出國報告（出國類別：訪問）

參加「德國 AWI 極地研究所訪問」出國報告

服務機關：國家海洋研究院

姓名職稱：傅科憲 副研究員

派赴國家/地區：德國

出國期間：113 年 5 月 26 日至 5 月 31 日

報告日期：113 年 7 月 23 日

摘要

本院與國立中山大學申請獲准參與德國阿爾弗雷德-維格納研究所(AWI, Alfred-Wegener-Institut)極星號研究船(R/V Polarstern) 航次，爰於本(113)年5月26至5月31日前往德國阿爾弗雷德-維格納研究所之極地海洋研究中心訪問並參加該單位主辦的北極熊保護培訓課程。

訪問期間，本院簡介了推動相關海洋政策與執行的研究成果，並與 PS144航次領隊 Dr. Benjamin Rabe、資深科學家及極地海洋組主任進行了交流討論。此外，參加 AWI 主辦的北極熊保護培訓課程，並通過了筆試與術科測驗，順利取得證照。在今年8月至10月的北冰洋海洋調查航次中，將擔任北極熊觀察員，協助不同科學團隊在海冰上進行調查作業。

後續本院參與2024年 ArcWatch-2北冰洋長期海洋觀測計畫航次，將獲取第一手北冰洋海洋觀測數據，透過實際調查進一步希望了解在全球氣候變遷的背景下，極地北冰洋海洋環境的時空變化。與德國阿爾弗雷德-維格納研究所後續將持續透過國際海洋科研合作方式，在相關極地研討會發表成果，展現我國極地海洋科學研究之量能並拓展國際海洋事務之深度與廣度，以落實「競逐太空、探索海洋」之海洋國家發展願景。

目次

壹、目的

在全球氣候危機情況下，海溫上升導致北極圈海冰覆蓋面積越來越少，融冰速度越來越快。北極海冰融化不僅衝擊到極區的陸地、大氣、海洋、生態等，亦會影響天然資源、經濟、交通航運與軍事戰略。USA TODAY 報導指出北極海冰減少日趨嚴峻，未來亞洲的貨輪可於夏季期間通過北極海，可縮短航程抵達歐洲港口，可能降低航運業的碳足跡，但仍須考量過多的貨輪行經北極海域恐會增加該地區的海洋污染情形。

目前，我國對於極區的海洋研究及科學家數量相對較少，可能係因台灣距離北極海域相對遙遠。然而，在全球氣候變遷危機下，如何突破國內大多海洋科學研究僅侷限於台灣周邊海域的限制，展現台灣對國際海洋氣候危機的關心與積極參與。為此，國家海洋研究院與國立中山大學海洋科學系合作，於2024年1月成功申請參與德國阿爾弗雷德-維格納研究所(AWI, Alfred-Wegener-Institut)所營運的破冰船「極星號研究船(R/V Polarstern) 」 PS144 ArcWatch-2 (TransArc)航次，本次航次由國家海洋研究院傅科憲副研究員於2024年8月至10月深入前往遙遠的北冰洋中部海域(Central Arctic Oceean)進行為期2個月的海洋現場調查作業，希望透過參與國際海洋科學調查研究，獲取第一手北冰洋海洋觀測數據，進一步了解在全球氣候變遷的背景下海洋環境的變化。希望透過國際海洋科研合作，作為我國開啟極地海洋環境監測、蒐集極區水文基礎資料之基礎，強化我們極地海洋科學研究之量能。在國際上展示我國積極參與國際上極區海洋事務並對於國際海洋氣候問題的關心與貢獻，以實現「競逐太空、探索海洋」的海洋國家發展願景。

貳、訪問行程

1. 時間與地點： 113 年 5月 26 日至 5 月 31 日。
2. 成員：國家海洋研究院 海洋科學及資訊研究中心 傅科憲副研究員
3. 訪問行程概述如下：

日期	地點	行程
5月26日(日)	高雄-桃園-德國慕尼黑	搭機出發 (機上過夜)
5月27日(一)	德國慕尼黑-不來梅	抵達不來梅 (住宿城市：不來梅)
5月28日(二)	AWI 極地研究所	AWI 極地研究所訪問：極地海洋科學研究交流與討論、專題演講
5月29日(三)	AWI 極地研究所	北極熊保護培訓課程
5月30日(四)	德國不來梅-慕尼黑-桃園	搭機返國
5月31日(五)	德國慕尼黑-桃園-高雄	搭機返國

一、 AWI 極地研究所訪問

本次訪問於5月28日前往阿爾弗雷德-維格納研究所(AWI, Alfred-Wegener-Institut)極地海洋研究中心(圖1)先拜訪資深科學家 Dr. Benjamin Rabe(極星號 PS144 ArcWatch-2 (TransArc) 航次領隊)、資深科學家 Dr. Mario Hoppmann (極星號 PS144 ArcWatch-2 (TransArc) 航次主要觀測作業科學家)、極地海洋物理組主任 Prof. Dr. Torsten Kanzow 等人。Dr. Benjamin Rabe 邀請本院傅科憲副研究員進行專題演講(簡報內容詳如附錄1)，內容包含國家海洋研究院的組織與架構、海洋研究領域與關注議題及執行政策方向、深水錨錠觀測與海面資料浮標觀測技術與資料研究成果。

圖1 阿爾弗雷德-維格納研究所(AWI, Alfred-Wegener-Institut)極地海洋研究中心外觀。

圖2 訪問極星號 PS144航次領隊 Dr. Benjamin Rabe 並合影。

德國極星號研究船(R/V Polarstern，圖3)是由阿爾弗雷德-維格納研究所(AWI, Alfred-Wegener-Institut)負責進行營運，該船1982年建造完成，是一艘專門設計為極地科學研究的破冰船，船長約118米、寬度25米，排水約17,300噸、最高航速17節，該船能夠在2米厚的冰層中破冰航行，並可在最大厚度達3米的冰層中間歇性破冰。船上具備許多實驗室與海洋科儀設備，包括濕實驗室、乾實驗室、生物實驗室和化學實驗室，進行海洋生物、沉積物、冰芯和水樣的採集和分析，裝備了冷藏和冷凍儲存設施，用於保存採集的樣品。海洋科儀設備包含多音束聲納、走航式海流儀、多參數水文觀測器、深海採樣器、走航式溫鹽深儀投放器等，用於海底地形測繪和海洋水文研究。船上也配備了氣象觀測設備，可用於觀測大氣條件和海冰情況。具備直升機平台，可以透過直升機進行空中觀測和樣品採集。極星號執行了許多全球極地國際合作項目，主要研究極地氣候變化及其對全球氣候的影響，調查極地生態系統，特別是極地海洋生物和冰川生態系統，監測極地海冰動態和冰川運動，為全球海平面變化研究提供數據。

本院傅科憲副研究員參與2024年極星號 PS144 ArcWatch-2 (TransArc) 航次，是延續2023年極星號 PS138 ArcWatch-1航次計畫，希望持續監測與調查極地海域海洋環境的變化。PS144 ArcWatch-2是由 Dr. Benjamin Rabe 擔任領隊，將於2024年8月至10月深入前往遙遠的北冰洋中部海域(Central Arctic Oceean)進行為期2個月的海洋現場調查作業，將透過蒐集現場觀測數據進一步了解在全球氣候變遷的背景下，北極海冰的覆蓋面積、厚度和體積的季節性和年際變化，測量海洋溫度、鹽度和密度的分佈，進一步研究分析水團結構與洋流的變化。圖4為 PS144 ArcWatch-2航次規劃航線，預計由挪威 Tromsö 港出發往北航行至北極點，主要會進行三條主要測線(I-III)，沿著測線上會進行一系列海洋觀測調查，以及10個定點海冰觀測站，使科學家在海冰上進行冰層與海洋水文的觀測與調查作業。本次訪問期間，國家海洋研究院同仁與領隊 Dr. Benjamin Rabe 進行航次初步作業規劃與討論，本院在這個航次主要負責在測線 I 至測線 III 上進行走航拋棄式溫鹽深儀的觀測作業，透過此種觀測方式希望能針對航線上空間上垂直水文結構進行深入的了解，目前規劃約10-20公里會進行一次水文取樣作業。

圖3 德國極星號研究船在北極拍攝照片。(摘自 AWI，Polarstern in the Arctic Photo: Mario Hoppmann)

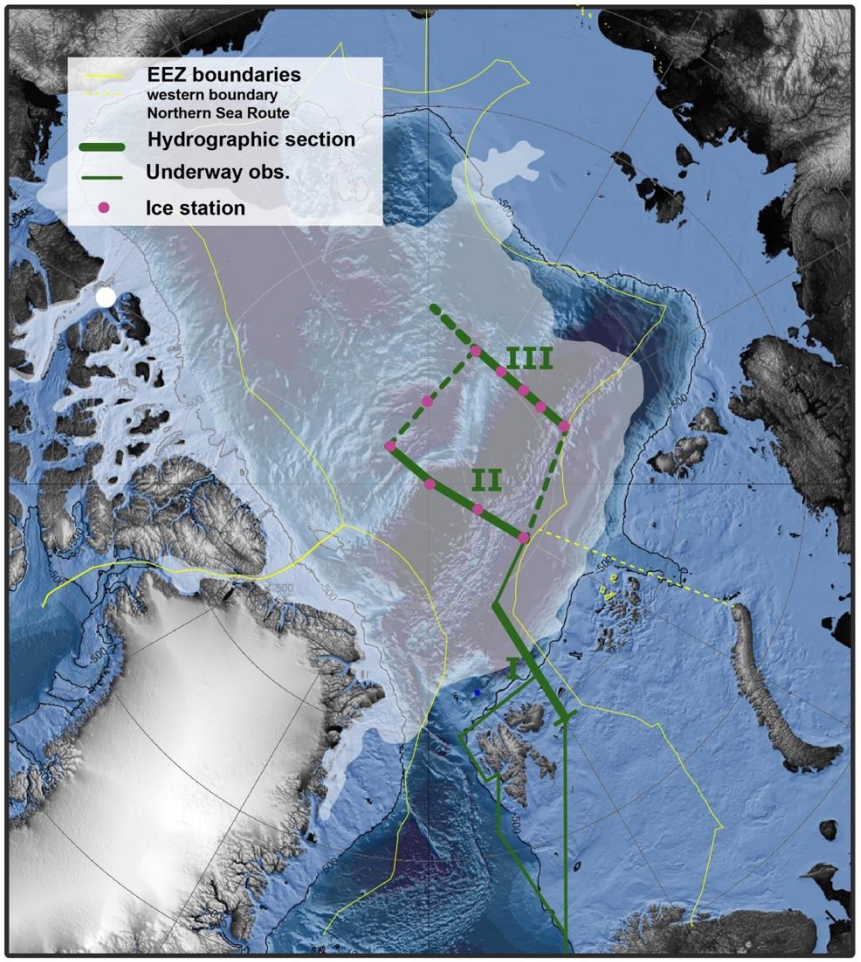


圖4 極星號研究船(R/V Polarstern) PS144 ArcWatch-2 (TransArc)航次路線與海冰測站。

二、 北極熊保護培訓課程

本次訪問第二天5月29日為前往 AWI 進行北極熊保護培訓課程，課程分成上午北極熊保護課程(圖5)由 AWI 講師簡介北極熊習性、海冰上作業應注意事項、來福槍與信號槍機構說明及分享過去曾發生的經驗，下午為前往郊區靶場(圖6)進行保護裝備實際操作與打靶訓練課程(因靶場屬於敏感區域，教練提醒禁止在內部進行任何攝影)。

有關北極熊保護培訓課程相關簡報資料詳如附錄2，課程重點摘要如下：

1. 北極熊的生態與生活習性

   這些大型肉食性動物，雄性的體重可達350至700公斤，雌性則介於150至350公斤之間，身高範圍從1.8公尺到3.5公尺不等。北極熊的生活史中有約75%的時間都在海冰上度過，成年北極熊每年需要捕食50到75隻海豹來維持生存。它們能夠以每小時30至45公里的速度奔跑，每天步行距離可達100公里。同時，北極熊具有極強的好奇心，喜歡探索周圍事物，應了解哪些因素會吸引他們接近，如何在不干擾北極熊的情況下進行科學研究。

2. 海冰上作業的風險評估

   科學團隊在海冰上作業時，應先觀察周圍是否有北極熊足跡、是否有北極熊出沒甚至躲藏，評估作業區域遭遇北極熊的風險及預防措施。課程中也說明科學團隊如何制定風險管理以確保團隊的安全。於冰上執行觀測作業時應至少有一個人負責瞭望四周是否有北極熊出沒，即所謂的北極熊觀察員。

3. 如何緊急應處與自我防護

   如何避免與北極熊保持安全距離的技巧，當發現遠處北極熊有逐漸接近科學團隊作業區域時，可以優先透過非致命裝備(信號槍)製造聲音來驅趕北極熊。萬一驅趕沒有奏效的應變流程為何，團隊應保持冷靜不要恐慌，通知船上領隊並即刻停止所有冰上活動，並盡可能護衛其他人員回到研究船上。課程也說明北極熊若已經十分接近作業人員，在非常危急情況應如何使用保護裝備(來福槍)進行最後一道自我防護。

4. 實際操作模擬訓練與測驗

   課程中也說明如何正確操作、維護及最後如何使用保護裝備，透過現實模擬練習如何應對遇到北極熊的情境，如信號槍操作使用練習、來福槍定點打靶與跑動一段距離以後再進行打靶等模擬情境，最後整個北極熊保護培訓課程結束後，主辦單位有非常嚴謹的筆試與術科測試。

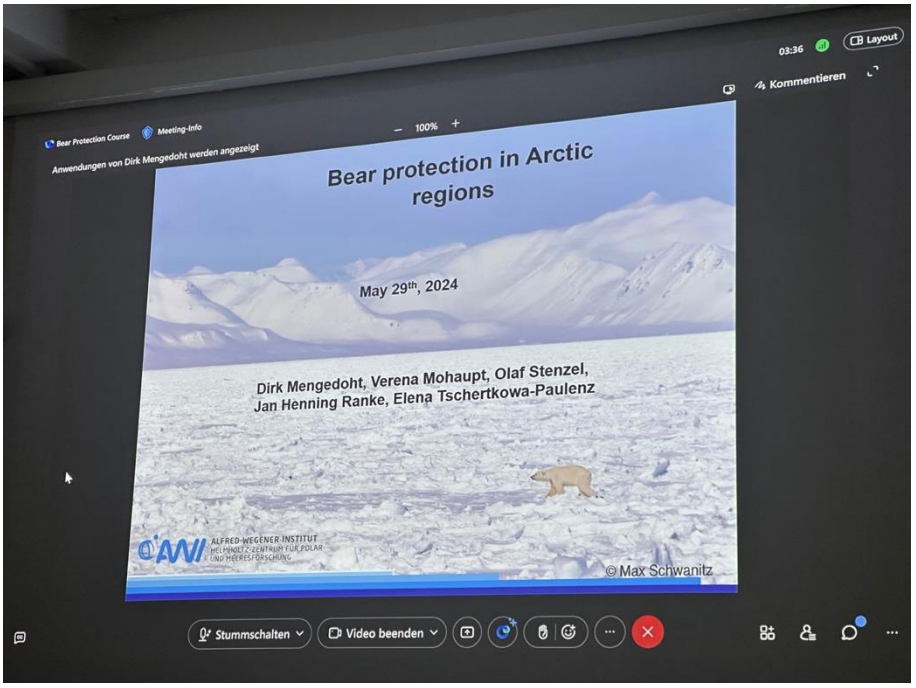


圖5 北極熊保護課程簡介。

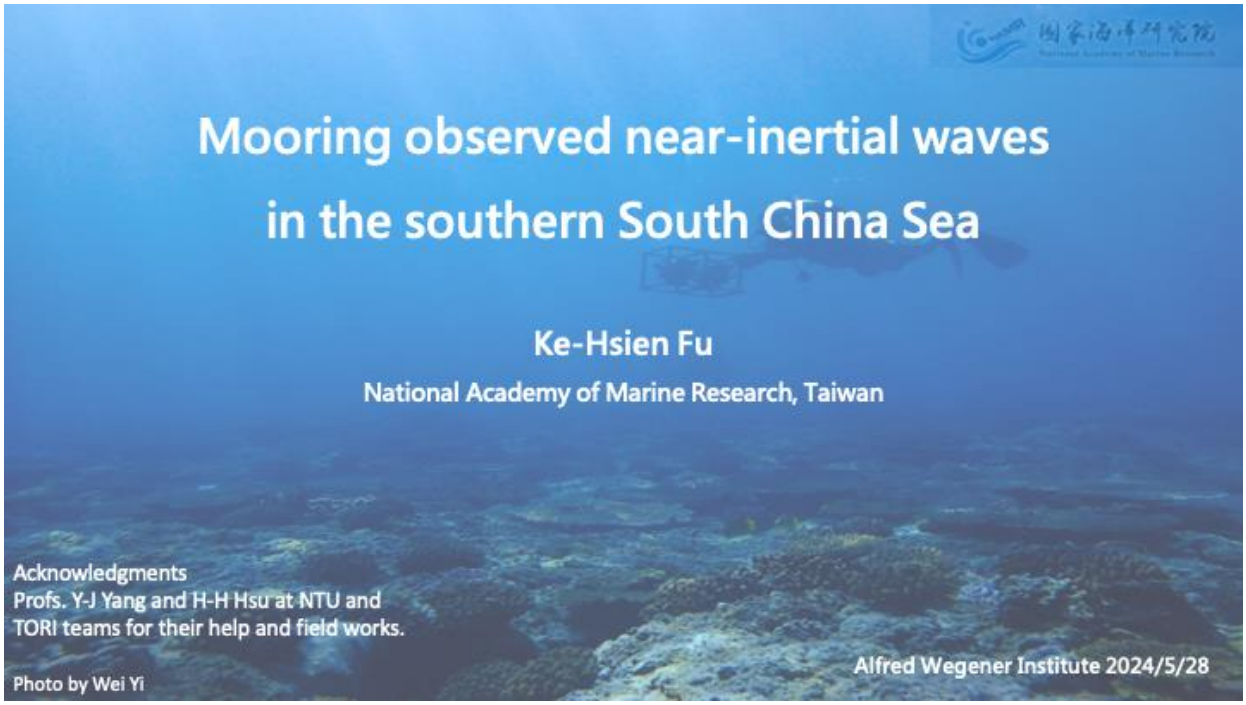
圖6 自我保護裝備實際操作練習場域。

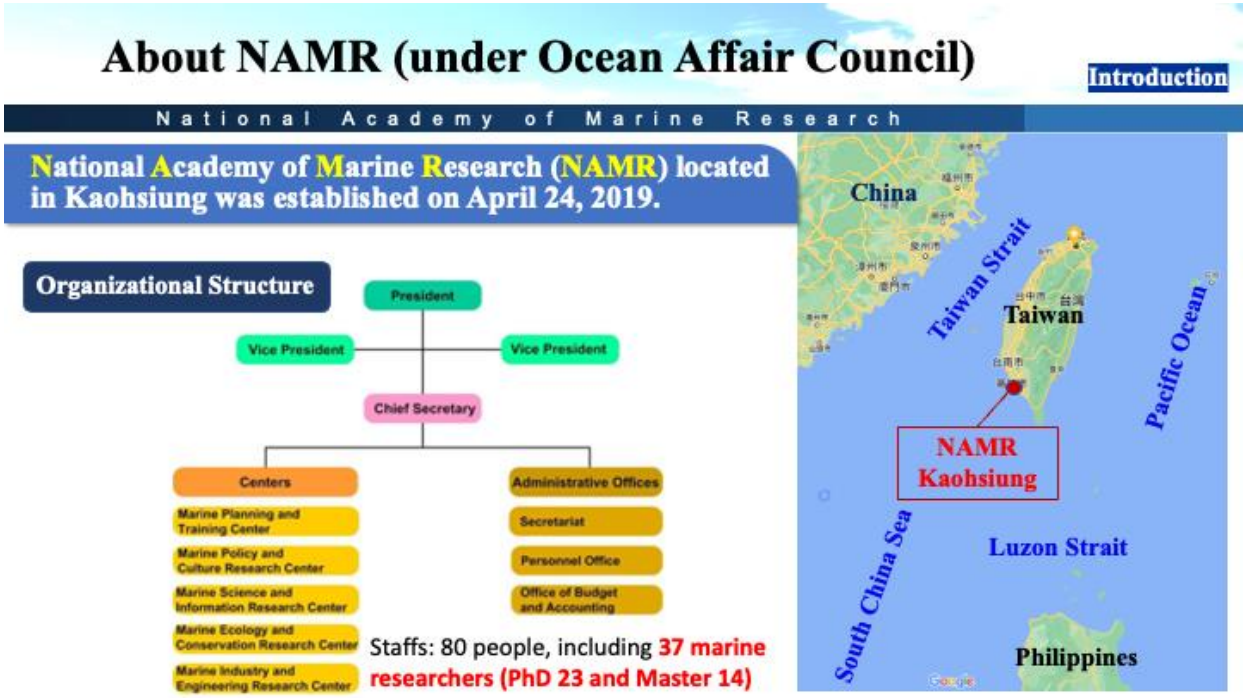
參、心得與建議

1. **臺德學術交流與合作研究：**本次訪問為國家海洋研究院、國立中山大學與德國阿爾弗雷德-維格納研究所(AWI)極地海洋研究所實際搭乘研究船前往北冰洋中央進行一系列極地海洋科學調查與觀測，透過此次訪問除了向 AWI 極地海洋研究所的科學家介紹國家海洋研究院的業務跟研究，未來冀能臺灣與該極地研究所在不同海域針對不同緯度海洋環境變遷差異性有更深入合作、討論與交流，可能議題包含透過長期監測合作，可了解極地、副熱帶與熱帶海域海洋環境變遷的差異；冰封的北冰洋海域內波場、鋒面結構、與垂直溫鹽通量。
2. **突破地域限制的海洋科學外交：**在全球氣候危機的背景下，極地海冰與海洋環境的長期變遷已成為國際大氣與海洋科學關注的重點。雖然極地距離台灣很遠，但如何讓國內的海洋科學研究可以打破過去僵化的地域限制。建議在國內投入適當資源，並透過國際合作方式將資源最大化，前往極地進行相關海洋調查與資料蒐集，建立我國極地海洋基礎資料與數據的長期資料庫。未來期望能吸引國內海洋科學家投入極地研究並逐漸強化國內極地海洋科學研究能量，在國際研討會展露台灣海洋科研實力，進一步透過科學外交方式有機會能參與國際上極地海洋相關事務與調查任務。
3. **海洋科學人才培育：**參與極地海洋科學調查如果要在海冰上作業，科學家必須要接受過北極熊保護培訓課程並通過測驗取得證照後才具備資格，主要是希望海冰上作業科學家能具備在北極地區安全作業的基本知識和技能，熟練應對北極熊風險，保護自己和同伴的安全。建議後續有機會參與極海洋科學研究人員應接受培訓課程成為北極熊觀察員，除了可以親自參與海冰上調查以外，也可以協助其他科學團隊增加研究效率。此外，透過接受培訓課程過程有助於拓展與建立國際合作的聯繫，對於未來國際科研合作具有積極意義。

肆、附錄

一、 專題演講簡報內容





Developed Projects for MASIRC

(MASIRC- MArine Science and Information Researh Center)

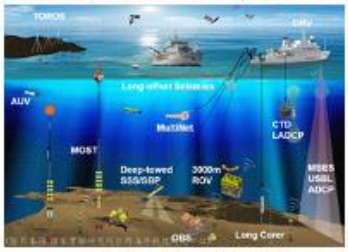
Project Development Panorama

Develpoed Projects for MASIRC

National Academy of Marine Research

Research Fleet

Global, regional and coastal classes (4000 Tones, 500 Tones, 200 Tones)



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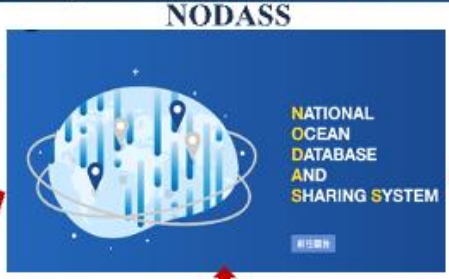
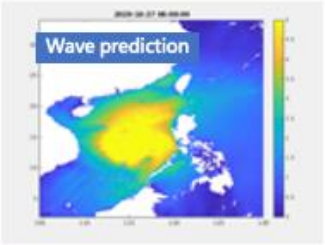


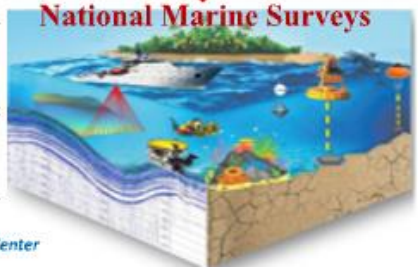
Ocean Modeling



National Marine Surveys

Hydrological Survey

Geophysical Survey



→ Physical oceanography
→ Chemical oceanography
→ Undersea soundscape

→ Geomorphology
→ Marine Geohazard
→ Seafloor Resource

Marine Science and Information Research Center

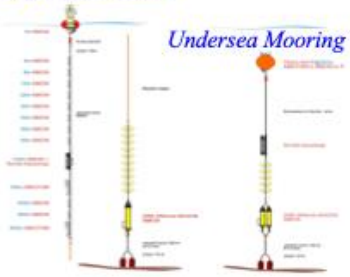
Hydrological Survey

Develpoed Projects for MASIRC

National Academy of Marine Research

Surface Data Buoy

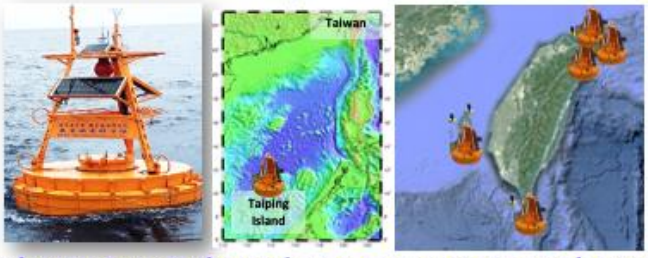
Undersea Mooring



Air
Wave, Temperature, Pressure, Humidity, Wind

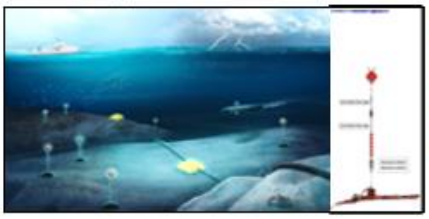
Under Water
Temperature, Salinity, (current velocity)

■ **Increase Buoy Distribution**



Real-time, long-term ocean and atmosphere monitoring in open ocean by moorings.

■ **Develop undersea soundscape**



Scientific applications:

- ***Air-sea interaction observation***
- ***Ocean climate change***
- ***Natural hazards monitoring***
- ***Undersea activity monitoring***

Study area

- Research vessel spends ~4.5 days from Taiwan to Taiping island.
- The researches were relatively rare due to the lack of observations

Field works

- **Surface data buoy system (Buoy-S, Buoy-W)**

Surface

Wave, Temperature, Pressure, Wind

Under Water

Temperature, Salinity, Current

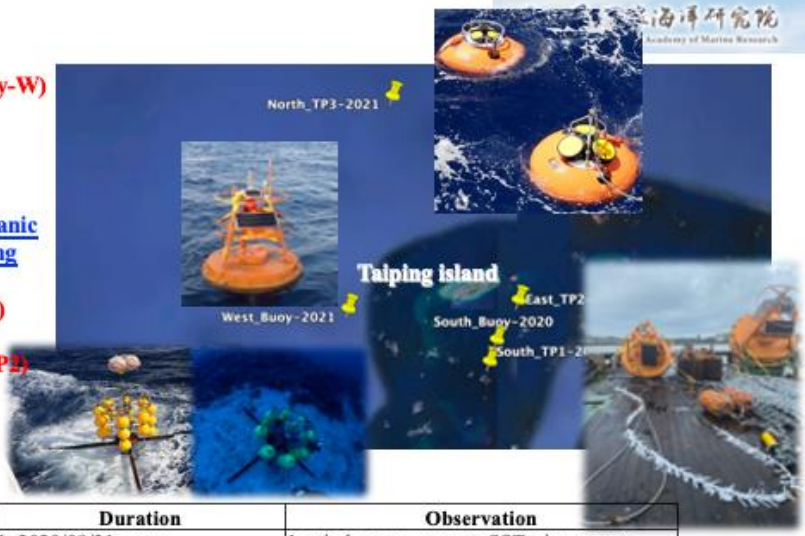
Aimed to monitor real-time, long-term oceanic and atmospheric environment in the Taiping island

- **ADCP mooring system (ADCP mooring)**

Current

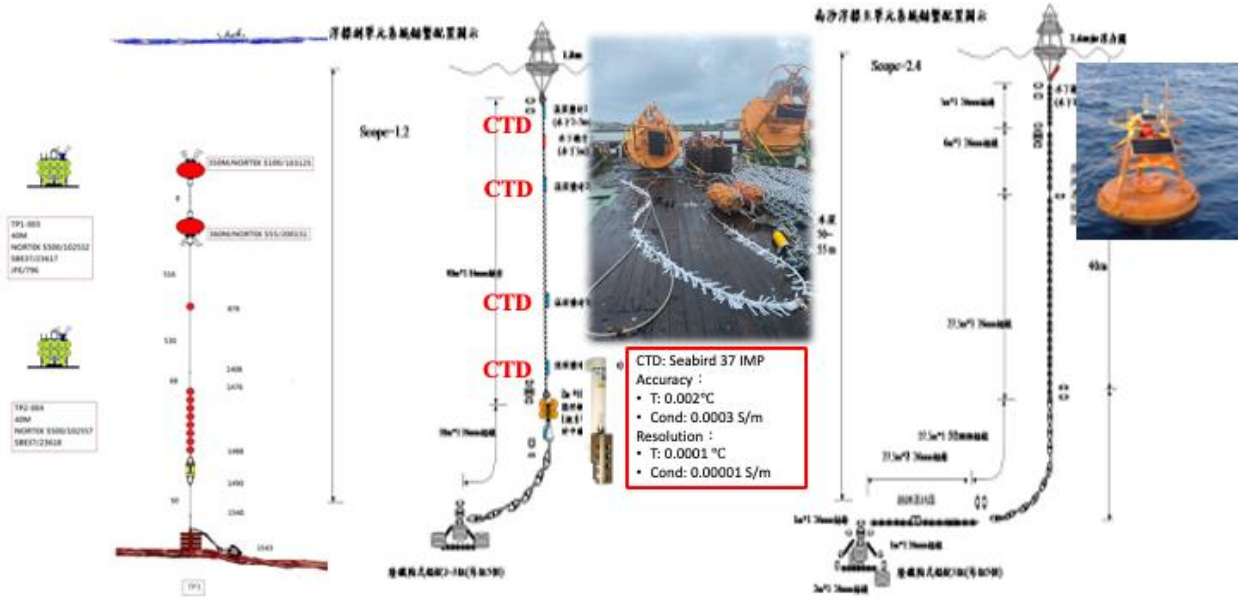
- **Bottom mounted ADCP system (TP1, TP2)**

Wave, current



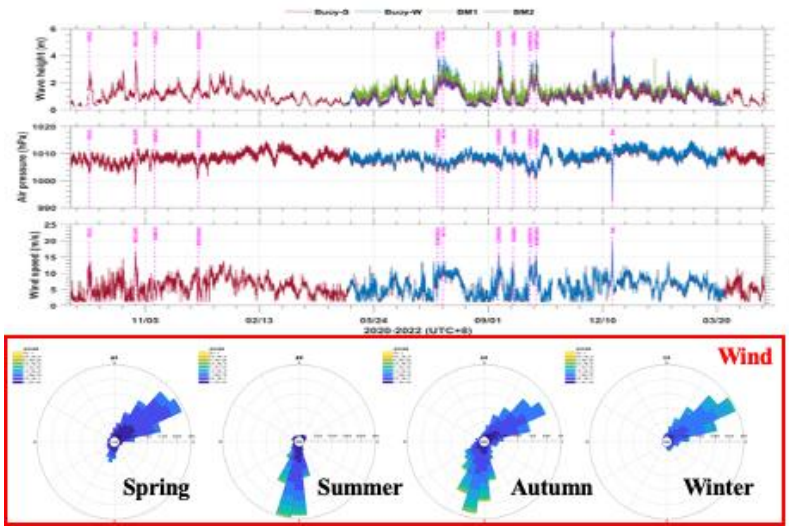
Station	Depth	Duration	Observation
South Buoy (Buoy-S)	50 m	1. 2020/08/31- now 2. 2020/09/29~2021/08/06, 2022/03/26 - now	1. wind, wave, current, SST, air pressure 2. underwater temperature and salinity (5m, 15m, 25m, 35m)
West Buoy (Buoy-W)	627 m	2021/04/30~2022/03/26	wind, wave, current, SST, air pressure
North TP3 (ADCP mooring)	1550 m	2021/5/1~2022/3/20	Current (40 m~900 m)
Bottom mounted ADCP (TP1, TP2)	46~48 m	2021/5/1~2022/3/20	wave, current

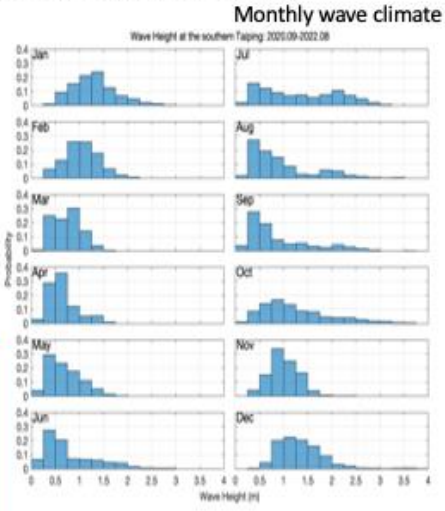
Surface data buoy system and moored observations



The observations of wave height and wind

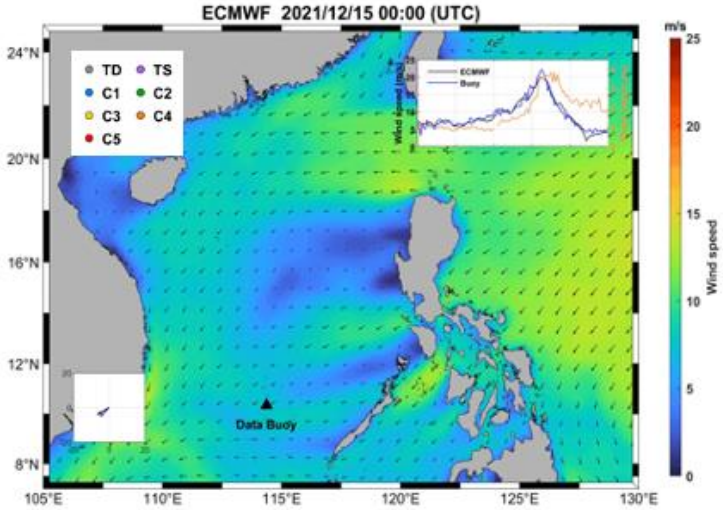
- The monthly wave height statistics reveal that **from March to May, approximately 80% of the waves are less than 1 m**. From July to October, there is a gradual shift in the wave height distribution. From November to February of the following year, waves height predominantly exceed 1 m.
- The seasonal wind rose diagrams show the transition of winds from southerly in summer to northeasterly in winter and spring.



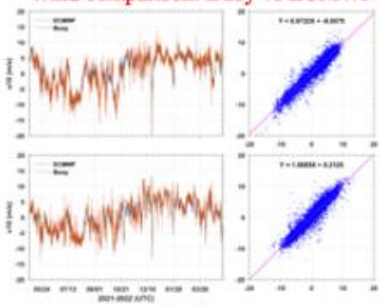


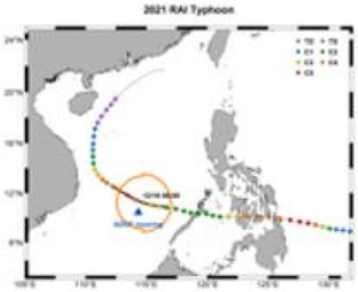
Case study: super typhoon RAI (Category 5)

- After entering the South China Sea, RAI moves at a speed of 15-20 kilometers per hour. The wind speed near the center of RAI strengthened to 22 m/s and the wave height is about 4 m.
- The center of RAI is closest to the Taiping island at 6:00 on Dec 18.

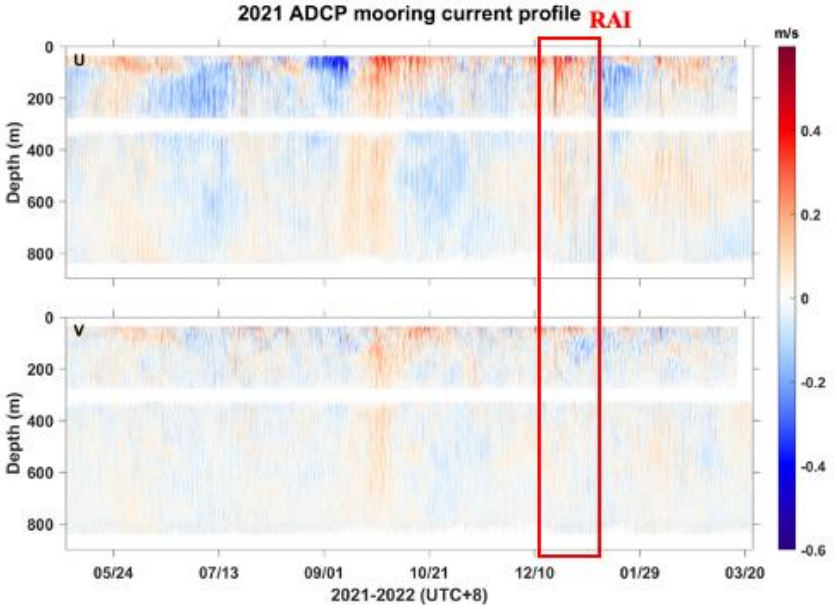


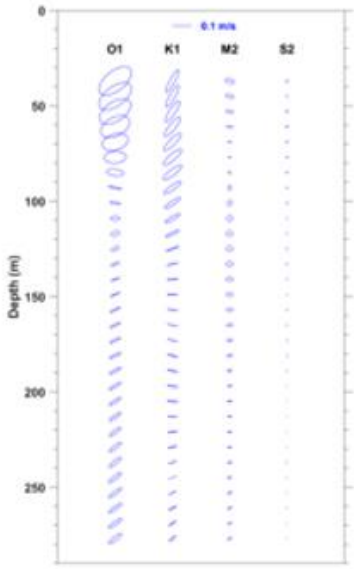
Wind comparison: Buoy vs ECMWF



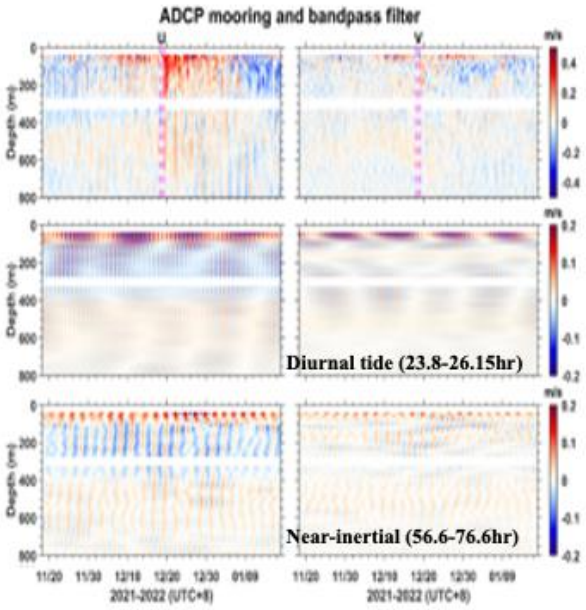


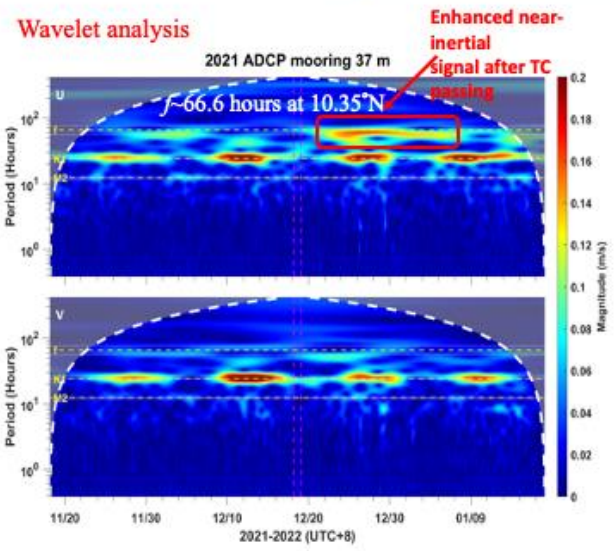
Current measurements in the northern Taiping island





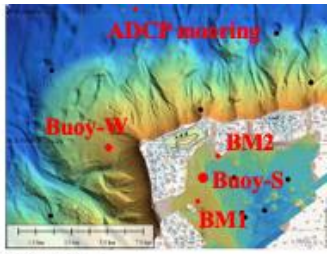
Current measurements in the northern Taiping island

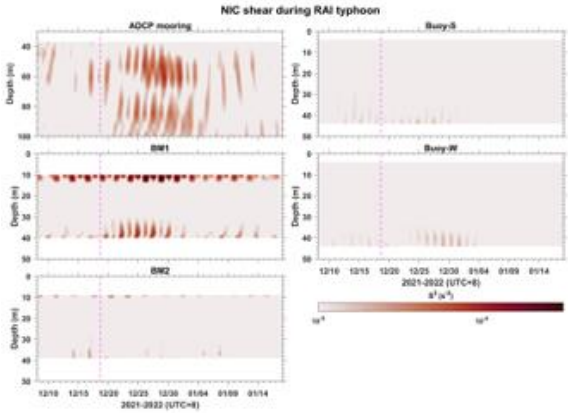


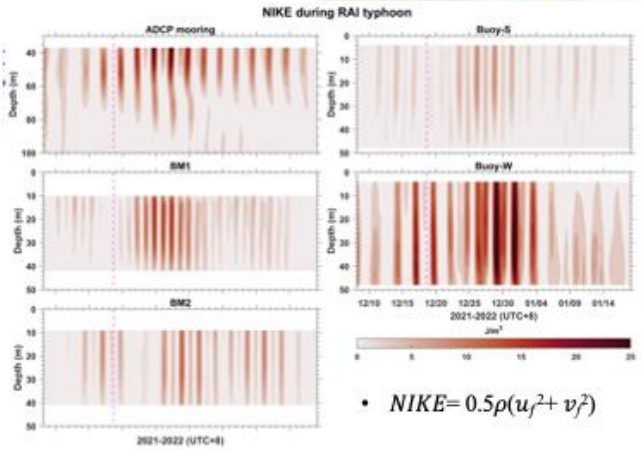


Near-inertial kinetic energy (NIKE) during typhoon RAI

- During typhoon RAI passed through the Taiping island, the NIKE propagates downward within the upper 100 m in the ADCP mooring.
- The depth-averaged NIKE can be enhanced up to 10 J/m^3 in the open ocean and 5-10 J/m^3 in the shallow water.



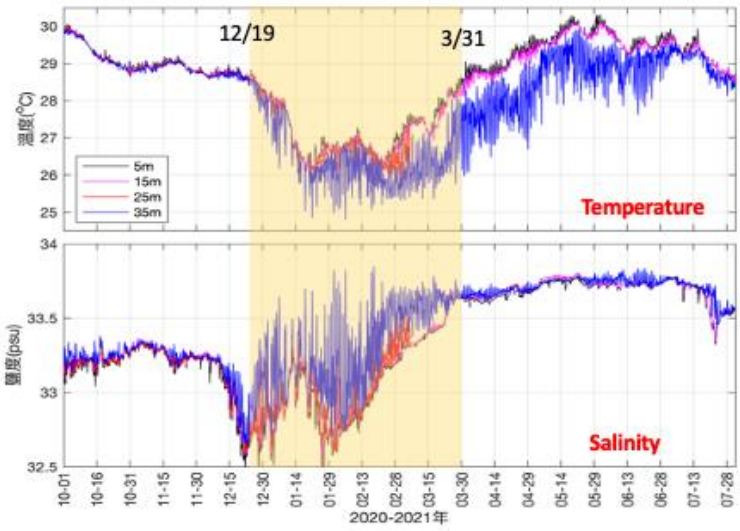


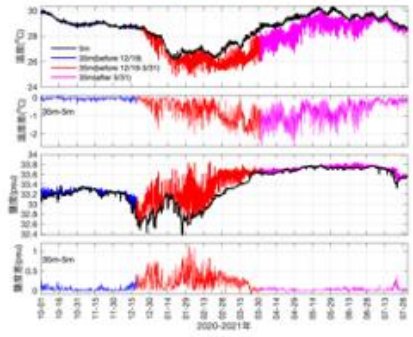


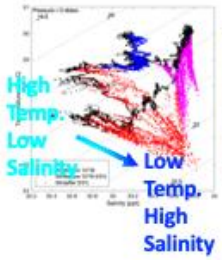
- $NIKE = 0.5\rho(u_f^2 + v_f^2)$

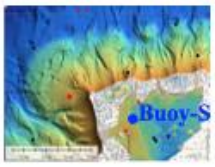
The changes of water masses from top to bottom layers

- Before 12/19, there are no differences from top to bottom layers.
- During 12/19 to 3/31 of the following year, the cold and salt water occurred with the change of temperature about 2℃ and that of salinity about 1 psu.



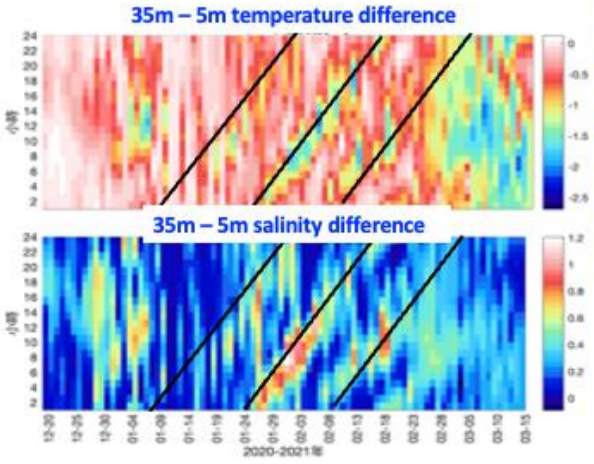


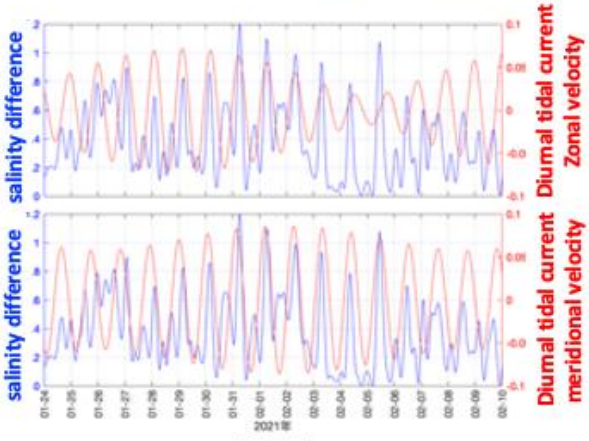




The difference of temperature and salinity between near surface and bottom layers

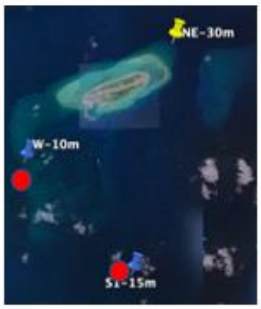
- The colder and salter water mass coincides with northeasterly diurnal current.

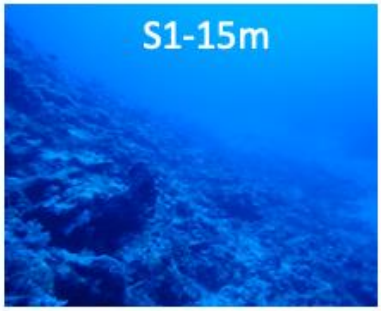




Preliminary findings

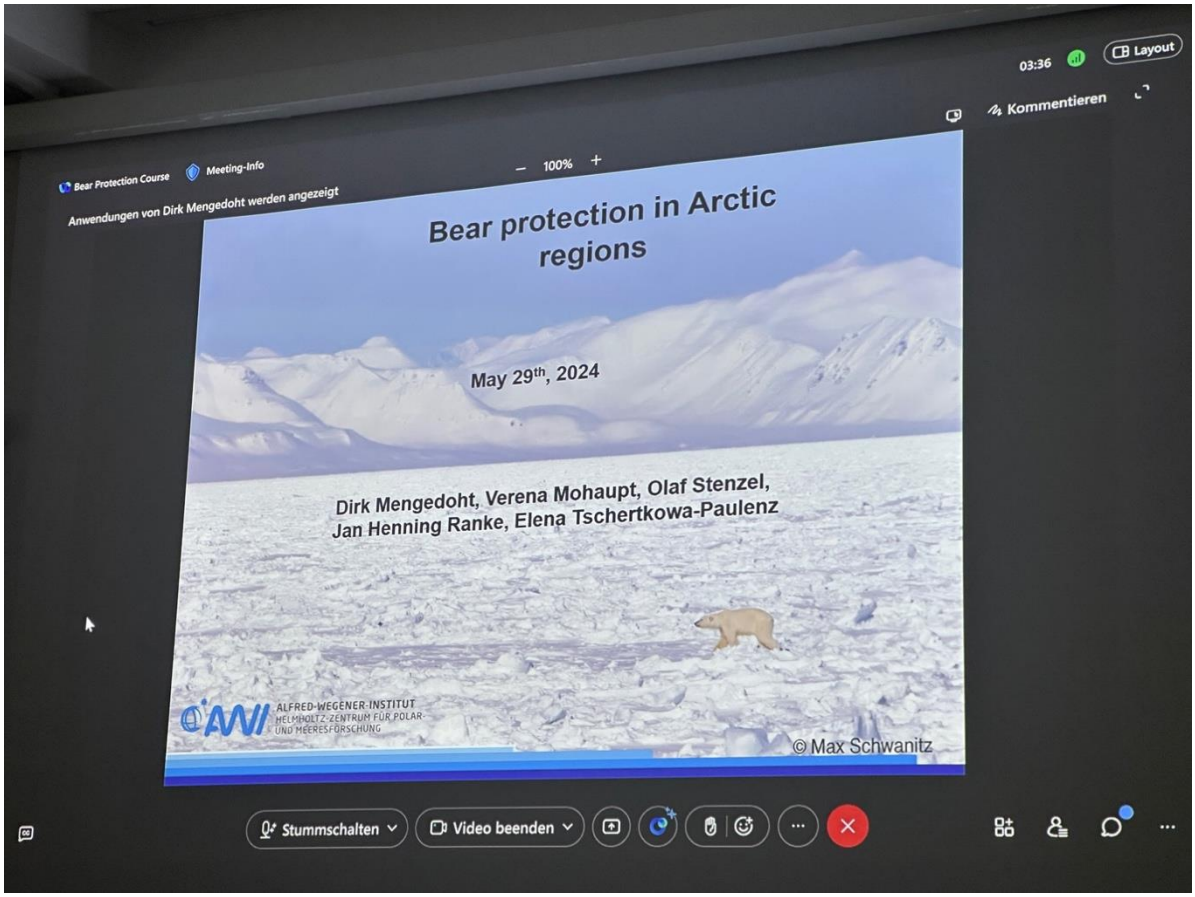
- From the monthly wave statistics, the wave heights are mostly less than 1 m (80%) during March to May. From July to October, wave height distribution becomes broader. From November to February of the following year, waves height predominantly exceed 1 m.
- The winds are southerly in summer and are northeasterly in winter and spring. There is a transition of wind direction in autumn.
- The typhoon RAI induced near-inertial current and can be enhanced NIKE up to 10-20 J/m^3 in the open ocean and 5-10 J/m^3 in the shallow water
- From mid-December to the end of March the following year, deep-water masses with low temperature and high salinity appear due to the northeastward diurnal tidal currents. The cold and nutrient-rich water masses could benefit the coral reef ecosystem around the Taiping island.

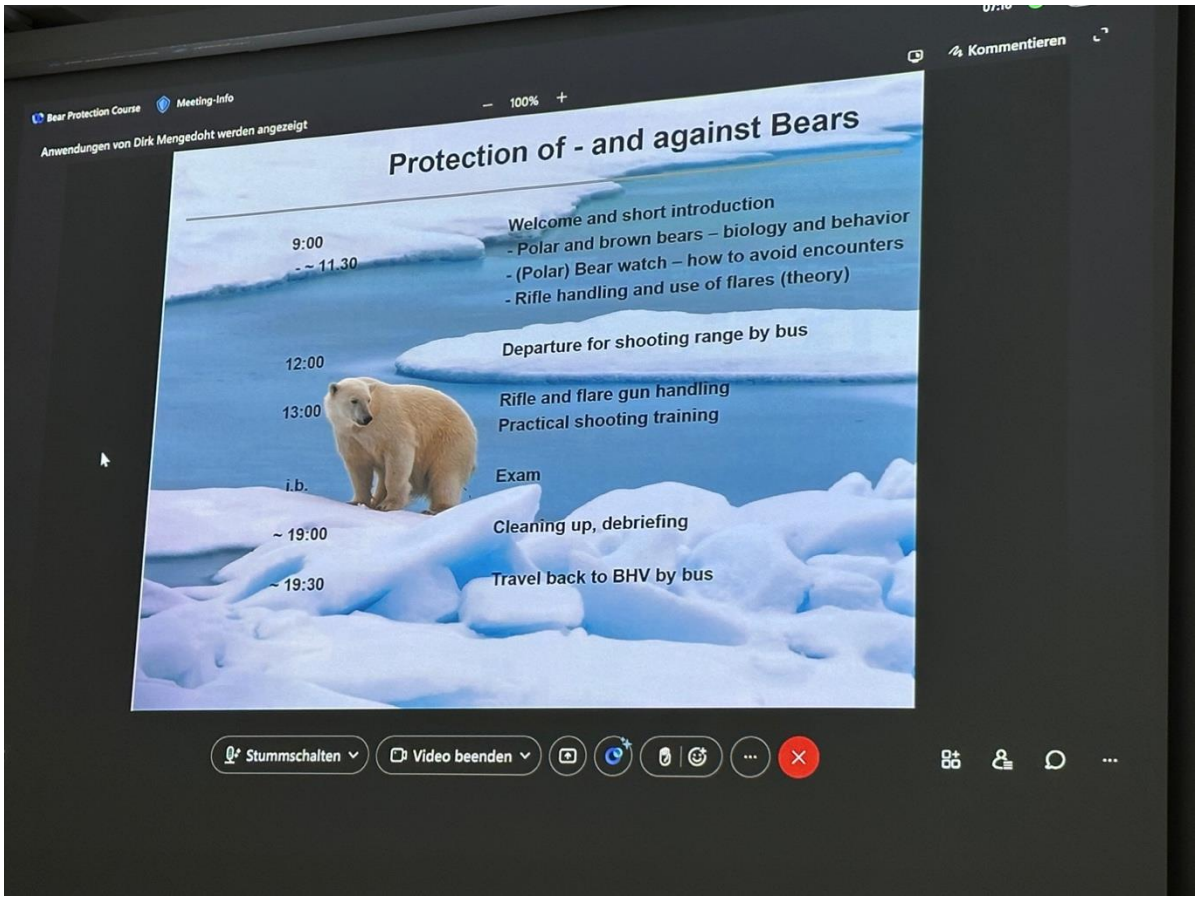


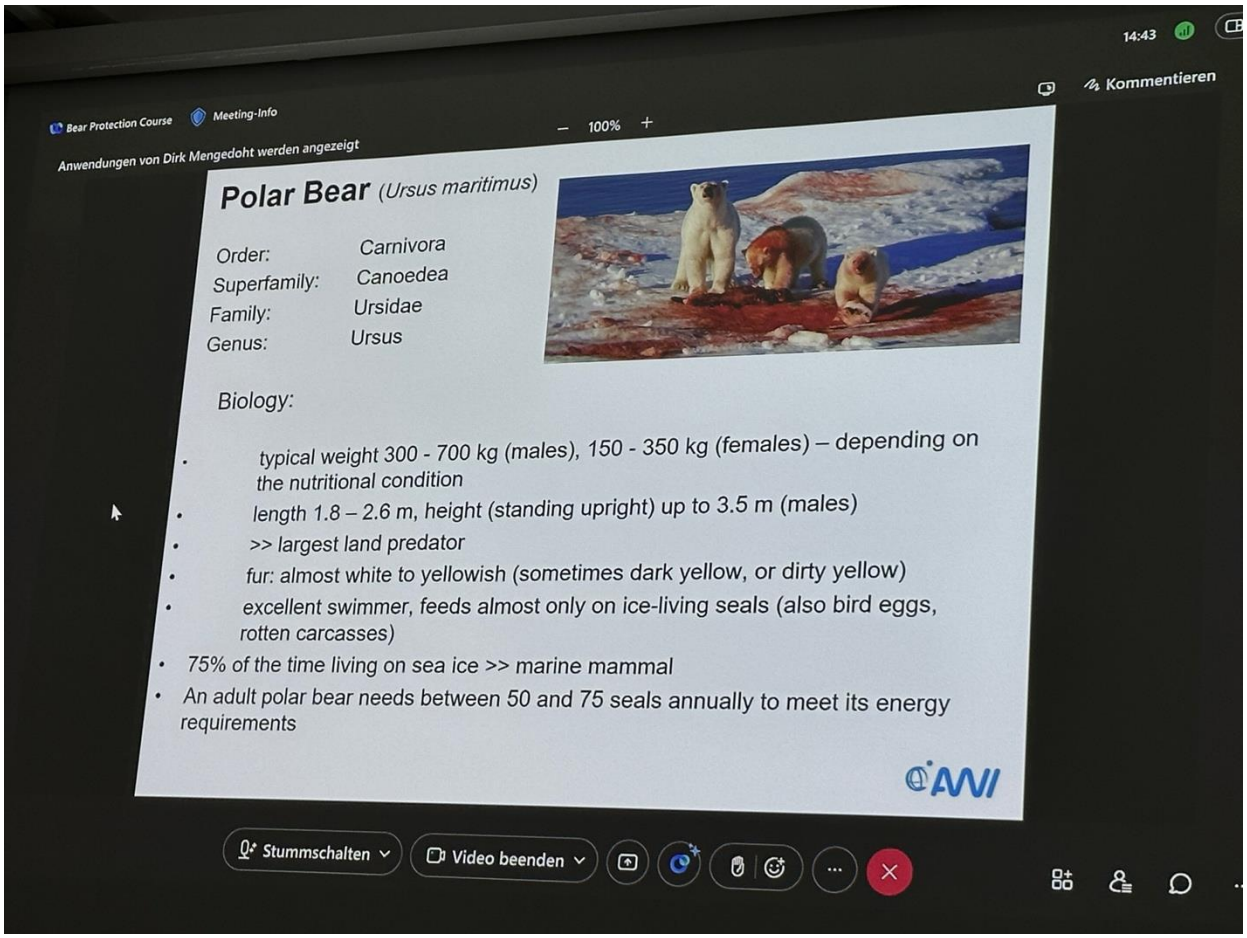


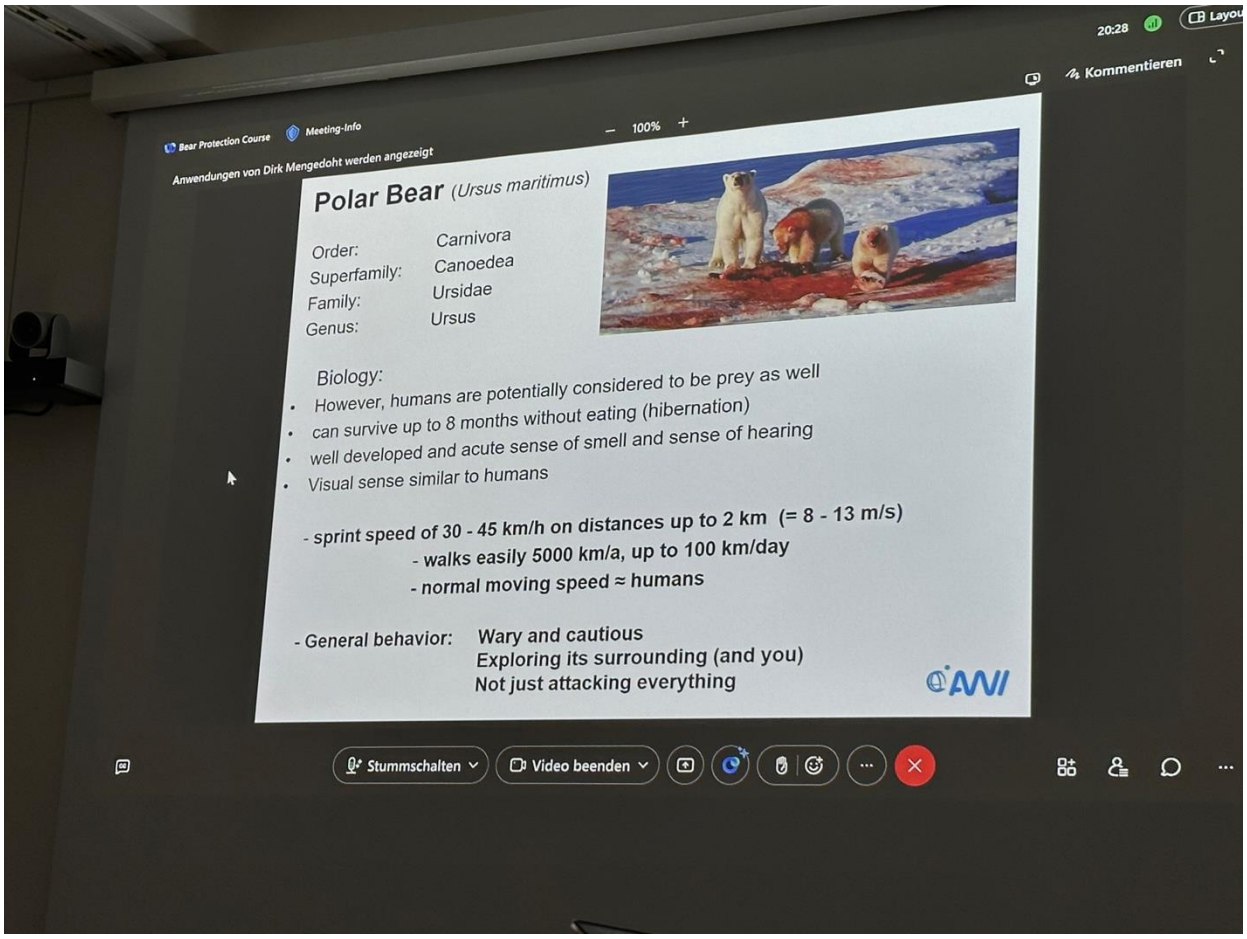
Marine Science and Information Research Center

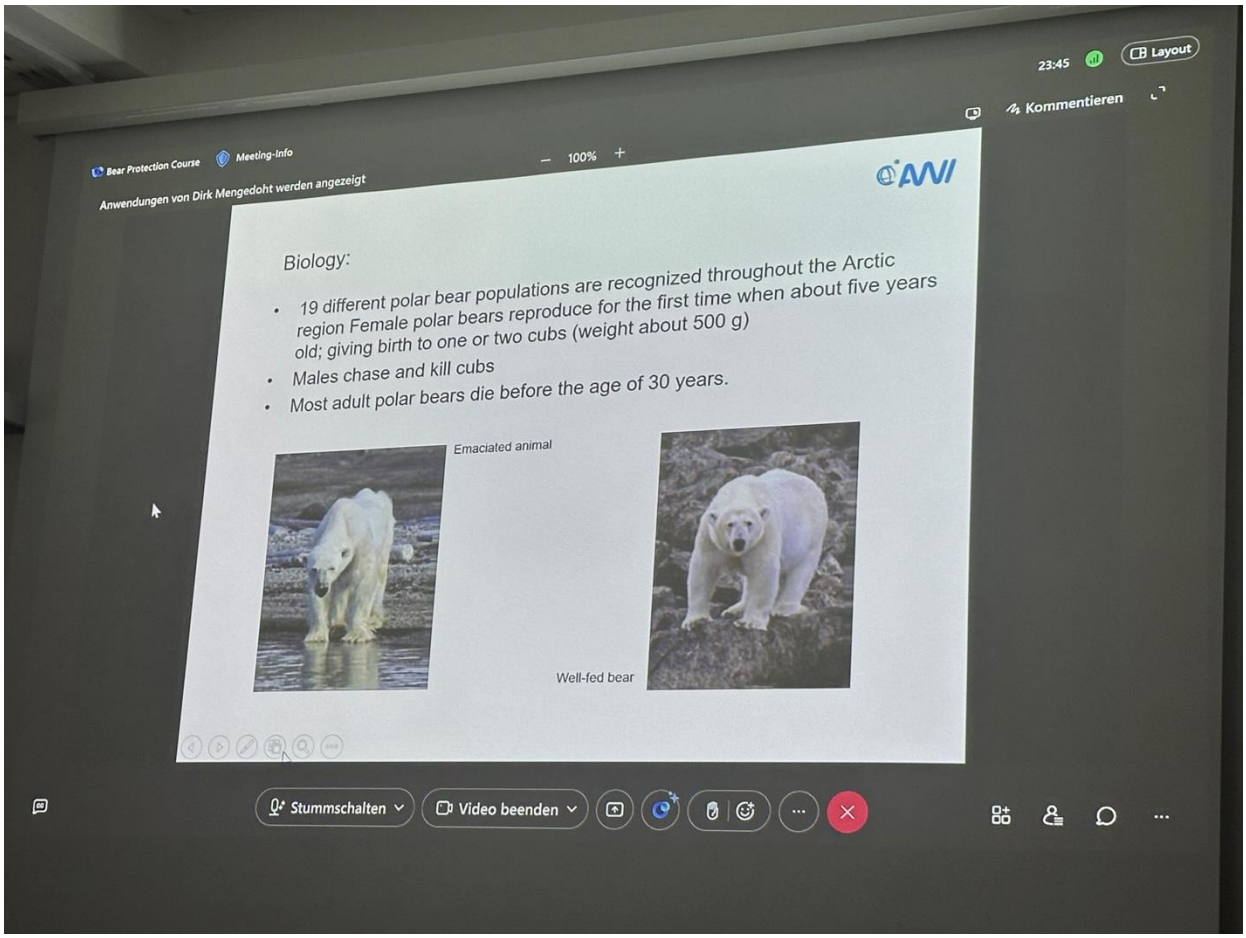
二、航前北極熊保護培訓課程

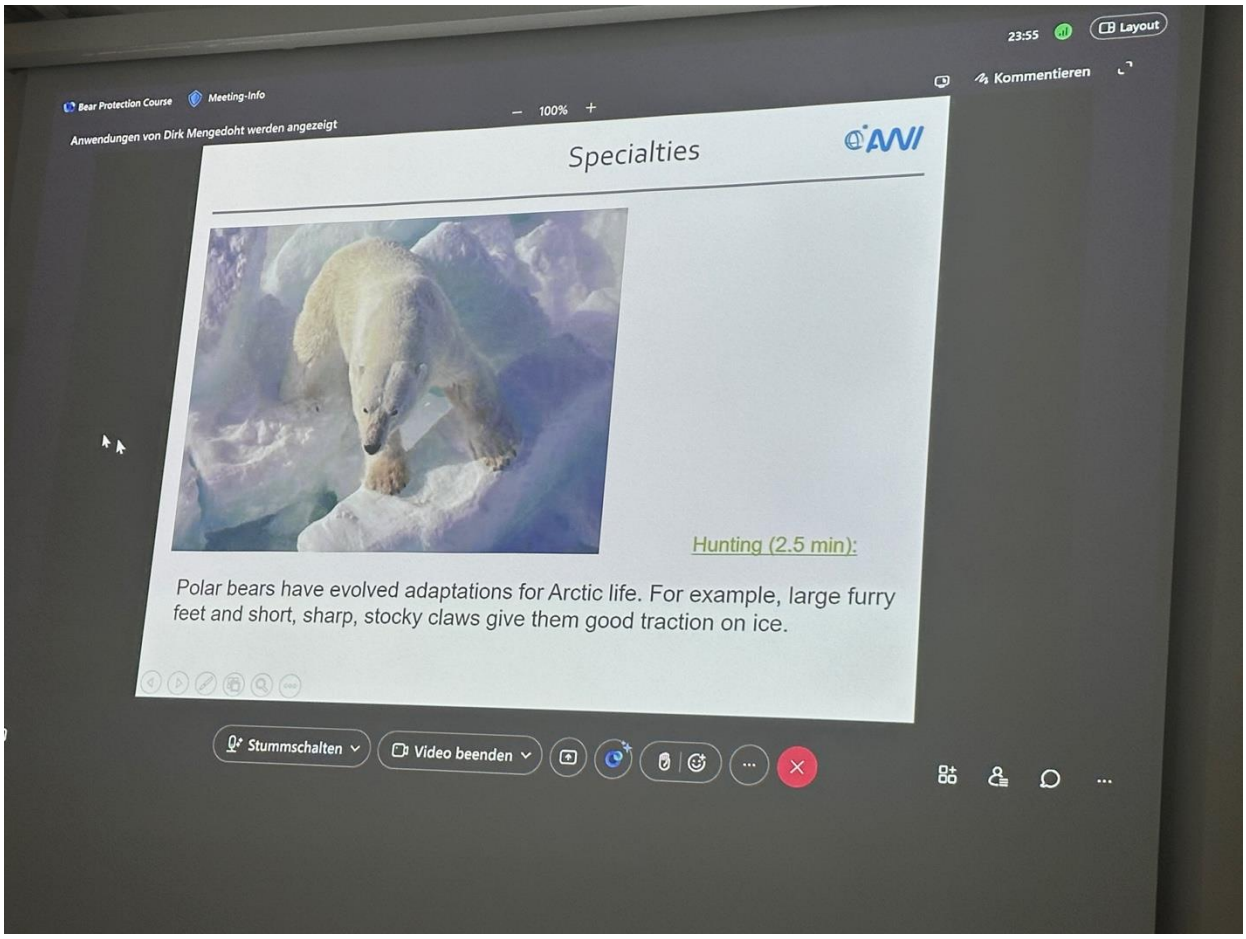


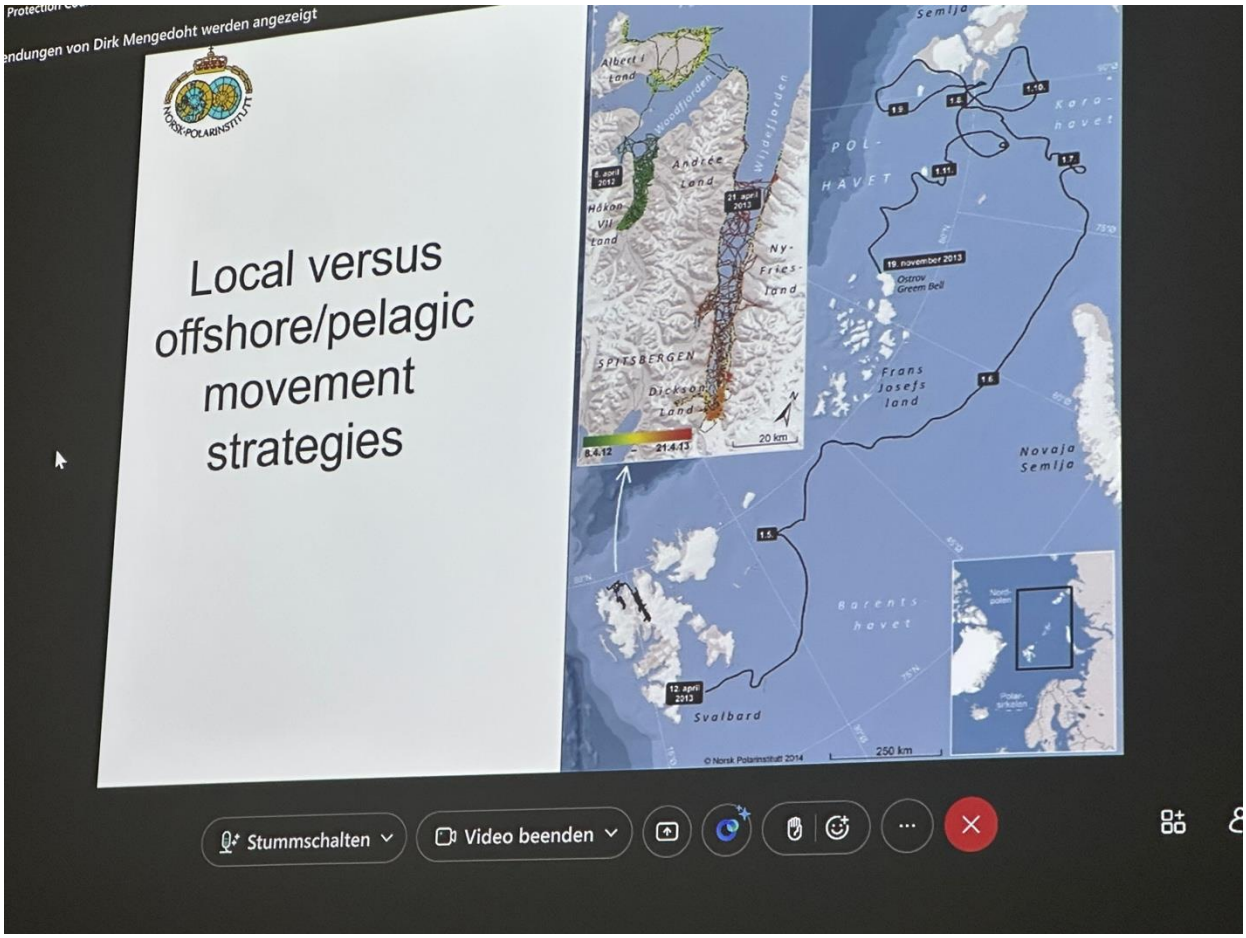



14:43
Kommentieren
Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Polar Bear (Ursus maritimus)
Order: Carnivora
Superfamily: Canoedea
Family: Ursidae
Genus: Ursus
Biology:
typical weight 300 - 700 kg (males), 150 - 350 kg (females) – depending on the nutritional condition
length 1.8 – 2.6 m, height (standing upright) up to 3.5 m (males)
>> largest land predator
fur: almost white to yellowish (sometimes dark yellow, or dirty yellow)
excellent swimmer, feeds almost only on ice-living seals (also bird eggs, rotten carcasses)
75% of the time living on sea ice >> marine mammal
An adult polar bear needs between 50 and 75 seals annually to meet its energy requirements
Stummschalten
Video beenden

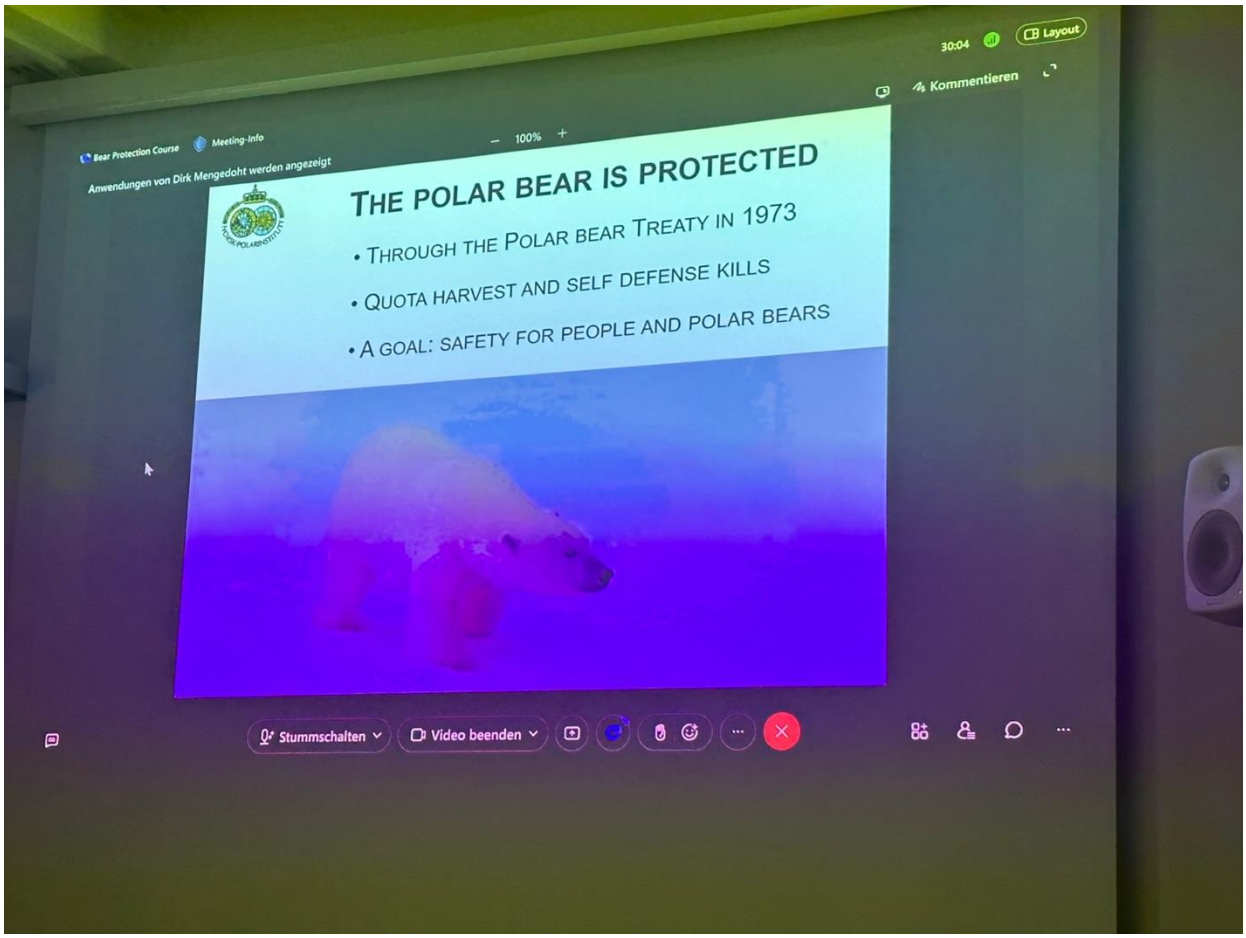

20:28
Kommentieren
Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Polar Bear (Ursus maritimus)
Order: Carnivora
Superfamily: Canoedea
Family: Ursidae
Genus: Ursus
Biology:
However, humans are potentially considered to be prey as well
can survive up to 8 months without eating (hibernation)
well developed and acute sense of smell and sense of hearing
Visual sense similar to humans
- sprint speed of 30 - 45 km/h on distances up to 2 km (= 8 - 13 m/s)
- walks easily 5000 km/a, up to 100 km/day
- normal moving speed ≈ humans
- General behavior: Wary and cautious
Exploring its surrounding (and you)
Not just attacking everything
Stummschalten
Video beenden

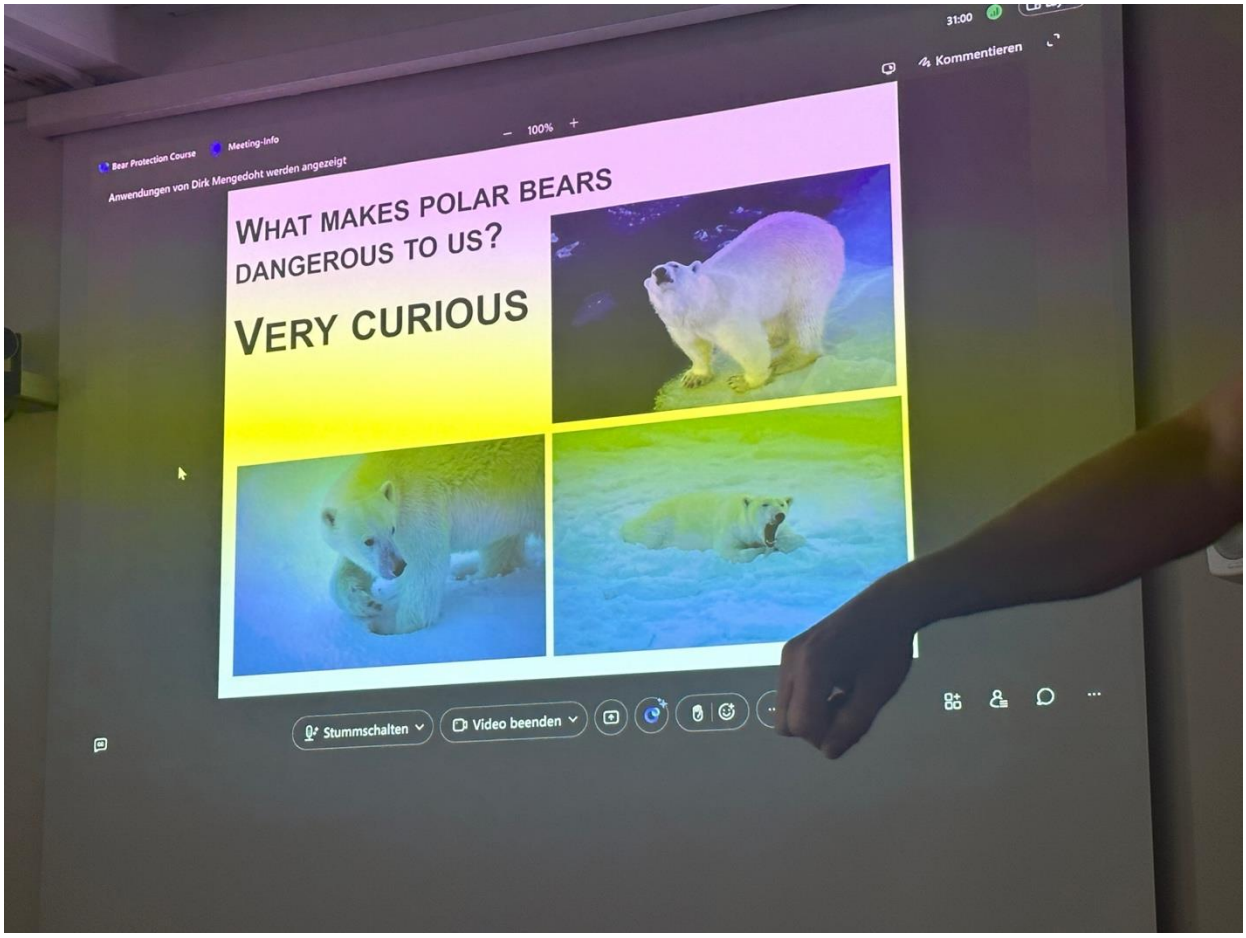

23:45
Layout
Kommentieren
Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Biology:
19 different polar bear populations are recognized throughout the Arctic region Female polar bears reproduce for the first time when about five years old; giving birth to one or two cubs (weight about 500 g)
Males chase and kill cubs
Most adult polar bears die before the age of 30 years.
Emaciated animal
Well-fed bear
Stummschalten
Video beenden


23:55
Layout
Kommentieren
Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Specialties
Hunting (2.5 min):
Polar bears have evolved adaptations for Arctic life. For example, large furry feet and short, sharp, stocky claws give them good traction on ice.
Stummschalten
Video beenden


Local versus offshore/pelagic movement strategies
Stummschalten
Video beenden

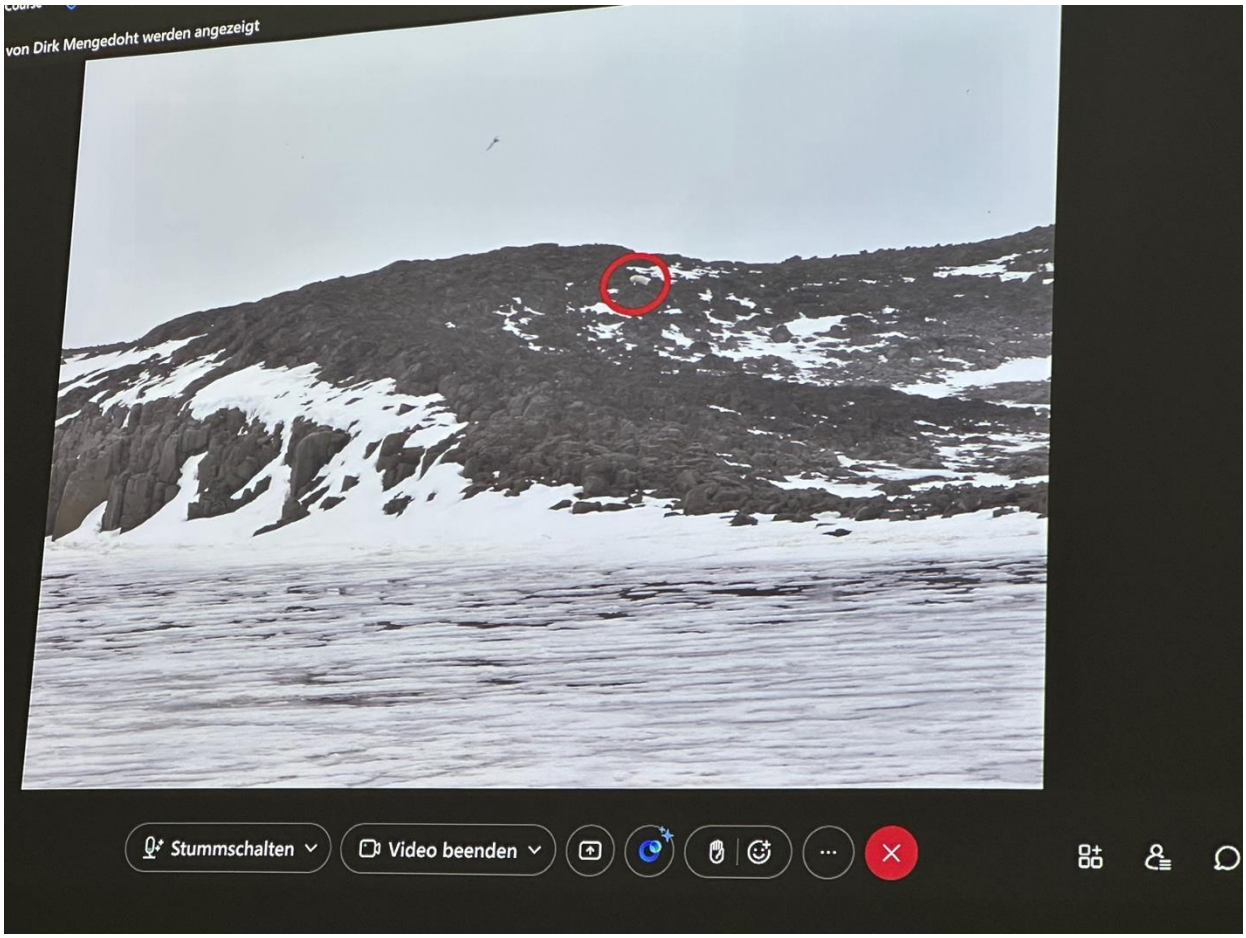

Summer
Stummschalten
Video beenden

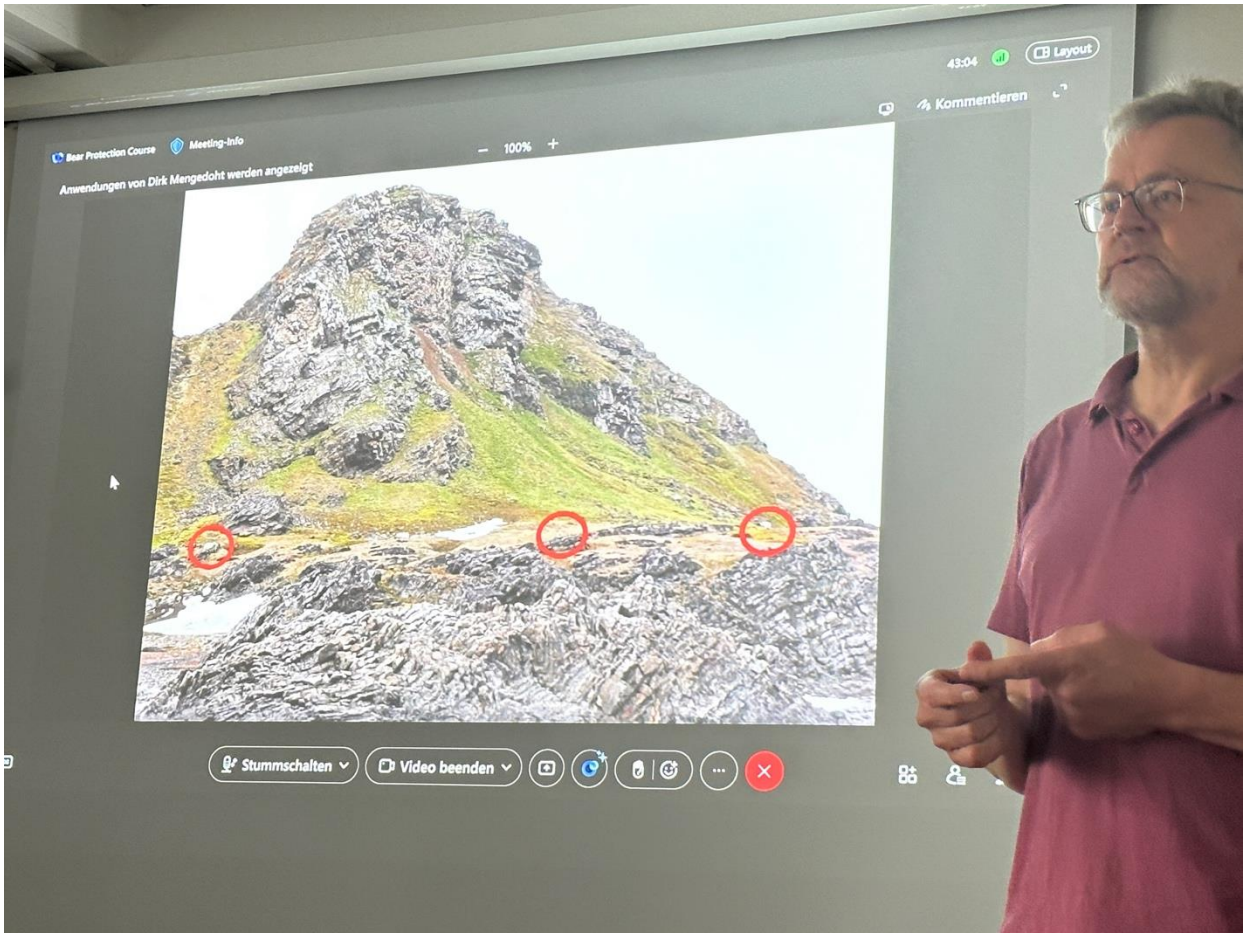

30:04
Layout
Kommentieren
Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
THE POLAR BEAR IS PROTECTED
• THROUGH THE POLAR BEAR TREATY IN 1973
• QUOTA HARVEST AND SELF DEFENSE KILLS
• A GOAL: SAFETY FOR PEOPLE AND POLAR BEARS
Stummschalten
Video beenden

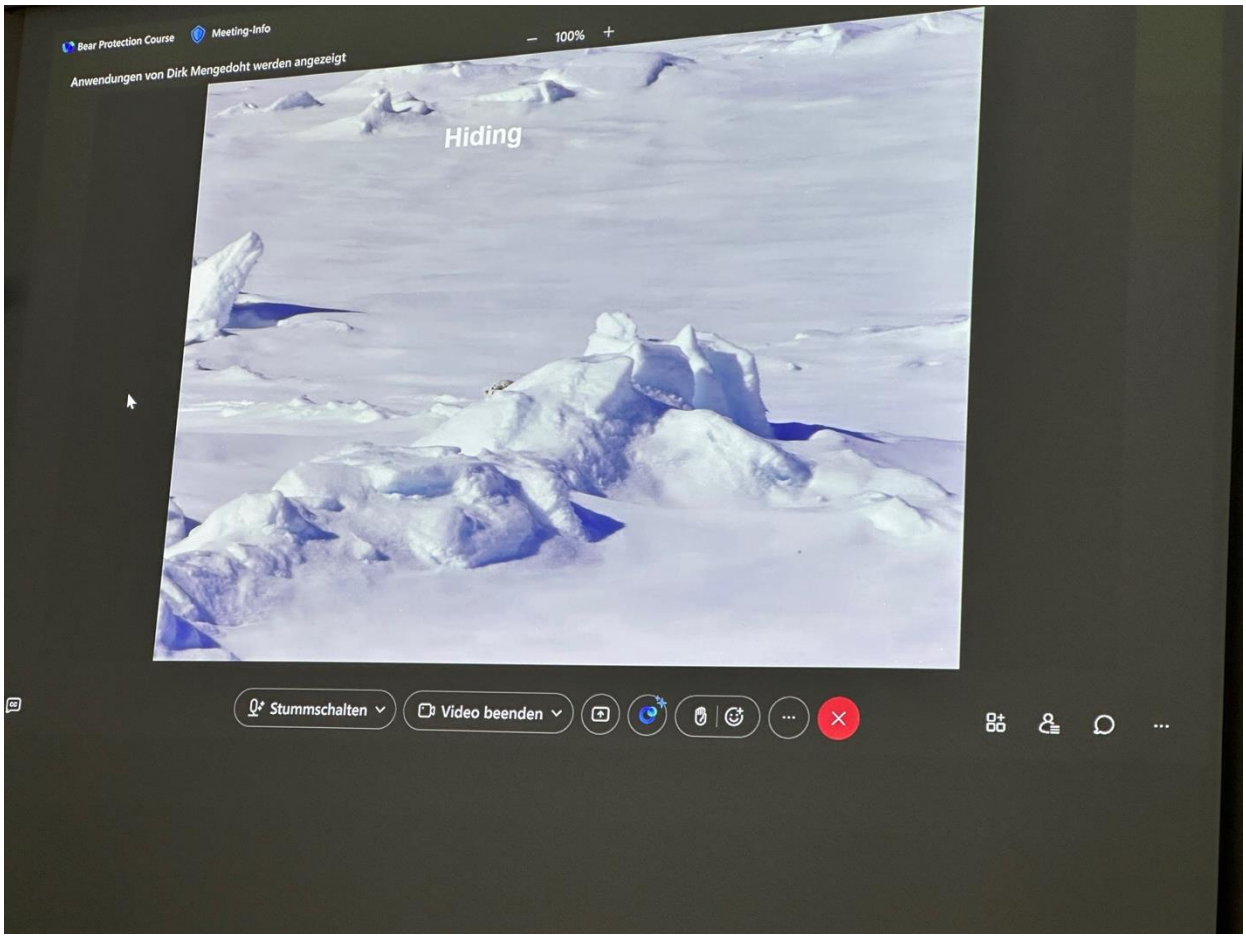

31:00
Kommentieren
Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
WHAT MAKES POLAR BEARS DANGEROUS TO US?
VERY CURIOUS
Stummschalten
Video beenden


33:00
Layout
Kommentieren
Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
POLAR BEAR BEHAVIOR
WHEN THE BEAR IS CHECKING YOU OUT:
• SNIFFS THE AIR
• HEAD HIGH
• UP ON TWO LEGS
EASIER TO SCARE OFF
Stummschalten
Video beenden

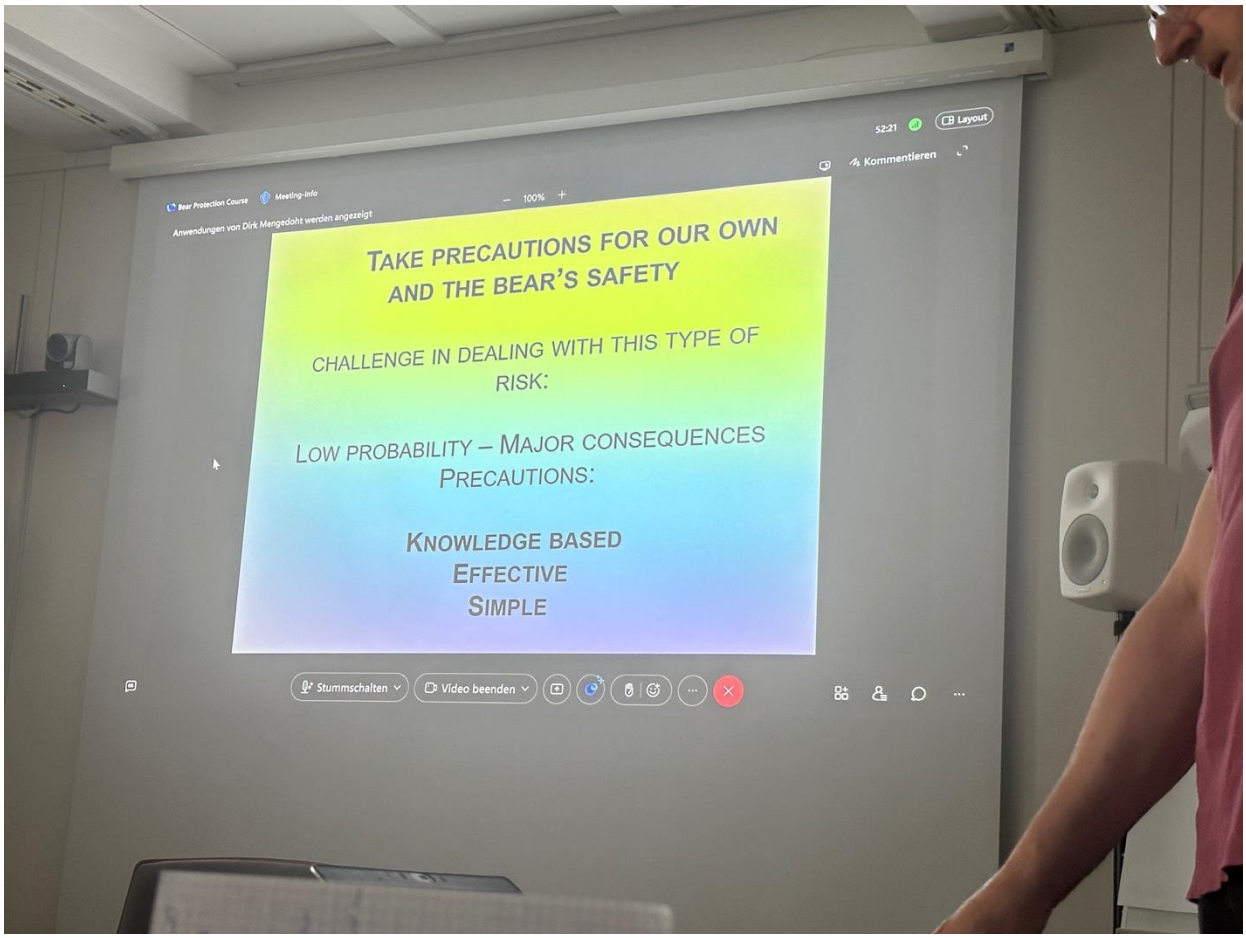

37:04
Layout
Kommentieren
Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Stummschalten
Video beenden

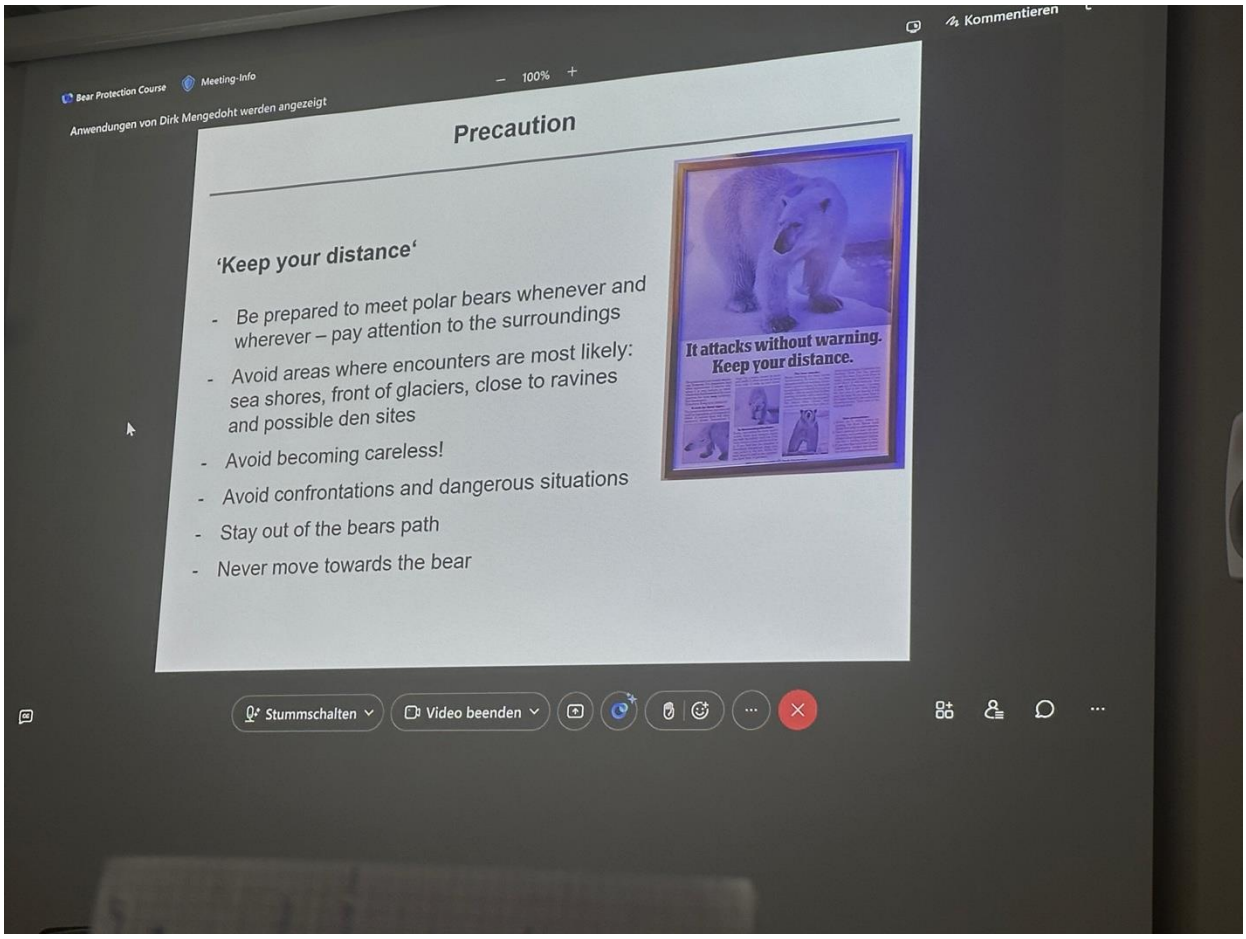

von Dirk Mengedoht werden angezeigt
Stummschalten
Video beenden

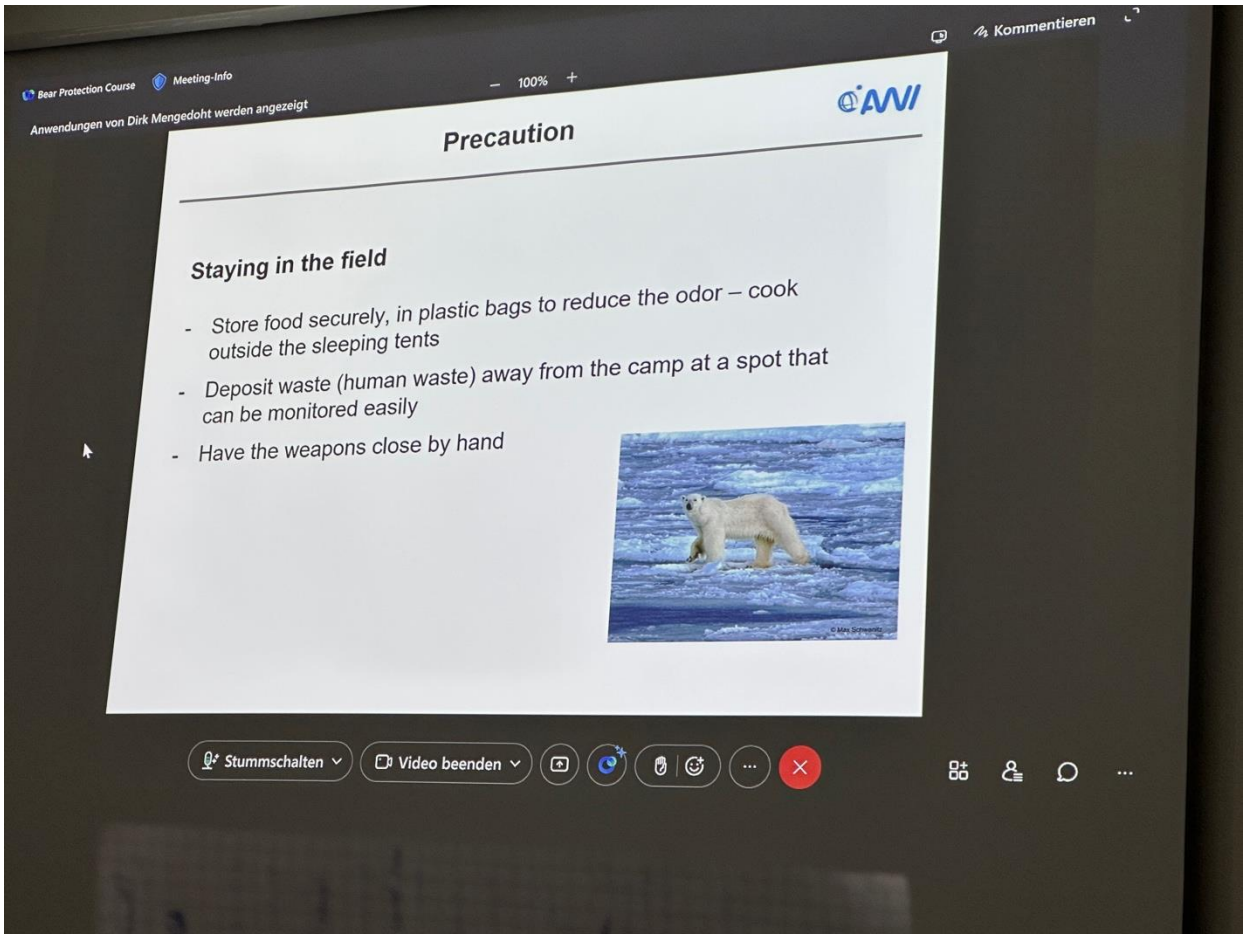

43:04
Layout
Kommentieren
Bear Protection Course
Meeting-Info
100%
Anwendungen von Dirk Mengedoht werden angezeigt
Stummschalten
Video beenden

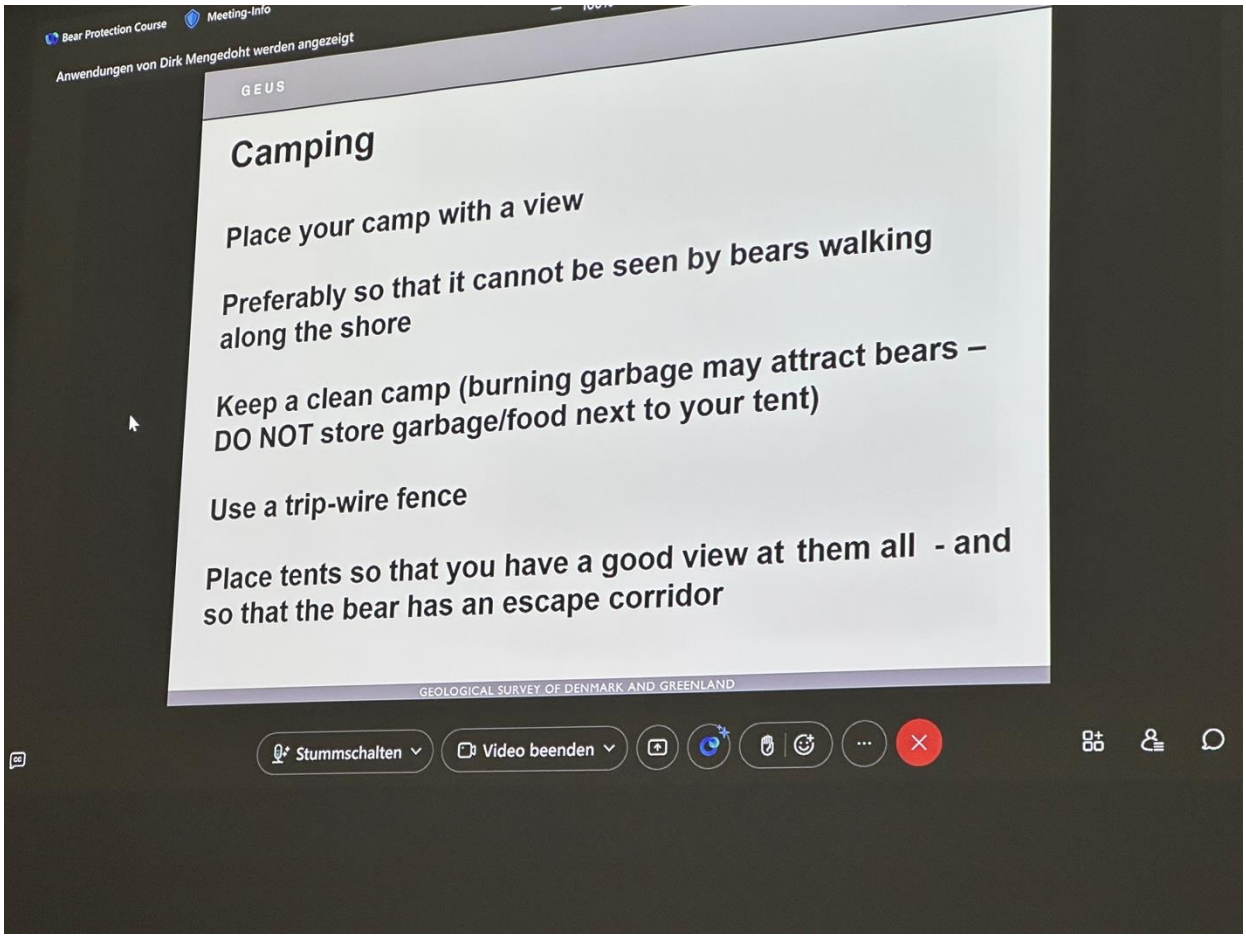

Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Hiding
Stummschalten
Video beenden

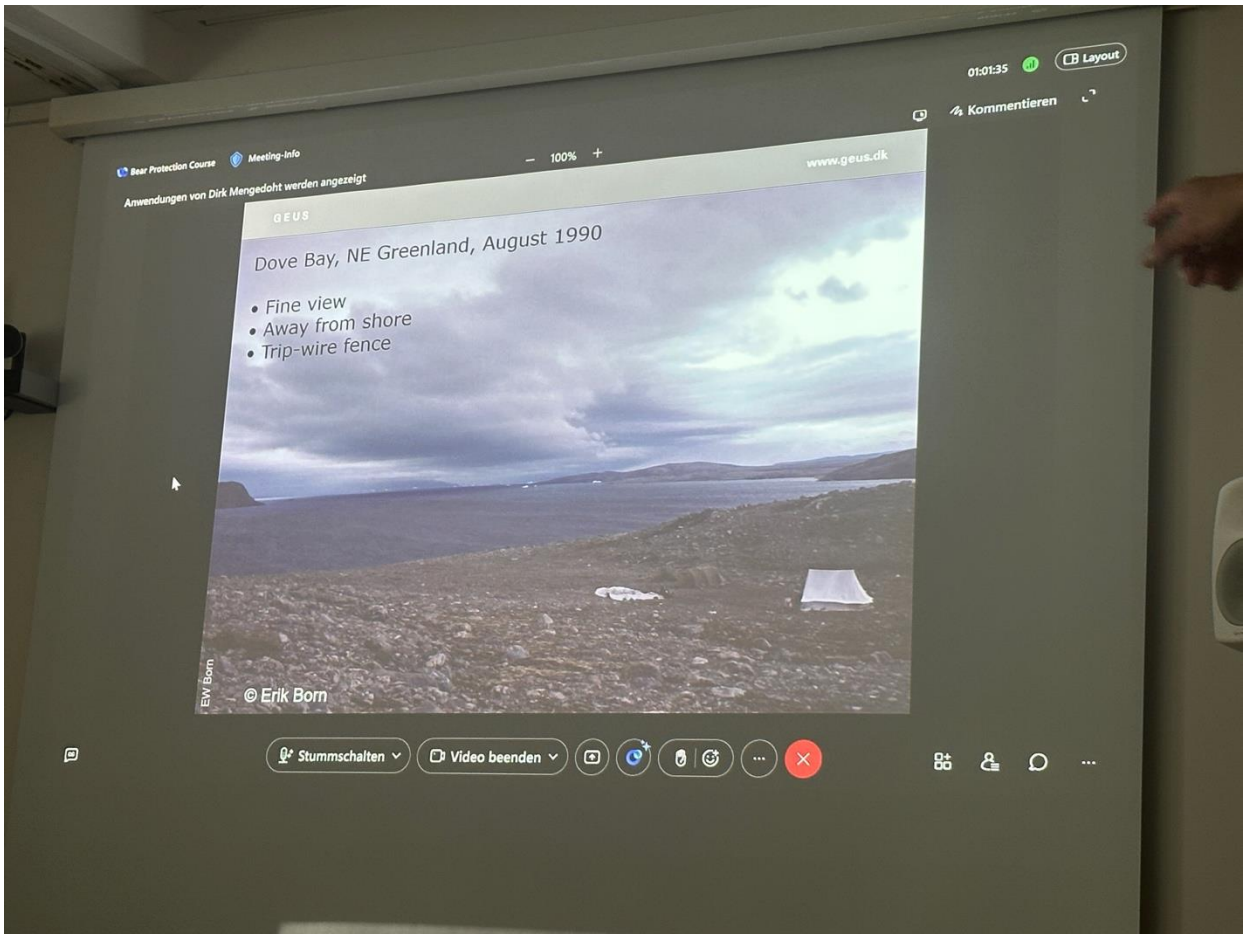

Kommentieren
Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Stummschalten
Video beenden

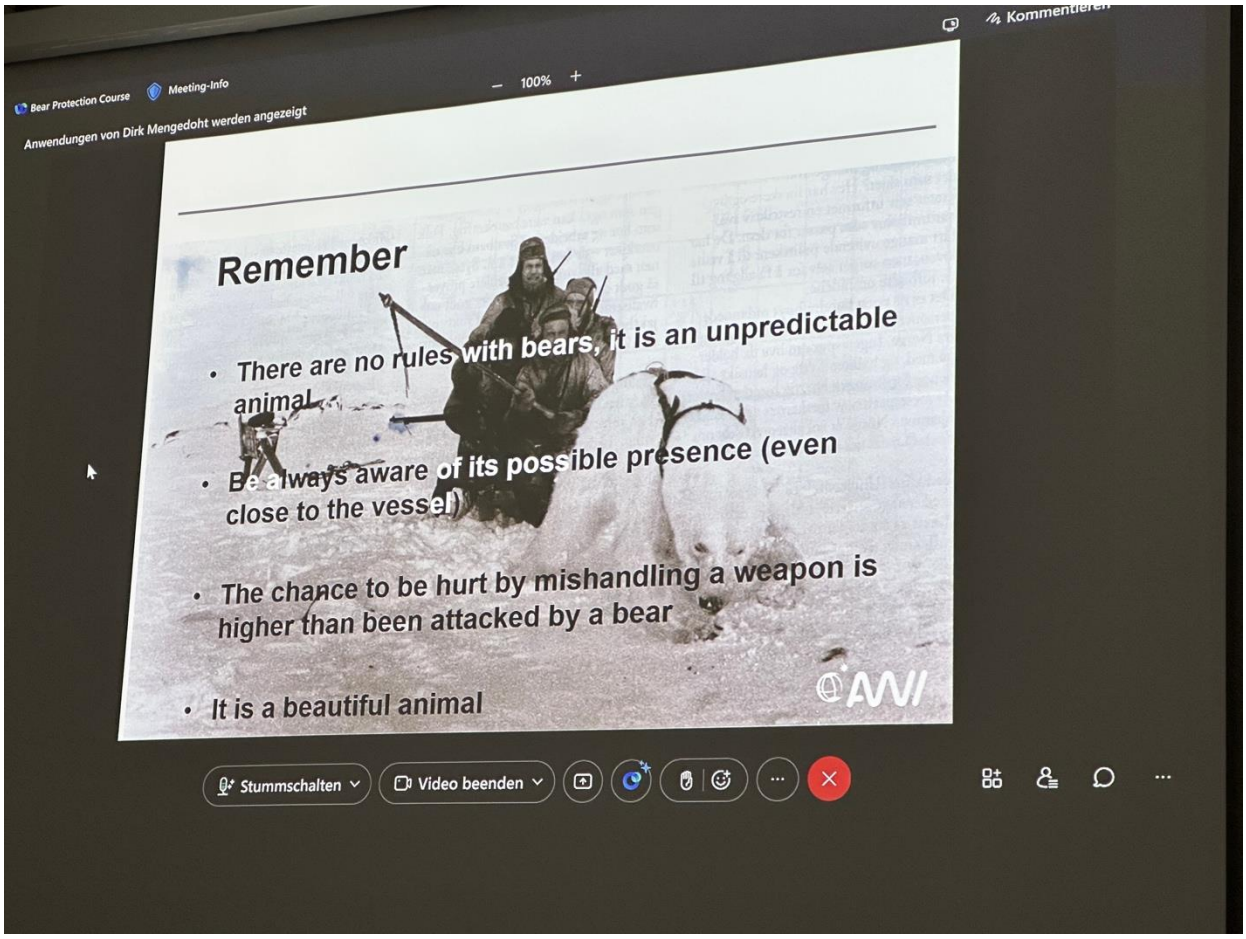

Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
52:21
Layout
Kommentieren
TAKE PRECAUTIONS FOR OUR OWN AND THE BEAR'S SAFETY
CHALLENGE IN DEALING WITH THIS TYPE OF RISK:
LOW PROBABILITY – MAJOR CONSEQUENCES
PRECAUTIONS:
KNOWLEDGE BASED
EFFECTIVE
SIMPLE
Stummschalten
Video beenden

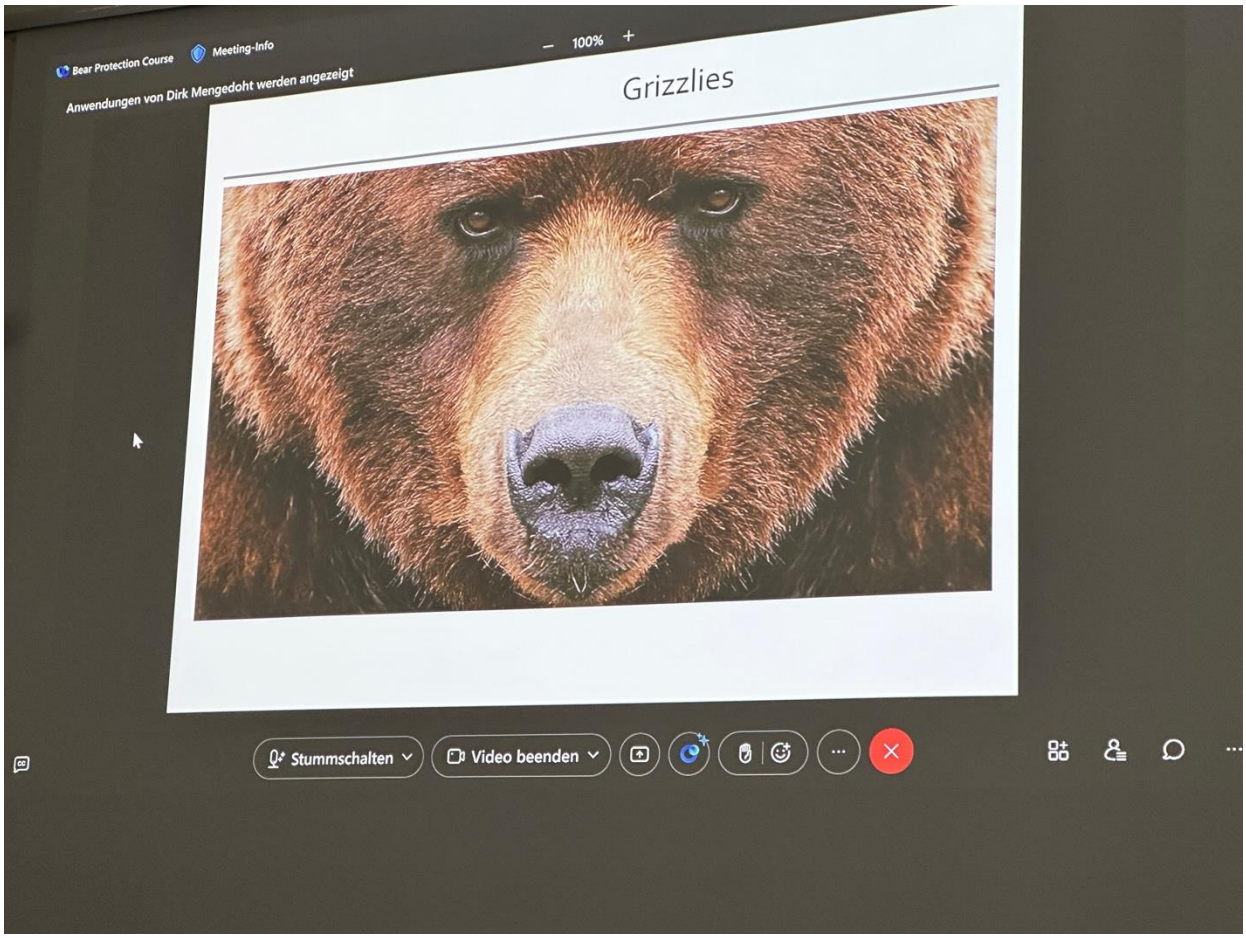

Kommentieren
Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Precaution
'Keep your distance'
- Be prepared to meet polar bears whenever and wherever – pay attention to the surroundings
- Avoid areas where encounters are most likely: sea shores, front of glaciers, close to ravines and possible den sites
- Avoid becoming careless!
- Avoid confrontations and dangerous situations
- Stay out of the bears path
- Never move towards the bear
It attacks without warning.
Keep your distance.
Stummschalten
Video beenden


Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Kommentieren
Precaution
Staying in the field
- Store food securely, in plastic bags to reduce the odor – cook outside the sleeping tents
- Deposit waste (human waste) away from the camp at a spot that can be monitored easily
- Have the weapons close by hand
Stummschalten
Video beenden


Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
GEUS
Camping
Place your camp with a view
Preferably so that it cannot be seen by bears walking along the shore
Keep a clean camp (burning garbage may attract bears – DO NOT store garbage/food next to your tent)
Use a trip-wire fence
Place tents so that you have a good view at them all - and so that the bear has an escape corridor
GEOLOGICAL SURVEY OF DENMARK AND GREENLAND
Stummschalten
Video beenden


Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
01:01:35
Layout
Kommentieren
www.geus.dk
GEUS
Dove Bay, NE Greenland, August 1990
• Fine view
• Away from shore
• Trip-wire fence
© Erik Born
Stummschalten
Video beenden


Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Kommentieren
Remember
• There are no rules with bears, it is an unpredictable animal
• Be always aware of its possible presence (even close to the vessel)
• The chance to be hurt by mishandling a weapon is higher than been attacked by a bear
• It is a beautiful animal
AWI
Stummschalten
Video beenden


Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
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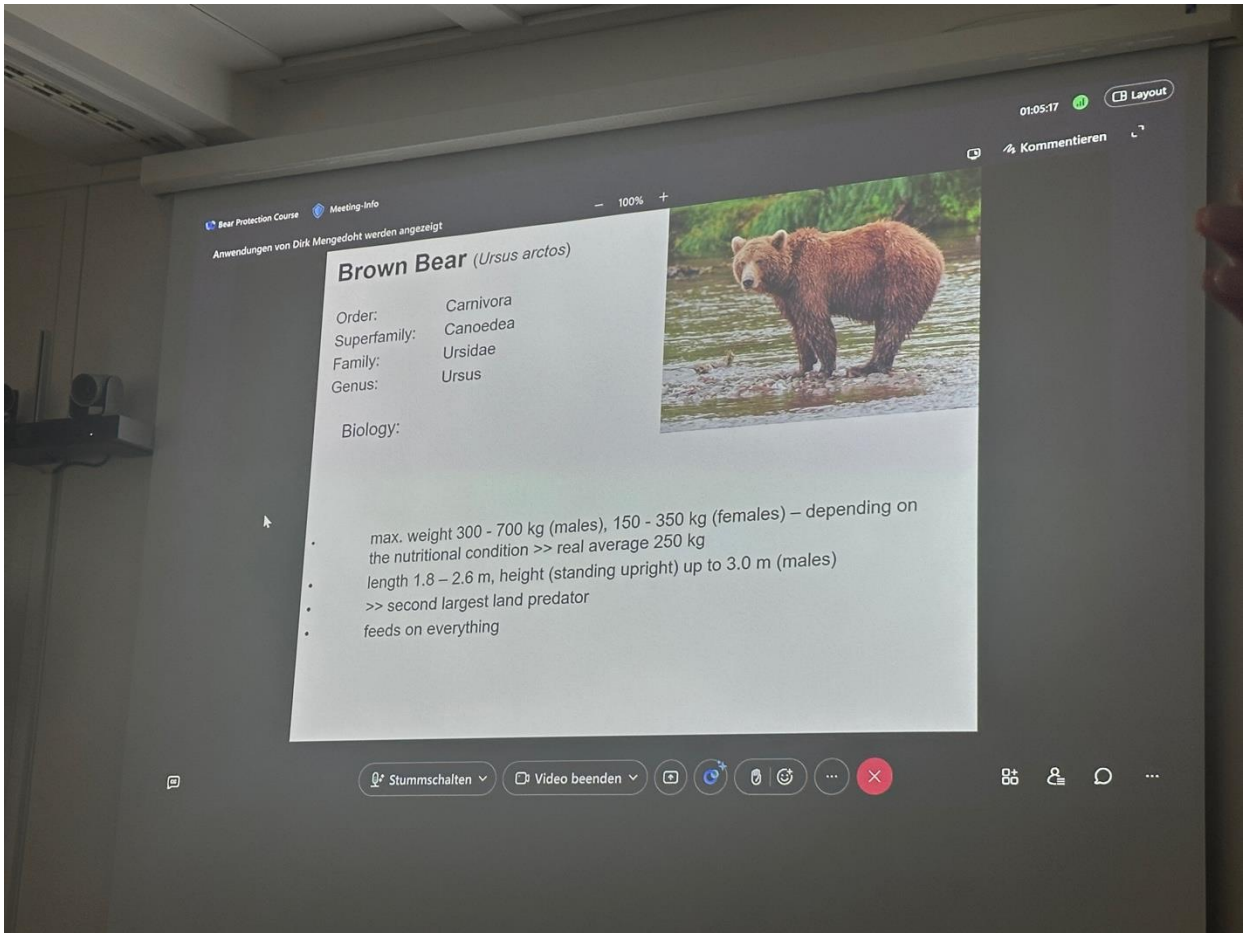
Grizzlies
Stummschalten
Video beenden


01:05:17
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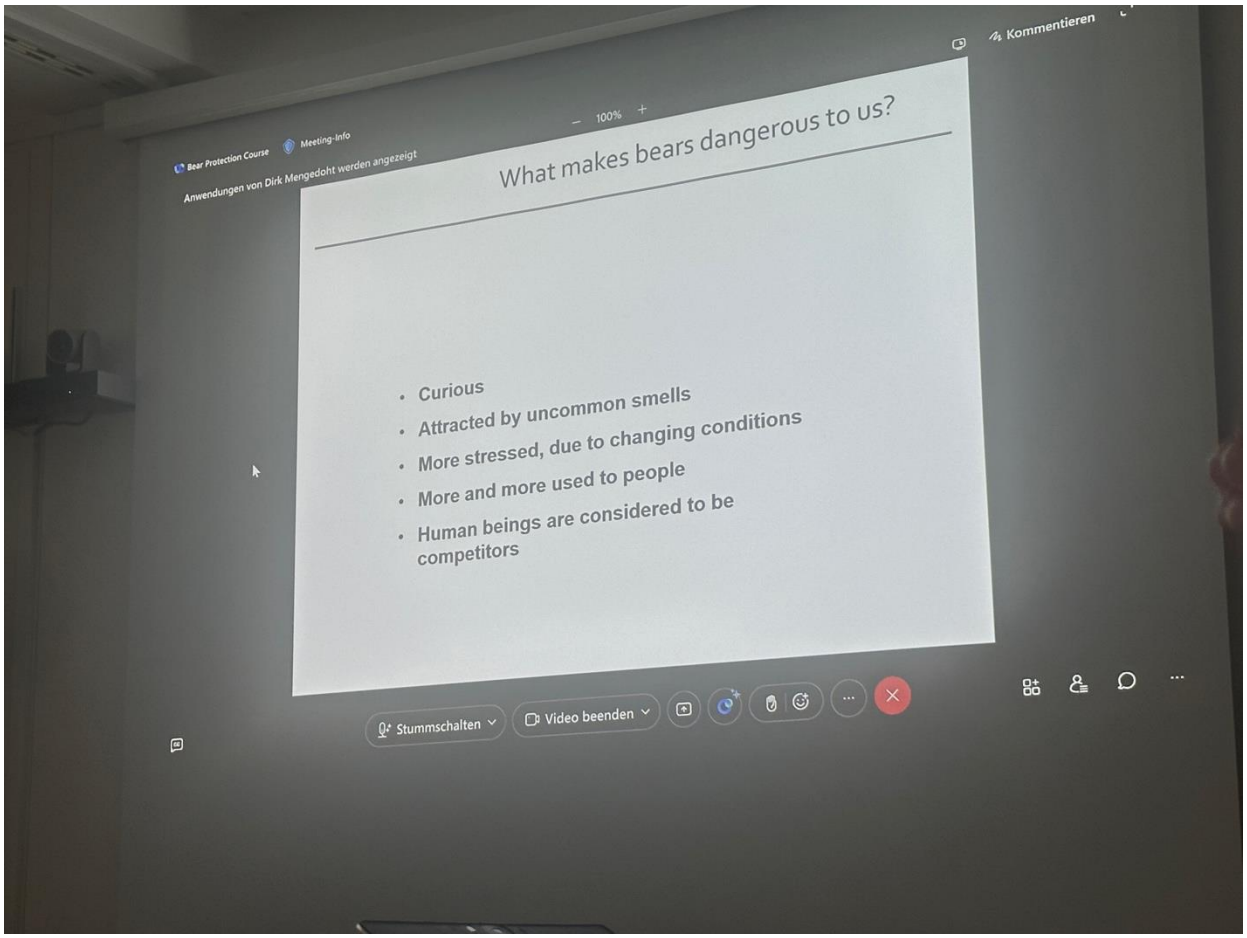
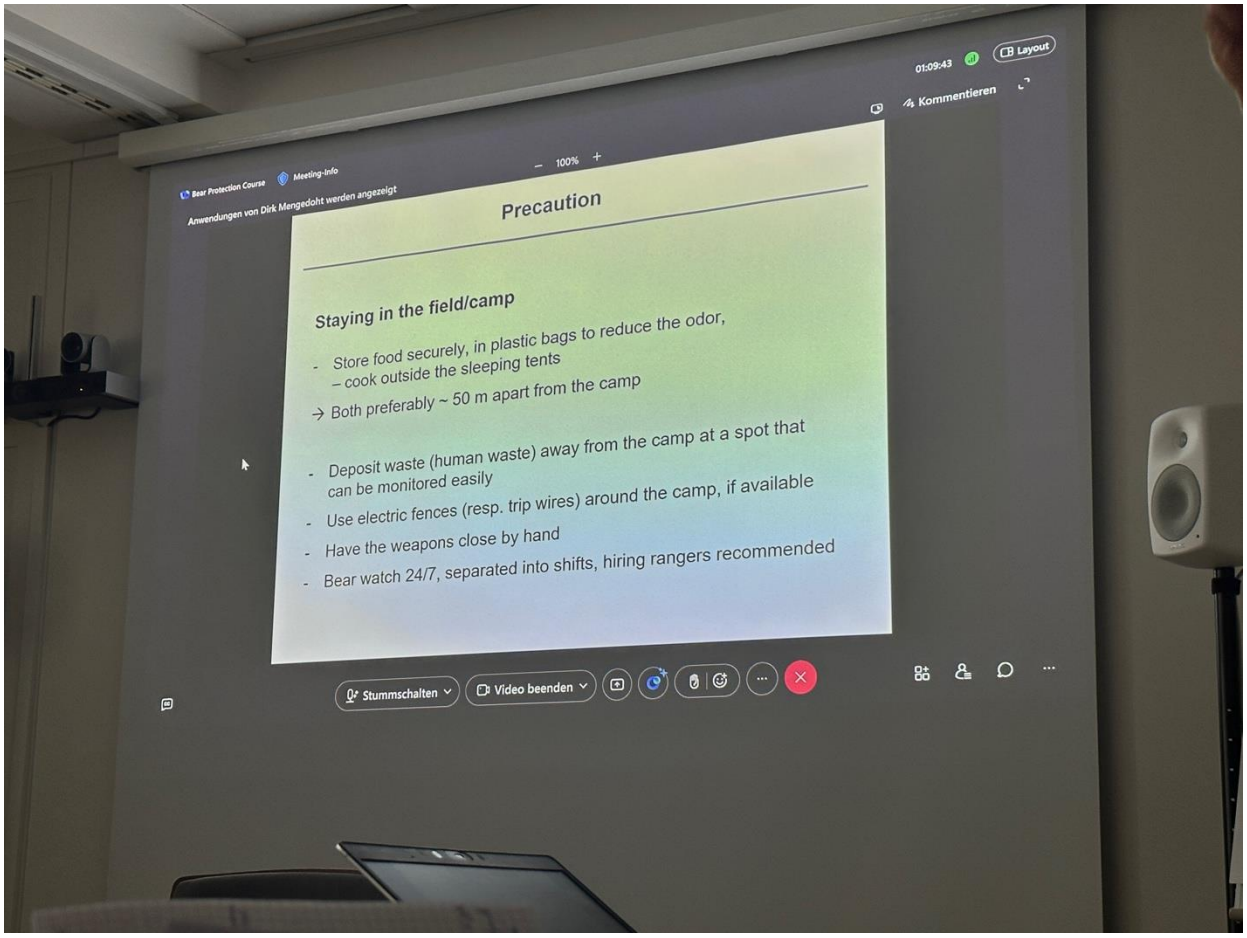
Kommentieren
Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Brown Bear (Ursus arctos)
Order: Carnivora
Superfamily: Canoedea
Family: Ursidae
Genus: Ursus
Biology:
max. weight 300 - 700 kg (males), 150 - 350 kg (females) – depending on the nutritional condition >> real average 250 kg
length 1.8 – 2.6 m, height (standing upright) up to 3.0 m (males)
>> second largest land predator
feeds on everything
Stummschalten
Video beenden


Kommentieren
Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
What makes bears dangerous to us?
Curious
Attracted by uncommon smells
More stressed, due to changing conditions
More and more used to people
Human beings are considered to be competitors
Stummschalten
Video beenden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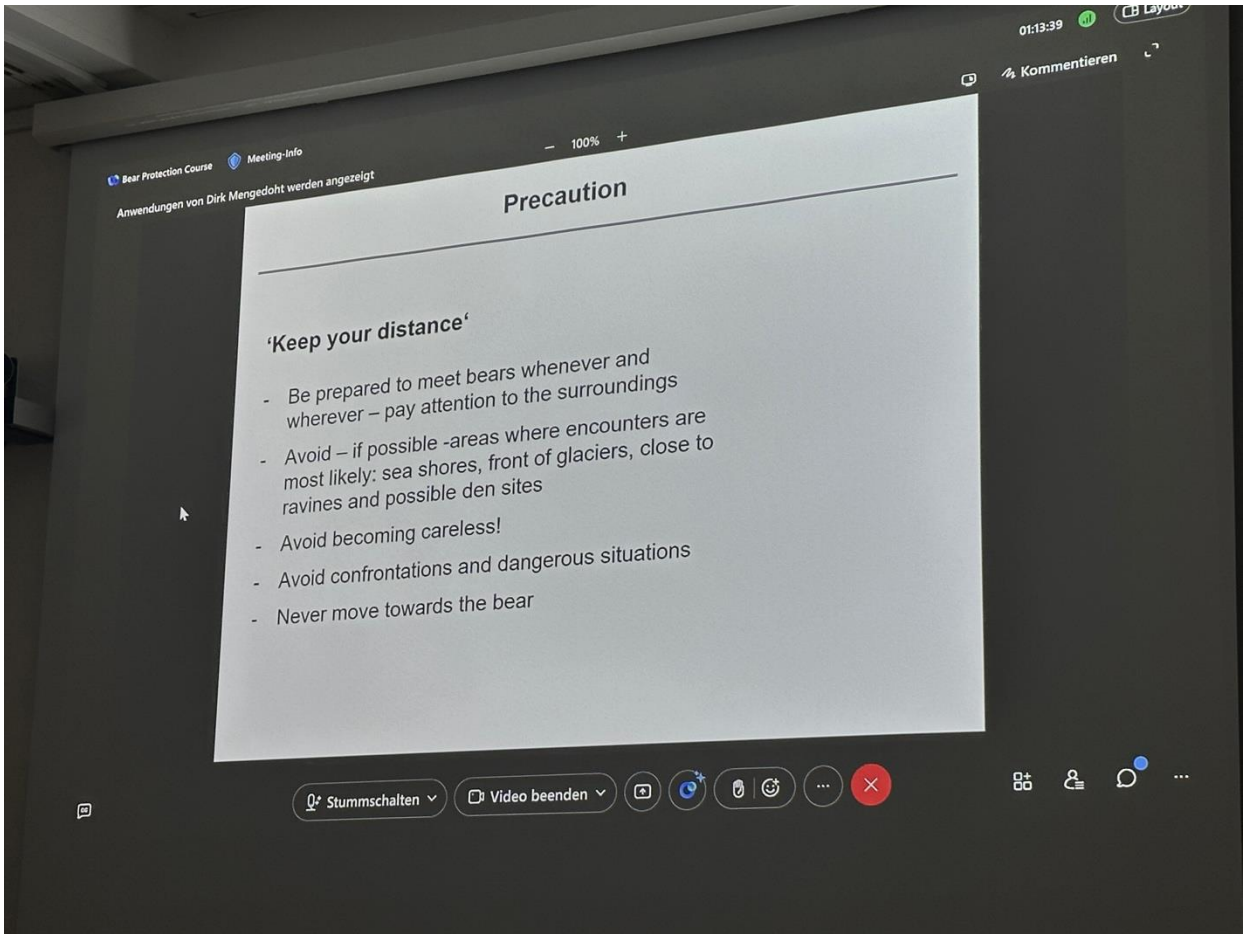
Kommentieren
Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Precaution
Staying in the field/camp
- Store food securely, in plastic bags to reduce the odor, – cook outside the sleeping tents
→ Both preferably ~ 50 m apart from the camp
- Deposit waste (human waste) away from the camp at a spot that can be monitored easily
- Use electric fences (resp. trip wires) around the camp, if available
- Have the weapons close by hand
- Bear watch 24/7, separated into shifts, hiring rangers recommended
Stummschalten
Video beenden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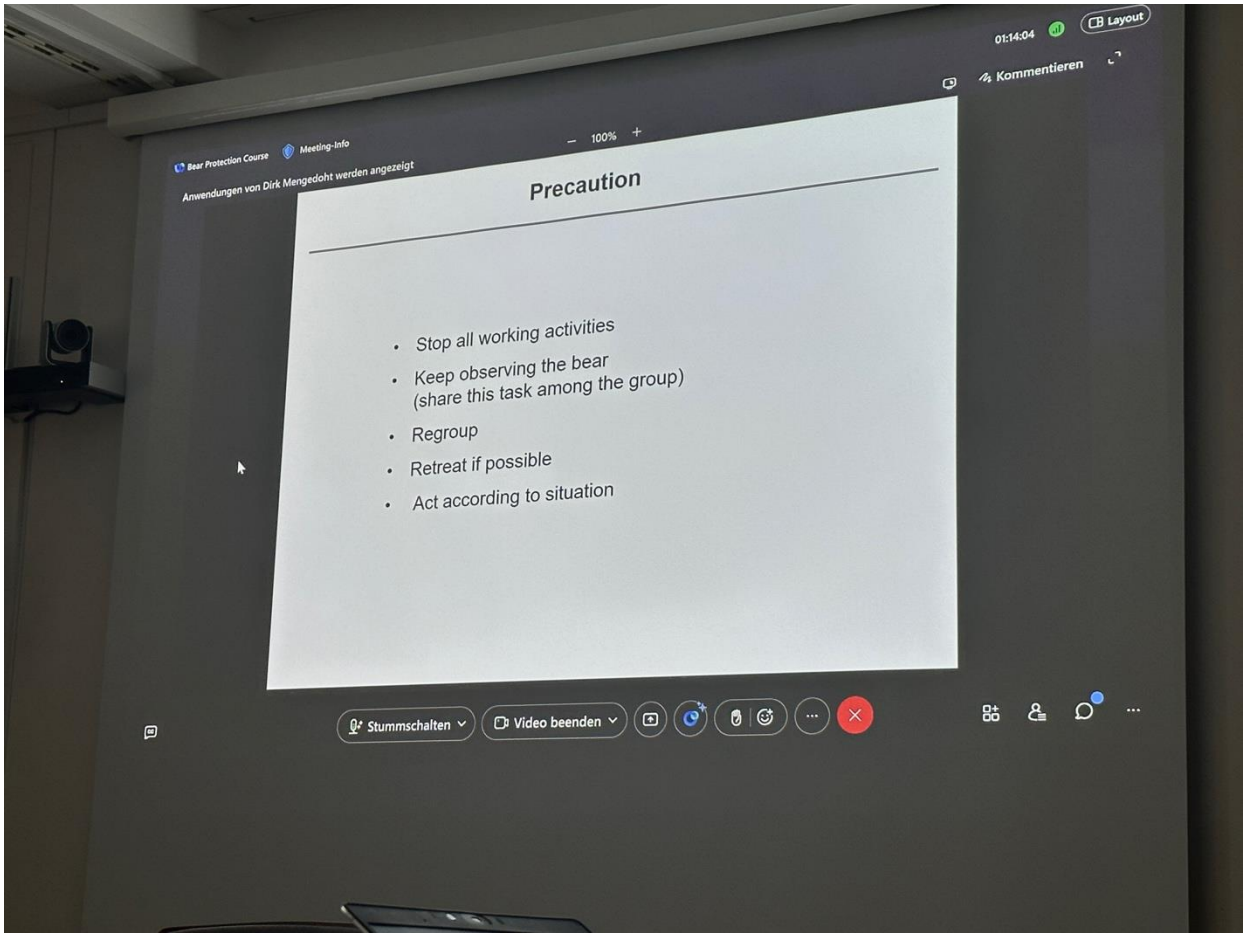
Kommentieren
Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Precaution
'Keep your distance'
- Be prepared to meet bears whenever and wherever – pay attention to the surroundings
- Avoid – if possible -areas where encounters are most likely: sea shores, front of glaciers, close to ravines and possible den sites
- Avoid becoming careless!
- Avoid confrontations and dangerous situations
- Never move towards the bear
Stummschalten
Video beenden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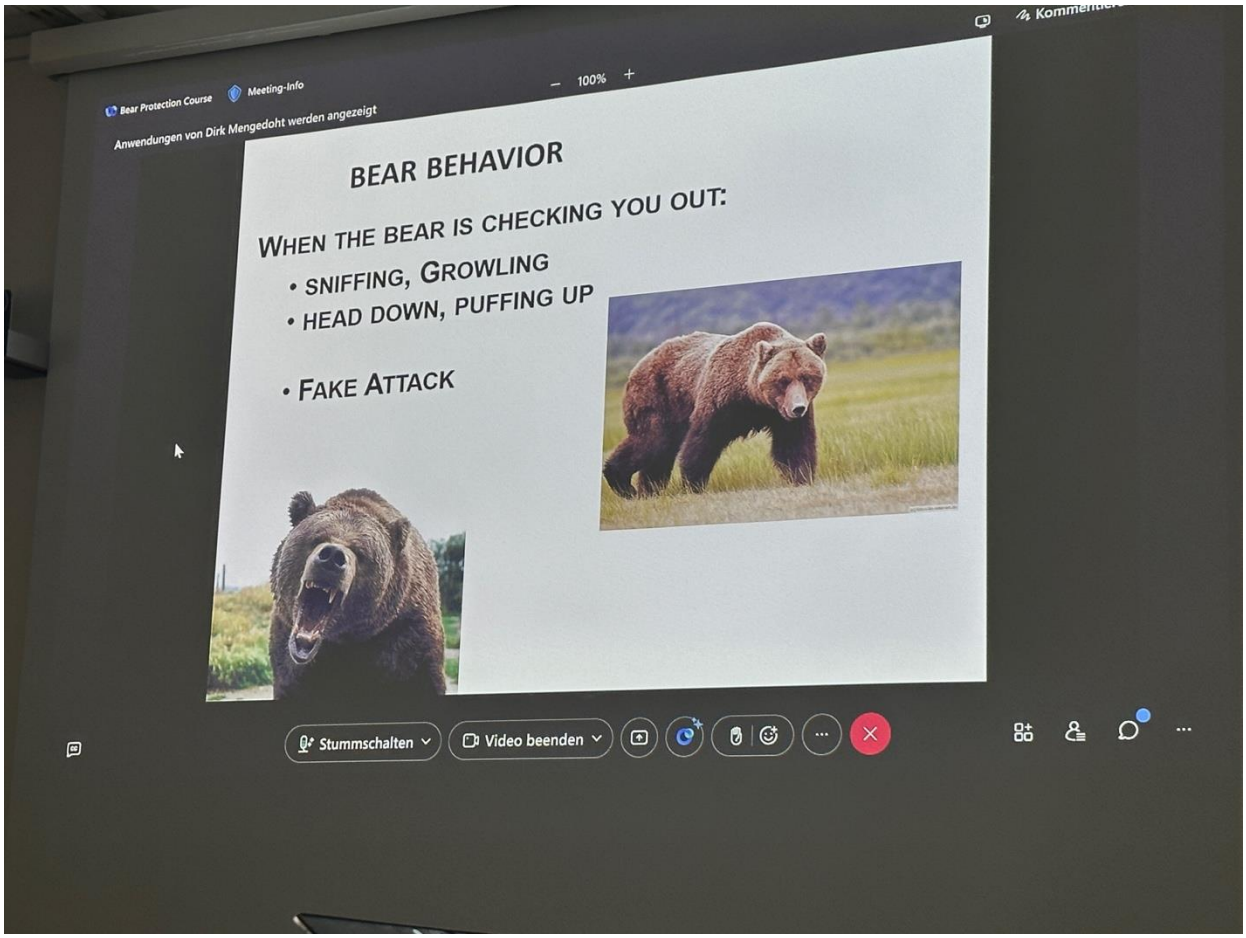
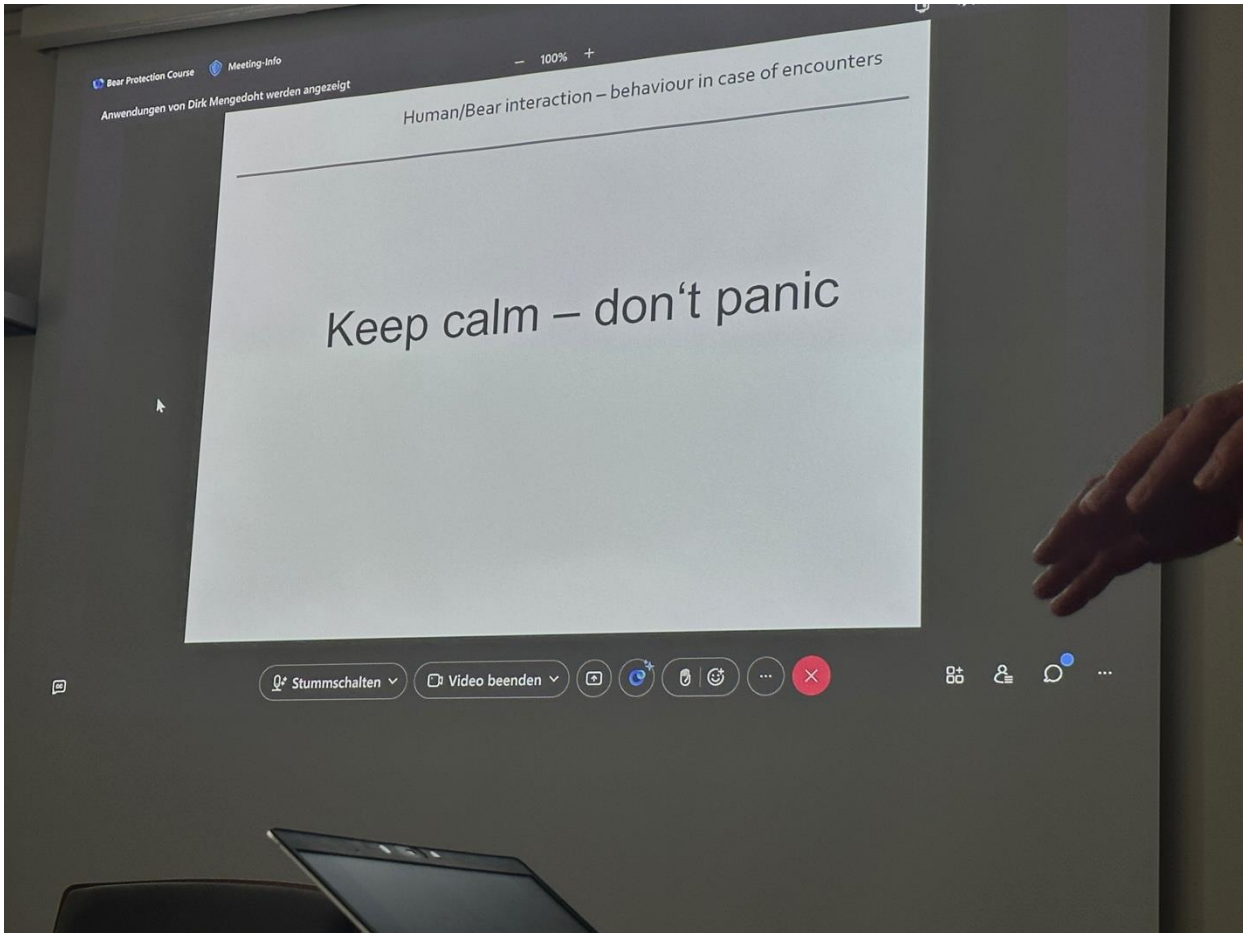
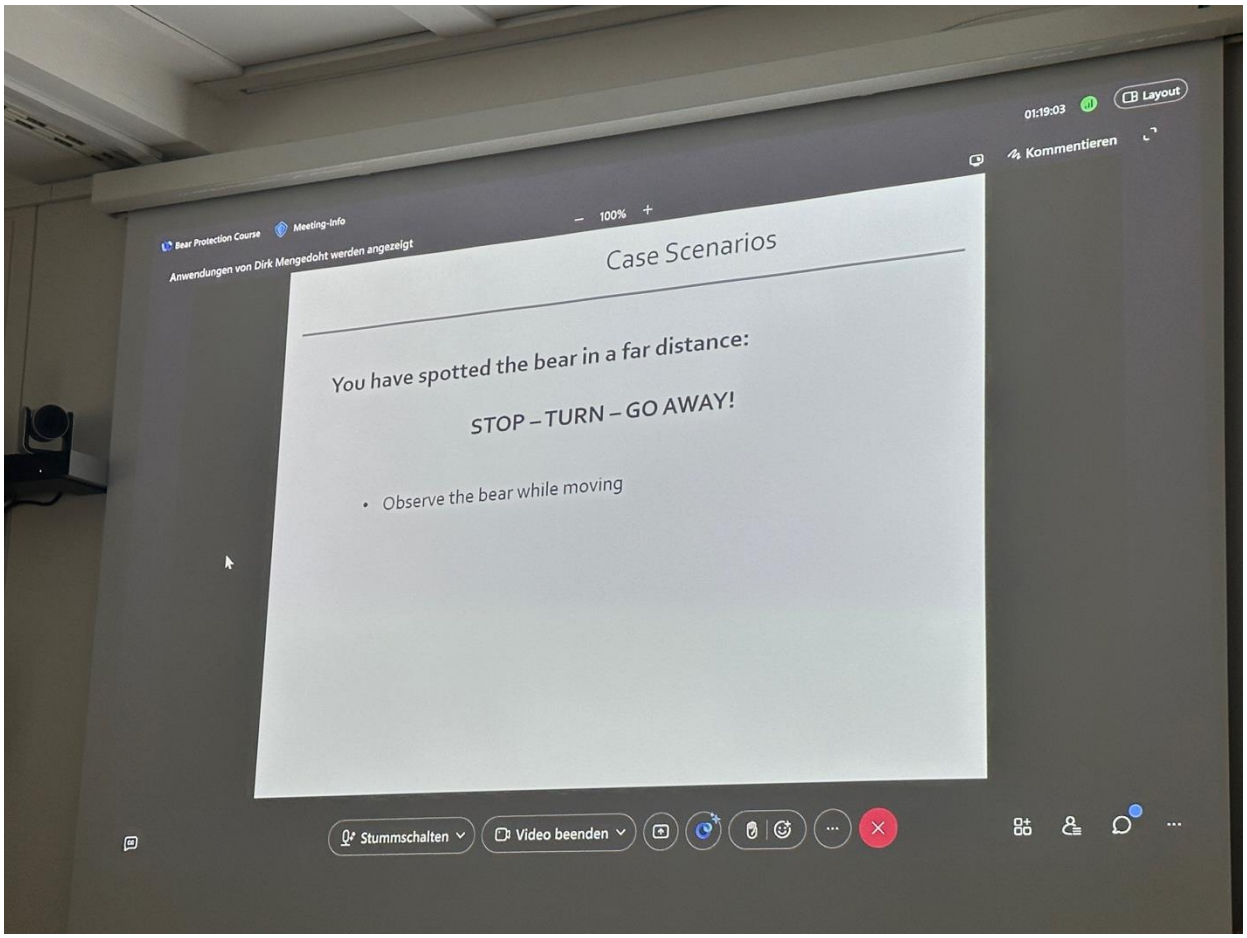
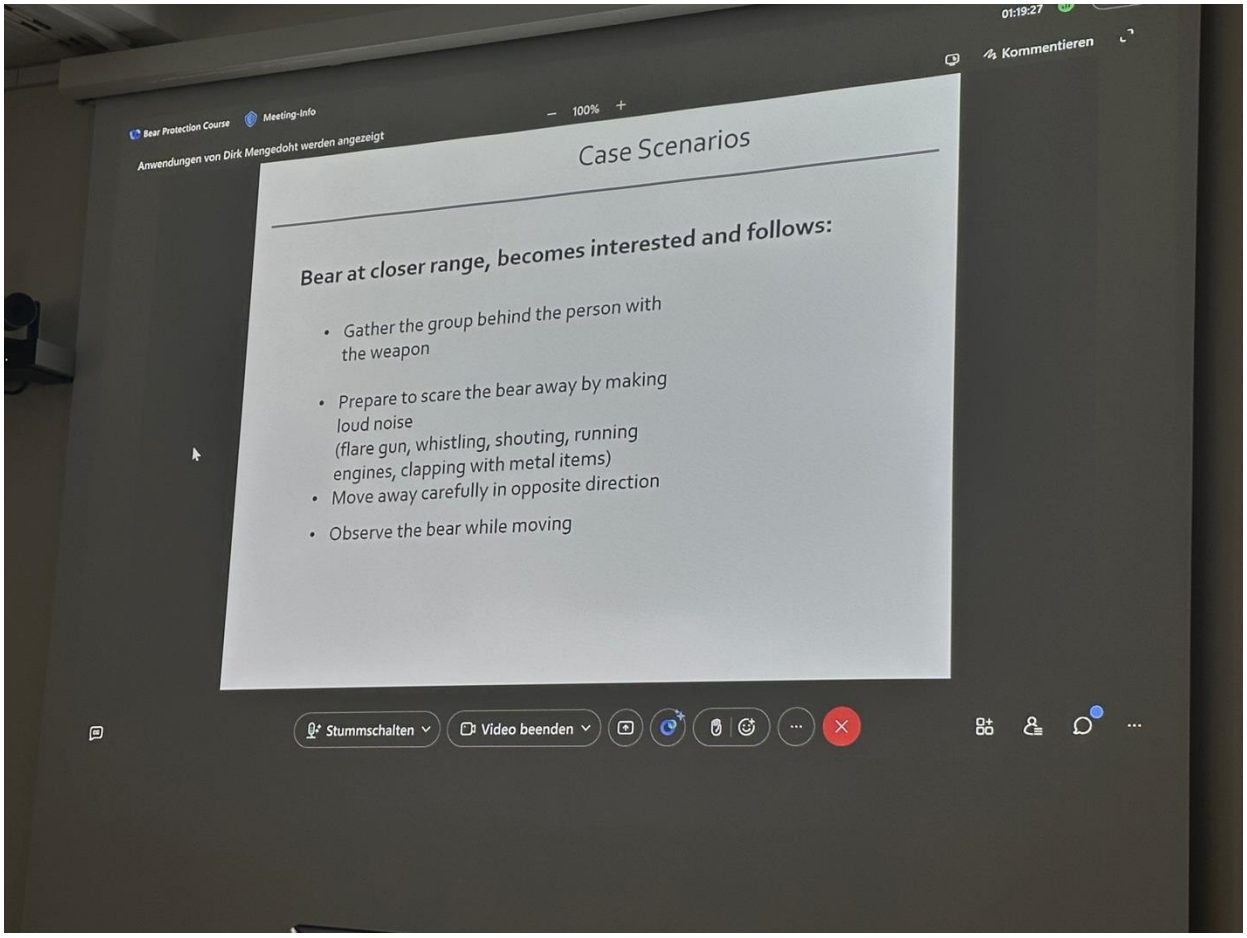
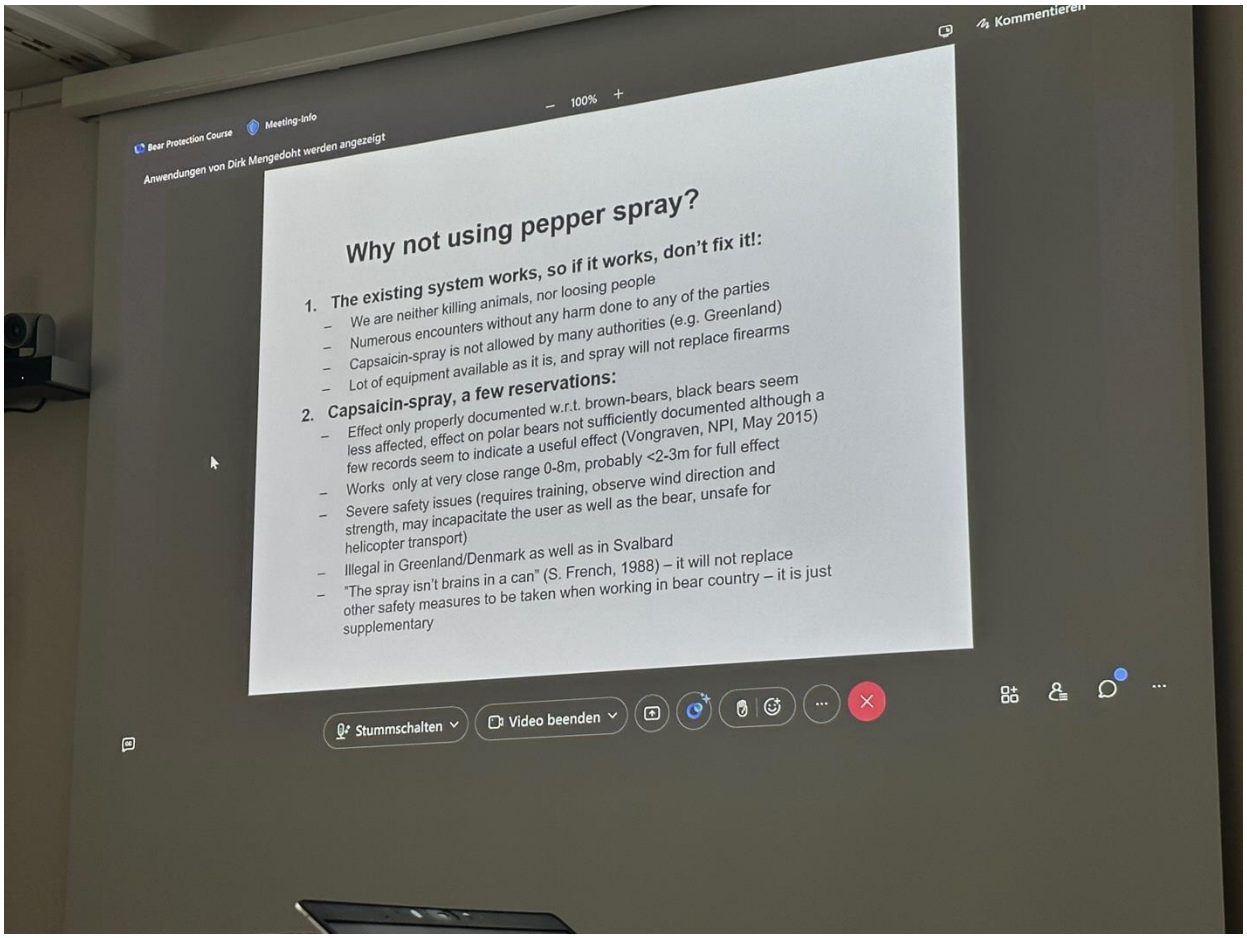
Kommentieren
Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Precaution
• Stop all working activities
• Keep observing the bear (share this task among the group)
• Regroup
• Retreat if possible
• Act according to situation
Stummschalten
Video beenden

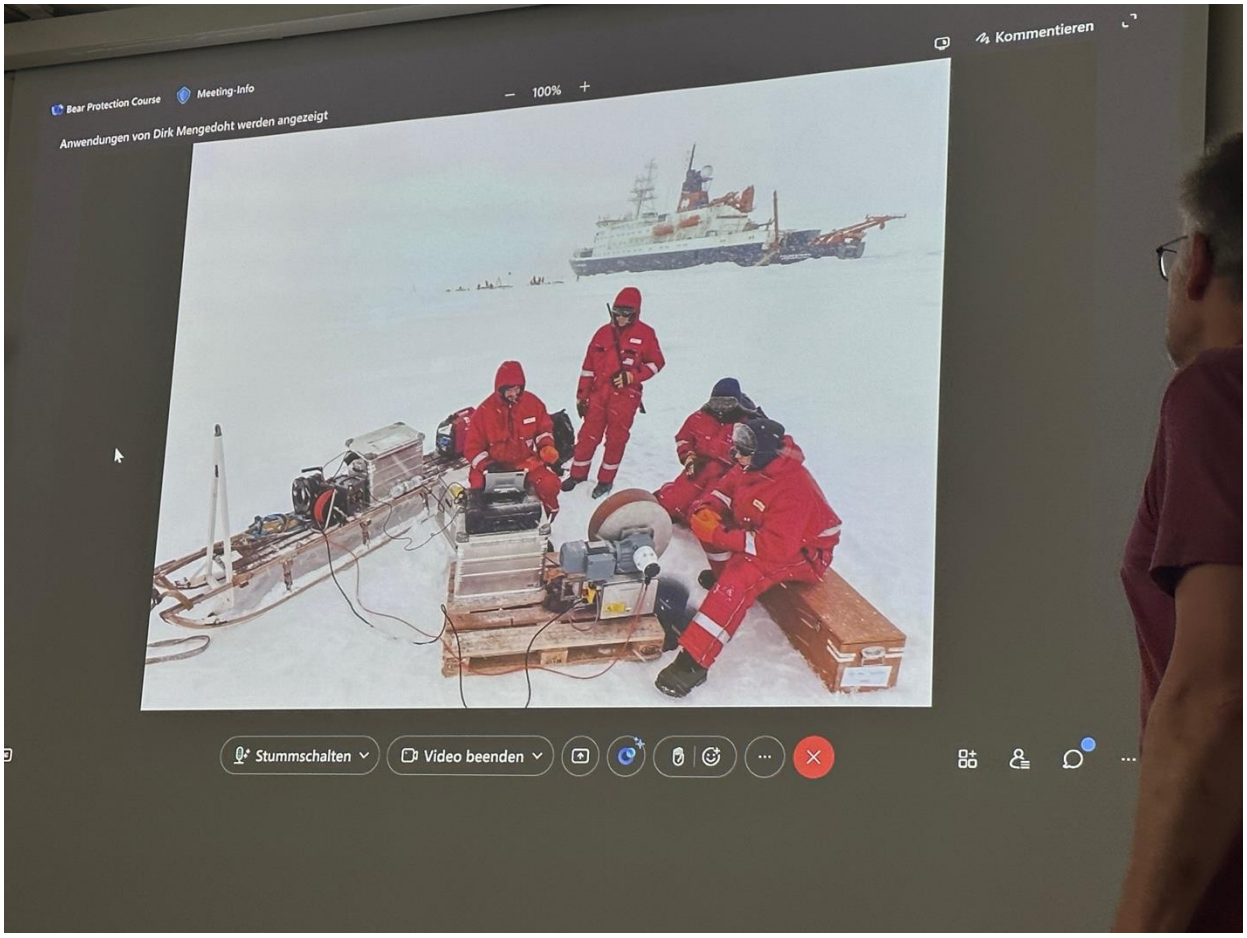

Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
BEAR BEHAVIOR
WHEN THE BEAR IS CHECKING YOU OUT:
• SNIFFING, GROWLING
• HEAD DOWN, PUFFING UP
• FAKE ATTACK
Stummschalten
Video beenden


Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Human/Bear interaction – behaviour in case of encounters
Keep calm – don‘t panic
Stummschalten
Video beenden


Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
01:19:03
Layout
Kommentieren
Case Scenarios
You have spotted the bear in a far distance:
STOP – TURN – GO AWAY!
• Observe the bear while moving
Stummschalten
Video beenden


Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
01:19:27
Kommentieren
Case Scenarios
Bear at closer range, becomes interested and follows:
• Gather the group behind the person with the weapon
• Prepare to scare the bear away by making loud noise (flare gun, whistling, shouting, running engines, clapping with metal items)
• Move away carefully in opposite direction
• Observe the bear while moving
Stummschalten
Video beenden


Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Kommentieren
Why not using pepper spray?
1. The existing system works, so if it works, don't fix it!:
– We are neither killing animals, nor loosing people
– Numerous encounters without any harm done to any of the parties
– Capsaicin-spray is not allowed by many authorities (e.g. Greenland)
– Lot of equipment available as it is, and spray will not replace firearms
2. Capsaicin-spray, a few reservations:
– Effect only properly documented w.r.t. brown-bears, black bears seem less affected, effect on polar bears not sufficiently documented although a few records seem to indicate a useful effect (Vongraven, NPI, May 2015)
– Works only at very close range 0-8m, probably <2-3m for full effect
– Severe safety issues (requires training, observe wind direction and strength, may incapacitate the user as well as the bear, unsafe for helicopter transport)
– Illegal in Greenland/Denmark as well as in Svalbard
– "The spray isn't brains in a can" (S. French, 1988) – it will not replace other safety measures to be taken when working in bear country – it is just supplementary
Stummschalten
Video beenden


Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
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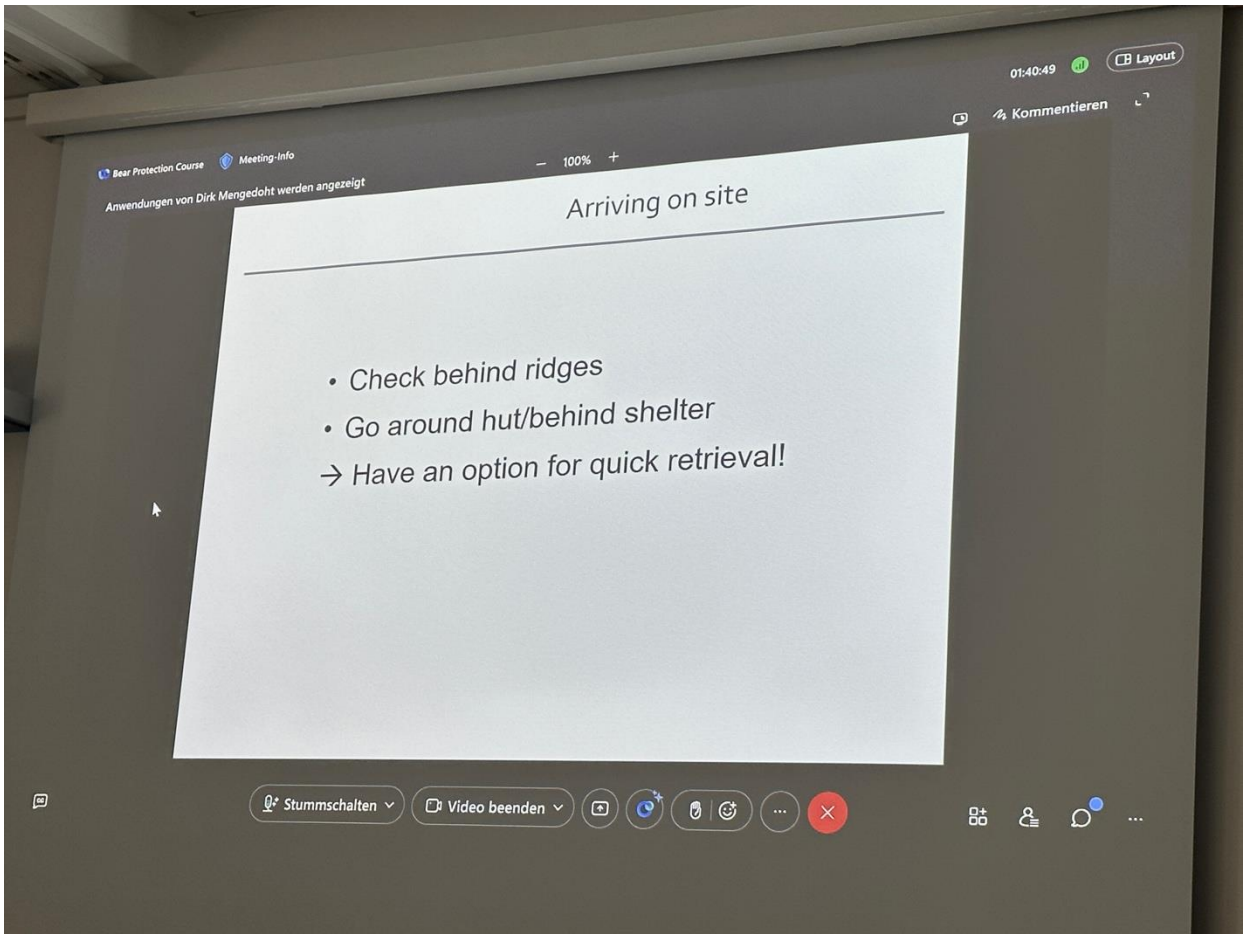
Kommentieren
Stummschalten
Video beenden


01:40:49
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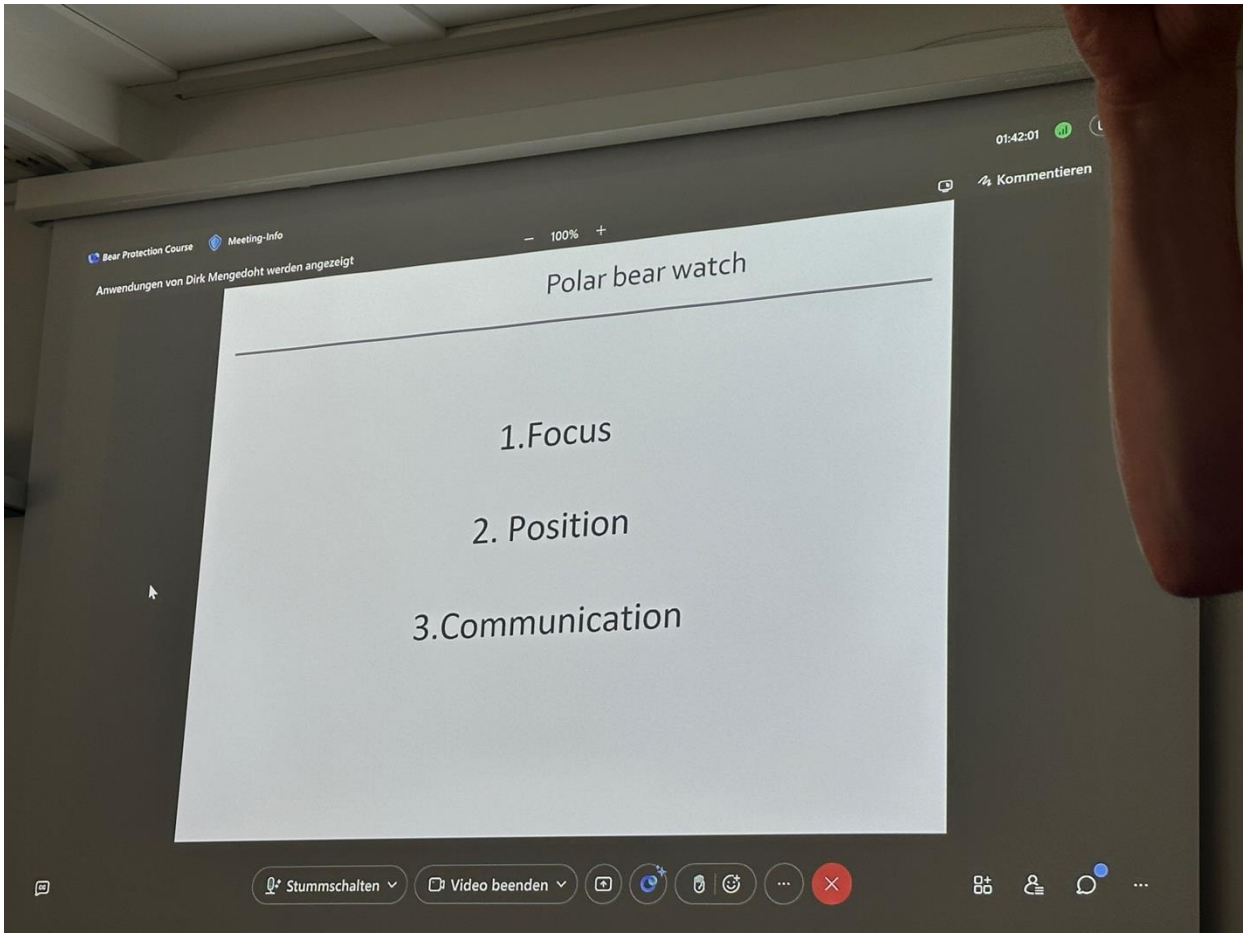
Kommentieren
Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Arriving on site
• Check behind ridges
• Go around hut/behind shelter
→ Have an option for quick retrieval!
Stummschalten
Video beenden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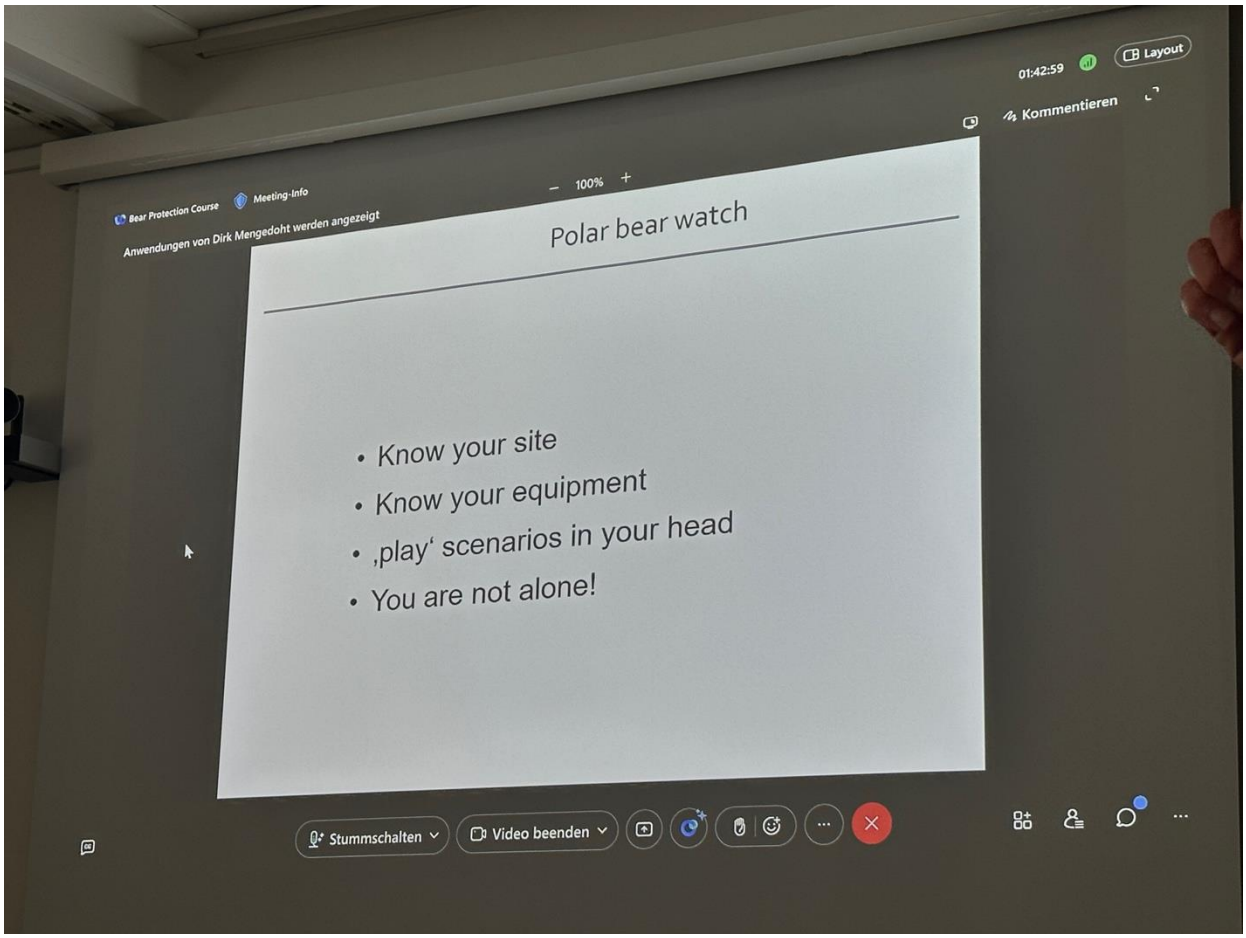
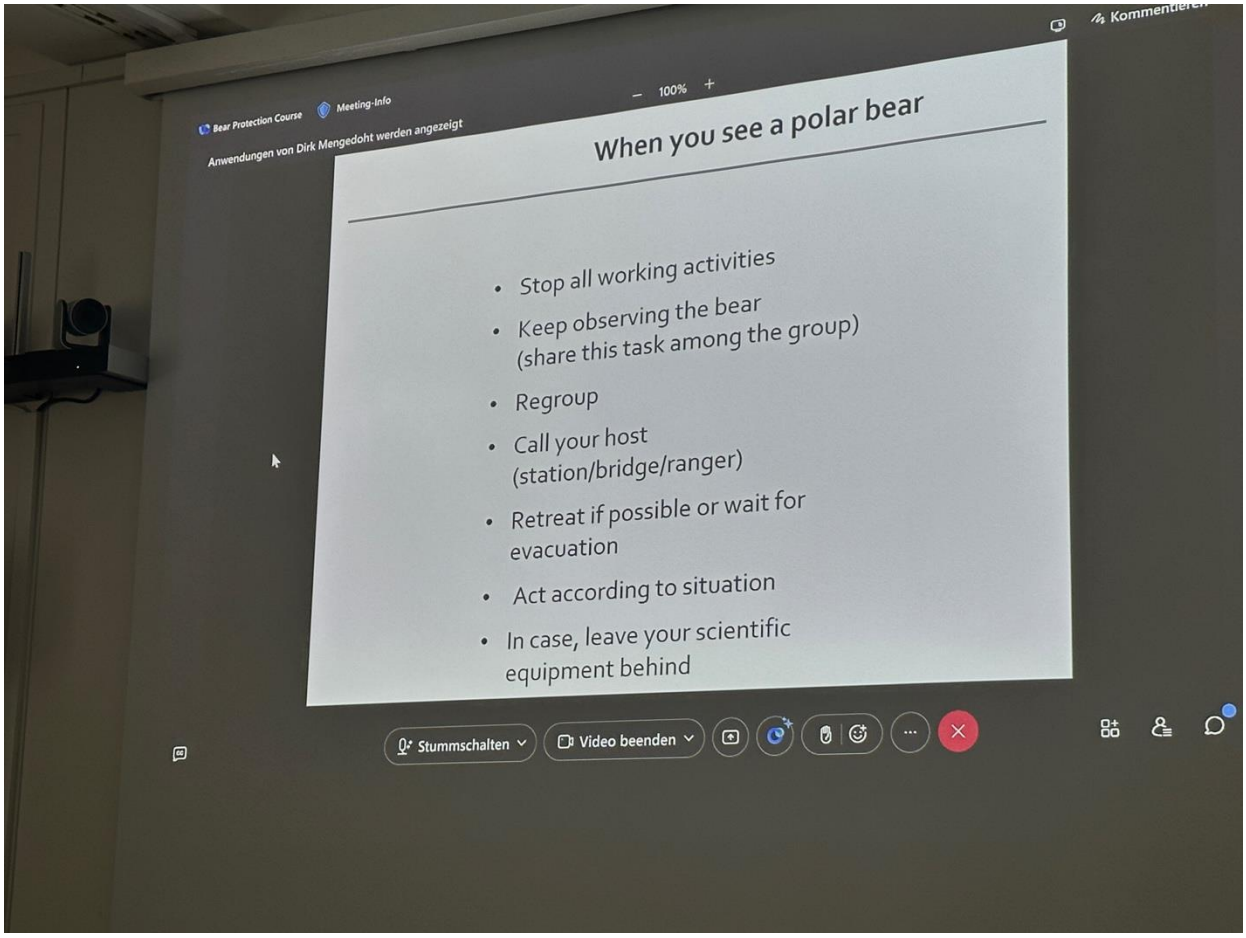
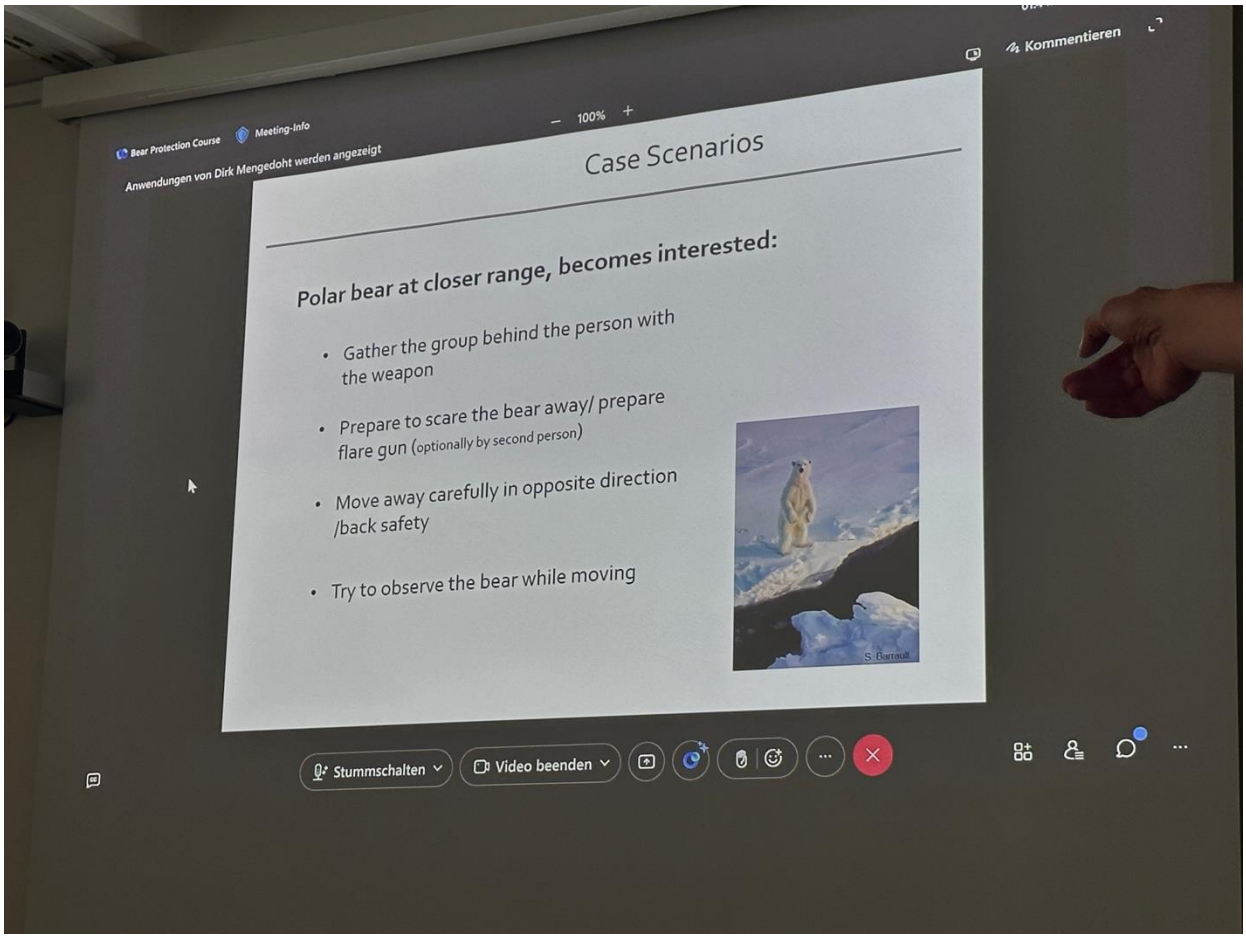
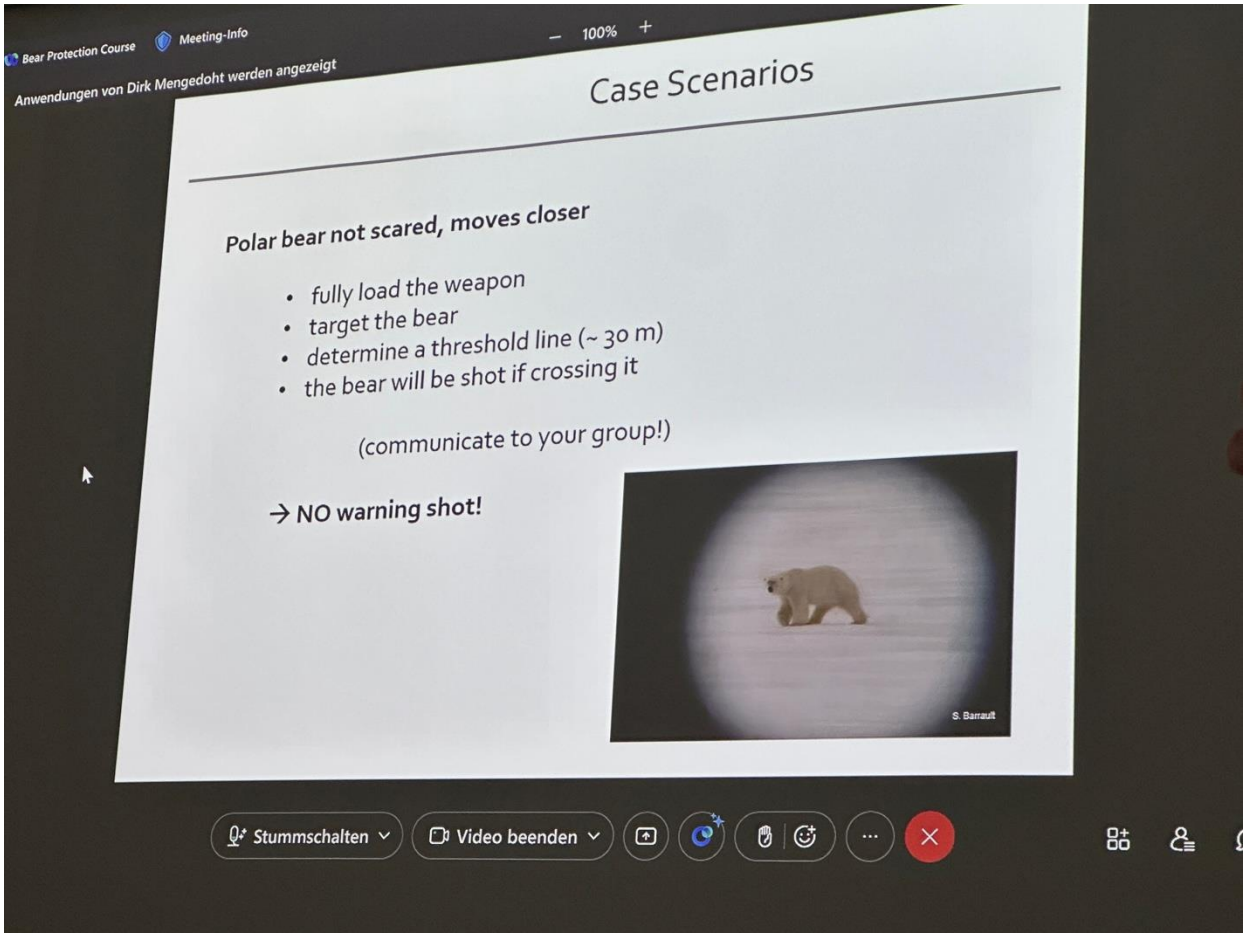
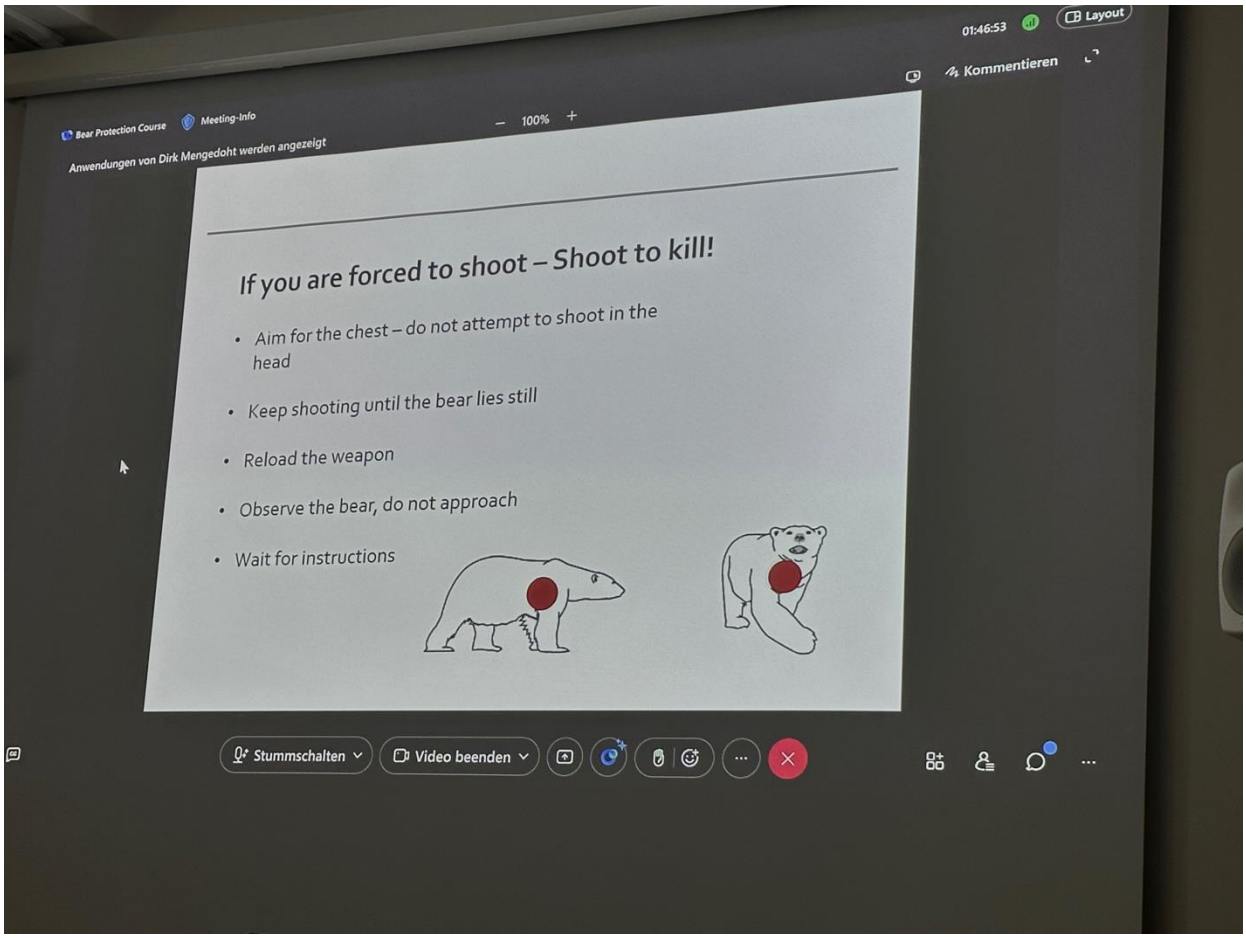
Kommentieren
Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Polar bear watch
1.Focus
2. Position
3.Communication
Stummschalten
Video beenden

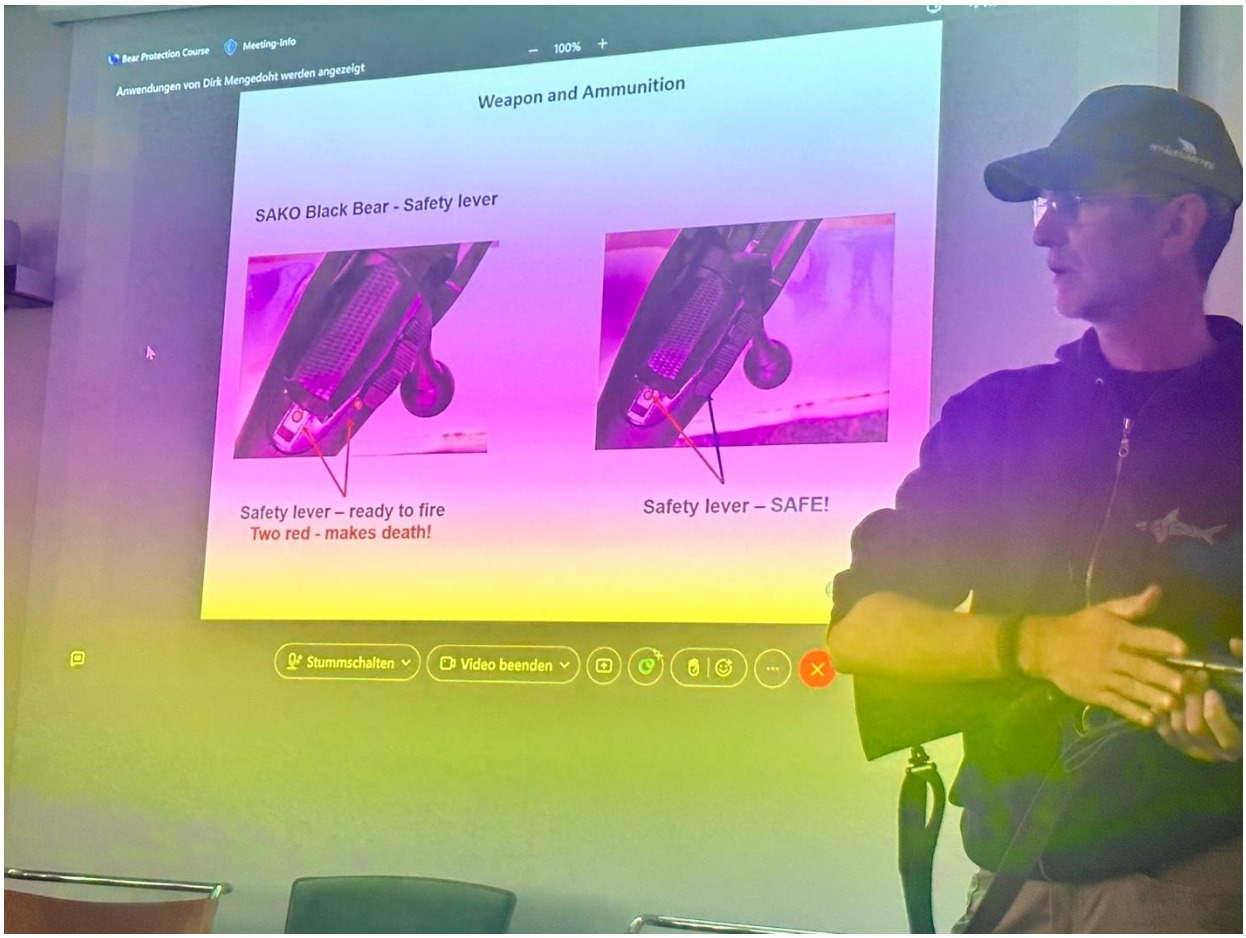

Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
01:42:59
Layout
Kommentieren
Polar bear watch
• Know your site
• Know your equipment
• ‚play' scenarios in your head
• You are not alone!
Stummschalten
Video beenden


Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Kommentieren
When you see a polar bear
• Stop all working activities
• Keep observing the bear (share this task among the group)
• Regroup
• Call your host (station/bridge/ranger)
• Retreat if possible or wait for evacuation
• Act according to situation
• In case, leave your scientific equipment behind
Stummschalten
Video beenden


Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Kommentieren
Case Scenarios
Polar bear at closer range, becomes interested:
Gather the group behind the person with the weapon
Prepare to scare the bear away/ prepare flare gun (optionally by second person)
Move away carefully in opposite direction /back safety
Try to observe the bear while moving
S. Barrault
Stummschalten
Video beenden


Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Case Scenarios
Polar bear not scared, moves closer
fully load the weapon
target the bear
determine a threshold line (~ 30 m)
the bear will be shot if crossing it
(communicate to your group!)
→ NO warning shot!
S. Barrault
Stummschalten
Video beenden


01:46:53
Layout
Kommentieren
Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
If you are forced to shoot – Shoot to kill!
Aim for the chest – do not attempt to shoot in the head
Keep shooting until the bear lies still
Reload the weapon
Observe the bear, do not approach
Wait for instructions
Stummschalten
Video beenden


Bear Protection Course
Meeting-Info
Anwendungen von Dirk Mengedoht werden angezeigt
100%
Weapon and Ammunition
SAKO Black Bear - Safety lever
Safety lever – ready to fire
Two red - makes death!
Safety lever – SAFE!
Stummschalten
Video beenden


Handling and Loa
1. The Safety Check – whenever you tak
- Point the rifle in a safe direction
- Check that there is no magazine in the w
otherwise remove the magazine
- Retract the bolt and check the chamber
Stummschalten
Video beenden