



# Diversity and distribution patterns of polynoids (Polychaeta: Polynoidae) across the CCFZ

Paulo Bonifácio, Lenka Neal & Lenaick Menot

# Polynoidae Family

- Scale-worms
  - High mobility
  - Wide range of distribution
  - 1<sup>st</sup> most diverse in number of genera (165)
  - 2<sup>nd</sup> most diverse in number of species ( $\approx 750$ )
  - 21 subfamilies !
- Some subfamilies, such as Macellicephalinae, appear to be restricted to the deep-sea, slope, abyss or submarine caves.

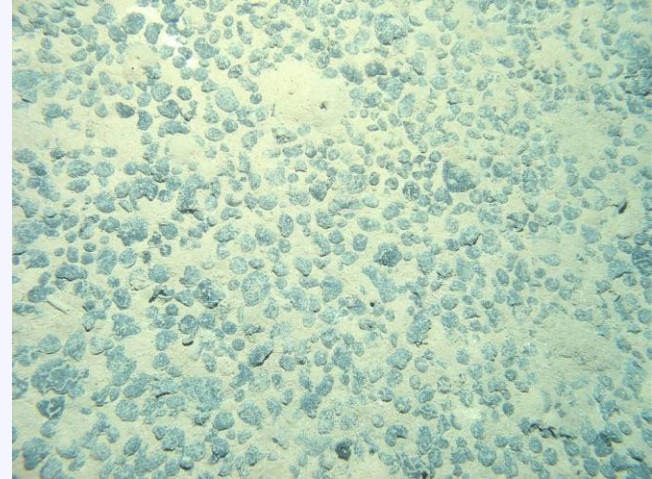
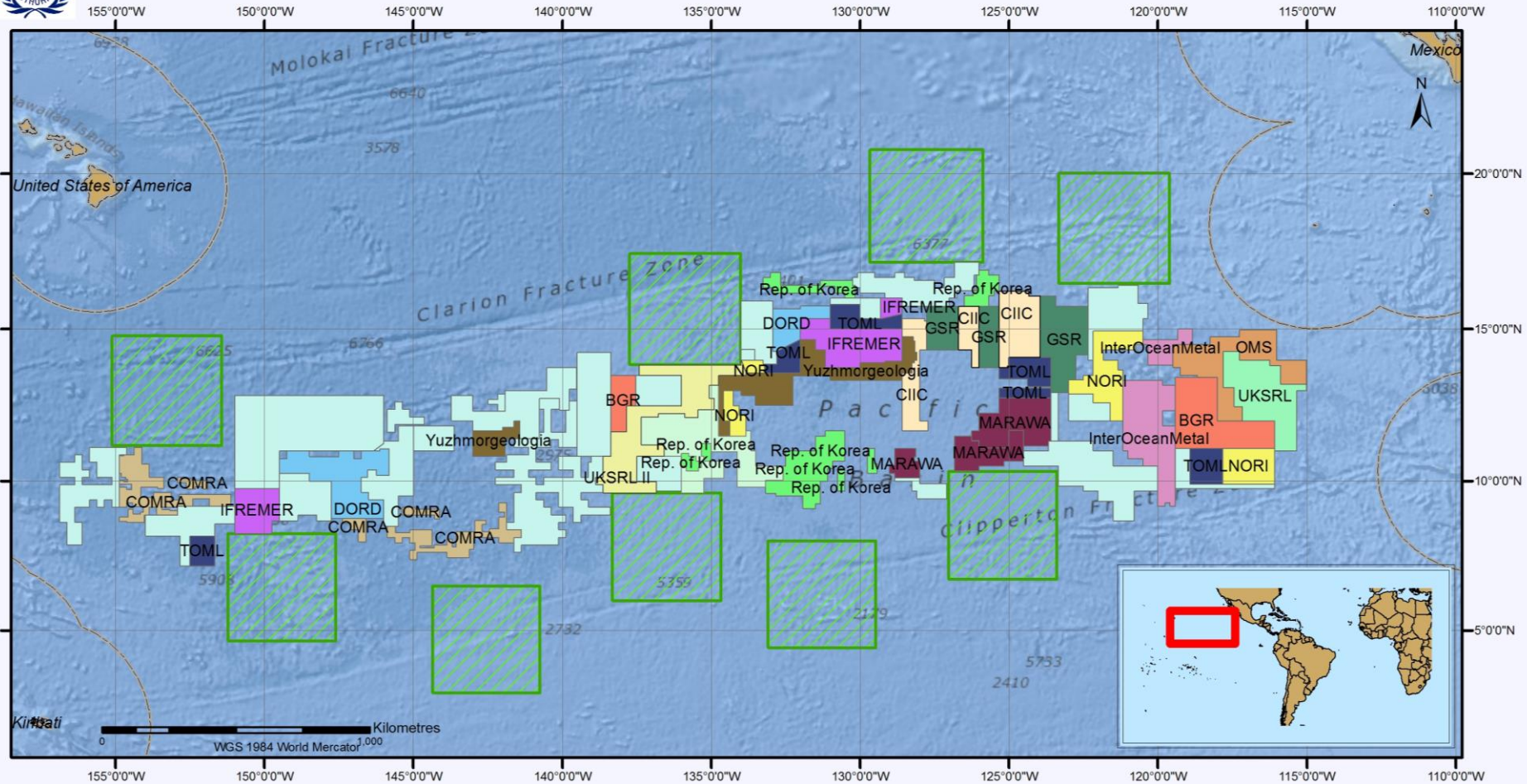


# Aims

- To describe polynoids from the CCFZ, including the description of new species using morphology complemented with molecular data (COI and 16S genes),
- To evaluate the monophyly of the subfamily Macellicephalinae; and
- To examine the genetic connectivity for dominant species shared amongst different sites.



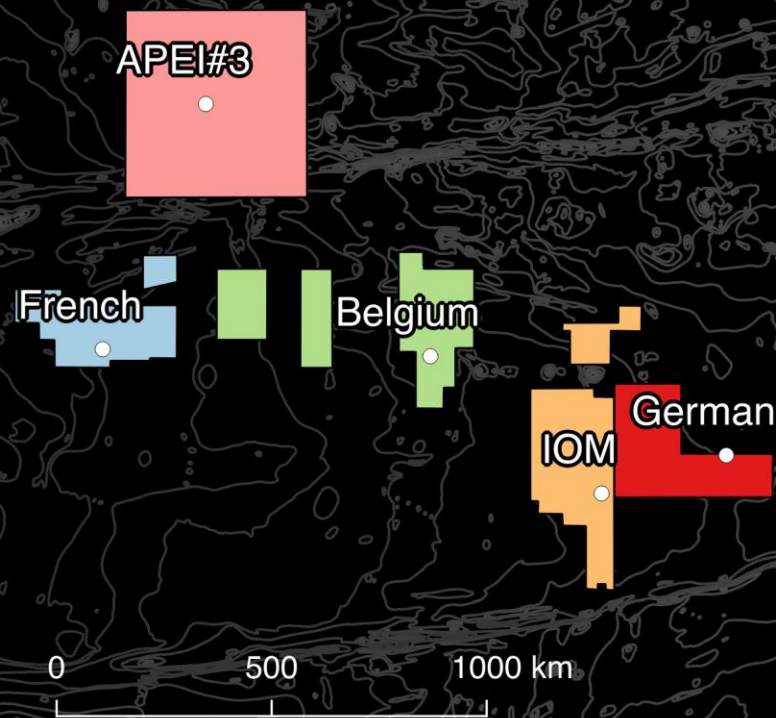
# Polymetallic Nodules Exploration Areas in the Clarion-Clipperton Fracture Zone



# Clarion-Clipperton Fracture Zone (CCFZ)



- Ecoresponse Cruise (March-April 2015)
- 5 license areas were sampled (4000 and 5000 meters depth)
  - German
  - IOM
  - Belgium
  - French
  - APEI#3
- Sampling
  - Epibenthic sledge (EBS)
  - ROV
- Live-sorting in low temperature
- 80% ethanol fixed/preserved
- 16s + COI





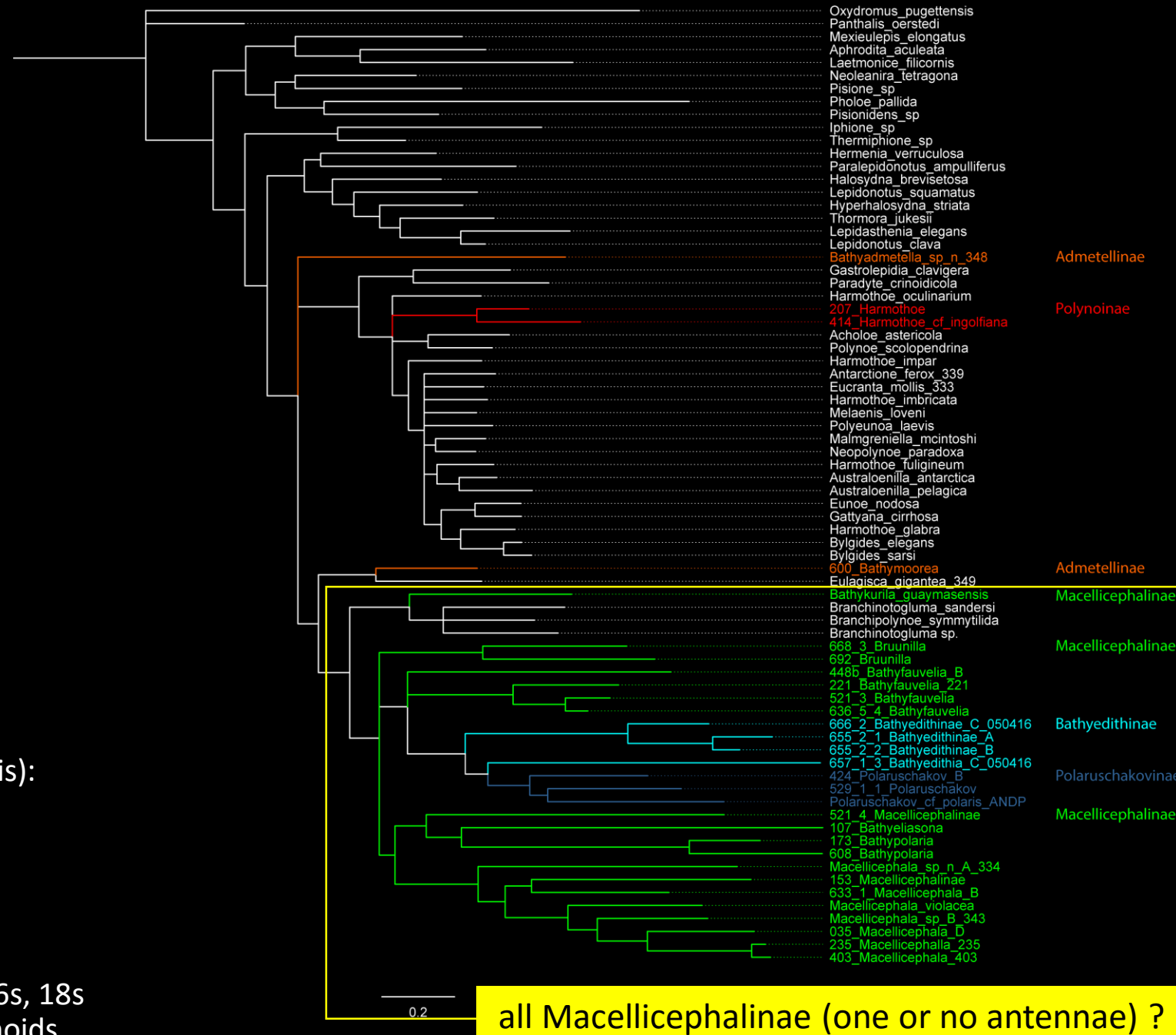
Preliminary results

# Polynoids diversity

- 278 specimens
- 6 subfamilies
- 44 morphotypes
- 67% successfully sequenced (30% both 16s and COI)
- 16s 99% similarity: 87 MOTUs
- COI 97% similarity: 73 MOTUs

GenBank sequences + this study (16s+COI bayesian analysis):

- **Macellicephalinae** is polyphyletic
- **Polaruschakovinae** is monophyletic
- More results will come using combined analysis (COI, 16s, 18s morphology) and more sequences of branched polynoids



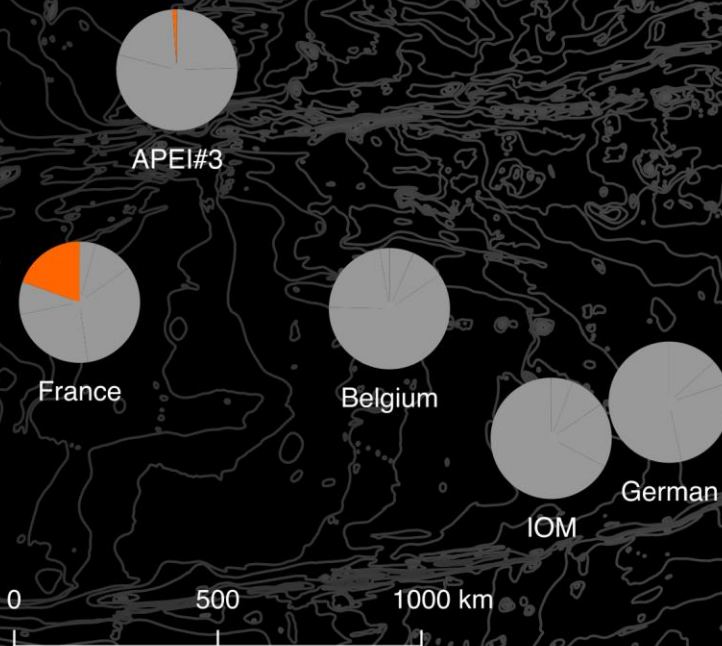
# Admetellinae

Uschakov, 1977

- 10 specimens
- 1 genus (*Bathymoorea*)
- Restricted distribution



Genus	Number of specimens	No. of MOTUS	MOTUS not singletons
<i>Bathymoorea</i>	10	1	1





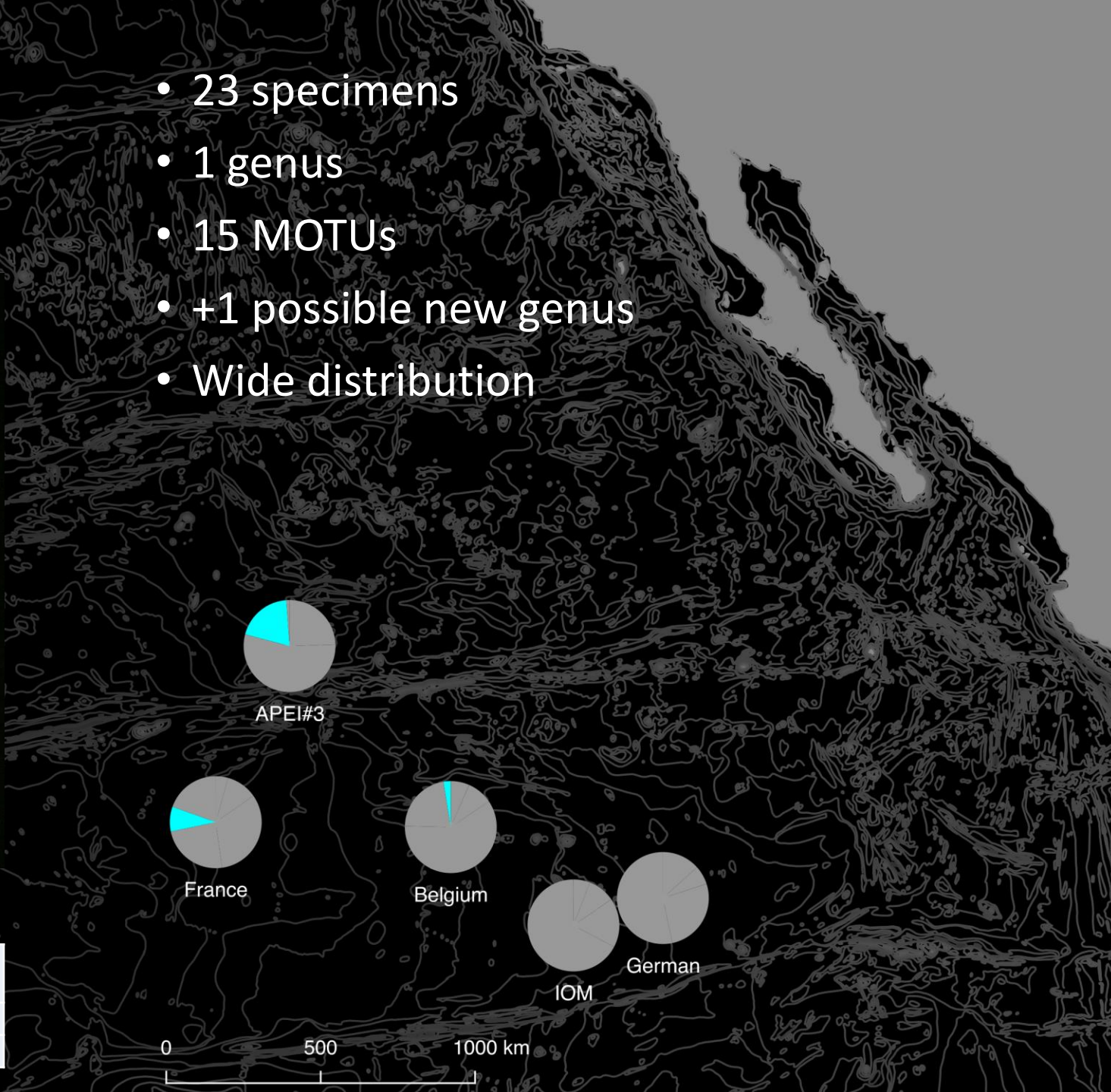
# Bathyedithinae

Pettibone, 1976

- 23 specimens
- 1 genus
- 15 MOTUs
- +1 possible new genus
- Wide distribution



Genus	Number of specimens	No. of MOTUs	MOTUS not singletons
<i>Bathyedithia</i>	14	11	2
Bathyedithinae	9	4	3



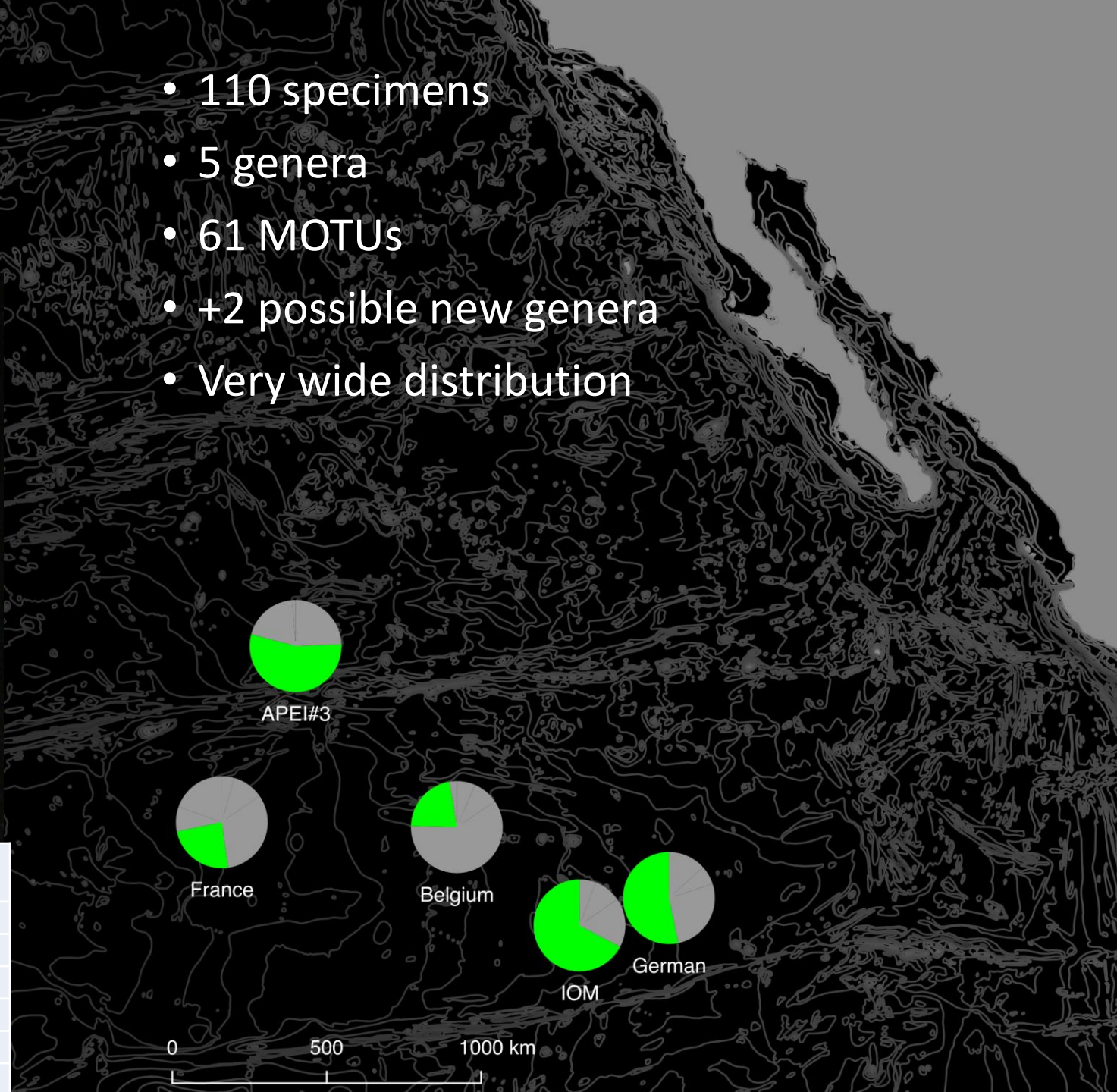
# Macellicephalinae

Hartmann-Schröder, 1971

- 110 specimens
- 5 genera
- 61 MOTUs
- +2 possible new genera
- Very wide distribution



Genus	Number of specimens	No. of MOTUs	MOTUS not singletons
<i>Bathyeliasona</i>	4	2	2
<i>Bathyfauvelia</i>	37	18	7
<i>Bathypolaria</i>	9	3	2
<i>Bruunilla</i>	10	9	2
<i>Macellicephala</i>	35	20	9
Macellicephalinae	15	9	2



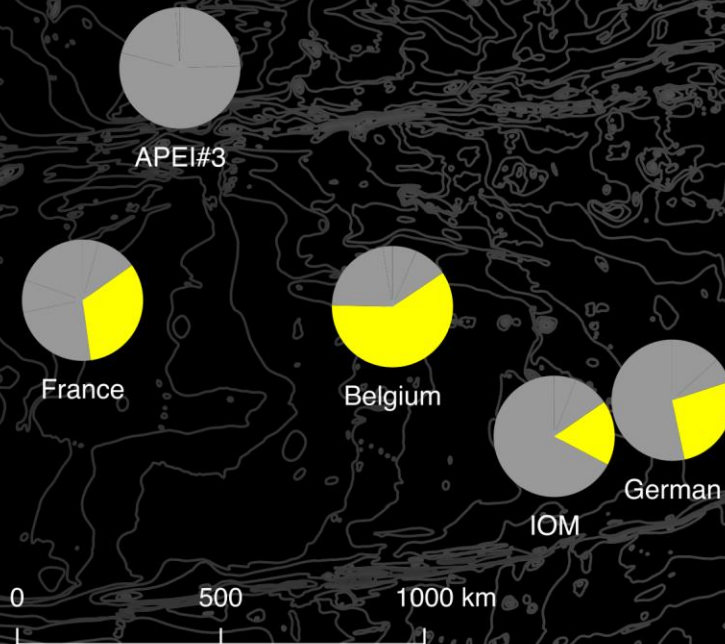
# Macellicephaloidinae

Pettibone, 1976

- 82 specimens
- 1 genus
- 7 MOTUs
- Very wide distribution
- Problematic sequencing COI/16s



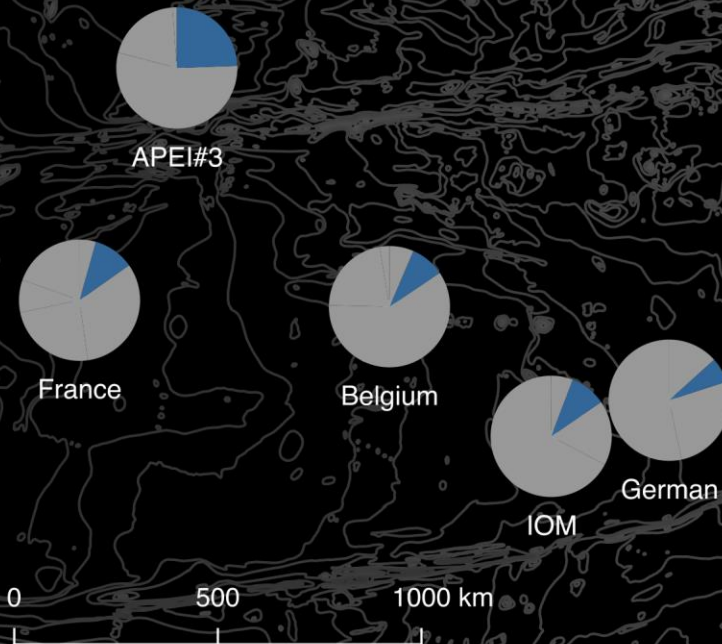
Genus	Number of MOTUs	No. of MOTUs	MOTUS not singletons
<i>Macellicephaloides</i>	82	7	4



# Polaruschakovinae

Pettibone, 1976

- 39 specimens
- 1 genus
- 25 MOTUs
- + 1 possible new genus
- Very wide distribution



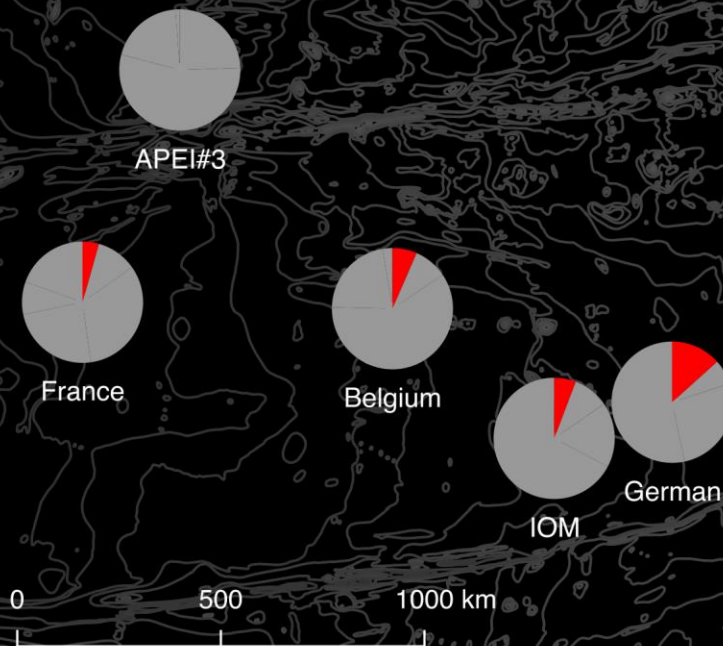
Genus	Number of specimens	No. of MOTUs	MOTUS not singletons
<i>Polaruschakov</i>	38	24	7
Polaruschakovinae	1	1	0

# Polynoinae Kinberg, 1856

- 12 specimens
- 1 genus
- 5 MOTUs
- Wide distribution
- Problematic 16s but ok for COI



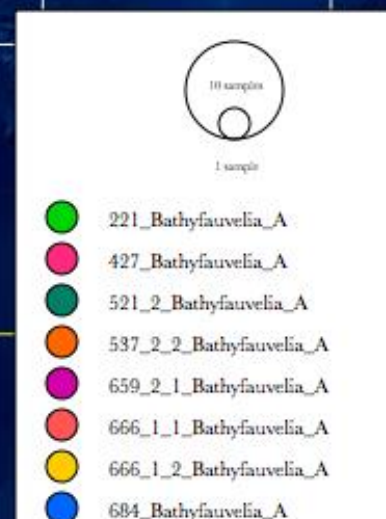
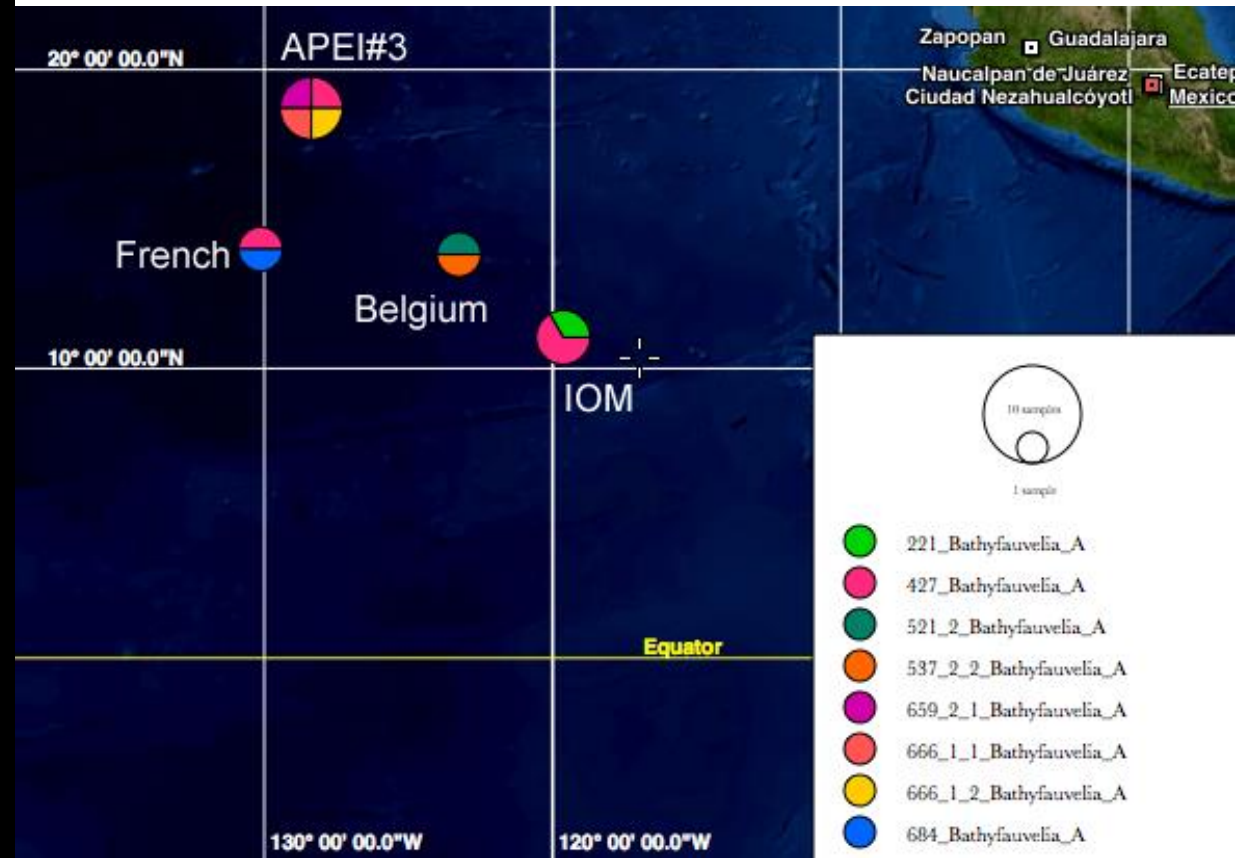
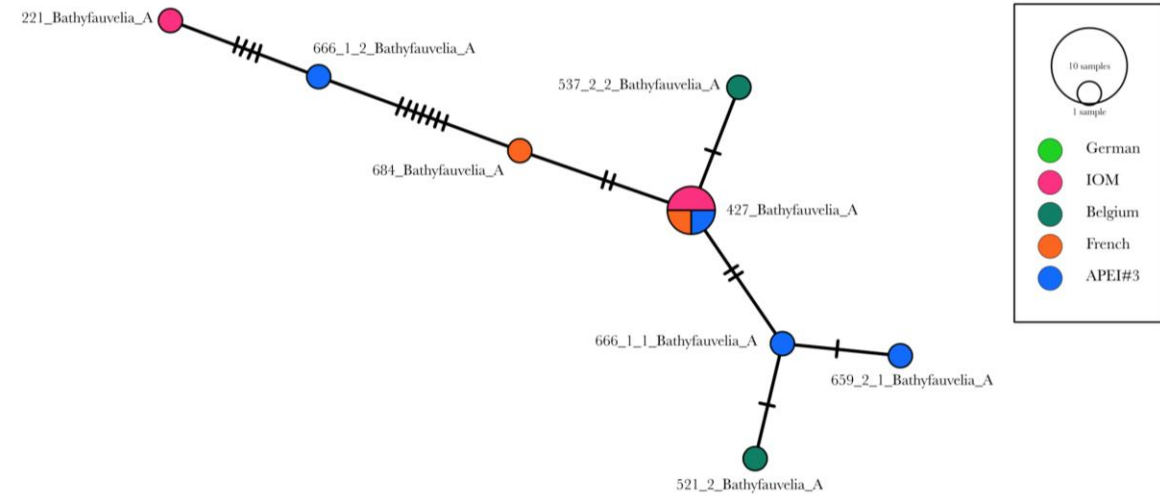
Genus	Number of specimens	No. of MOTUs	MOTUS not singletons
<i>Harmothoe</i>	12	5	3



# *Bathyfauvelia* sp. A



- 12 nucleotide sequences (COI)
- 8 haplotypes
- Wide distribution (at least 1000 km)
- No structure of population was observed
- High connectivity between areas



# Summary main findings

- High diversity with undescribed species and genera
- Very limited data about fauna in such deep water but polynoids were dominant in our samples
- High connectivity in deep water at least 1 000 km
- No data about reproductive strategies to potentially explain some results
- Limited oceanographic data about deep currents
- Really need to understand and study the benthic communities of CCFZ before they are destroyed by mining.



Thank you !

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