



European Geosciences Union - General Assembly  
Geophysical Information for Teachers (GIFT) Workshop  
Austria Center Vienna, April 3, 2006

# **The Polar Regions**

## **From Exploration to Scientific Work: A Century of Human Endeavour in the Polar Regions**

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Alfred Wegener Institute for Polar and Marine Research, Bremerhaven  
(Germany)

















## Overview 1

# Austro-Hungarian North Pole Expedition 1872-1874 with the 'Admiral Tegetthoff'

Leaders:



Julius Payer



Carl Weyprecht





## Overview 2

### **Fourth Greenland Expedition of Alfred Wegener 1930/31**

Aim: establish a station on the inland ice of Greenland in order to obtain a full year's data record

Alfred Wegener, meteorologist and geophysicist, professor in Graz between 1924 and 1930.

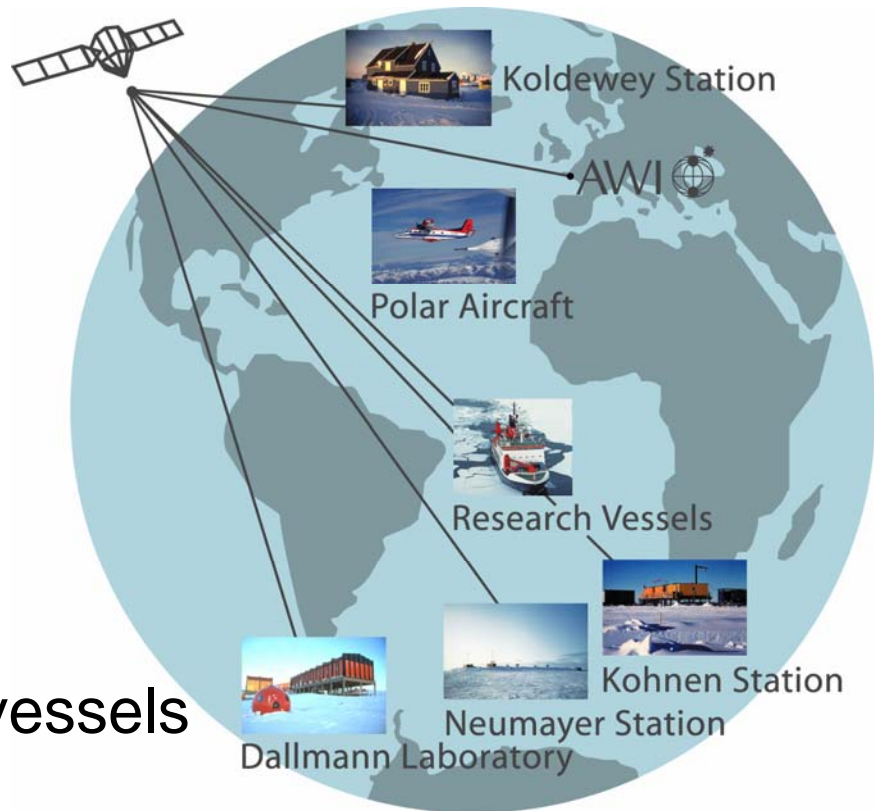
He died in November 1930 during the expedition on Greenland



## Overview 3

### Today's Polar Research

Permanent stations  
Aircraft  
Satellites  
Ice breaking research vessels



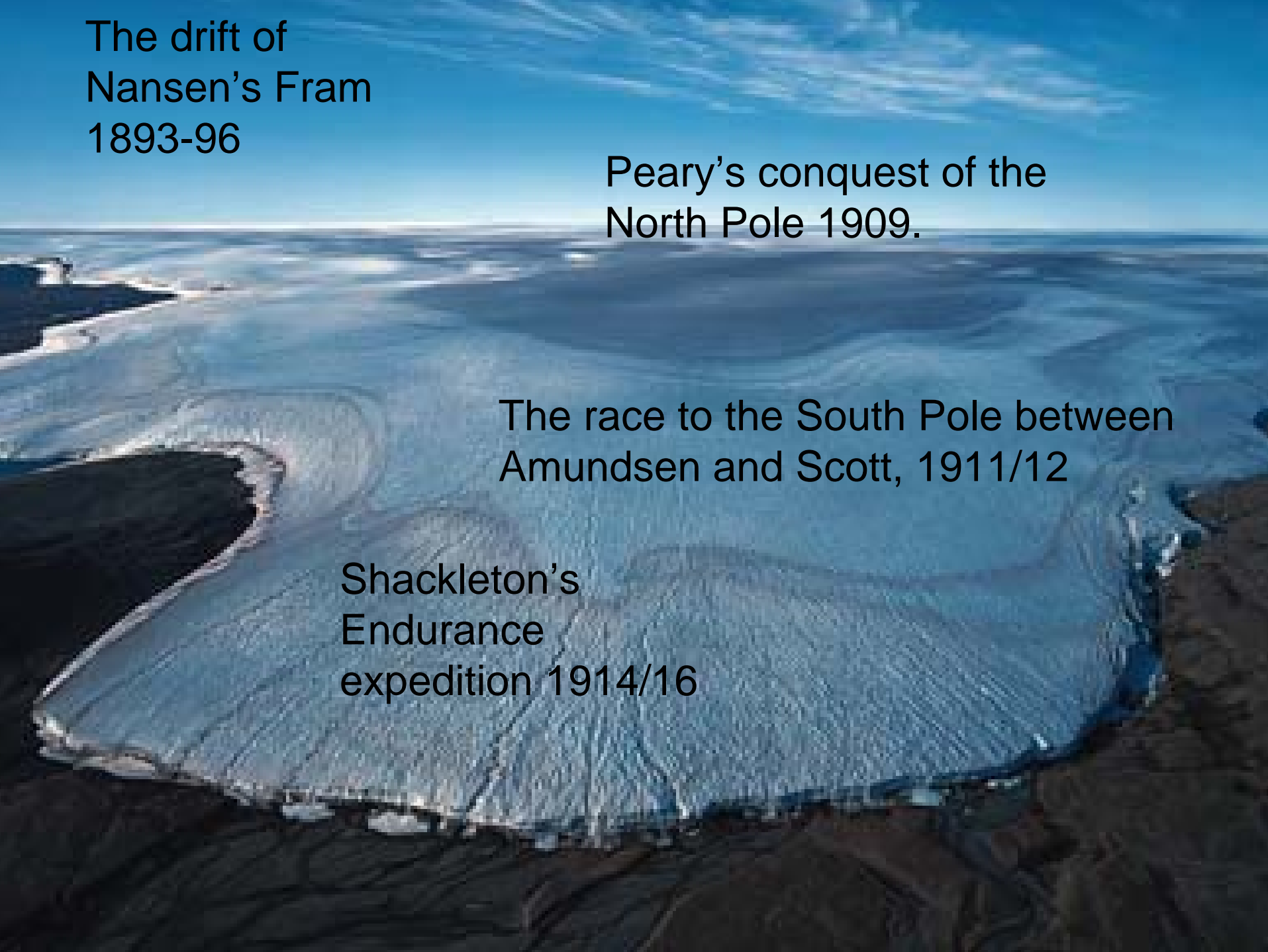


The drift of  
Nansen's Fram  
1893-96

Peary's conquest of the  
North Pole 1909.

The race to the South Pole between  
Amundsen and Scott, 1911/12

Shackleton's  
Endurance  
expedition 1914/16



# Overview 1

## **Austro Hungarian North Pole Expedition 1872-1874**

Fourth Greenland Expedition of Alfred Wegener  
1930/31

Today's Polar Research (RV Polarstern, aircraft,  
satellites)





# Austro-Hungarian North Pole Expedition 1872-1874

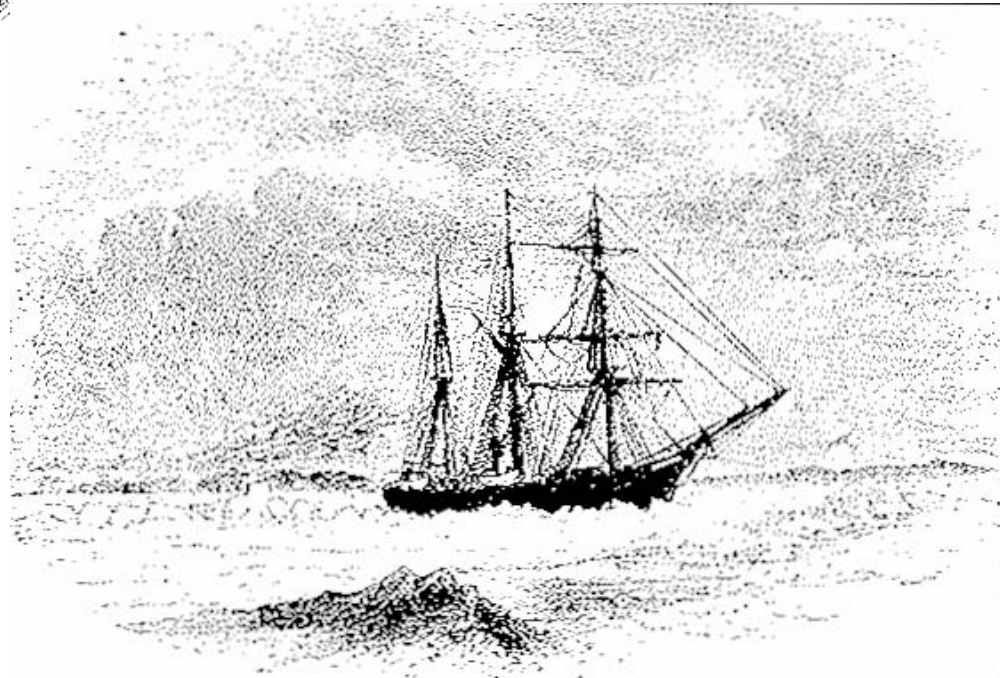


Carl Weyprecht



Julius Payer

Admiral Tegetthoff



# Austro-Hungarian North Pole Expedition 1872-1874

Start:

June 13<sup>th</sup>, 1872, from Bremerhaven with the purpose of exploring the unknown regions beyond Novaya Zemlya.

The ship “Admiral Tegetthoff” :

38.3 metres long,

7.3 metres wide and

with a 100 horse power engine, reaches a speed of six knots.



# Austro-Hungarian North Pole Expedition 1872-1874

The crew:

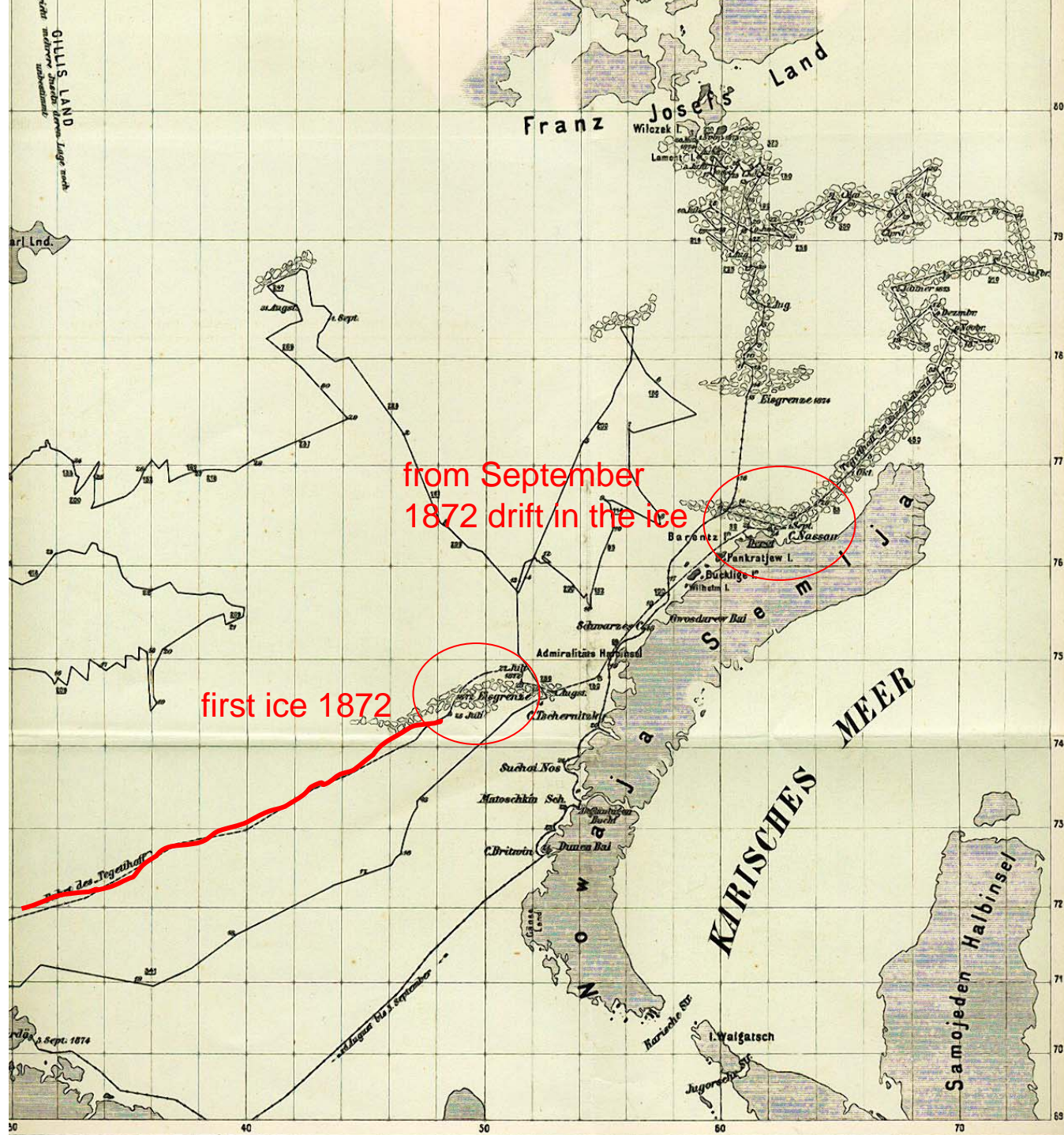
- Carl Weyprecht as nautical leader,
- Julius Payer directing the land based ventures,
- two marine officers and
- an expedition doctor.

These five men are also responsible for conducting scientific measurements.

The rest of the crew consists of 19 men, including a Norwegian ice pilot.







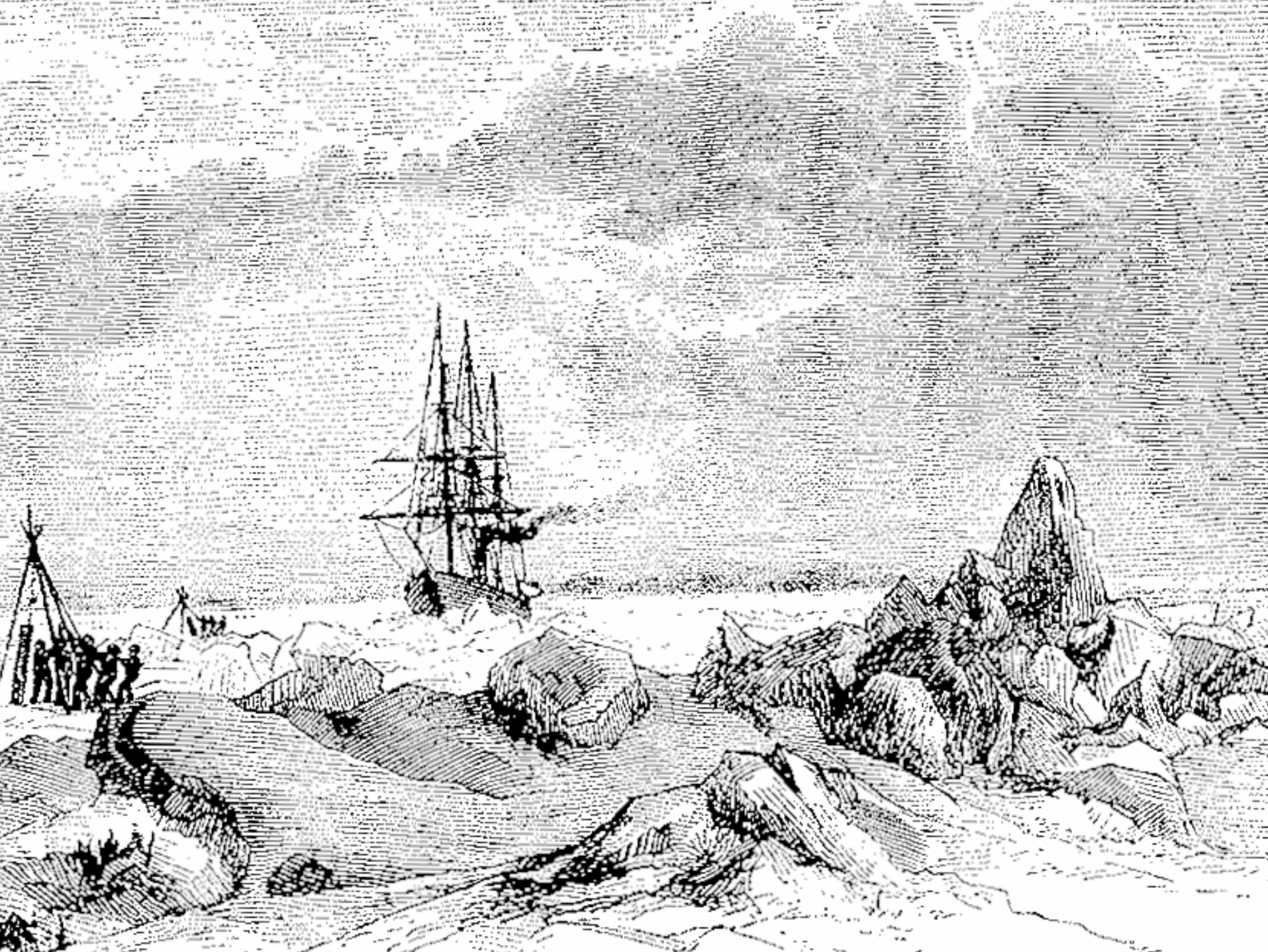




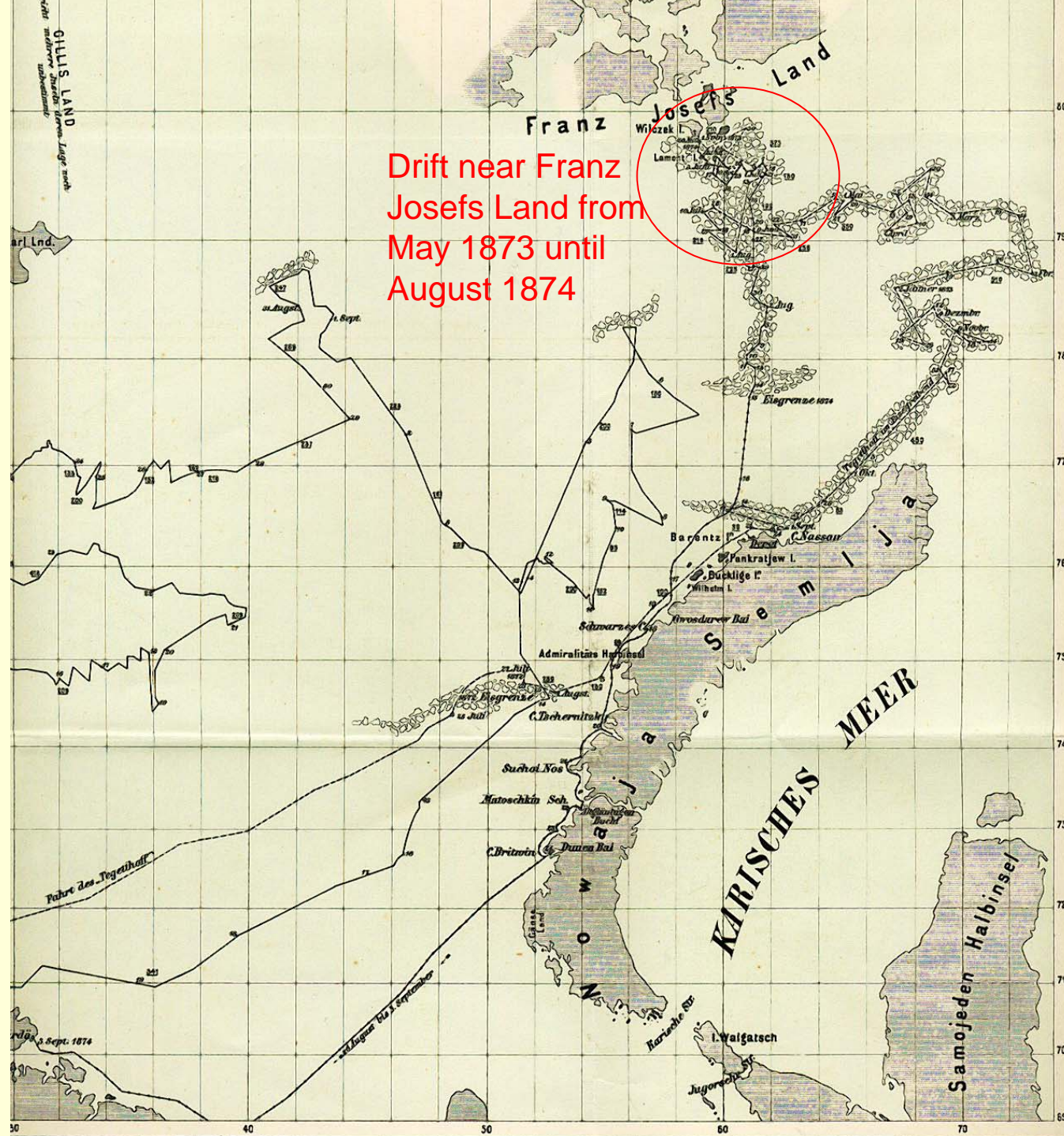












Drift near Franz  
Josefs Land from  
May 1873 until  
August 1874









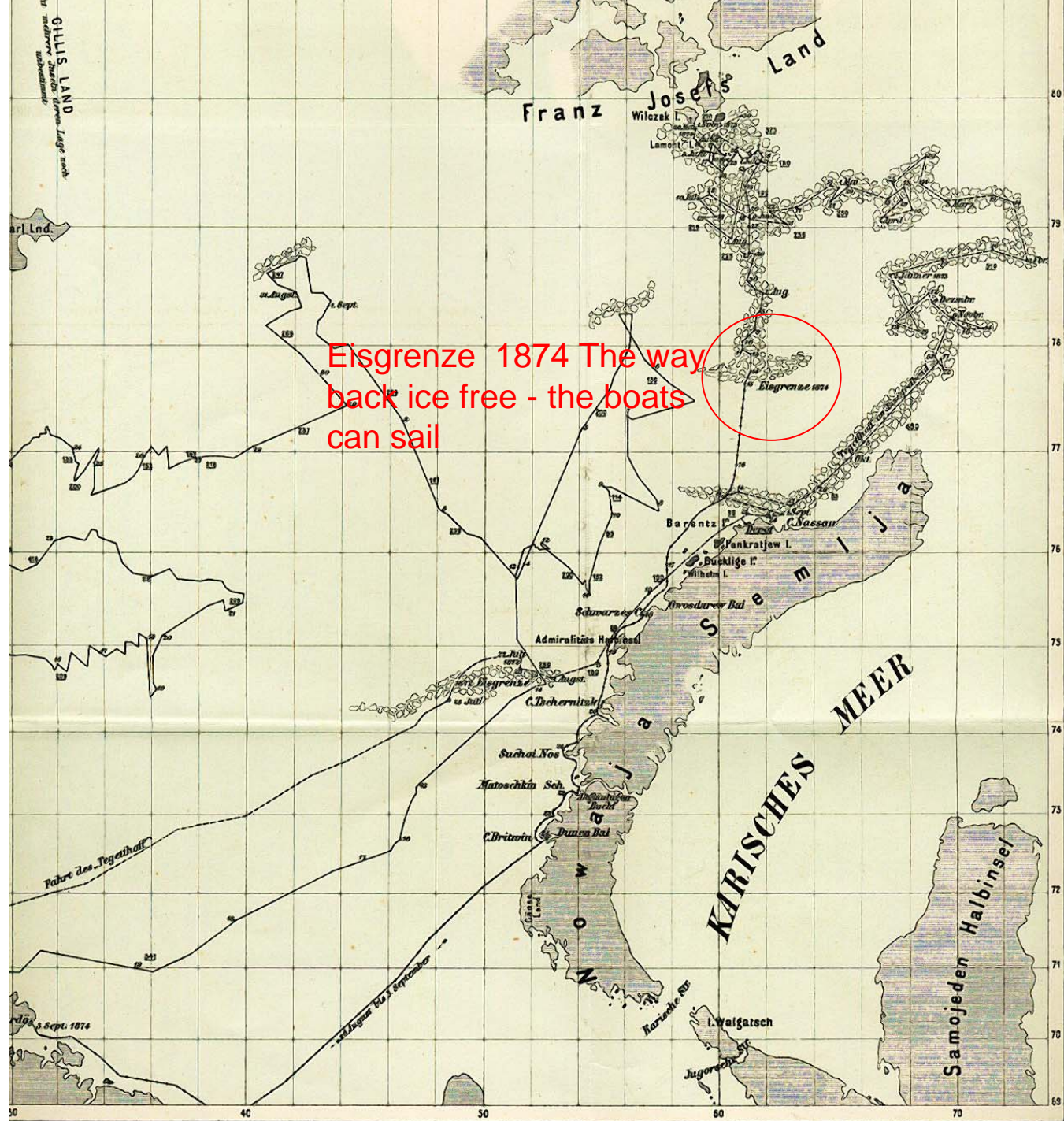




Verlassen des Eisfeldes am 17. Juni 1874.

Von der österreichisch-ungarischen Nordpolerpedition. Nach Skizzen von Hans Drrasch gezeichnet von Franz Schlegel.









Art. Kreier & Co. 1894

# DAS VERLASSEN DES EISES.

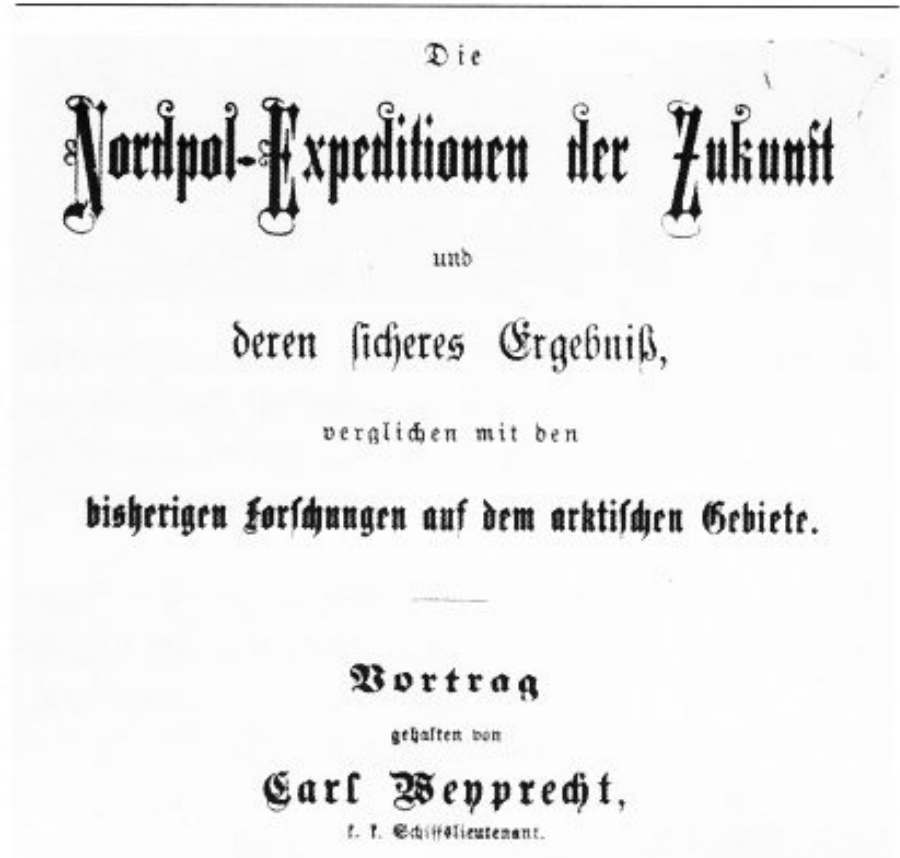
gezeichnet von Ed. Orel

# Austro-Hungarian North Pole Expedition 1872-1874

What are the results?

- The discovery of Franz Josefs Land
- The continual meteorological, magnetic and geophysical observations represent important pioneer work.
- The expedition has demonstrated that there is no ice-free open Polar Sea.





# Austro-Hungarian North Pole Expedition 1872-1874

Carl Weyprecht gained the following far reaching insight:

“In order to obtain conclusive scientific results, we need several simultaneous expeditions with the objective to make one-year observations, using the same methodology and the same instruments at different locations across the Arctic region.”



## Steps to the 1. International Polar Year

1879 Second International Meteorological Conference in Rome and

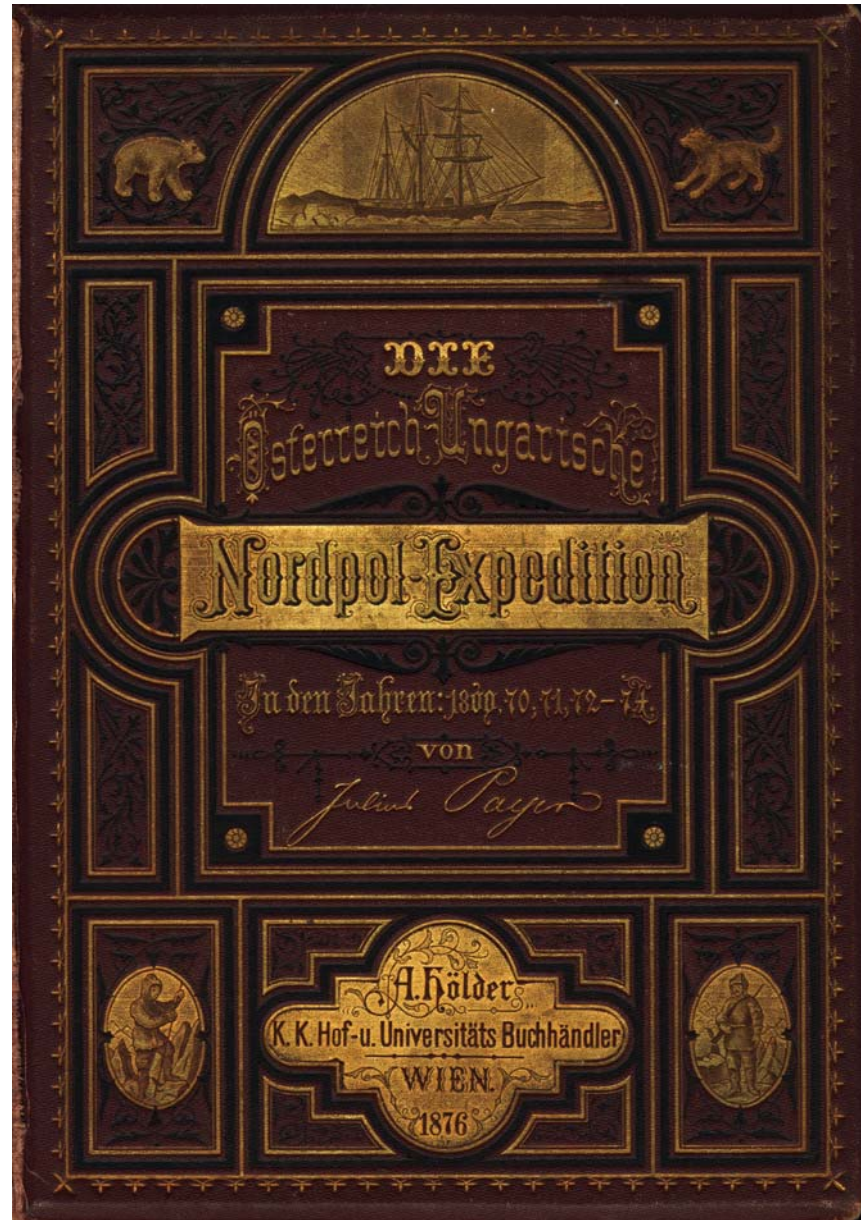
Founding of the International Polar Commission at the German Hydrographical Office in Hamburg. Georg von Neumayer, Director of the German Hydrographical Office, became chair of the commission.

Neumayer paved the way for the First International Polar Year. He successfully promoted integration of the Antarctic into the programme.

One year after Weyprecht's death on March 29<sup>th</sup>, 1881 the First International Polar Year 1882/83 took place with participation of twelve nations. The largest scientific project of its time included 15 coordinated expeditions to the Arctic and Antarctic.

# Austro-Hungarian North Pole Expedition 1872-1874

This kind of documentation allows broad participation of the general public, and an expedition like this then can be the source of novels or television dramas much later on.



# Overview

Austro Hungarian North Pole Expedition  
1872-1874

**Fourth Greenland Expedition of Alfred Wegener  
1930/31**

Today's Polar Research (RV Polarstern, aircraft,  
satellites)





# Greenland Expedition Alfred Wegener 1930/31



1906



1912

1930



Alfred Wegener  
(01.11.1880 - November 1930)



# Greenland Expedition Alfred Wegener 1930/31

Aims of the expedition:

- a one-year recording of weather and ice conditions all the way across the inland ice of Greenland.
- measure the thickness of the inland ice

Use of new methods, new technology  
motorised sleds specifically designed to facilitate transports across the inland ice.







Map of Greenland  
with  
Oststation  
Eismitte  
Weststation











EISBAR

50 X



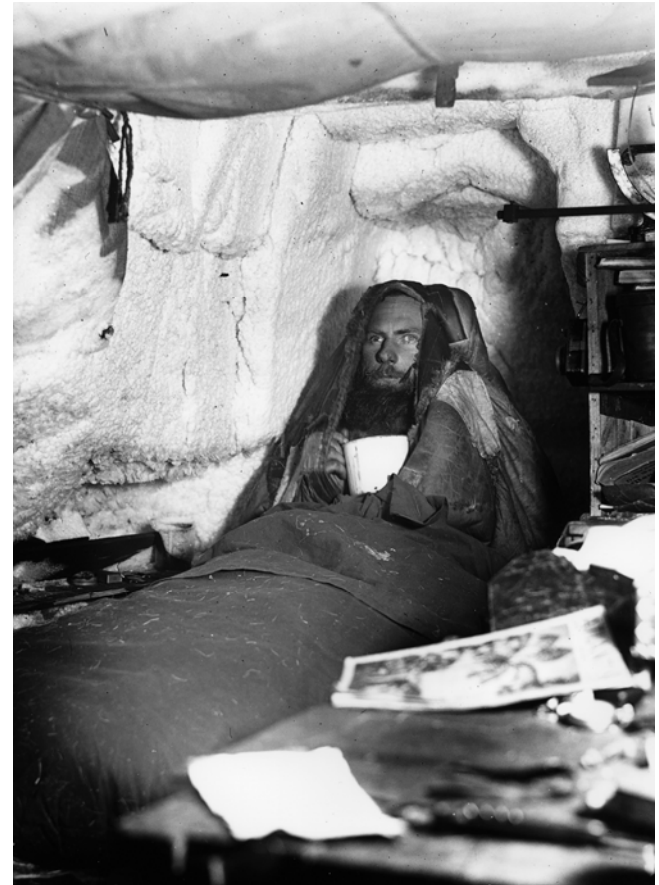


# Greenland Expedition Alfred Wegener 1930/31



Johannes Georgi

Ernst Sorge



Fritz Loewe



In station  
Eismitte during  
winter 1930/31



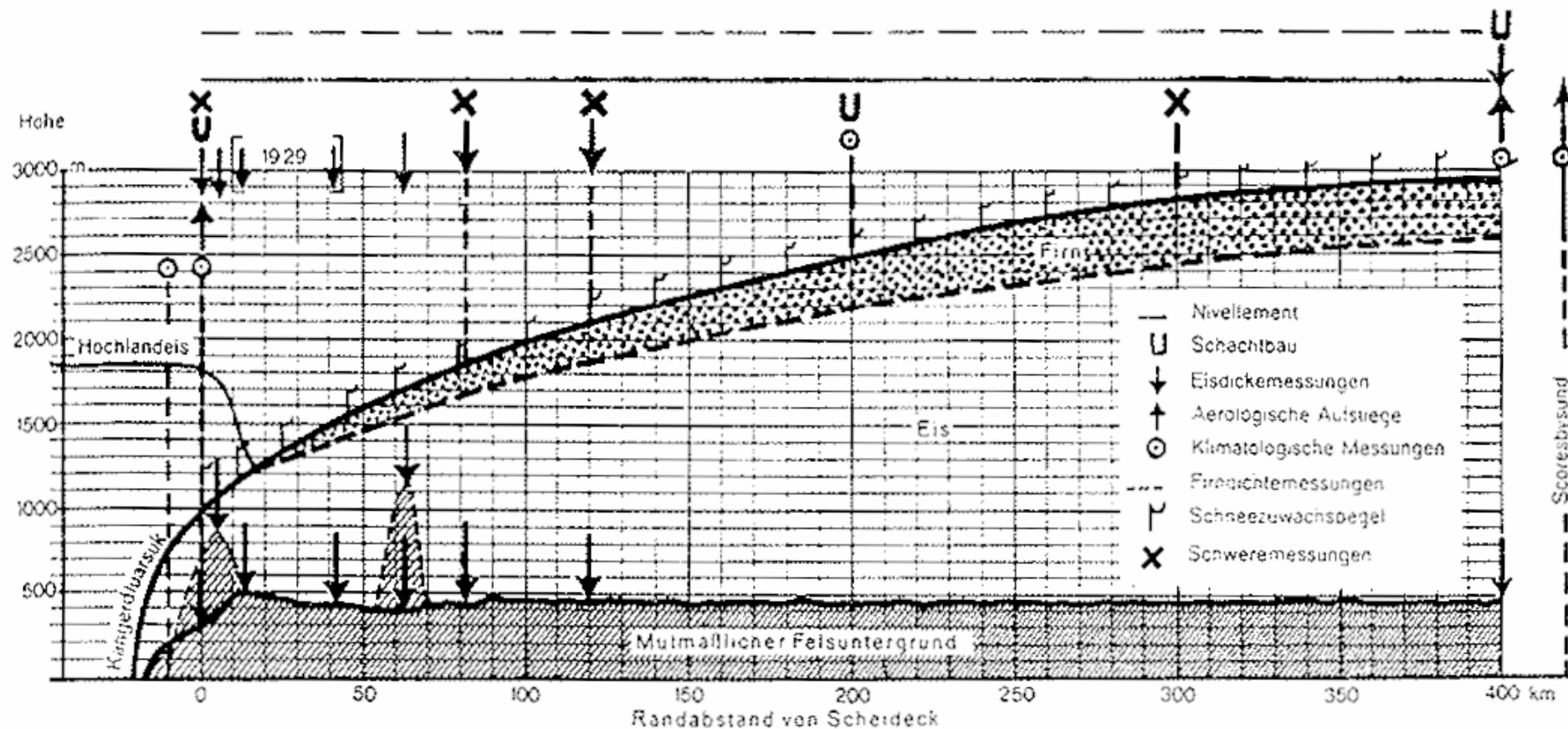
Das Große Eis



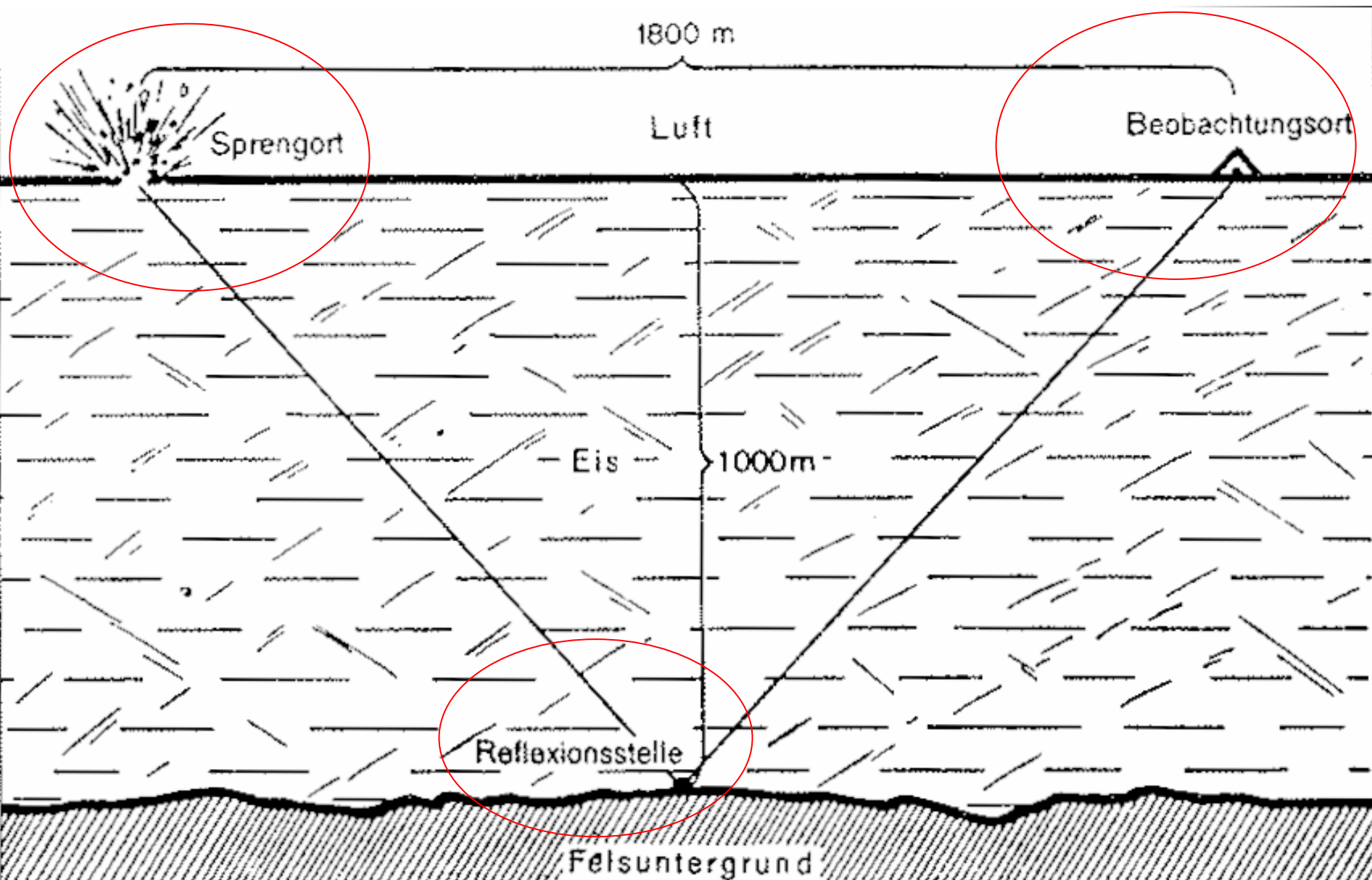


# Greenland Expedition Alfred Wegener 1930/31

## Measurements on the inland ice



# Greenland Expedition Alfred Wegener 1930/31





# Greenland Expedition Alfred Wegener 1930/31

What were the results?

Determination of the ice thickness: 1800 metres

At station Eismitte, Oststation and Weststation one year long several measurements were carried out.

A wealth of data, observations and of experience with new methods and technology



## **Greenland Expedition Alfred Wegener 1930/31**

Else Wegener published a book with the description of the expedition.

His brother Kurt Wegener worked together with the other scientists on the publication of the scientific results.

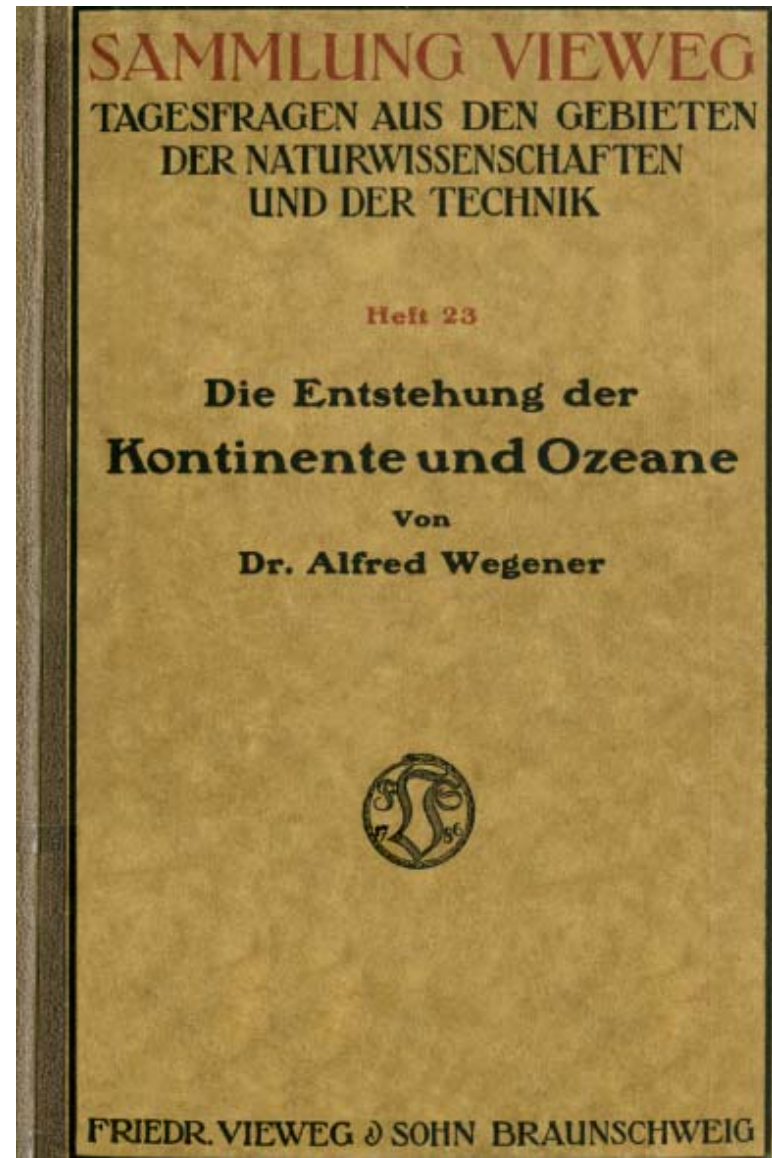
A lot of photographs were published and a film for schools was produced. The media reported about the expedition, whenever they had a new information, so the public could participate.





# Greenland Expedition Alfred Wegener 1930/31

Alfred Wegener:  
'The origin of  
continents and  
oceans'.



## Greenland Expedition Alfred Wegener 1930/31

Alfred Wegener:

“Only by integrating all geosciences we can hope to discover the truth, i.e. to find the picture which represents the total of known facts in the greatest order and hence deserves the claim for highest likelihood.”





# Overview

Austro Hungarian North Pole Expedition  
1872-1874

Fourth Greenland Expedition of Alfred Wegener  
1930/31

**Today's Polar Research (RV Polarstern, aircraft,  
satellites)**







# Today's Polar Research

Research facilities of  
the Alfred Wegener  
Institute around the  
globe



# RV `Polarstern´

Polar research and supply ship

Commissioning: 1982

Length: 118 m

Crew: 41- 44 persons

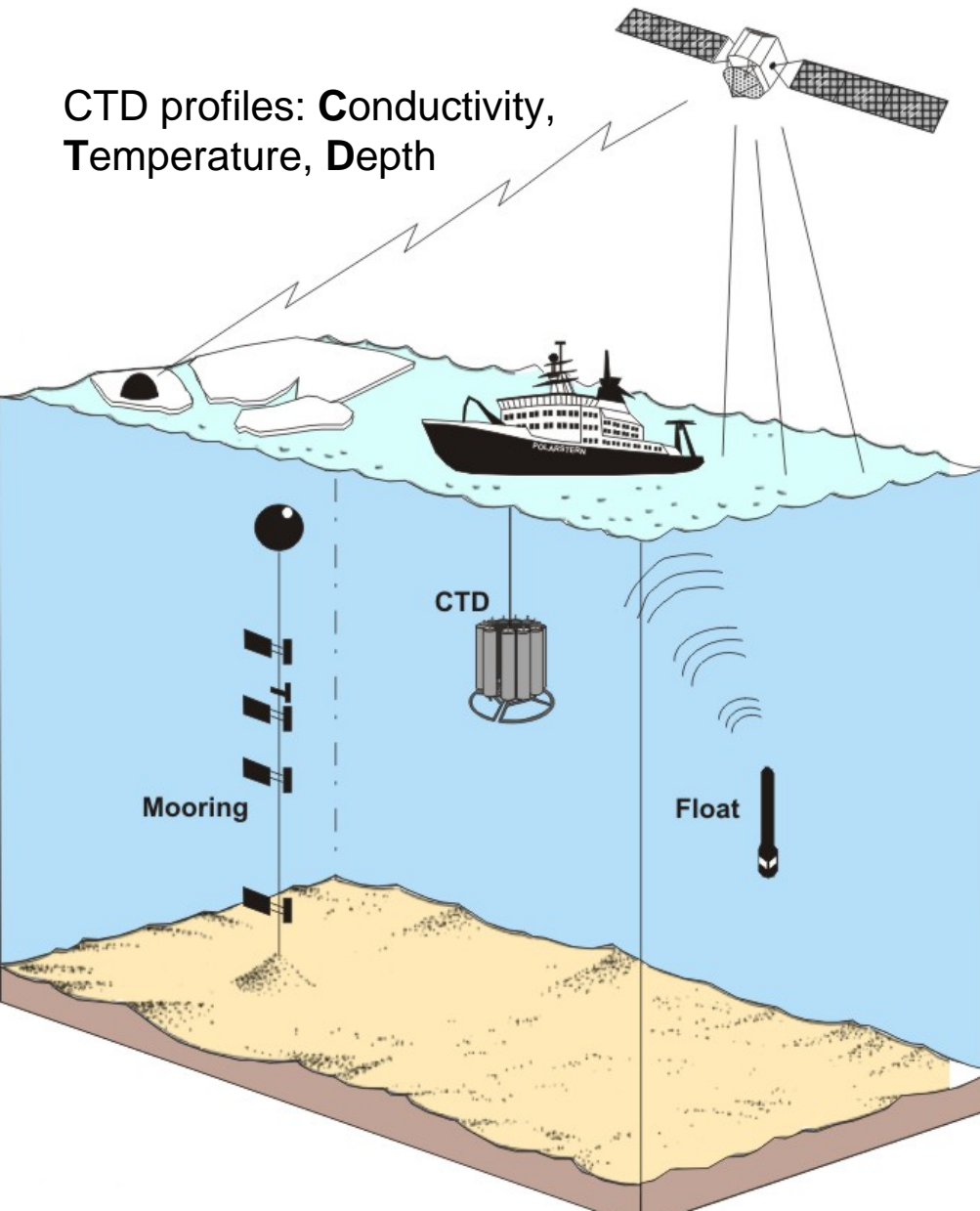
Working facilities: 50 scientists  
and  
technical staff



[www](http://www.awi.de)



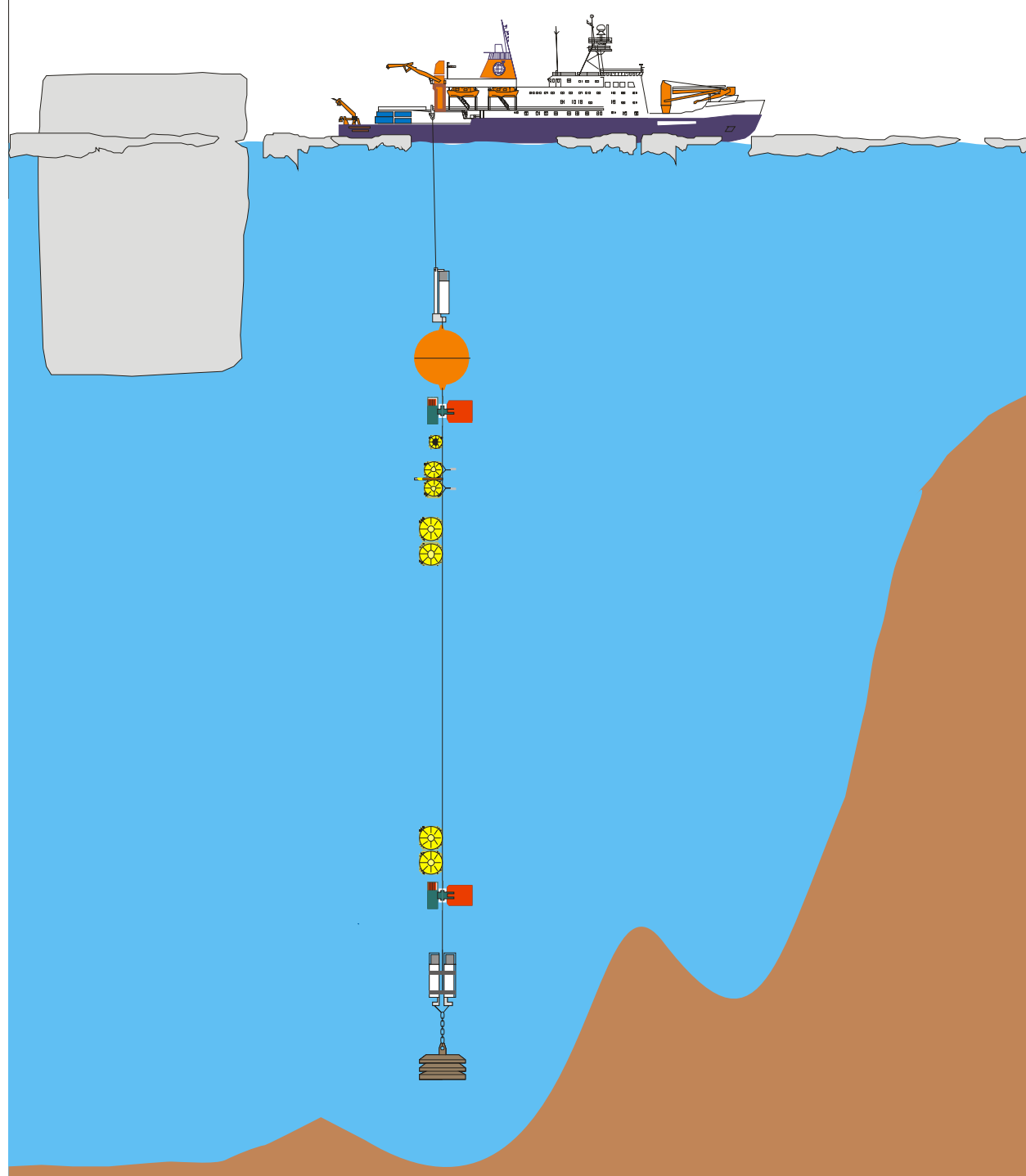
# Today's Polar Research



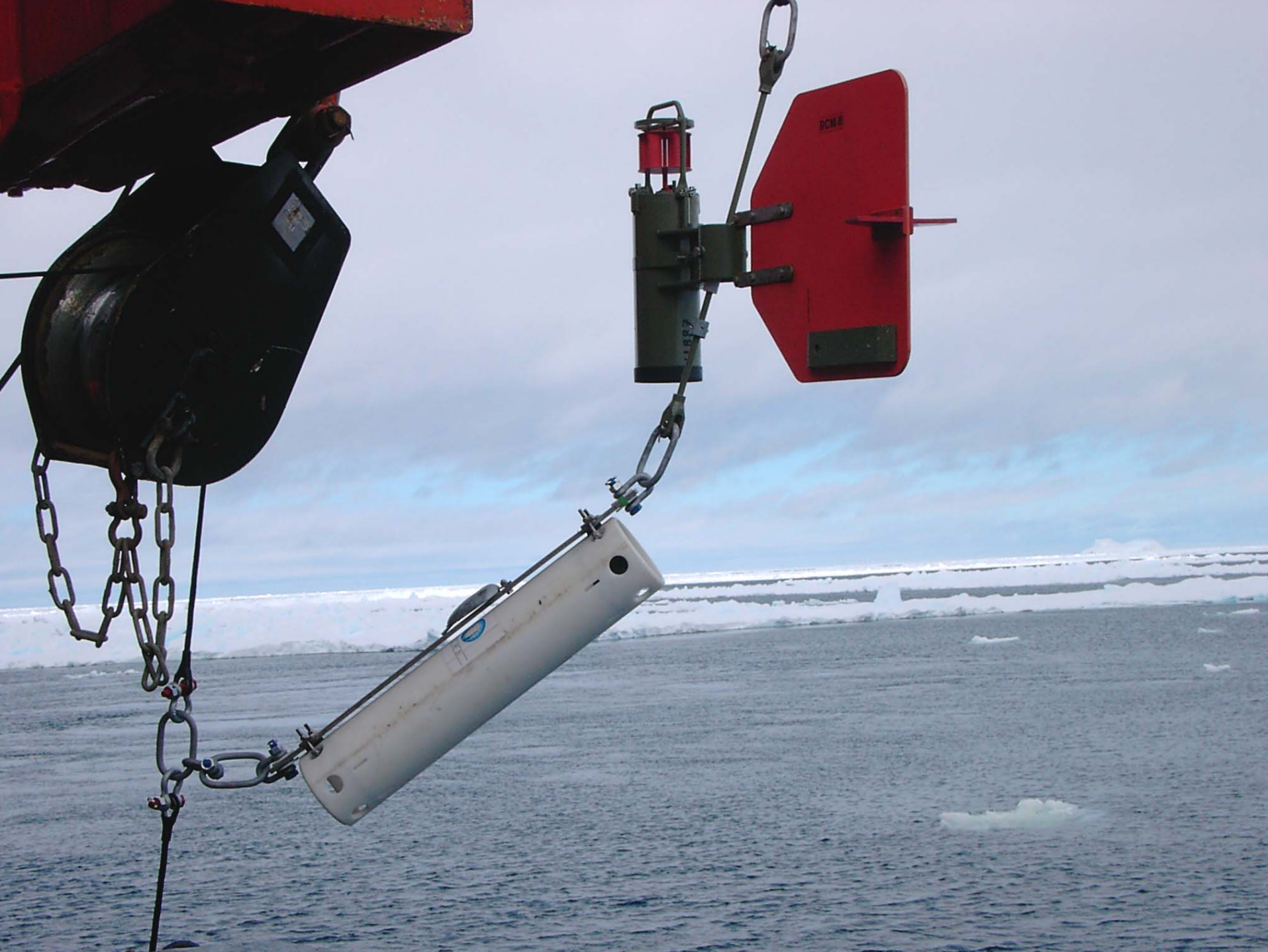


Anchored structures (moorings) are deployed from research vessels and retrieved after 1 - 2 years.

Such semi-permanent structures record data continually over extended periods of time at one particular location.

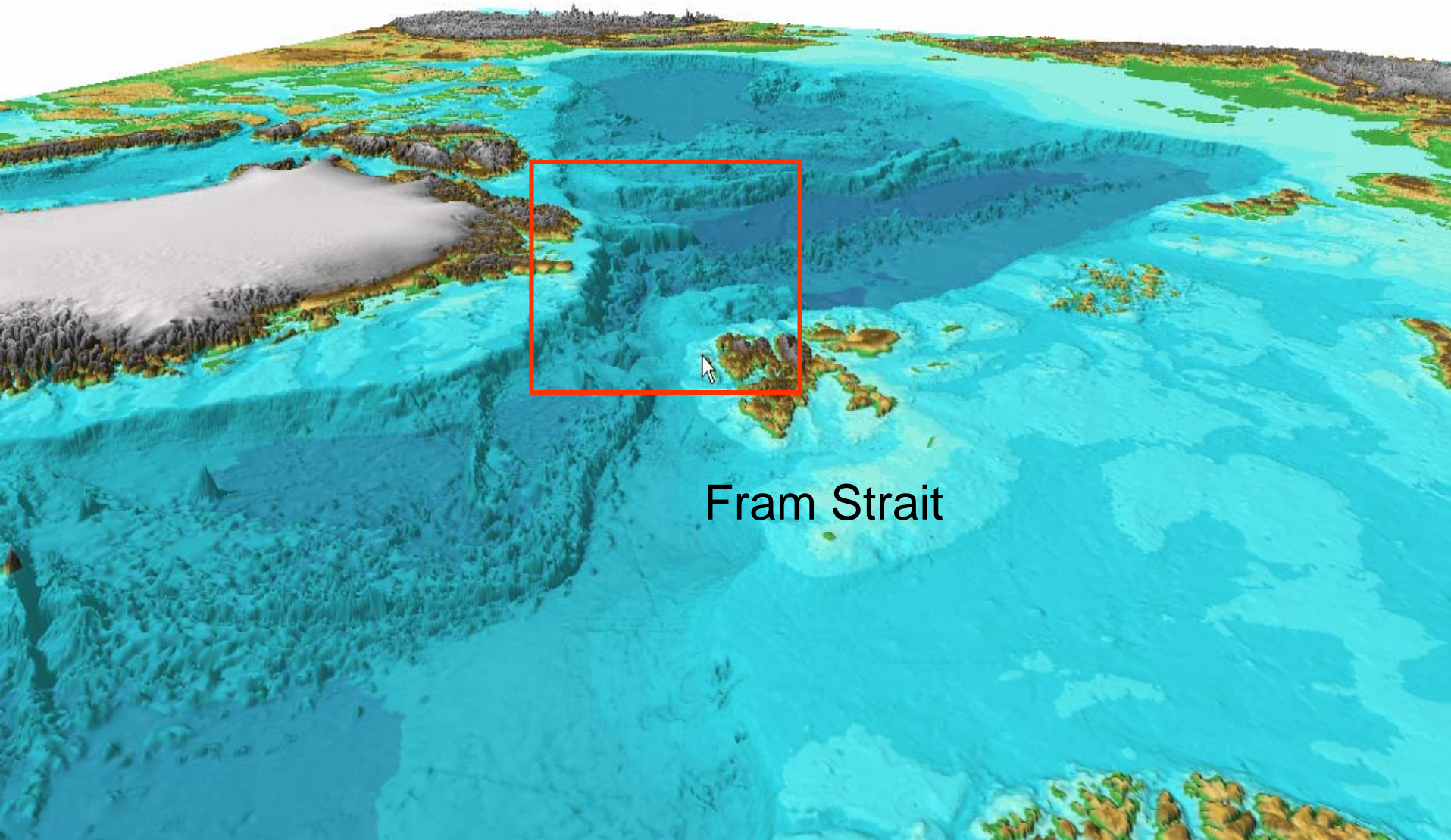








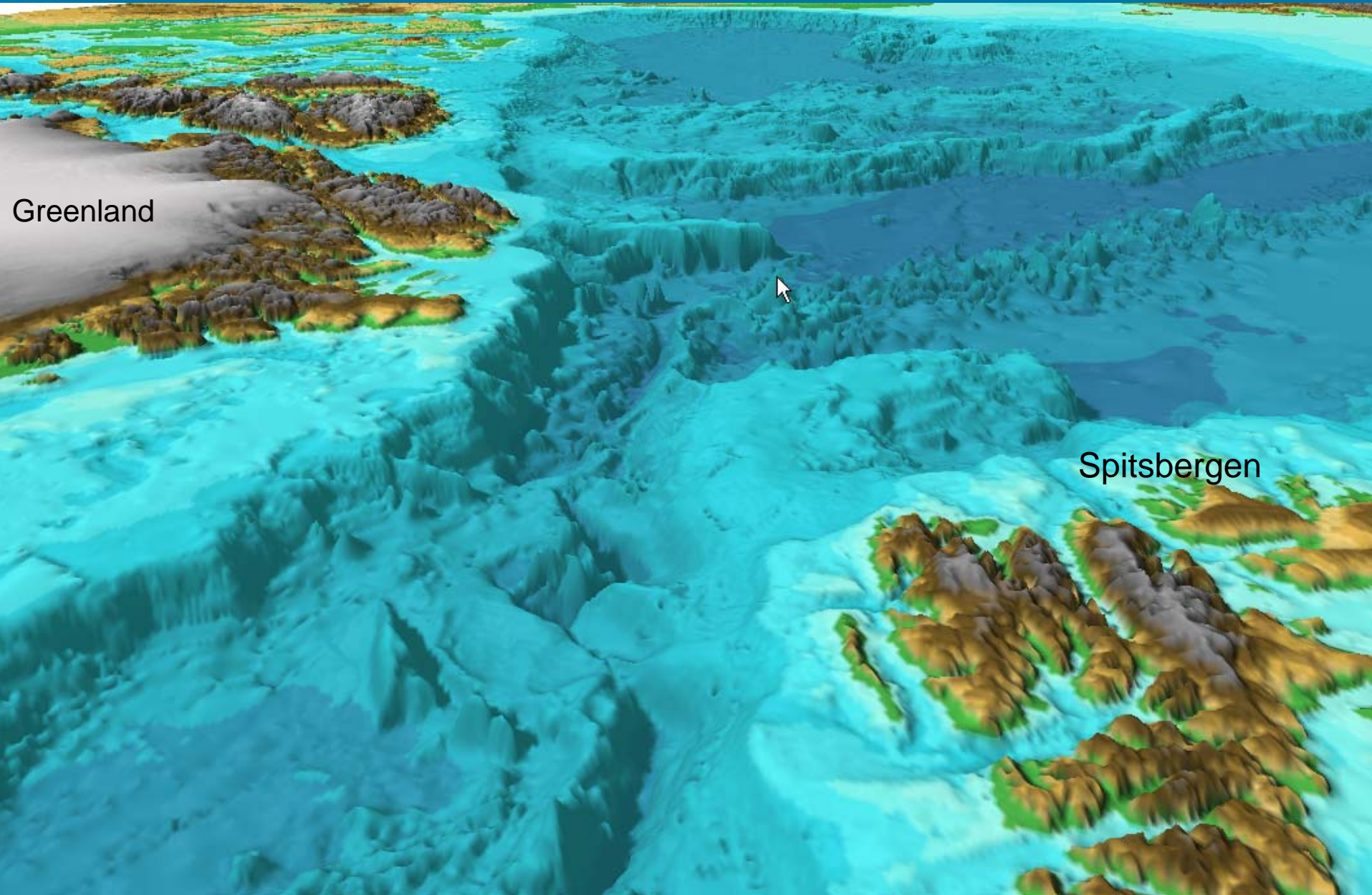
# Today's Polar Research



Fram Strait



# Today's Polar Research



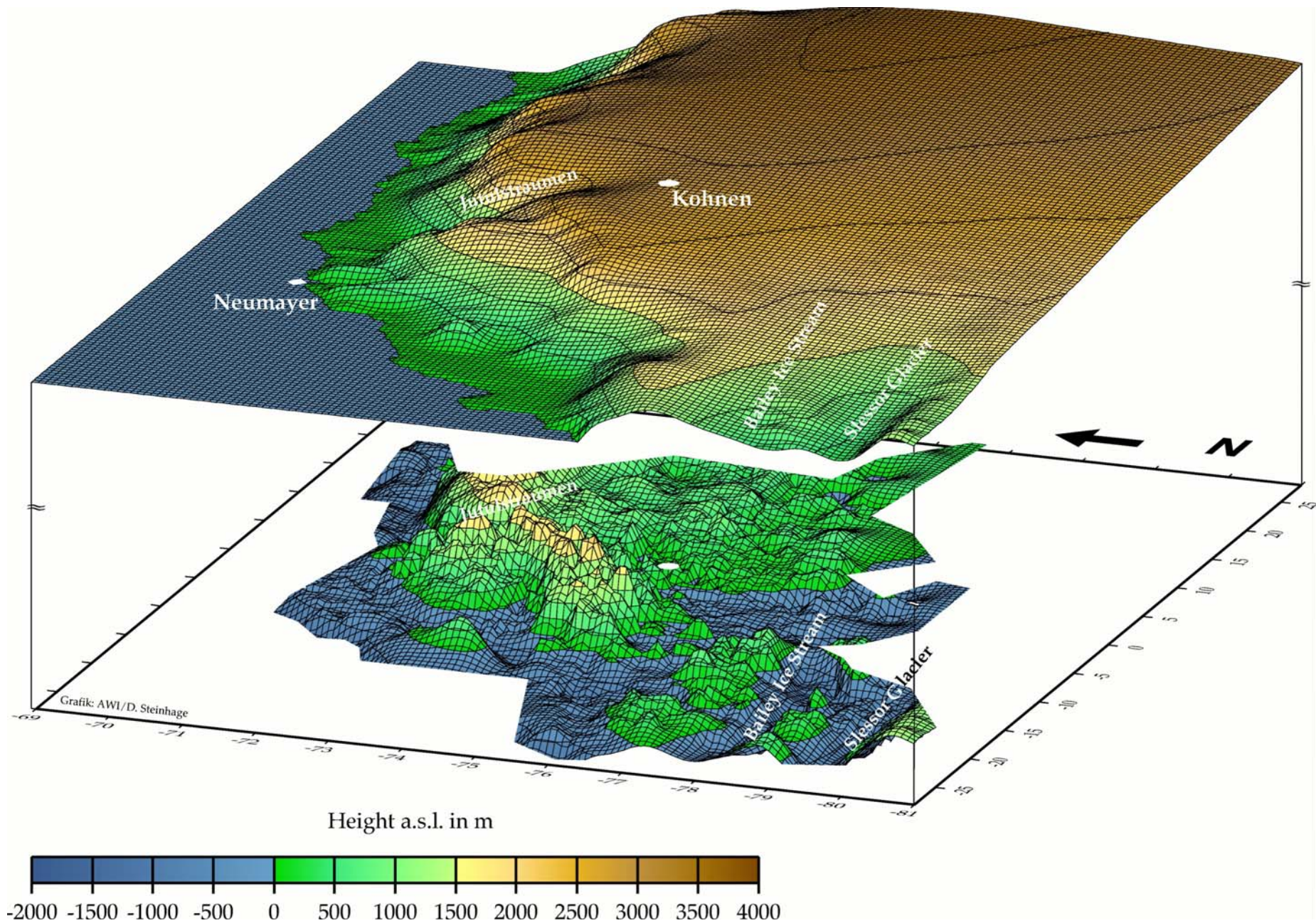


# Today's Polar Research

The AWI polar aircraft is equipped with instrumentation for the investigation of ice and atmosphere in polar regions. In the Antarctic, it is also used for logistic purposes.







# Today's Polar Research

CryoSat-2

launch in March 2009

Through its view from space,  
CryoSat will enable the first  
near-simultaneous systematic  
assessment of ice thickness at  
both poles









# The end

<http://www.awi-bremerhaven.de/>

