

The 12<sup>th</sup> Norwegian - Russian Symposium  
Tromsø, 21-22 August 2007

# Age reading of Northeast Arctic cod otoliths through 50 years of history

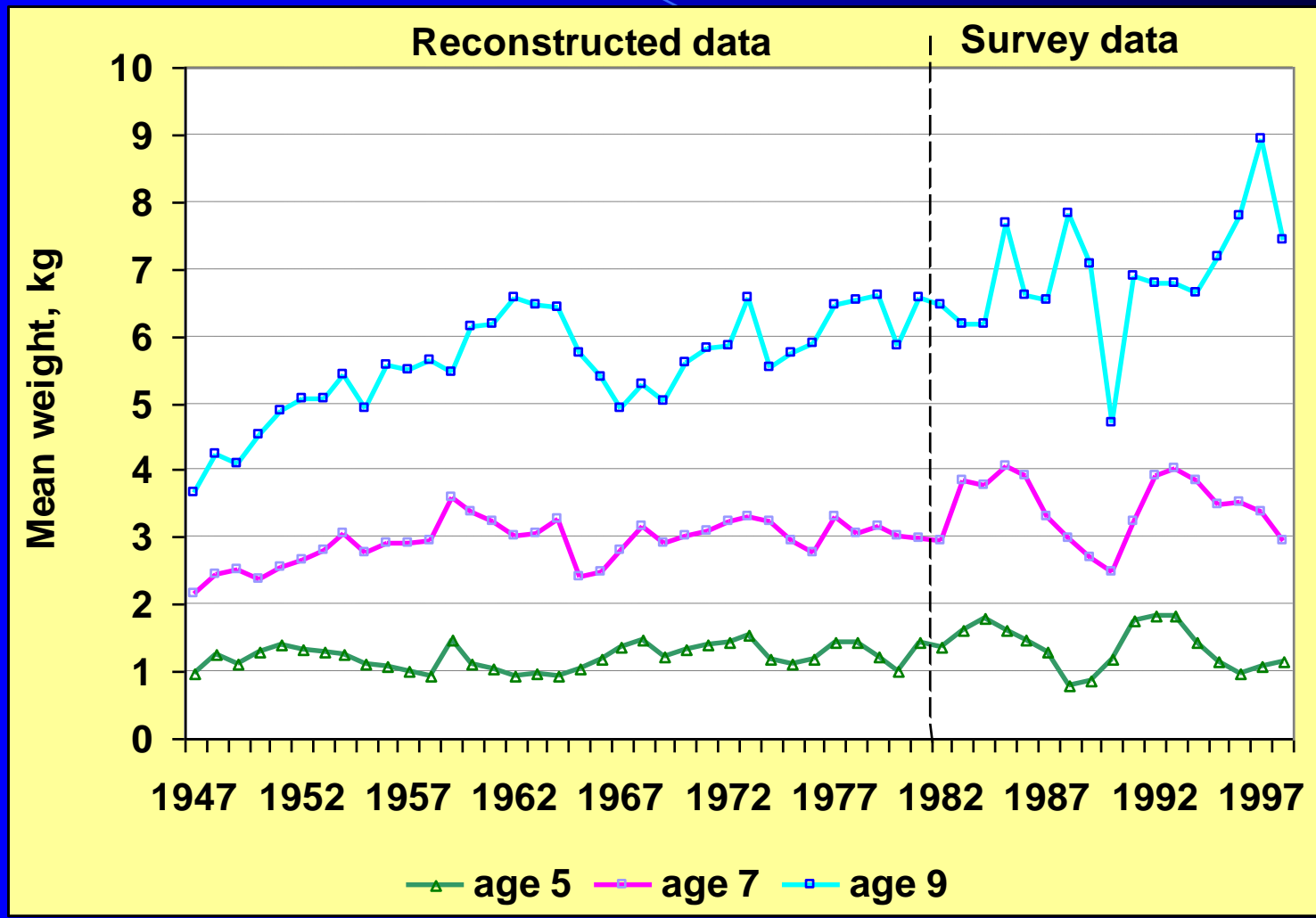
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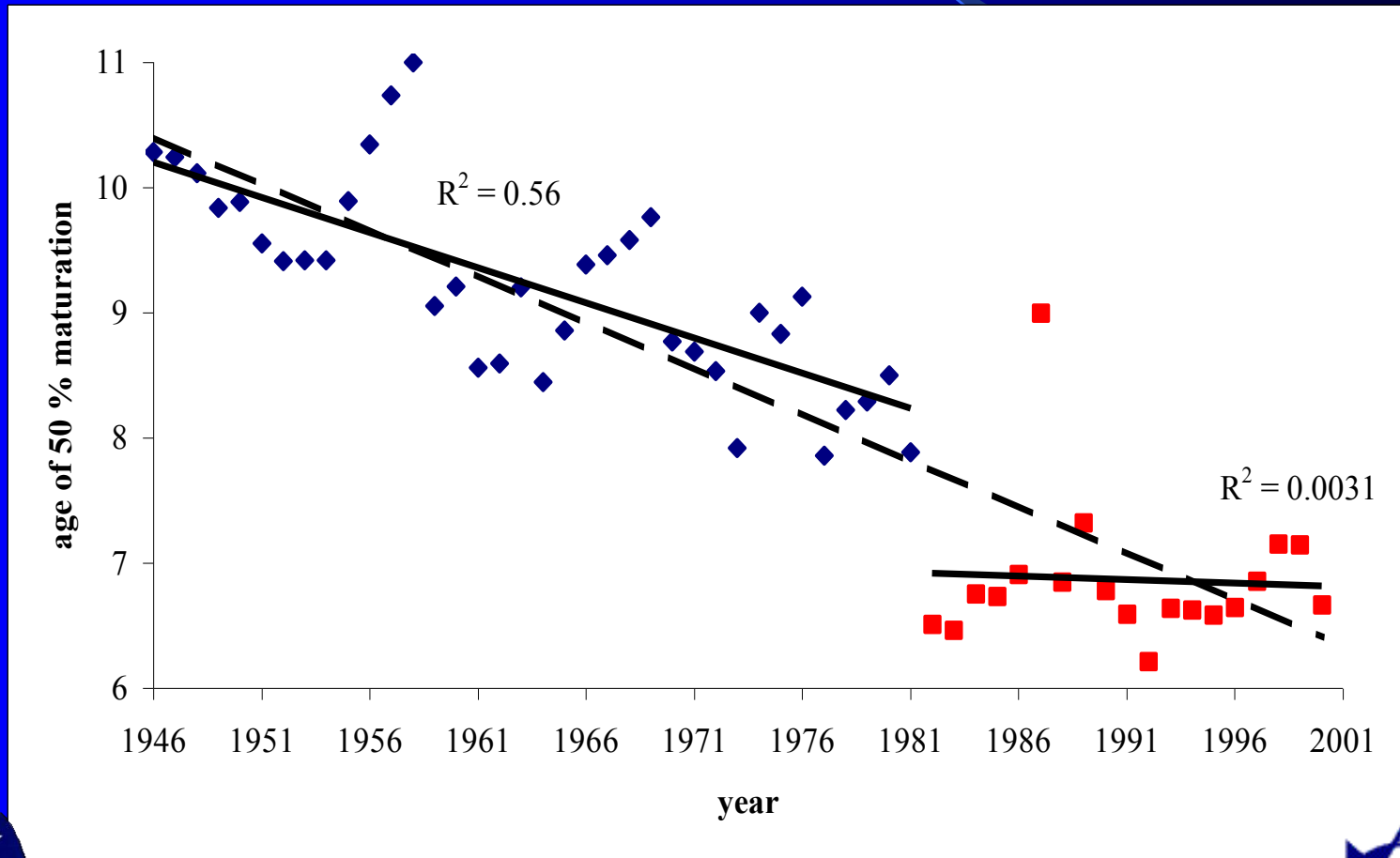
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# Weight at age



# Changes in age of 50 % maturation of NEA cod and trends corresponding to different time series

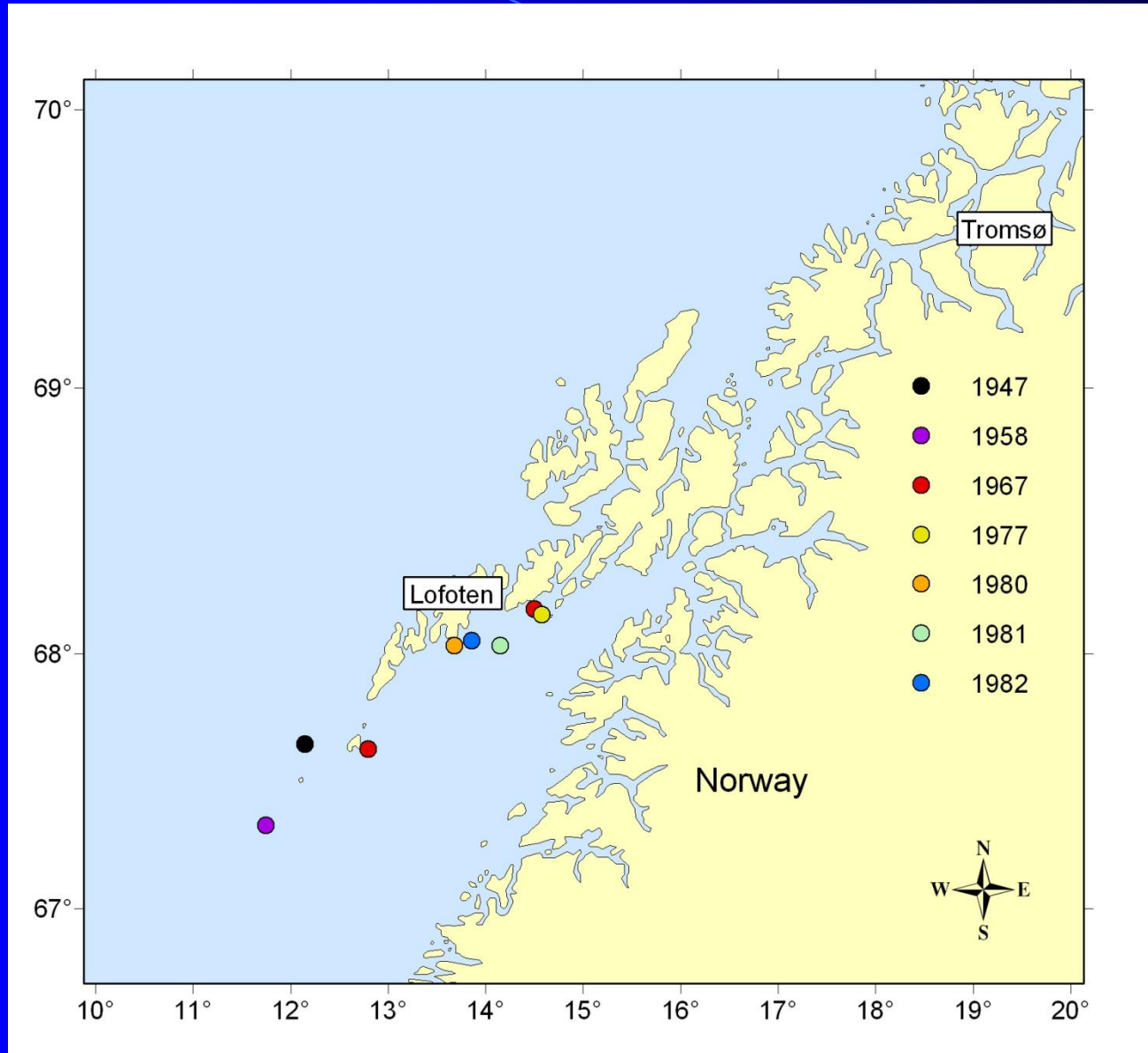


# Questions

- **Is there any bias in ageing of the NEA cod between two generations of readers, which would influence on appearance of temporal trends in size at age?**
- **Is there any bias in the NEA cod of spawning zones number between two generations of readers, which would influence on age of maturity?**



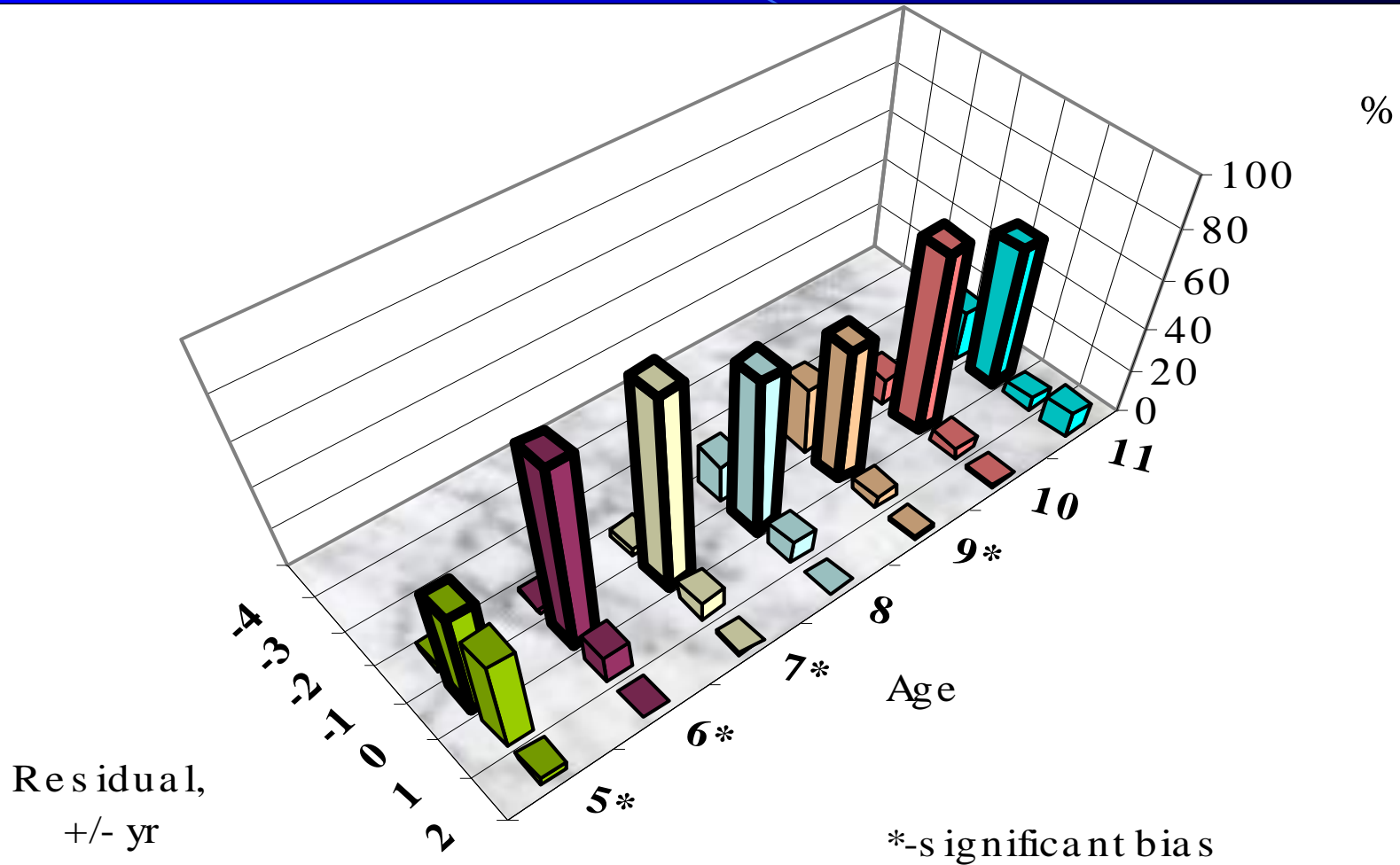
# Sampling locations



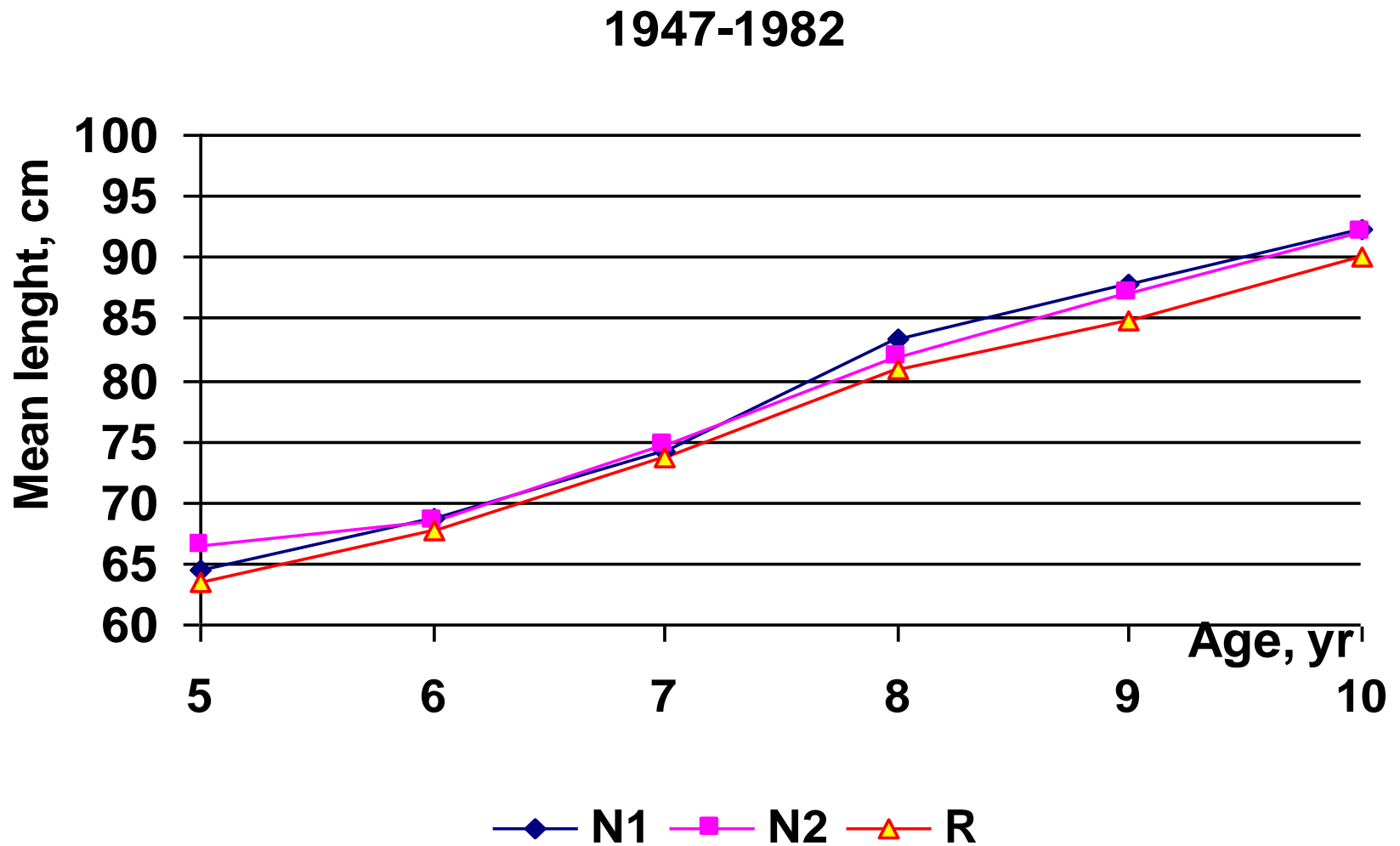
# Number of cod otoliths reread and per cent of agreement between ageing results

<b>Year</b>	<b>No obs.</b>	<b>Min – max age due to N 1</b>	<b>Mean % % agreement between N1 and N2</b>	<b>Mean % % agreement between N1 and R</b>	<b>Mean % % agreement between N2 and R</b>
<b>1947</b>	91	6-18	64	62	77
<b>1958</b>	75	5-11	65	65	64
<b>1967</b>	100	6-13	55	20	34
<b>1977</b>	100	4-10	83	76	85
<b>1980</b>	87	6-12	84	77	76
<b>1981</b>	93	4-14	80	71	71
<b>1982</b>	100	3-9	78	79	84
<b>Sum</b>	<b>646</b>		<b>73</b>	<b>65</b>	<b>70</b>

# Age comparison by selected years and by all years combined (N1 - N2)

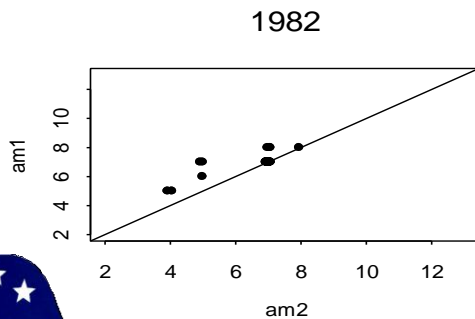
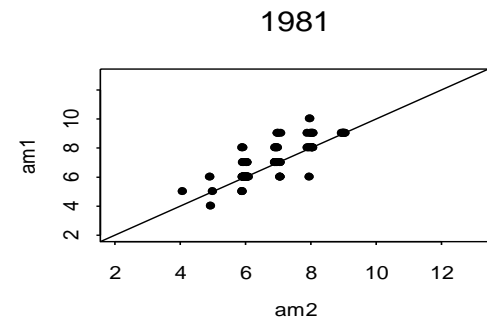
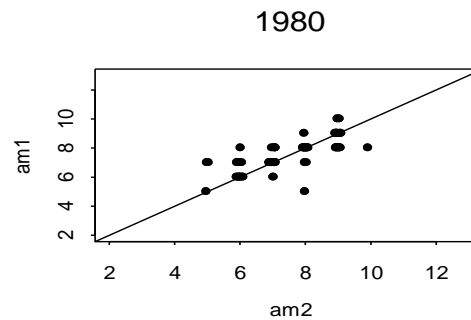
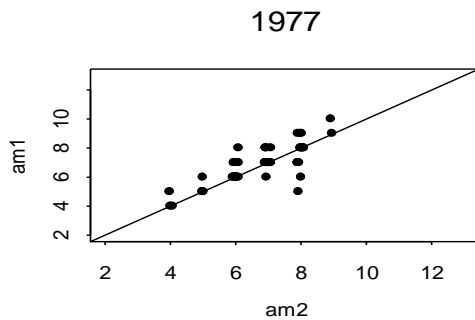
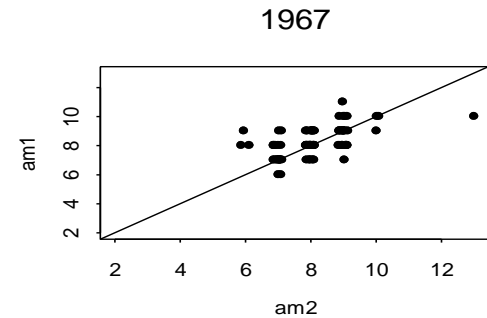
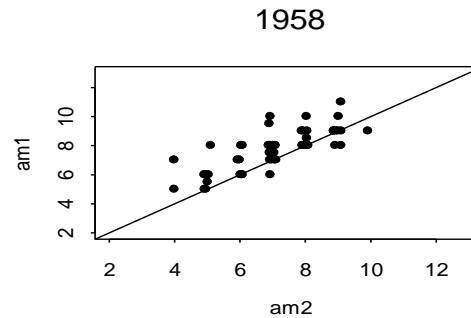
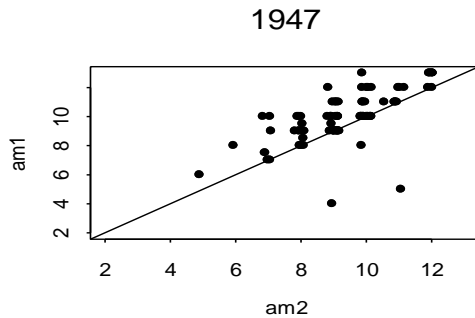


# Calculated mean length

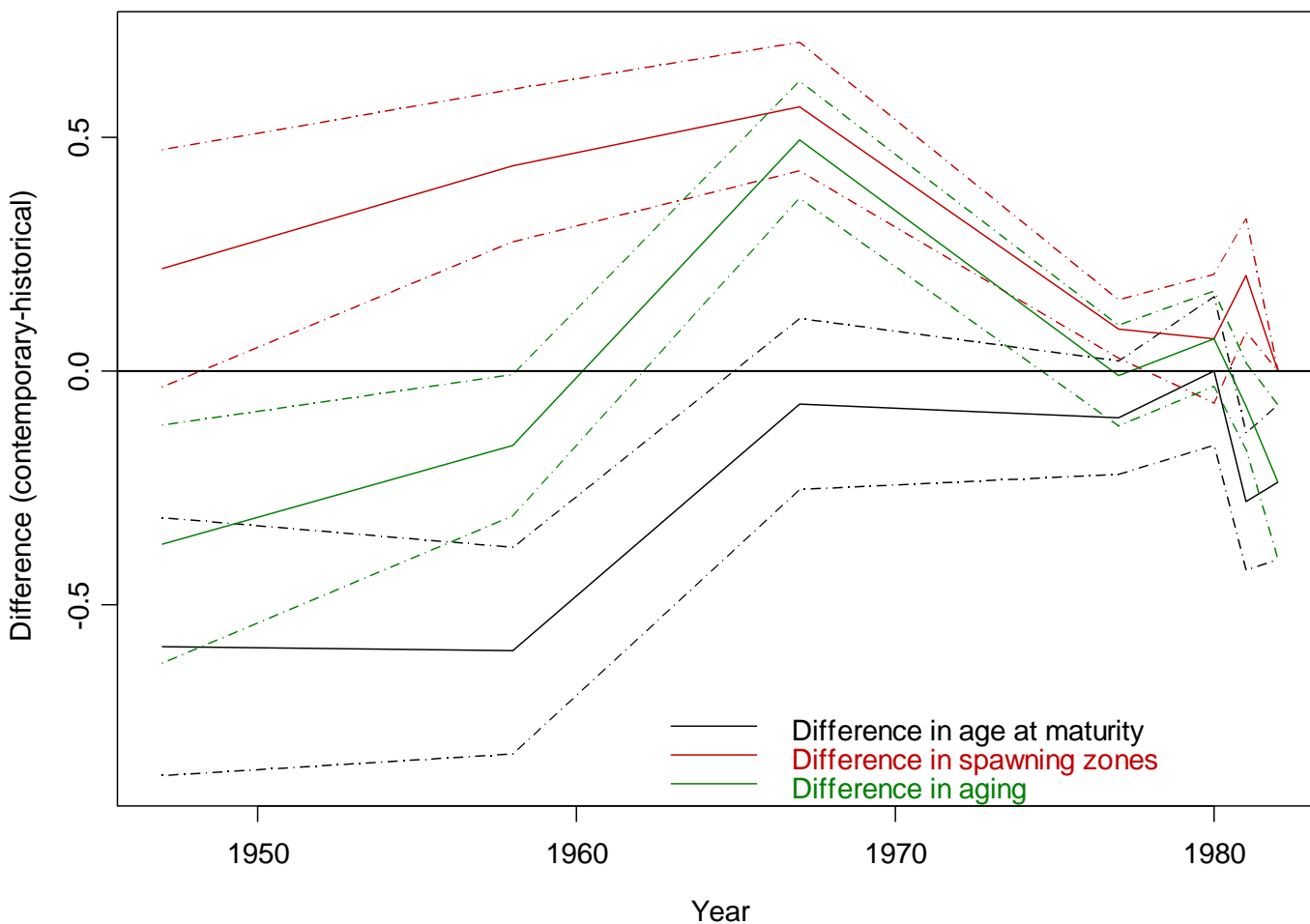




# AGE AT FIRST MATURATION from original readings (am1) versus contemporary readings (am2), for each of the considered years



# Estimated mean difference in age at first maturity (black) and number of detected spawning zones (red)



# Conclusions

- Discrepancies in age readings in different time periods cannot explain the appearance of the observed temporal trends in biological characteristics of the Northeast Arctic cod population.
- Revision of historical age readings by the contemporary readers would generally lead to the strengthening of the observed tendencies.
- The bias in age at maturation of the re-read material, on average, is systematically negative, i.e. the age at maturation determined by the contemporary readers is younger than determined by the historical readers. The difference in age at maturation is largest in 1947 and 1957, decreasing with time.



# Conclusions

- The presented bias in determination of age maturation by age readers CAN only explain a small part of the estimated (ICES 2002) changes in mean age of 50% maturation from the 1940s to present.
- Cod otoliths stored for a long time under proper conditions can be reliable material for many ichthyologic fields of research.





Thank you for your  
attention!