Risk Management of Climate Change and Expectation of Agricultural Sector

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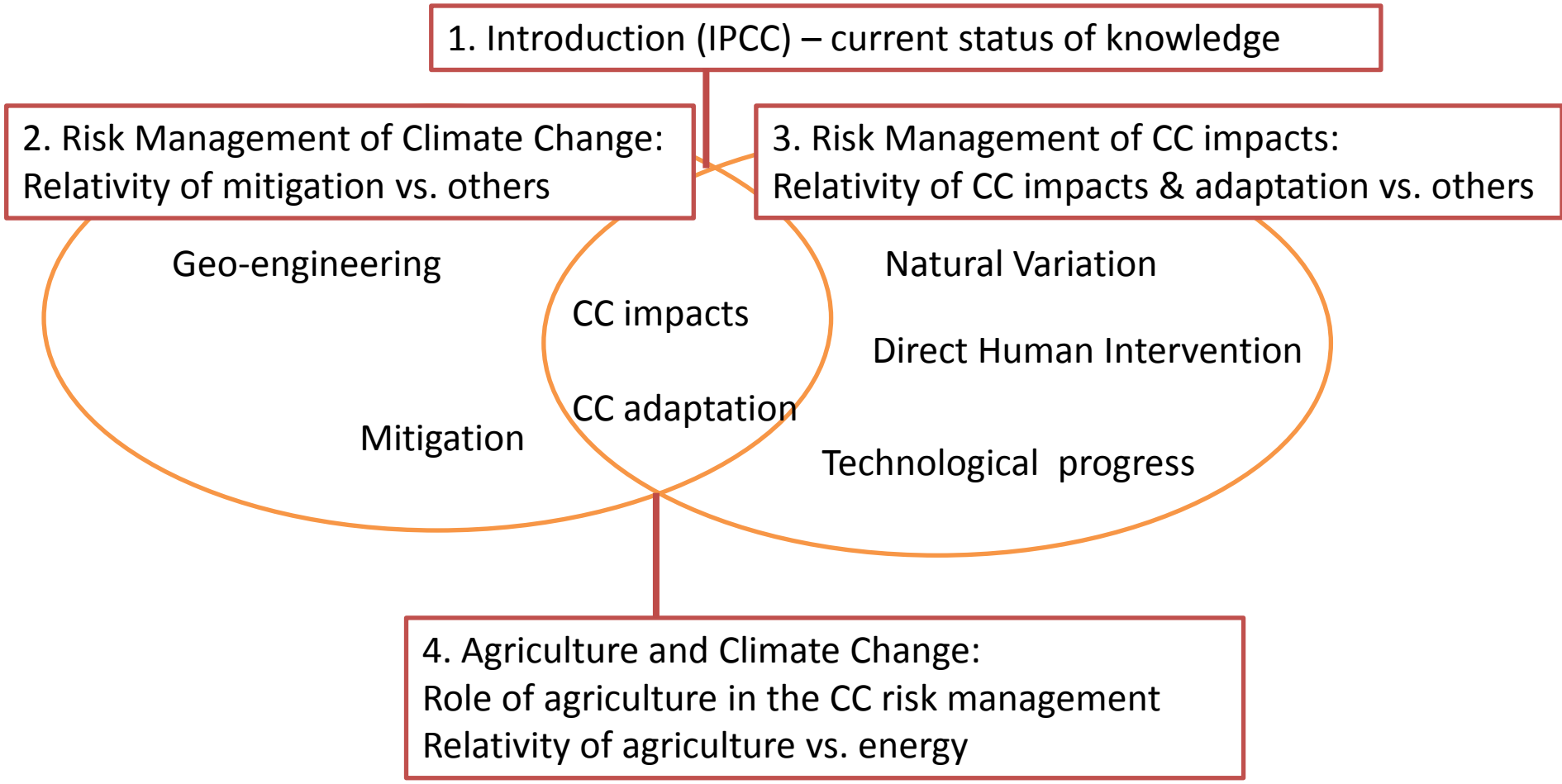
Contents

1. Introduction: IPCC
2. Risk Management of Climate Change
3. Risk Management of CC Impacts and adaptation (vs Natural Variation and Direct Human Intervention)
4. Agriculture and Climate Change

Note: This presentation is purposely provocative and include much preliminary ideas

Map of the presentation



1. Introduction: Achievement of IPCC, and its future agenda

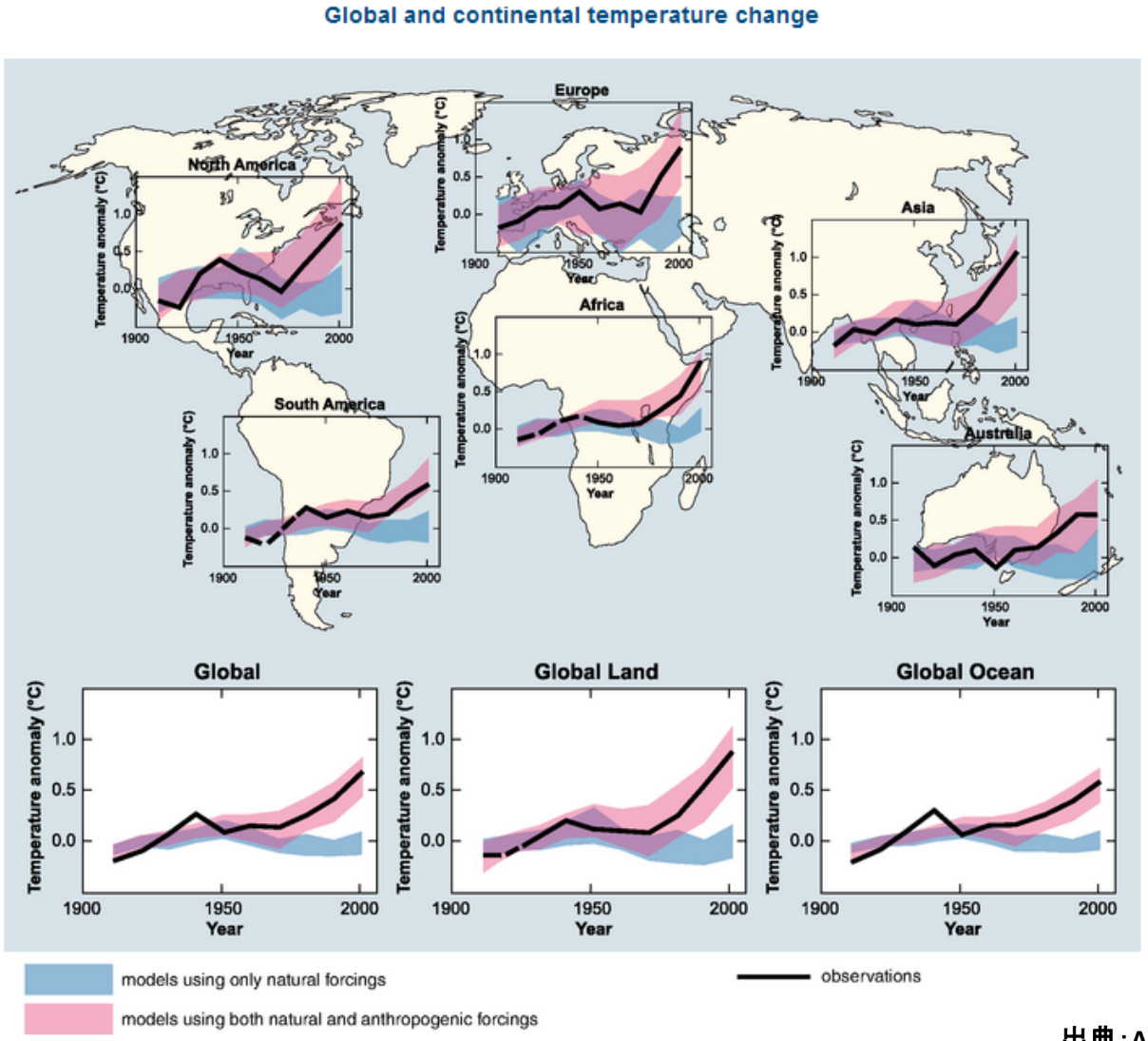
What is IPCC?

- Belong to UNEP/WMO
- Four assessment report (1990, 1995, 2000, 2007). 5th : 2013-14
- “Special reports””Technical report” on specific topics, 1 or 2 reports per year
- Nobel prize in 2007

Structure of IPCC

- WG1 : Natural Science of CC
- WG2 : Impacts of CC on human and ecosystems, and adaptation.
- WG3 : Mitigation (emission reductions of CO2 etc) technology and costs

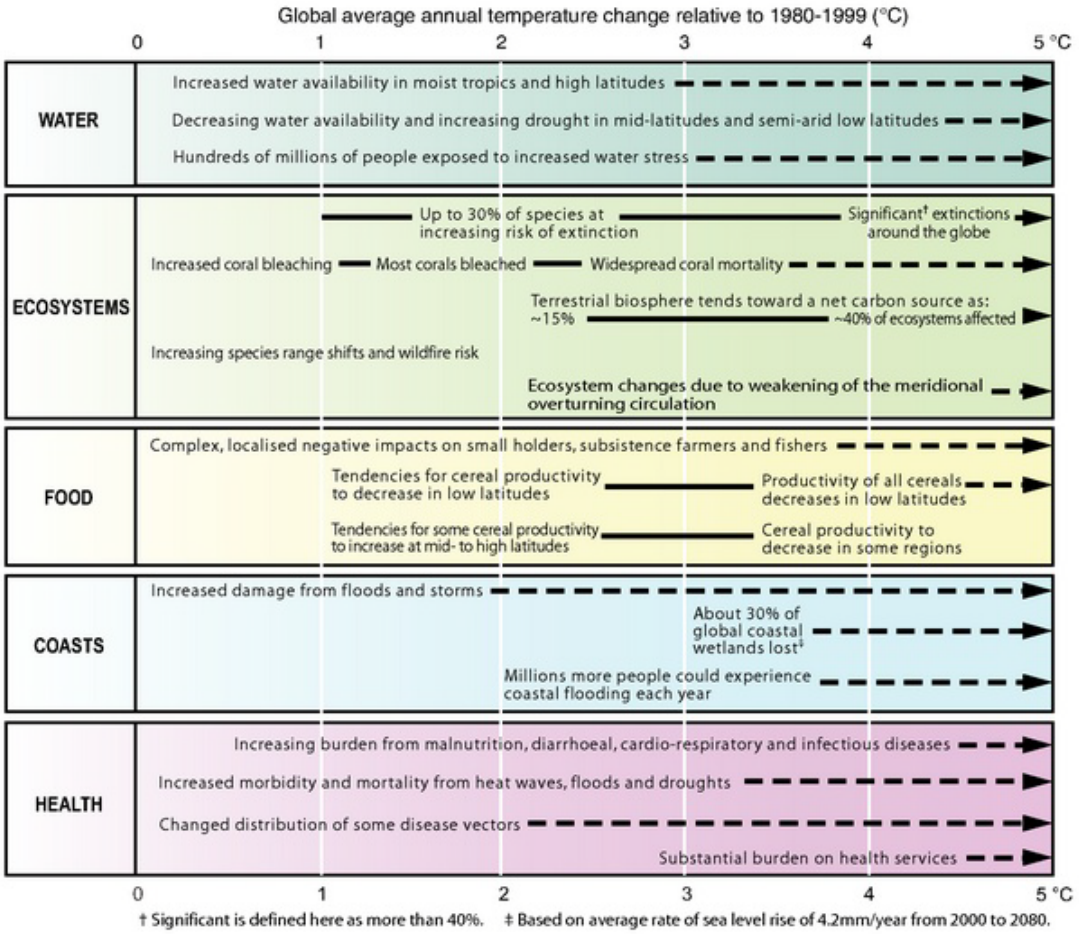
WG1

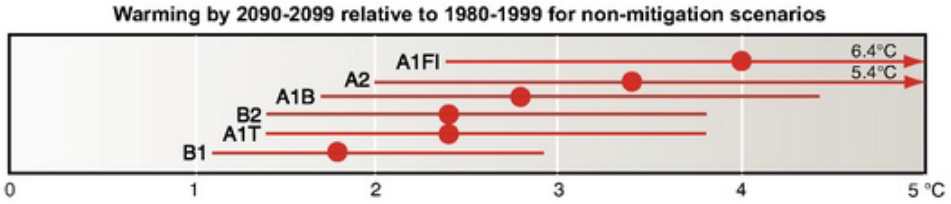


出典：AR4 SYR SPM 図SPM4

WG2

Examples of impacts associated with global average temperature change (Impacts will vary by extent of adaptation, rate of temperature change and socio-economic pathway)

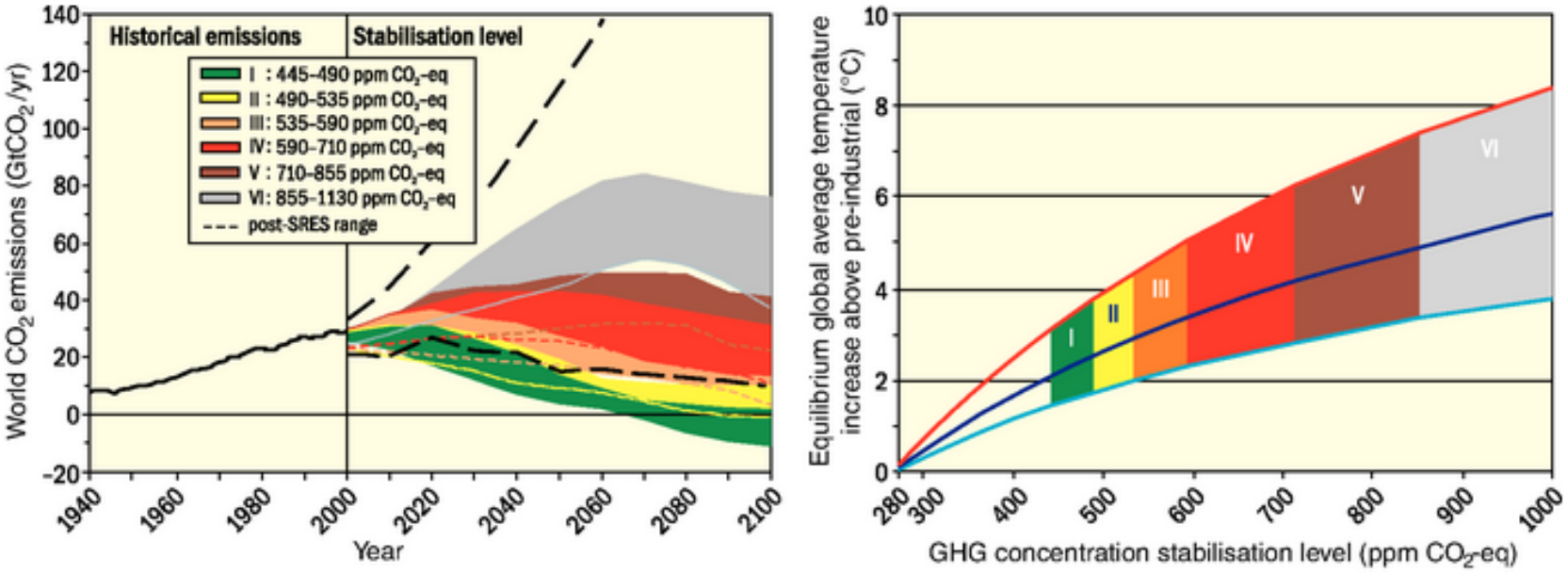




出典：AR4 SYR 図SPM7及びSPM6

WG3

CO_2 emissions and equilibrium temperature increases for a range of stabilisation levels



出典：AR4 SYR 図SPM7及びSPM6

What IPCC has done

- Making CC science official and put CC on political agenda. Warned of the danger of CC.
- WG1: proved that ”CC is occuring”&”by human gas emissions” relying on global computer simulation.
- WG2: mapped the risks of increasing global temperature of 2 , 3, 4, .. degree C.
- WG3: compiled information on emission cut technologies and costs
- Quoted, incorrectly, as proposing the political target of “2 degree C, 450ppm, emission cut by 80% in major economies, etc”.

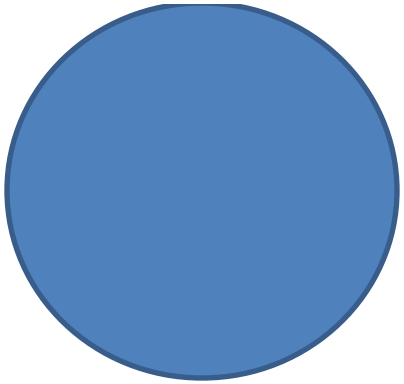
Future agenda of IPCC (personal view)

- From warning to response strategy
- Practical, down on the ground understanding of local level impacts and adaptation.
- From bad impacts alone to both bad and good impacts, comprehensively, taking into adaptation
- From human-induced CC impacts alone to natural variation, direct human intervention to nature, comprehensively

2. Risk Management Framework of Climate Change

Shape *changes* by angle

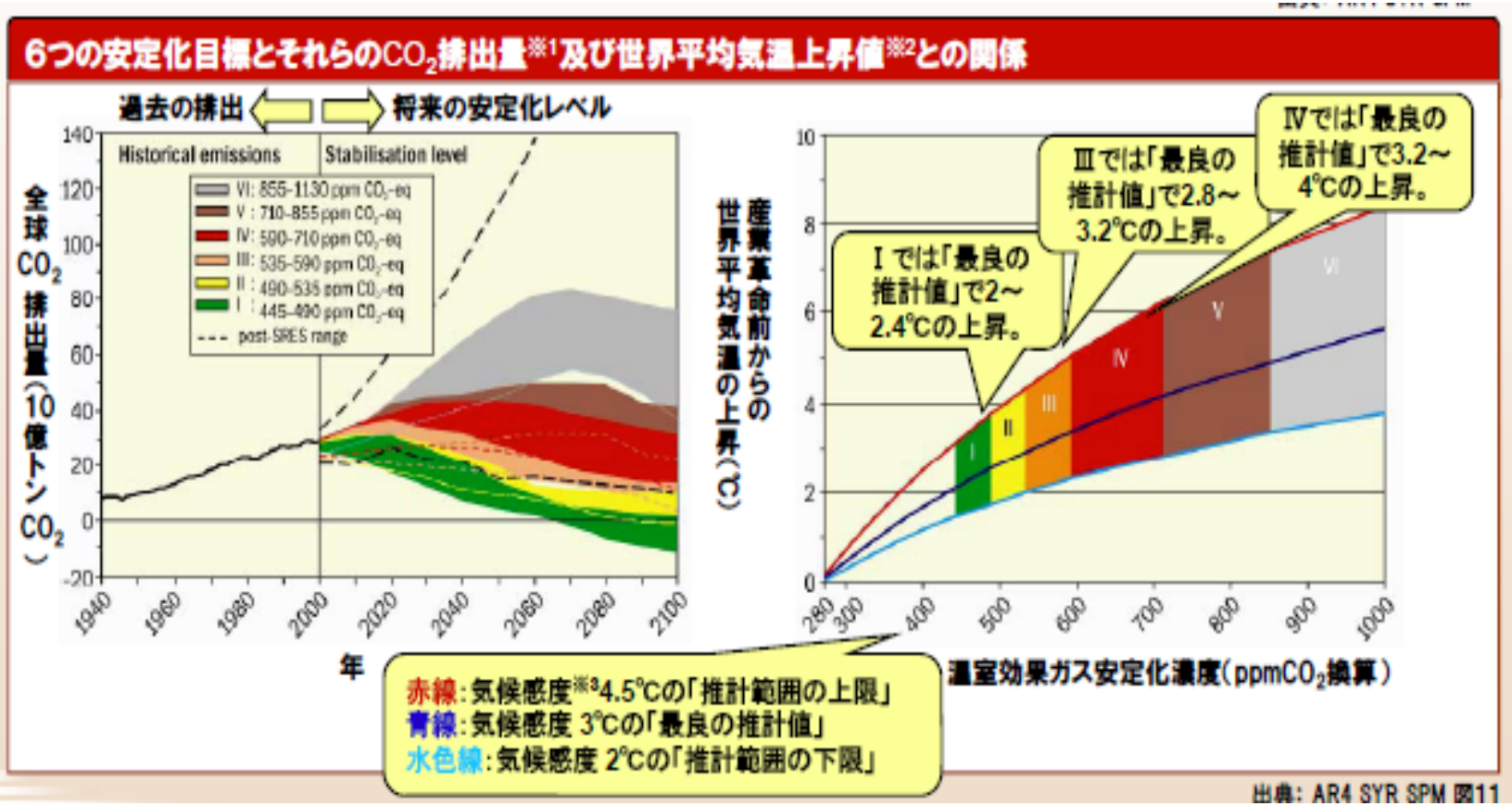
?



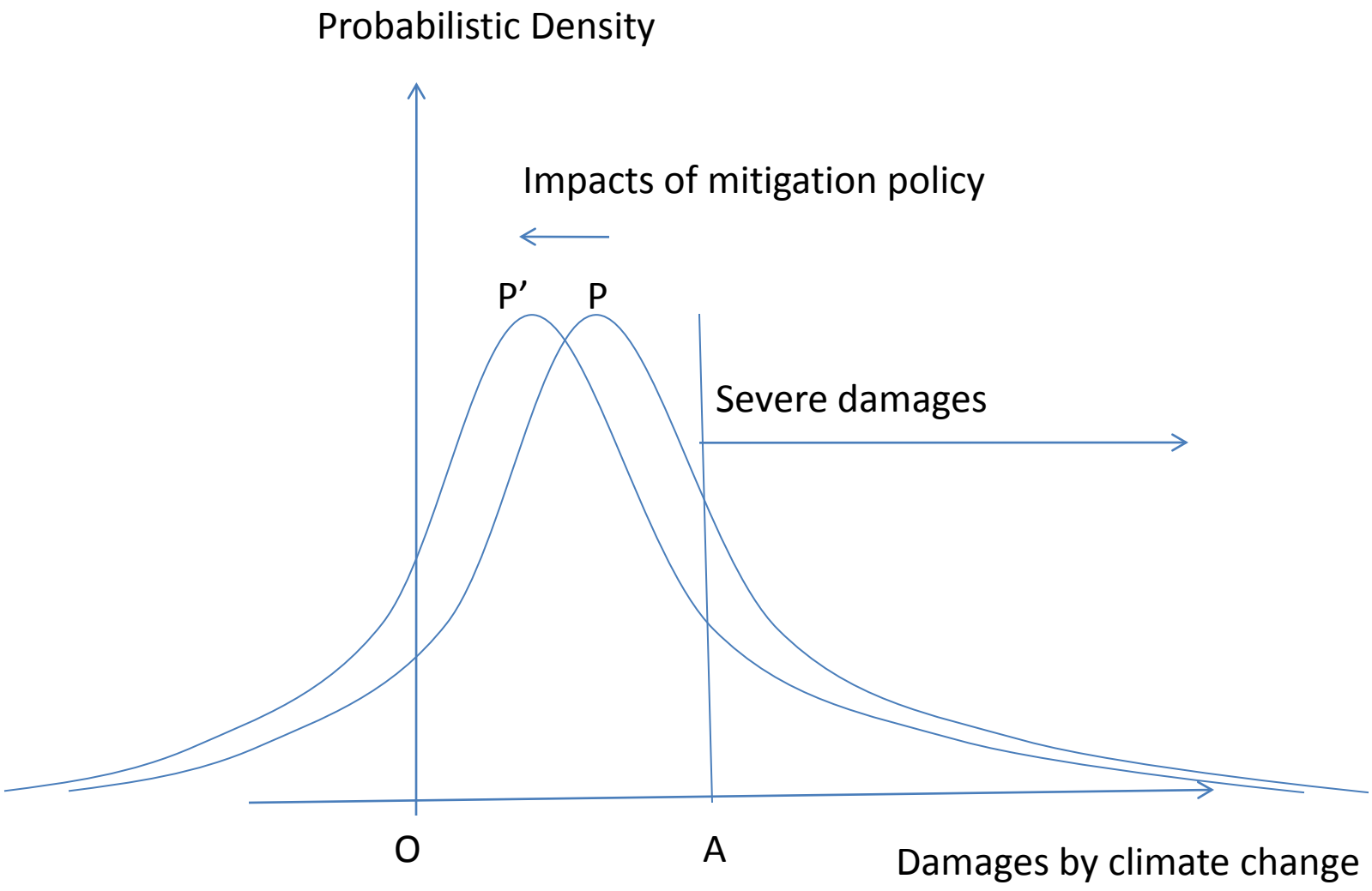
?

Is the cup round or four-sided?

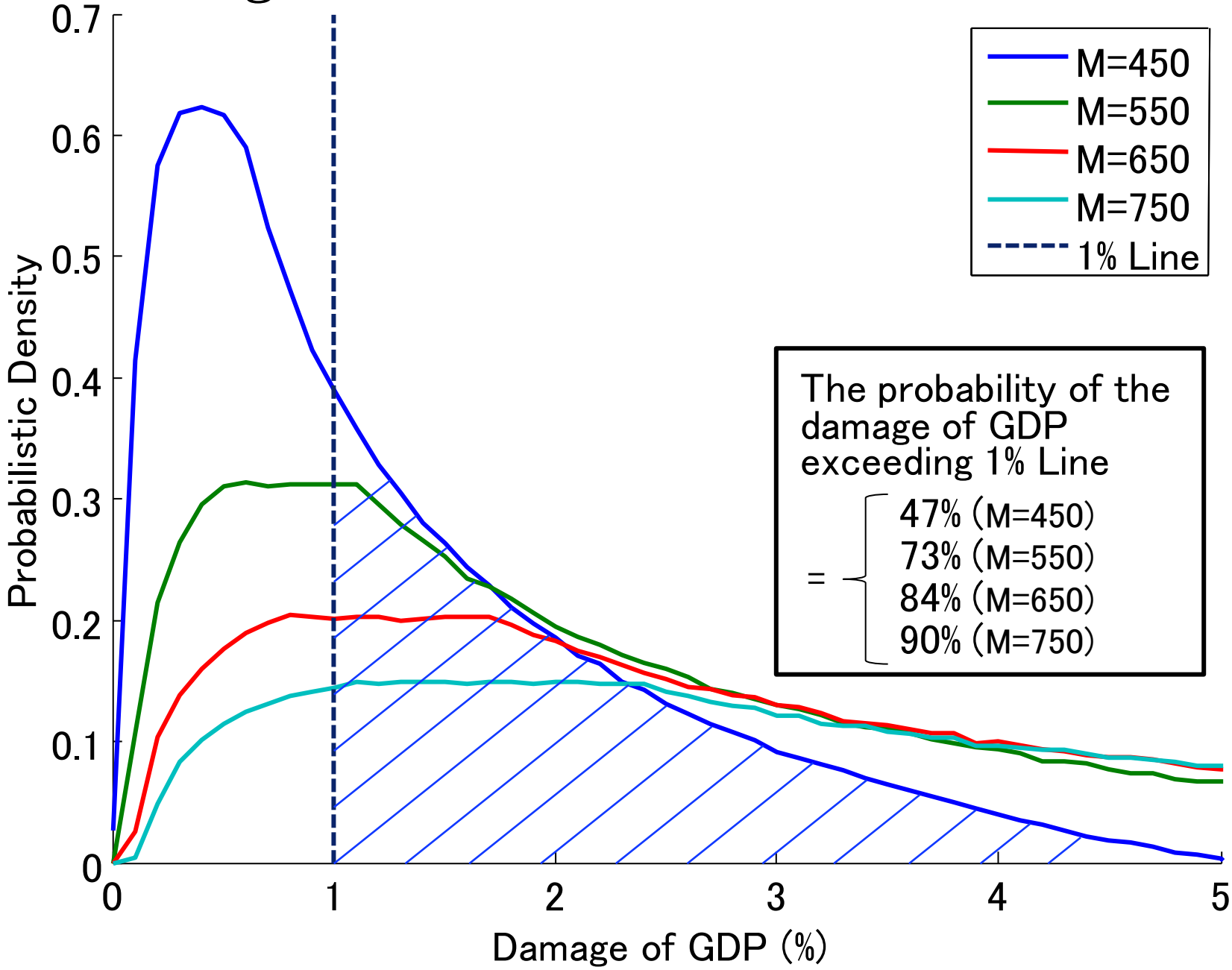
Uncertainty in temperature rise



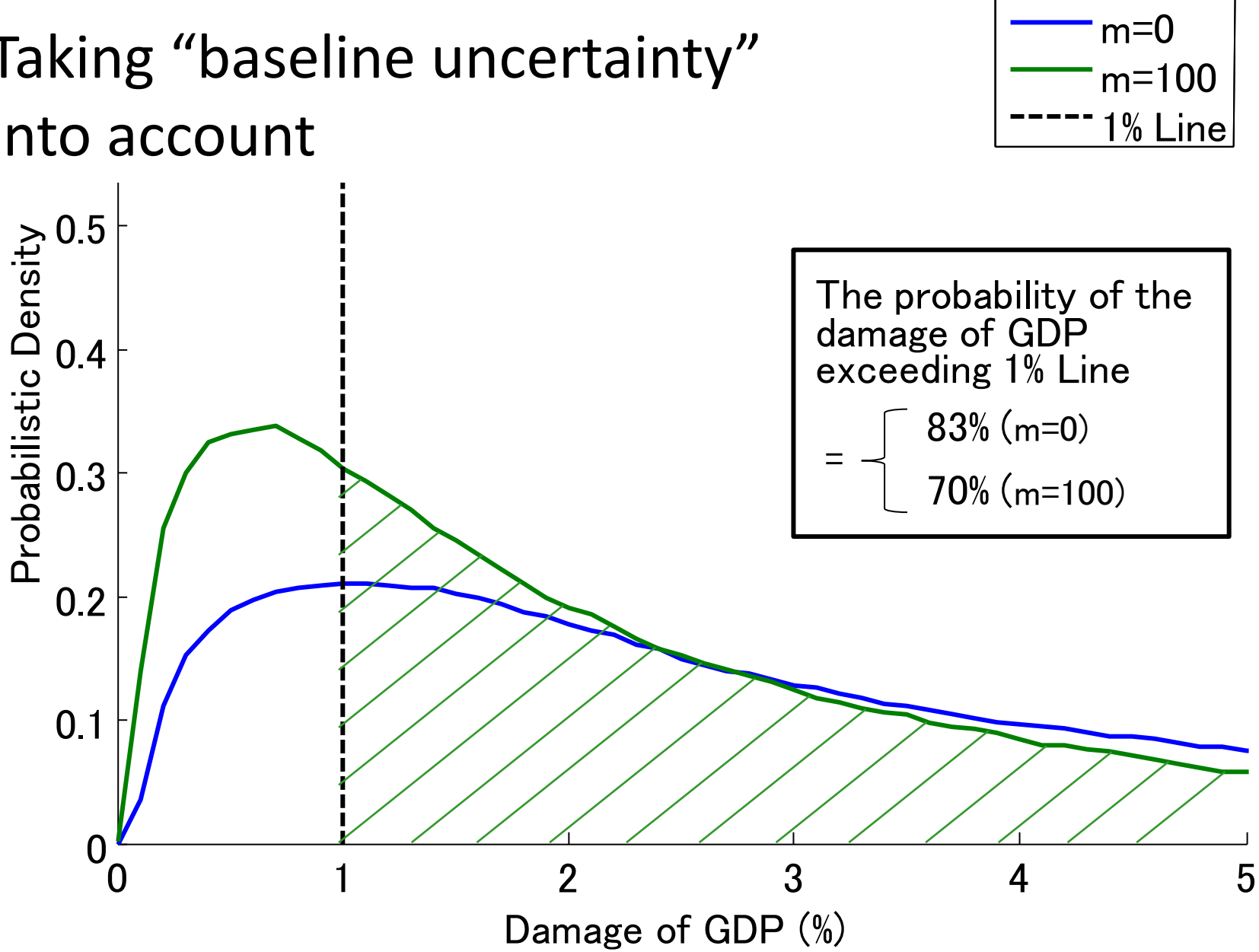
Limits to Mitigation? (conceptual)



Assuming concentration M is controllable



Taking “baseline uncertainty” into account



Distribution of damage may not change much by mitigation policies.

Mother nature's geoengineering

Source: USGS

Source: Blackstock et al (2009)

3. Risk Management of CC Impacts and adaptation

Fallacy of composition

1. [Literature 1]Rice yield decreases by global warming “if you plant
   the same specie,
   at the same place,
   with the same technology,
   and the same practice.”
2. [Literature 2] Global warming is occurring.
3. (WRONG conclusion)
   Rice yield decreases by climate change.

Why it happens?

1. Often, people's implicit baseline is "environment (and people's life) never changes unless people intentionally change it".

…. But It is simply wrong.

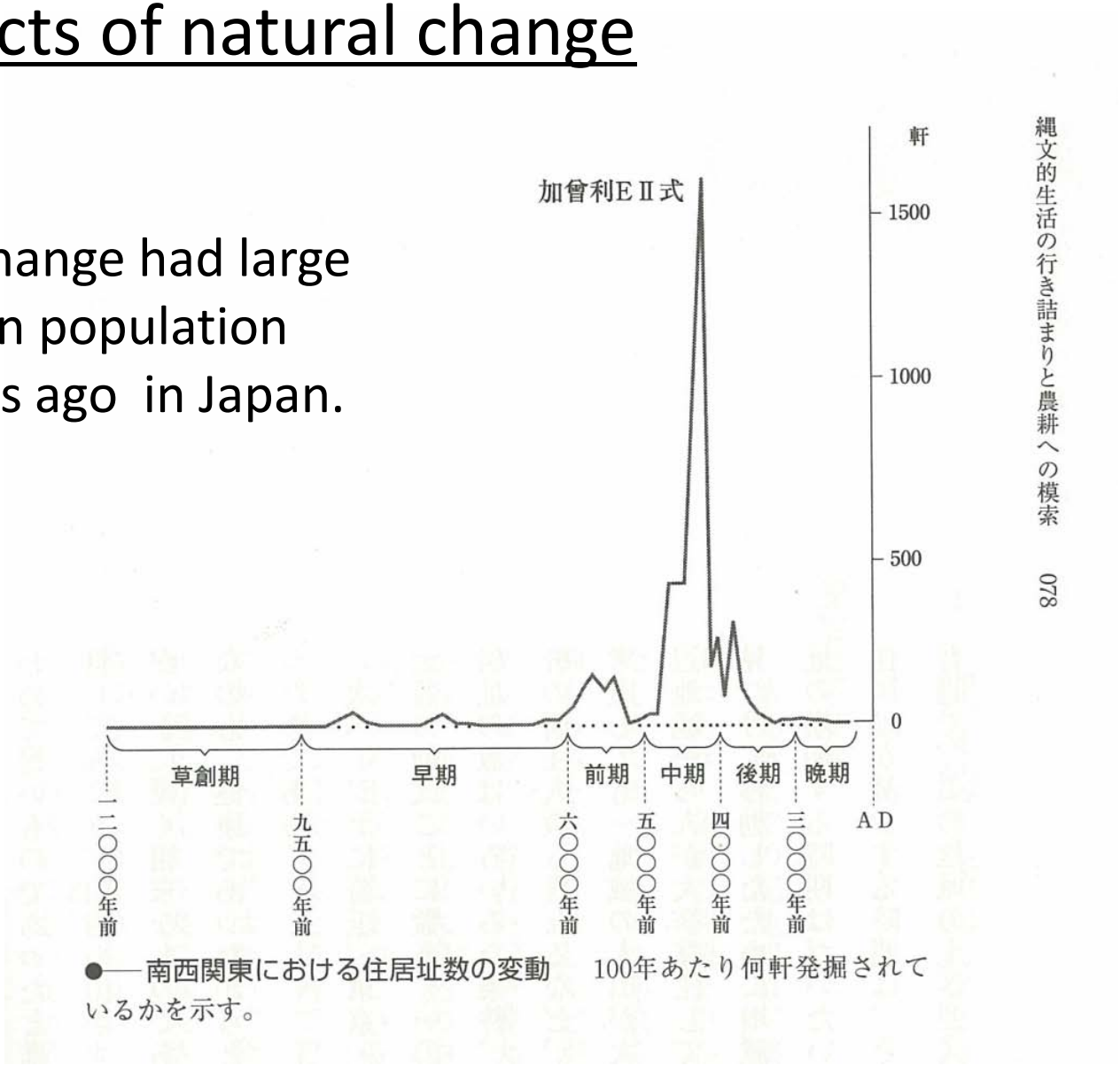
- Natural Variation: environment changes by itself,
- Direct Human Intervention changes environment unintentionally at very large scale.

2. People also lack knowledge on technological progress.

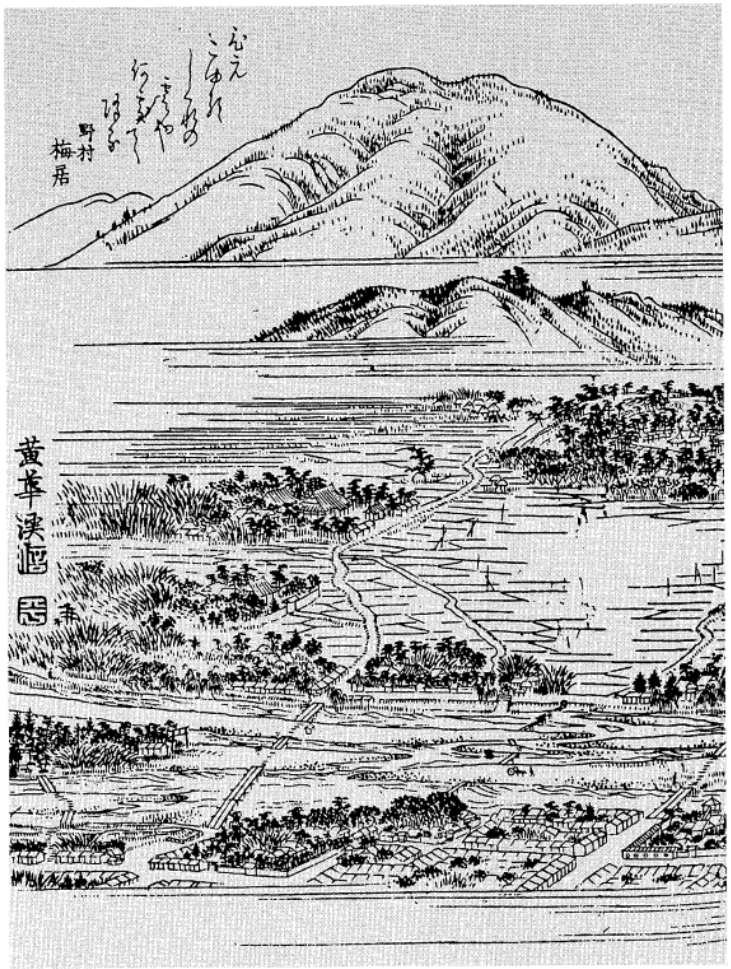
Look at natural variation, human direct intervention, and technological progress …

Impacts of natural change

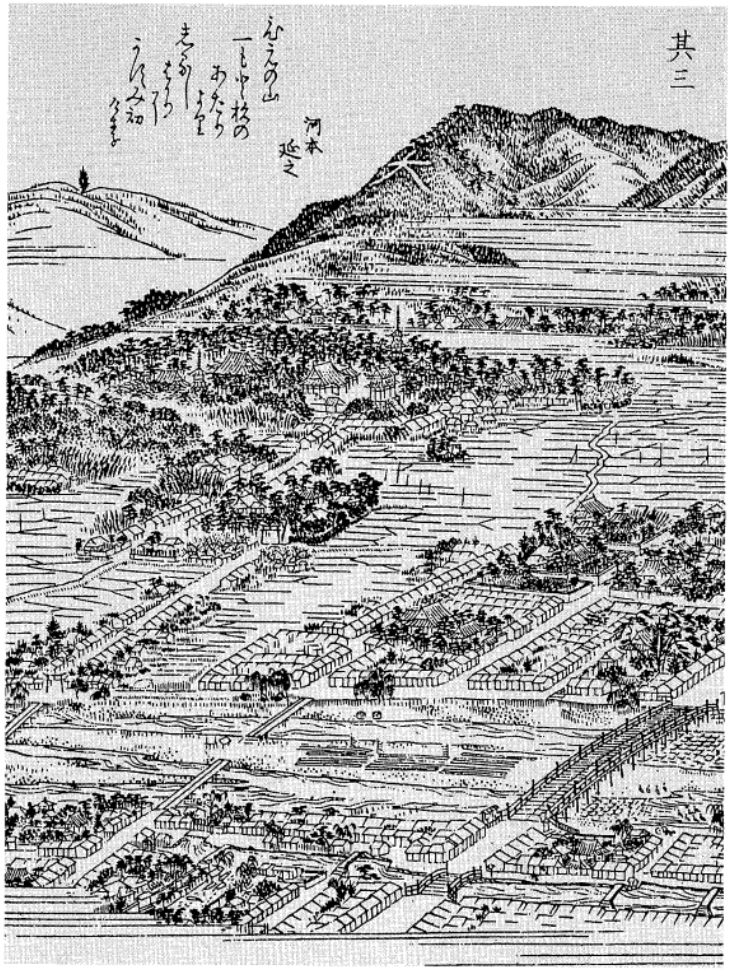
Climate change had large impacts on population 4000 years ago in Japan.



Human interventions



●──比叡山・東山の風景　一本杉付近には「ひえの山一もと杉のあたりよりしる



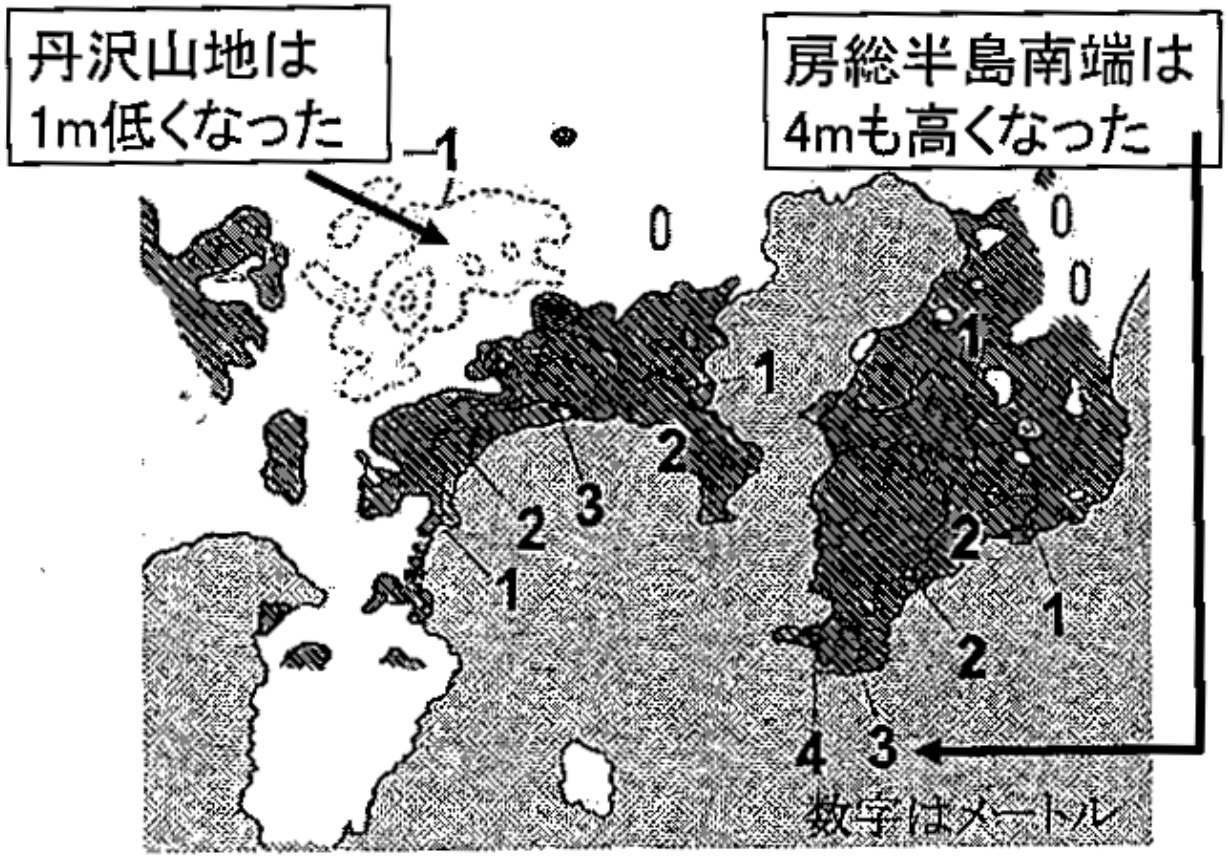
しはかりにかすみ初けり」と記されている（「東山全図」『再撰花洛名勝図会』）。

Bare mountains everywhere in 1600- 1950s.
Agriculture totally changed the landscape

Impacts of natural change

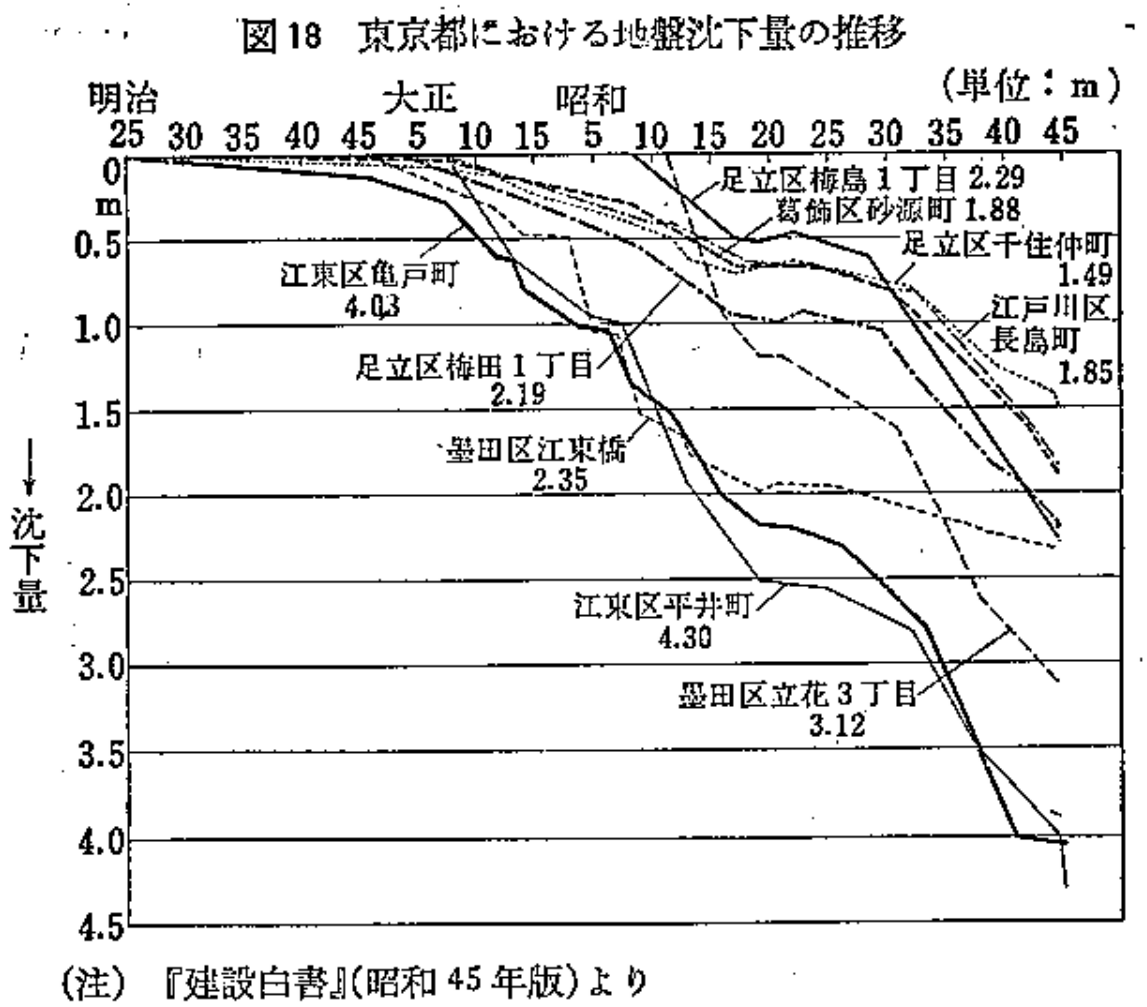
Earthquakes have changed sea level by meters. What were the impacts to, and adaption by, human activities?

【図38】関東大震災（1923年９月１日）後の激しい地盤の上下動



『科学の事典』岩波書店、1982年版、所載の図より。

Human interventions



Land sank by meters in decades by pumping underground water in Tokyo. How have we adapted to the effective sea level rise?

Human Intervention

Dears nearly extinguished 100 years ago but revived recently. Human hunting matter more than global warming.

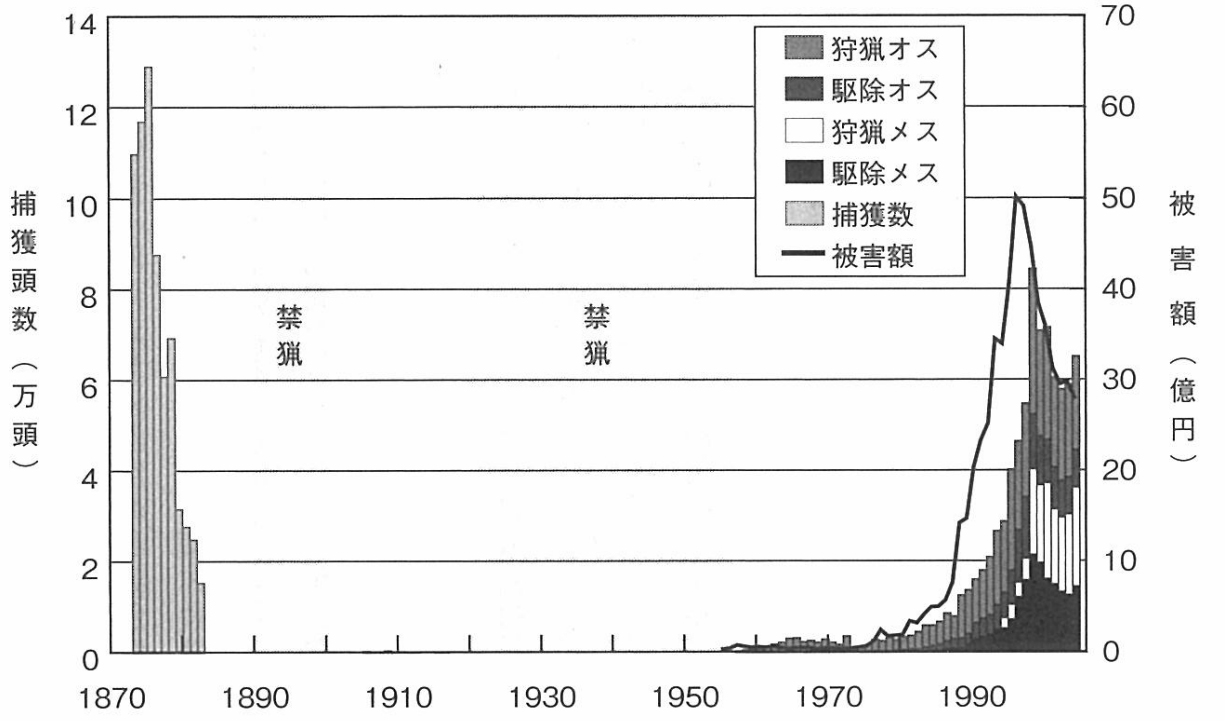


図1　北海道のエゾシカ捕獲頭数（1873 ～ 2004 年）と農林業被害額（1955-2004 年）の年変化[3]

1955 年以降の捕獲頭数は，雌雄別・狩猟と駆除（許可による捕獲）とに分けて示した

（湯本・松田 2006 p41）

Impacts on human and ecosystems

1. Stone age:

   Natural Variation >> Human Interventions

2. Historical age:

   Human Intervention >> Natural Variation

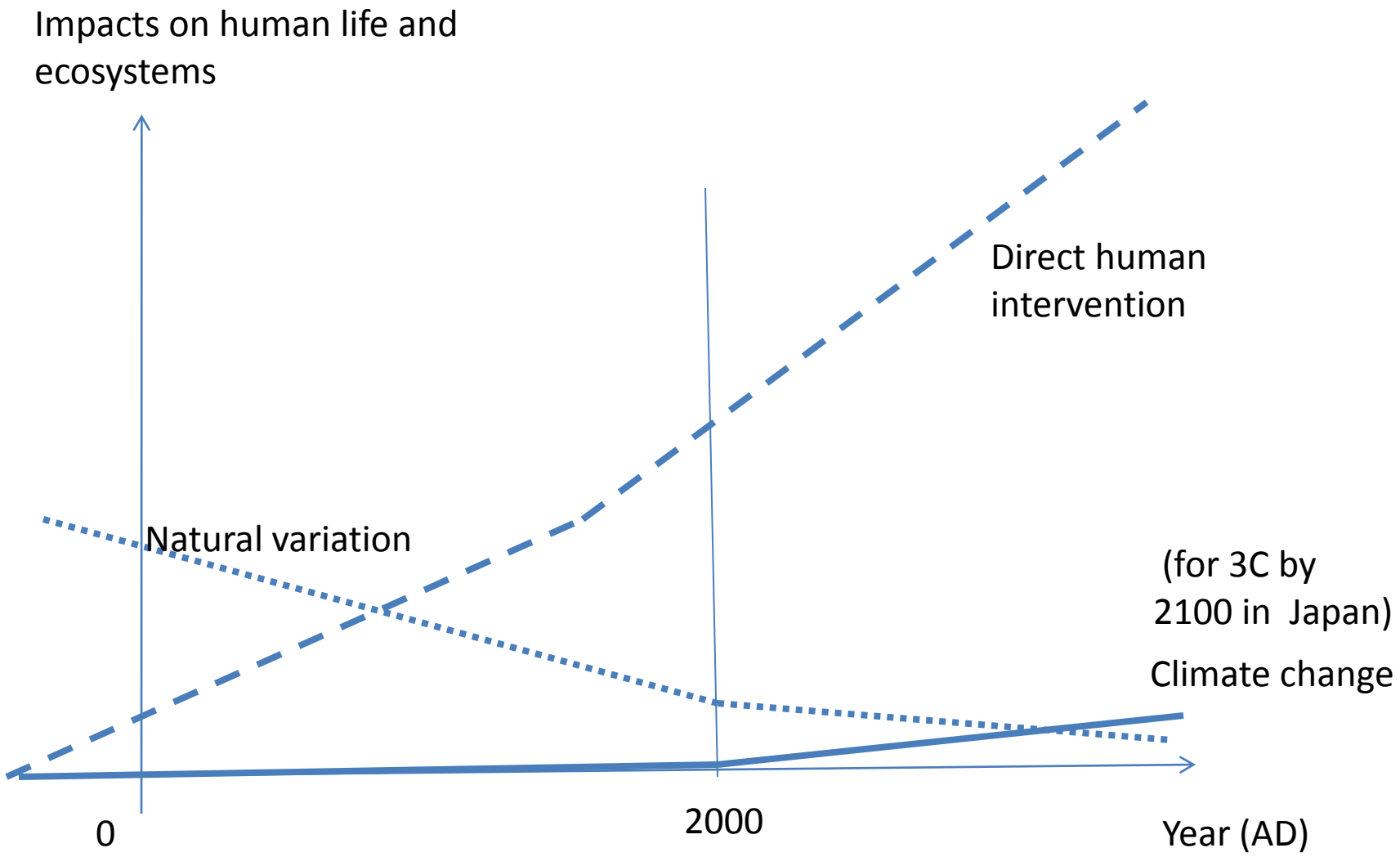
3. Now and Future:

   Human Intervention >>

   Natural Variation *& Climate Change*

   (for 3C by 2100 in Japan)

Comparison of CC Impacts vs. others



4. Agriculture and Climate Change:

Role of agriculture in the CC risk management
Relativity of agriculture vs. energy

Rapid tech progress

Farmers have planted new rice species by every 5 year

Share of specie of rice in Hokkaido, Japan (%)

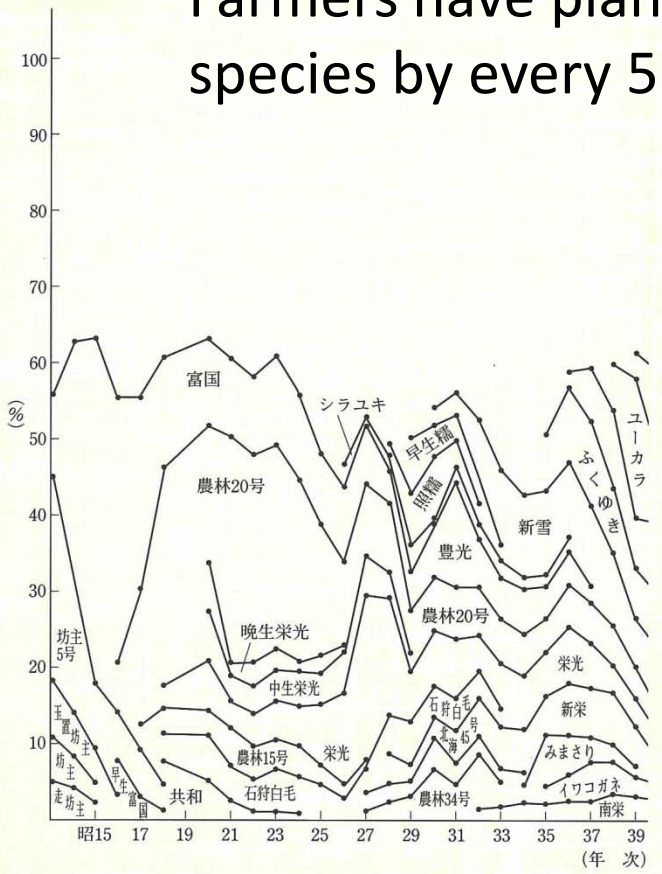
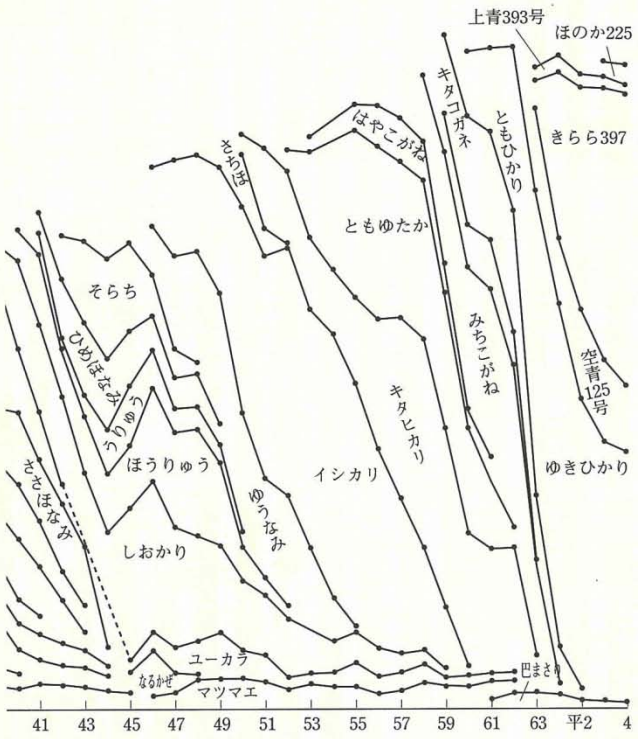


図1 北海道における主要品種の作付
1)北海道における水稲品種の変遷
2)大内邦夫作図

出典：星野達三『北海道の稲作』1994，北農会



比率の推移（昭和13～平成4年）
（米麦改良協会）

Adaptation to the impacts

Human beings have diversified the foods to adapt to the natural climate change.

Adaptation

1. Inevitable. - Committed global warming
2. Manageable.

   Rapid change in planting

   Rapid improvement of species and technologies

   Historically agriculture was fight against *cold* weather

   CC adaptation is not more than extension of risk management practice against natural variation and human intervention.

3. "Automatic Adaptation" likely

   Large cities experienced 3 deg C increase in 100 year – agriculture adapted even without knowing it.

   (for 3 deg C by 2100 in Japan)

Mitigation

1. Large emissions
2. Large potential with low to negative costs
3. “Barrier” exists for information, education, training, coordination among stakeholders, split incentives, etc

   c.f. “energy efficiency barrier” IPCC TAR/ AR4 WG3
4. *Potential may be small and costs may be high in agricultural sector.*

Technological Development and Transfer: Green revolution

1. Successful governmental R&D

   Japanese rice, US wheat, …..

   - key: close relationship between farmer & researchers

2. Successful international tech transfer

   Philippine rice, IRRI, CGIAR, …..

   - international network of governmental research institutes
   - Key: capable local governmental research institute with farmers involved

3. May be a model for energy sector?

   - idea of "Network of research institutes and/or regulatory authorities".

   caveats:

   - Governmental energy R&D has been less remarkable than agriculture
   - Energy technology is almost the same across countries unlike agricultural technologies that require local R&D by nature.

Development

For poorest countries economic development is the first priority.

1. Agriculture is the most important sector
2. Good governance and economy are essential
3. What is the best agricultural choice?

New international climate regime

1. Mitigation: from mere talking to technically feasible targets with proven policy instruments
2. Adaptation: manageable – extension of disaster risk management institutions
3. Geo-engineering: research first, (then implement if necessary).
4. Development

For 1,2,4: agriculture will be the key sector

Conclusions

1. Limits to mitigation on global scale
2. Adaptation is inevitable, but manageable.*
3. R&D in geo-engineering necessary
4. Direct human intervention will dwarf the impacts of climate change.*
5. Barriers exist for mitigation in agricultural sector. Potential may be small and costs may be high.
6. There may be lessons from agricultural tech R&D and transfer policy to energy sector

(*… for 3 deg C by 2100 in Japan)

References(in Japanese only)

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http://www.climatepolicy.jp/thesis/pdf/10016dp.pdf

- 地球温暖化への日本の適応戦略

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