NILU: F 01/2003

NILU: F 01/2003
REFERENCE: O-101032
DATE: JANUARY 2003

Effect of climate change on flux of N and C: air–land–freshwater–marine links

Lars R. Hole

Presented at RegClim meeting
(Informasjonsmøte: Tilgjengelighet av klimadata til effektforskning)
Held at: met.no, Climate Department
30 January 2003

Effect of climate change on flux of N and C

air-land-freshwater-marine links

- NFR 2003-2007
- Budget 12 mill
- Project leader:
  Arne O. Stuanes, IJVF NLH
- Presented by Lars R. Hole, NILU

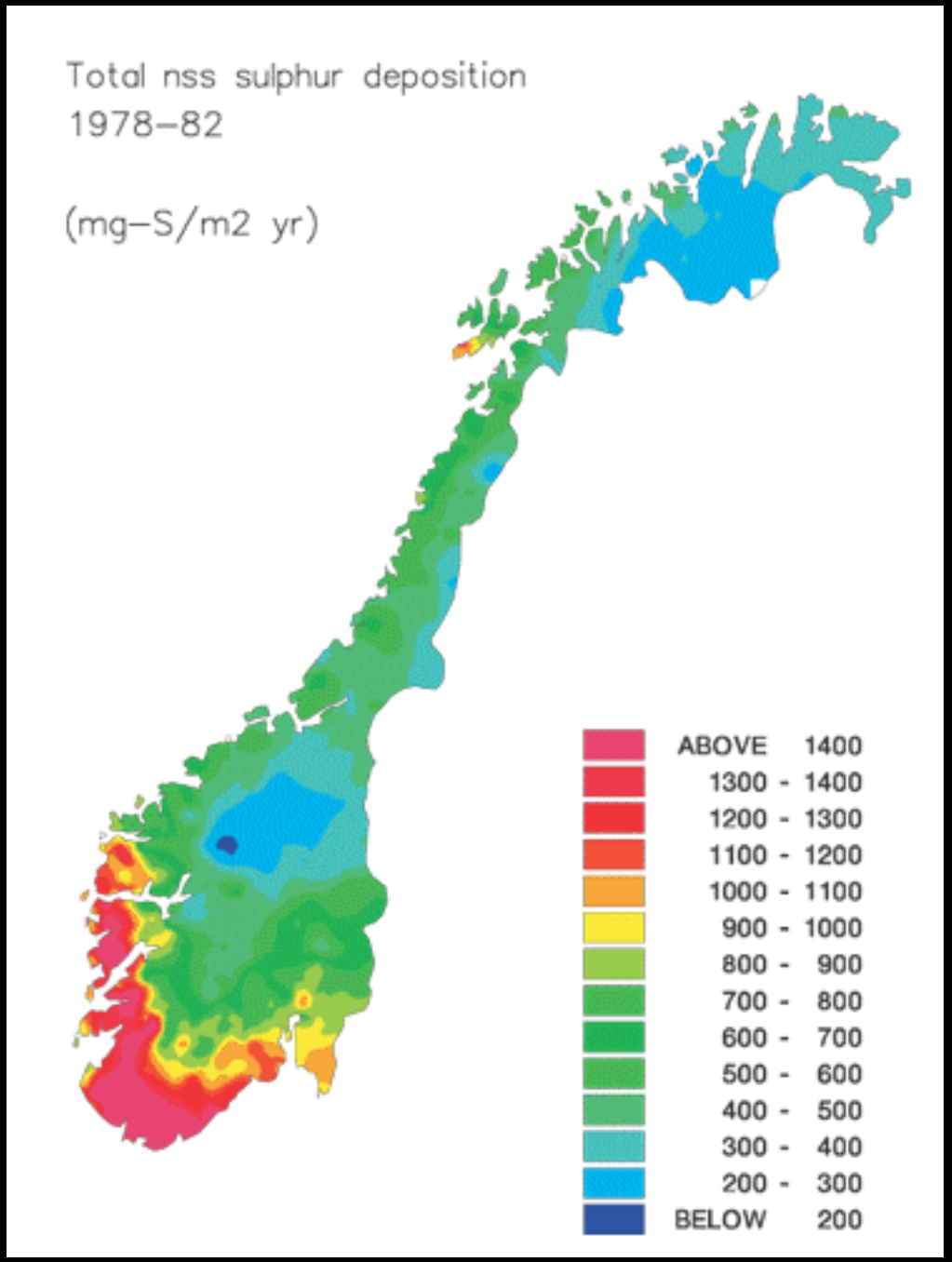
NLH NIVA NILU NIJOS folkehelseinstituttet

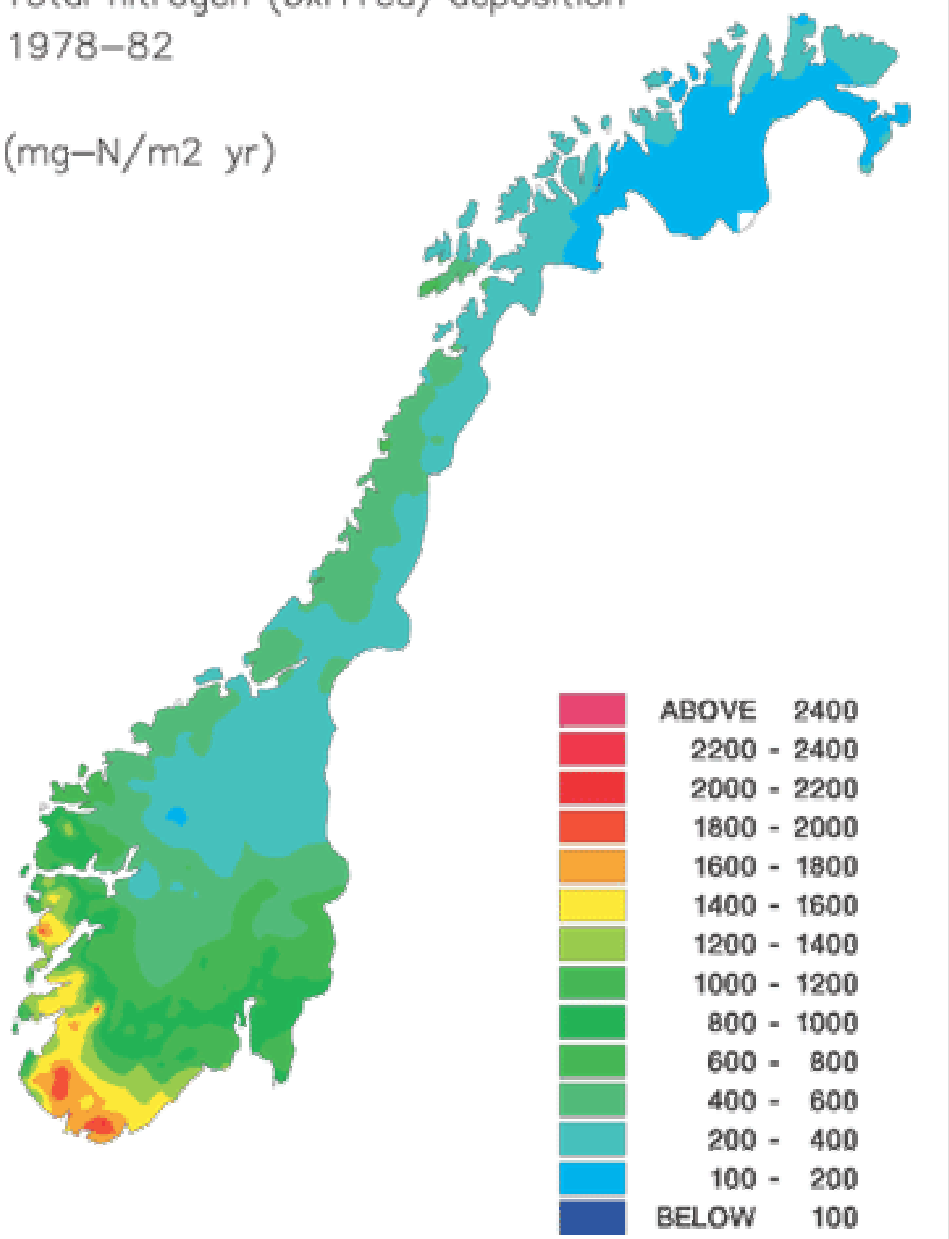
Background/Motivation

- *Nitrogen from mountains to fjords* (93-95)
- Significant reductions in ambient concentratio of SO_2 (70-80% since 1980) have influenced t dry deposition rates for reduced nitrogen (NH
- Total N deposition (wet + dry) to Norway reduced with only 16% in same period (peak around 1990)
- Changes in precipitation patterns will strongly affect total deposition loads on local/regional scale

Background/Motivation

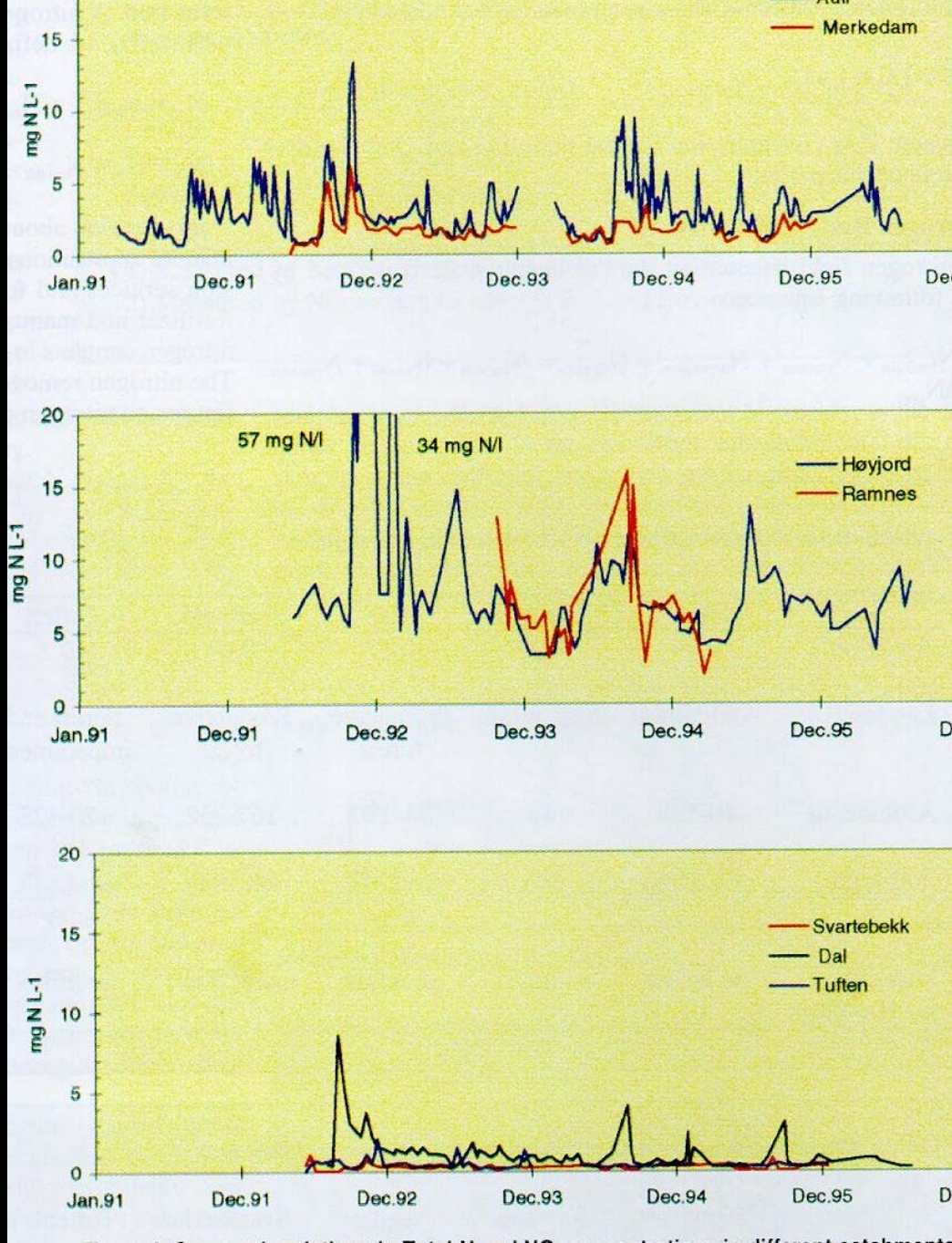
- No scenarios made on effect of climate change on N and C budgets for Norwegian watercourses
- Changed precipitation pattern and more winter thaws will change N budget and release of C to catchments
- Altered climate can result in larger turnover of TOC and mobilization of N depots in soil

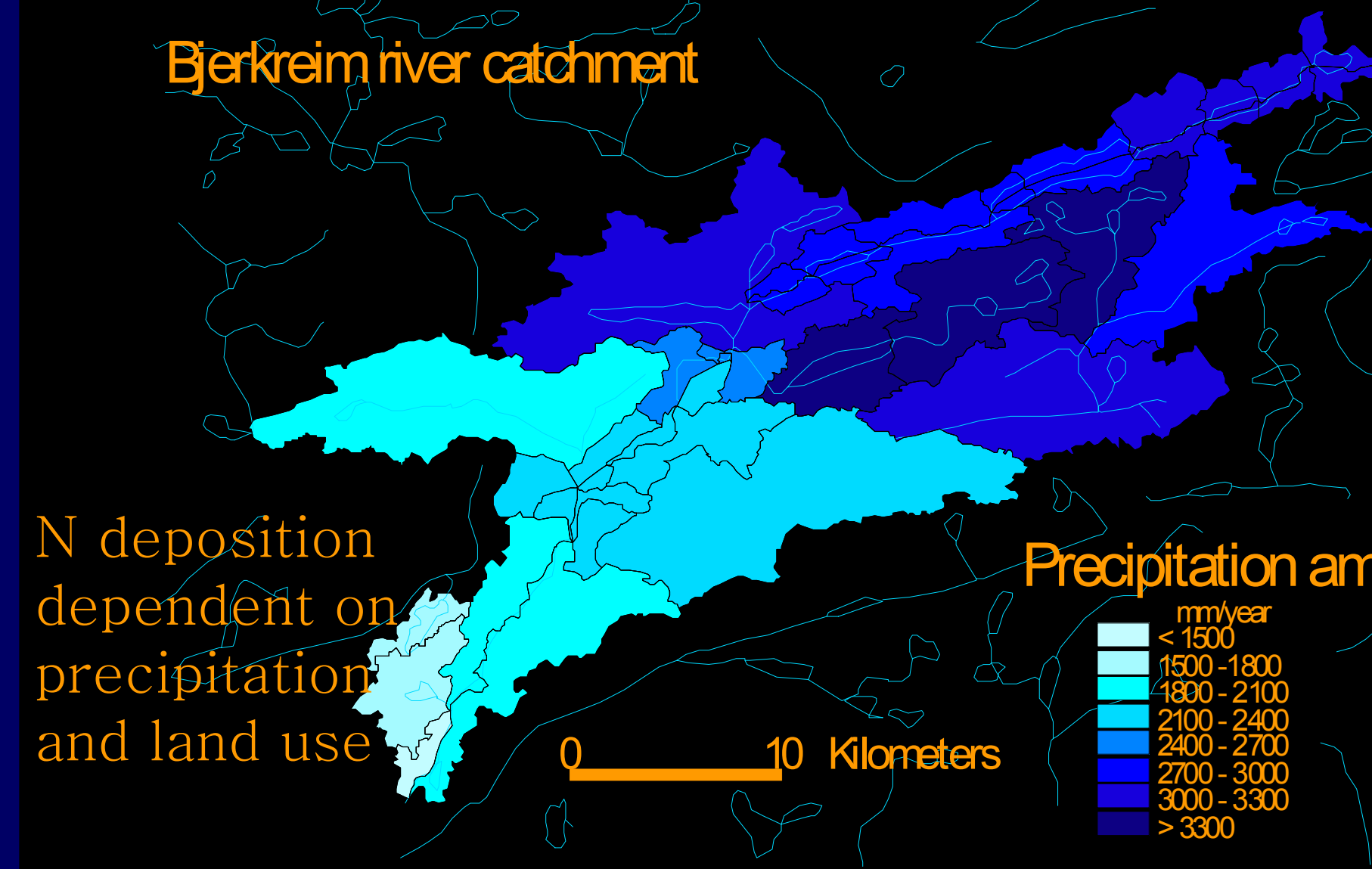

Total nss sulphur deposition
1978–82
(mg–S/m2 yr)
ABOVE 1400
1300 - 1400
1200 - 1300
1100 - 1200
1000 - 1100
900 - 1000
800 - 900
700 - 800
600 - 700
500 - 600
400 - 500
300 - 400
200 - 300
BELOW 200


Total nitrogen (oxi+red) deposition
1978–82
(mg–N/m2 yr)
ABOVE 2400
2200 - 2400
2000 - 2200
1800 - 2000
1600 - 1800
1400 - 1600
1200 - 1400
1000 - 1200
800 - 1000
600 - 800
400 - 600
200 - 400
100 - 200
BELOW 100

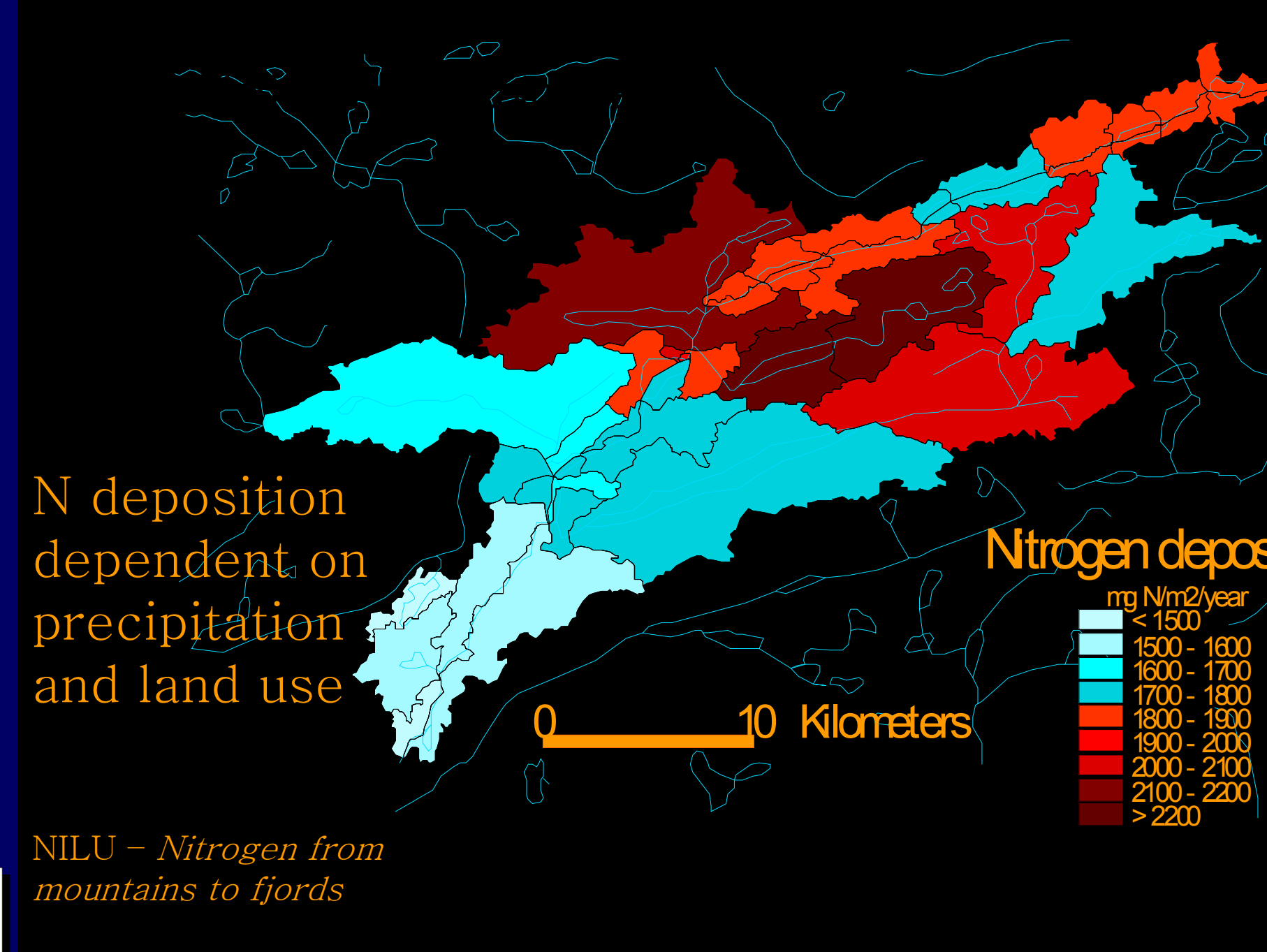
N concentrations in catchments highly dependent on land use and weather conditions

Jordforsk – *Nitrogen from mountains to fjords*





NILU – *Nitrogen from mountains to fjords*


N deposition dependent on precipitation and land use
Nitrogen depos
mg N/m2/year
< 1500
1500 - 1600
1600 - 1700
1700 - 1800
1800 - 1900
1900 - 2000
2000 - 2100
2100 - 2200
> 2200
0
10 Kilometers
NILU – Nitrogen from mountains to fjords

Activities

1. Quantify the effects of climate change on N deposition to and flux of N and C from semi-natural terrestrial ecosystems to water

- Changes in depostion mechanisms (physical a chemical) in an altered climate
- Effects of melting episodes due to increas winter temperature
- Effects of increased frequency of freezing/thawing cycles in winter
- Modelling of NAO correlation with sea s episodes
- Combined effects of changes in grazing press and climate

Activities

2. Assess effects of climate change on N and C fluxes at the river basin scale

3. Assess the consequences of changes in fluxe of N and C on freshwater and marine water quality and biology

4. Assess the implications for environmental policy and management of land and water resources

Application of RegClim results

- Scenarios for future deposition of nitrogen, sulphur and sea salts by Chemical Transport Modelling (CTM)
- Coupling of DOC and nitrate concentration trend in freshwater with NAO index
- Consequences of altered N and C inputs to marine environments