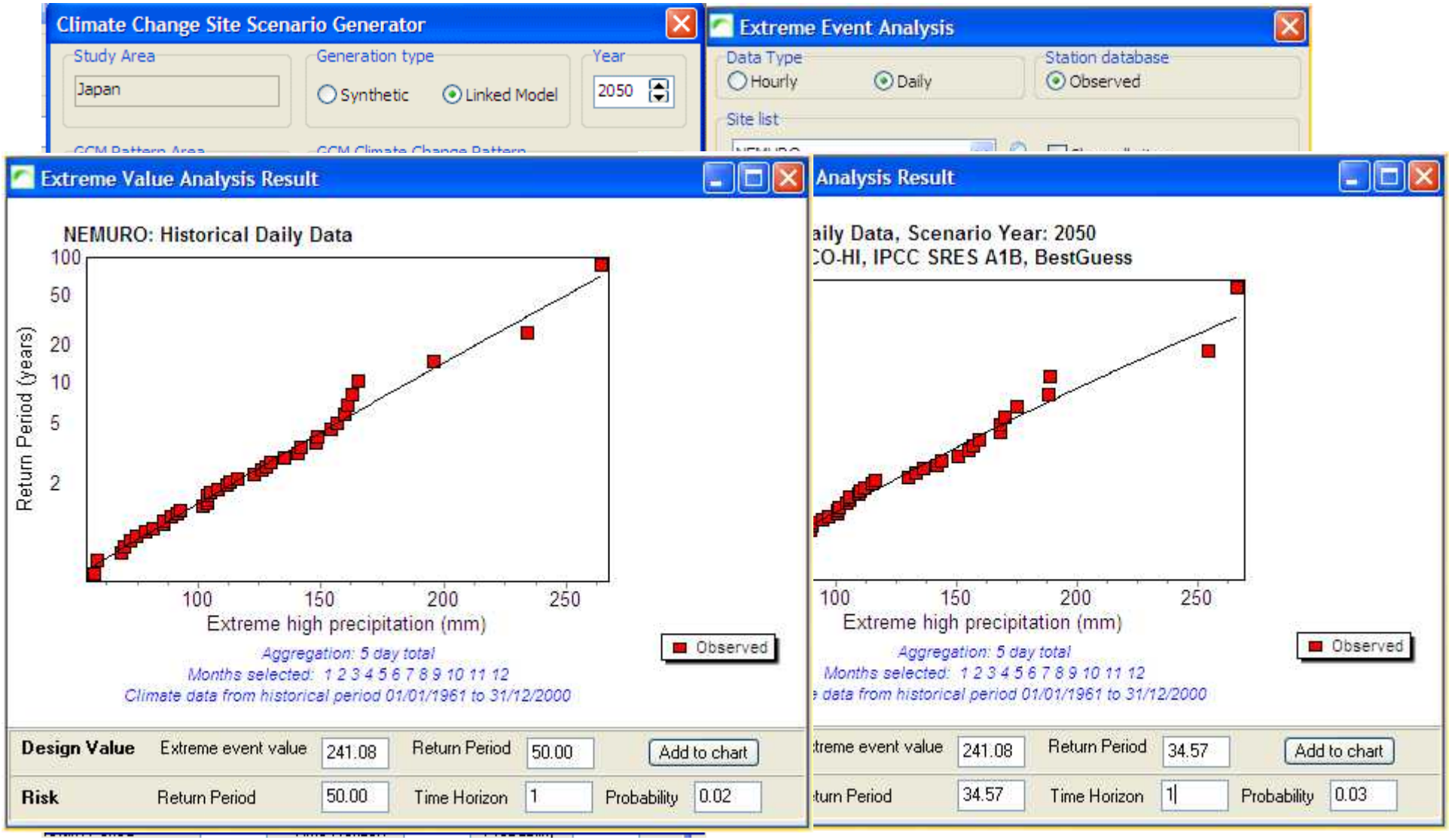
1990 brings up baseline climate

Scenario years up to 2100





Constructing Climate Change Scenarios: site specific



SimCLIM can be used to

- Describe baseline climates
- Examine current climate variability and extremes
- Assess risks – present and future
- Investigate adaptation – present and future
- Create climate change scenarios
- Conduct sensitivity analyses
- Examine sectoral impacts
- Examine uncertainties
- Facilitate integrated impact analyses

Thank You!

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