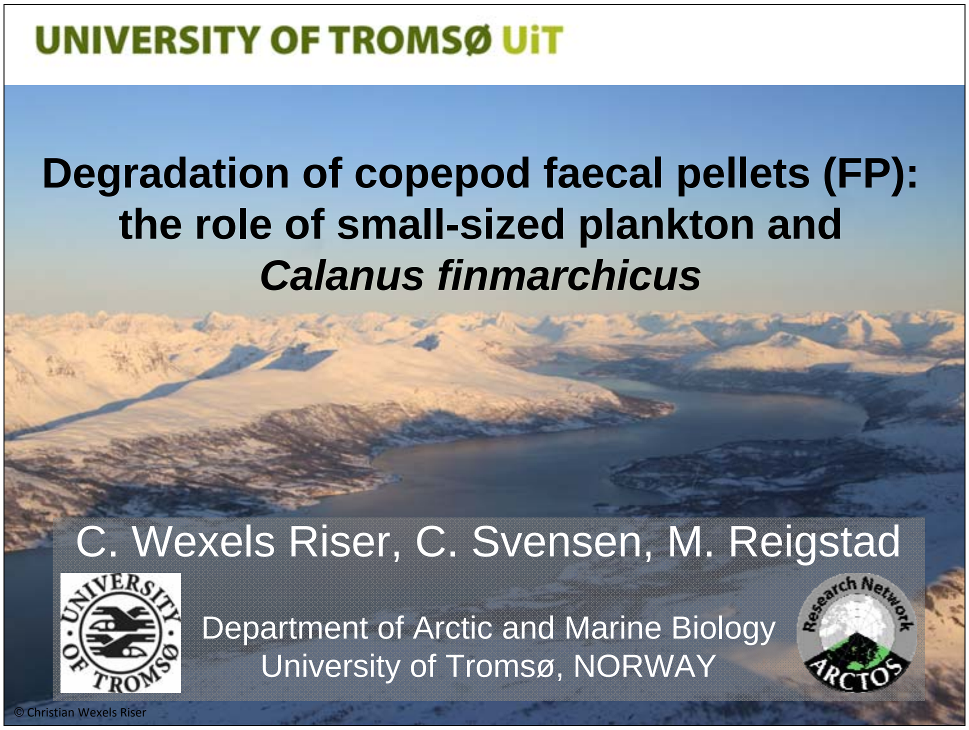
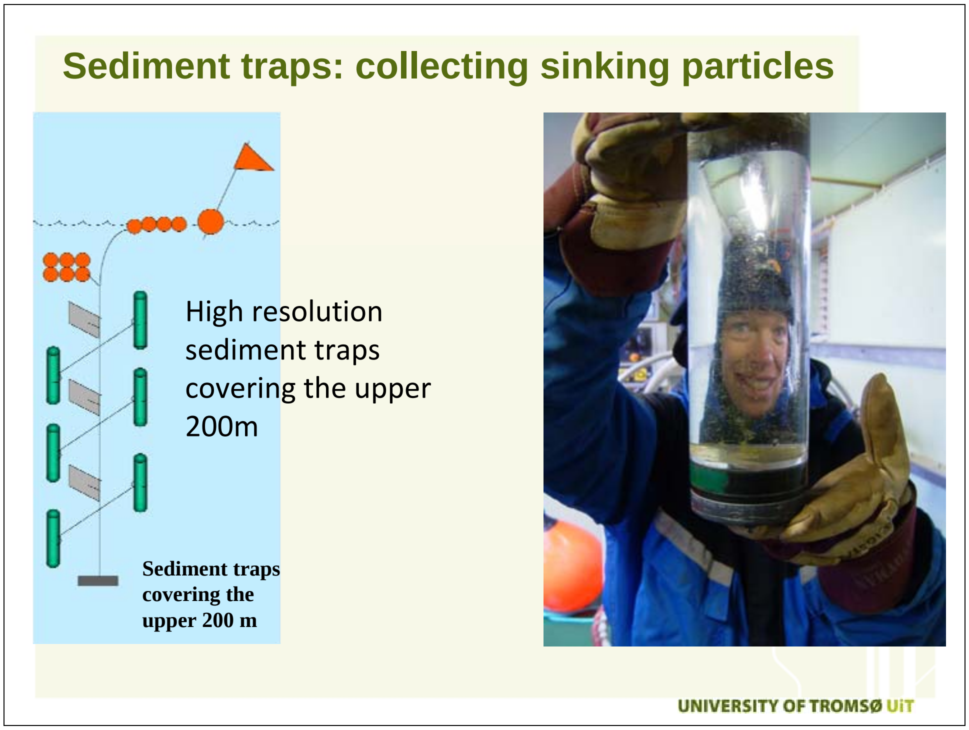


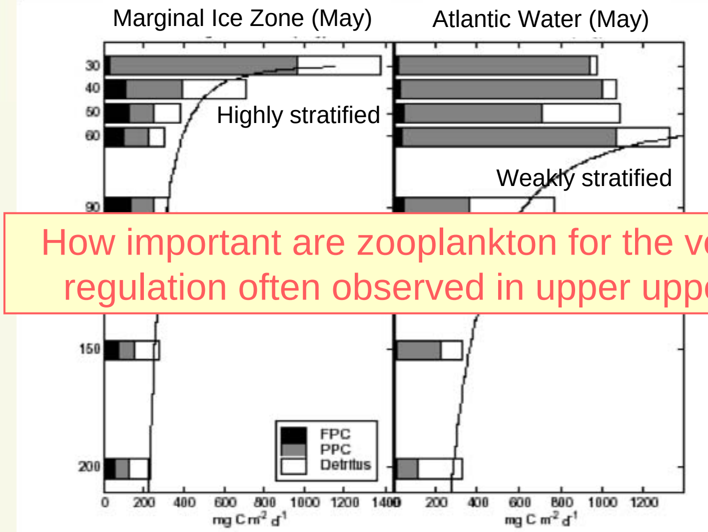
I will present data from an experiment conducted in May 2009 in Tromsø, Norvay, as part of the conflux project. Although I am the one presenting the work I want to emphasise that this is a result of a teamwork and the contribution from all authors have been essential.



The “sedimentation team” in Tromsø have for many years studied the POC flux and its composition in the upper 200 meter, using high resolution sediment traps typically 7-8 depths


USA
Canada
Russia
Beaufort Sea
Arctic Ocean
Concentrations of polynyas
Major shore lead polynyas
Shore fast ice
Mobile ice
Fram strait
Barents Sea
Greenland
Norway
Atlantic Ocean

POC export: example from the Barents Sea



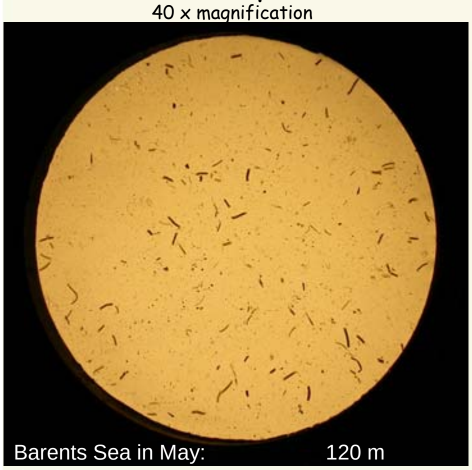
Wassmann et al. 2003

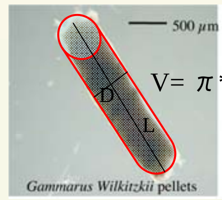
How important are zooplankton for the vertical flux regulation often observed in upper upper layer?

In addition to measure the POC export we are also interested in its composition

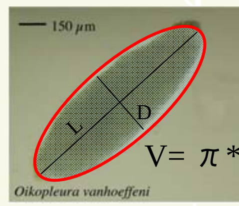
Sediment trap material

40 x magnification





$V= \pi * L * D^2/4$



$V= \pi * L * D^2/6$

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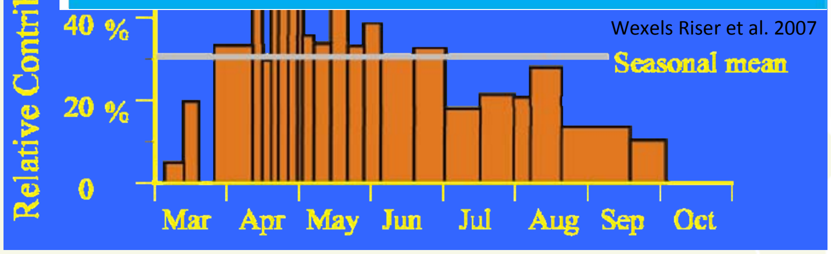
Export or Retention of Faecal Pellets (FP)?

Balsfjord, northern Norway

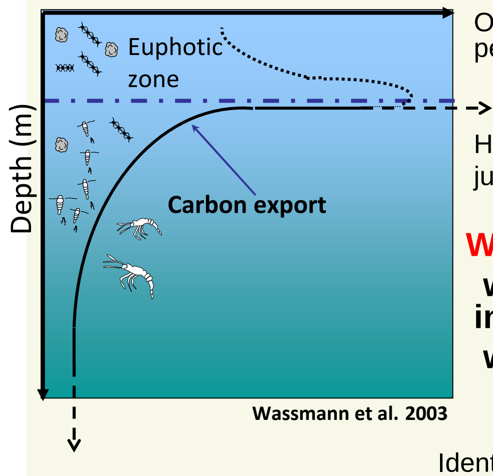
	Layer (m)	FPC production (mg FPC m^{-2} d^{-1})	Vertical flux (mg FPC m^{-2} d^{-1})	Export (%)
Late bloom	**0-20**	**12**	**9**	**77**
	20-50	**43**	**3**	**6**
	50-90	**4**	**1**	**2**
Peak bloom	0-20	22	14	64
	20-50	34	30	53
	50-90	3	16	27

Wexels Riser et al. 2007



Wexels Riser et al. 2010

So what we know:



Only a fraction of copepod faecal pellets reach sediment traps

Highest retention of FP is just below euphotic zone

What we know less about:

which processes are involved?

who are the main actors?

Identification of processes = better suited to predict vertical carbon flux

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Why did we conduct this experiment?
From field investiagations we know that only a fraction….
In 2004 we conducted an experiment on the role of Oithona as a flux feeder.

Vårt fokus er hva som ikke synker ut og hvilke prosesser som former kurvaturen.

Research question:

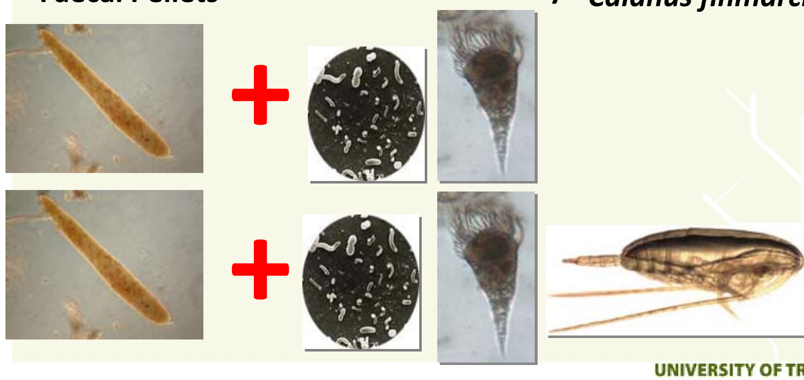
Which actors are contributing to retention faecal pellet?

- Microbial community (Bacteria + plankton < 180 µm)
- Microbial community + *mesozooplankton (Calanus)*

Faecal Pellets

< 180 µm fraction
Microbial community

Calanus finmarchicus



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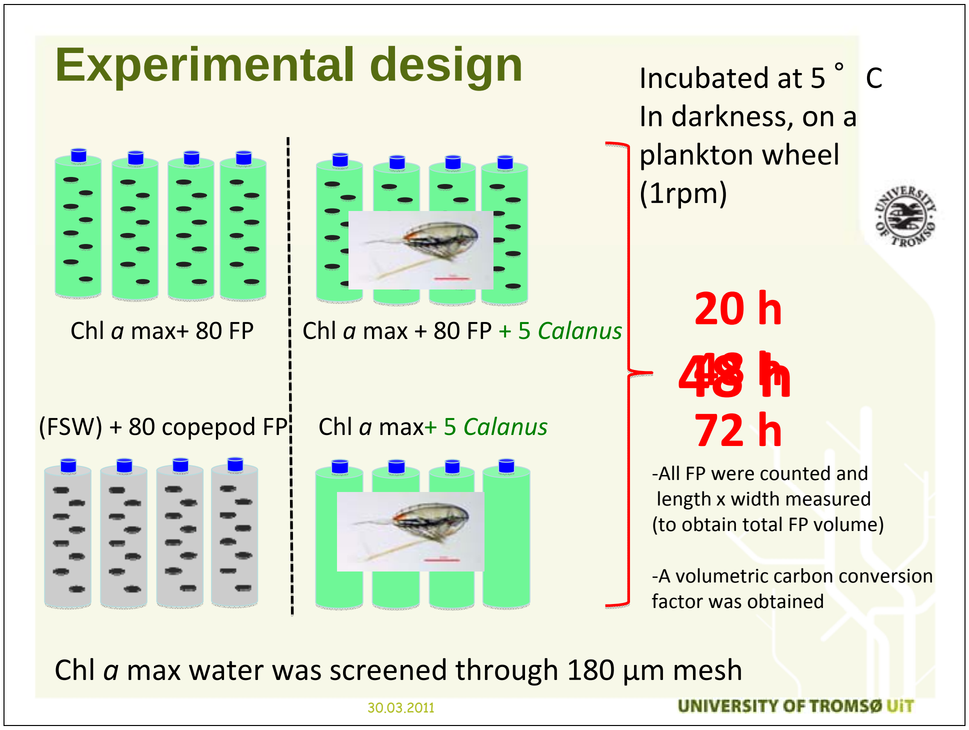
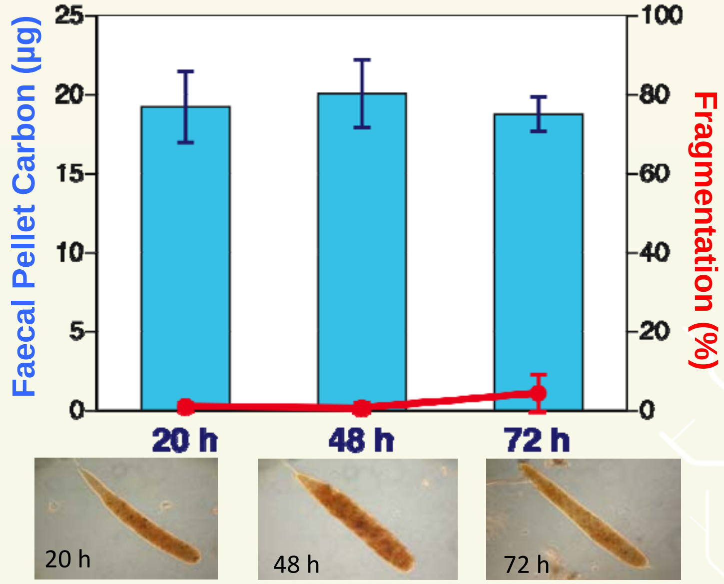


Tidsaspektet er viktig

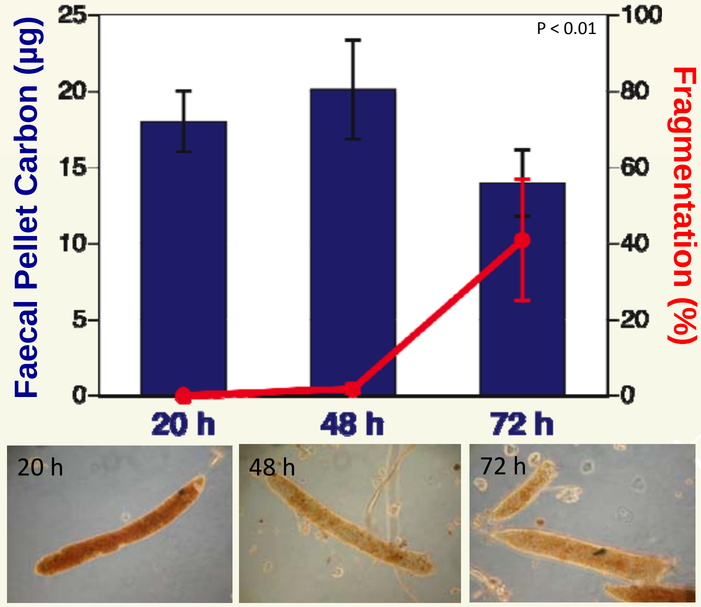
Incubation water: composition of microzooplankton (mg C m^{-3})

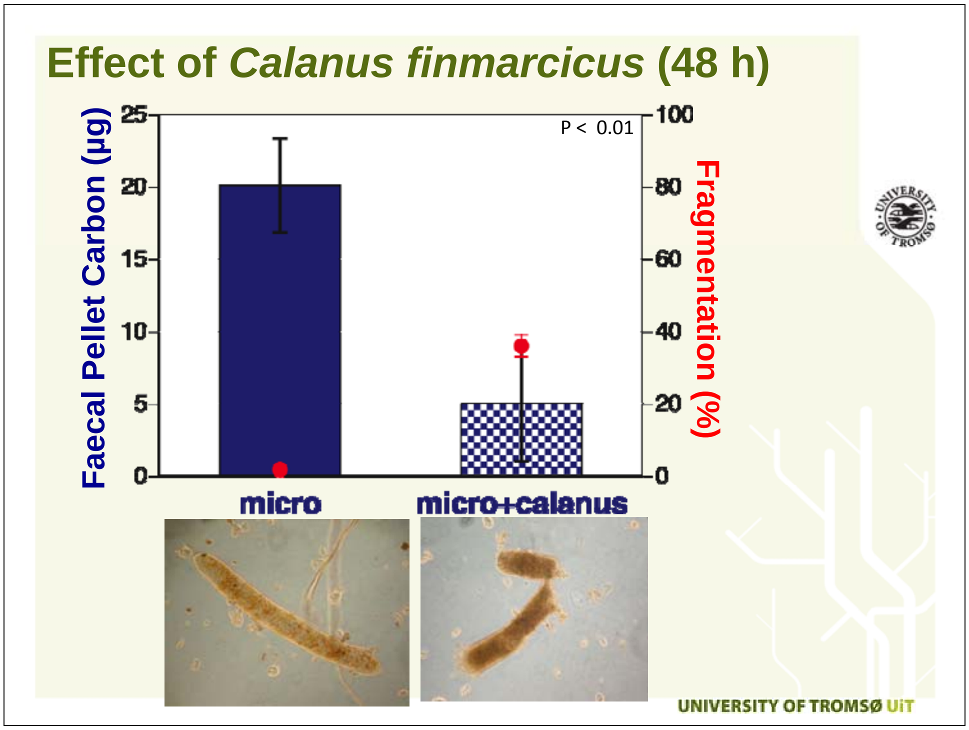
Species	20 m
Strombidium spp.	22
Laboea strobila	18
Other ciliates	10
Total ciliates	*50*
Athecate ESD 10-30	16
Athecate ESD 30-50	4
Other dinoflagelaltes	7
Total dinoflagellates	*26*
total Protozoa (mg C m^{-3})	**76**
% ciliates	**66**

Faecal pellets: in filtered seawater



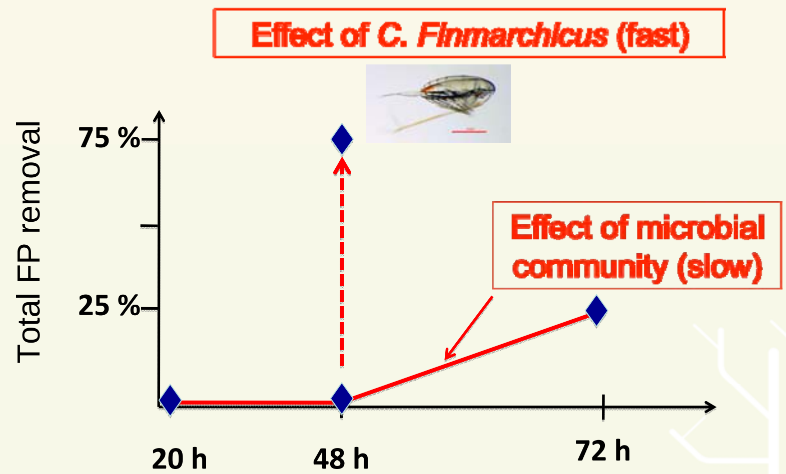
FP with Microbial community (< 180 µm)





% fragmentation equal to that of 72 h incubation

Summary faecal pellet degradation



Downward flux of faecal pellets in the upper 100 m: Summary and ecological relevance

Sinking rate of large copepod FP (*Calanus*)		**≈100 m d^{-1}**
Retention time of FP in euphotic layer **approx 50 % of FP is degraded in upper 100 m**		**< 1 d**
Visible effect of microbial community		**> 2 d**
Effect of microbial + *Calanus*		**< 2 d** **Instant?**

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Bruke god tid på denne!
Microbial større betydning ved større dyp, eller hvor man har mindre pellets med lavere synkehastighet.
Calanus gjør den første nedbrytingen mekanisk og katalyserer effekten av de mikrobielle organismene

Conclusions

- The microbial community degraded large FP at a time-scale of 3 days or more.
- Too slow to be responsible for the high degradation of large FP often observed in the upper 100 m.
- More important for deep-ocean fluxes and small FP
- *Calanus* may act as a ”catalyst” speeding up the process of FP degradation.
- Combination of mechanical destruction of FP and microbial degradation is one likely explanation for high degradation rates of FP in coastal areas