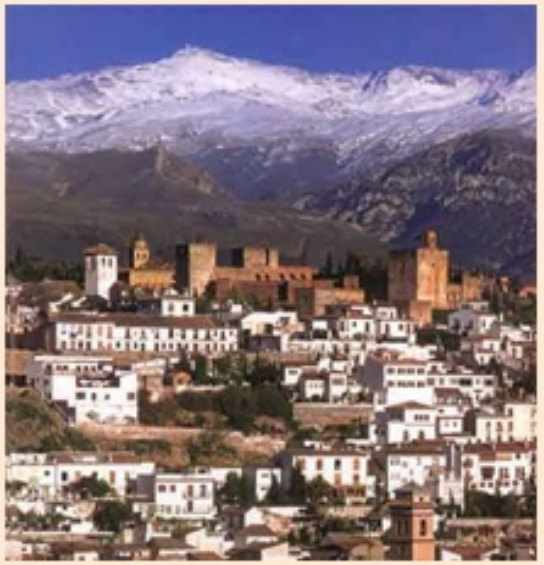
NTA 4 ⅓

ESR - Meeting in Granada

24th and 25th of November 2011

"During this meeting we have to decide what to do for the next two years..." (Ken J.)



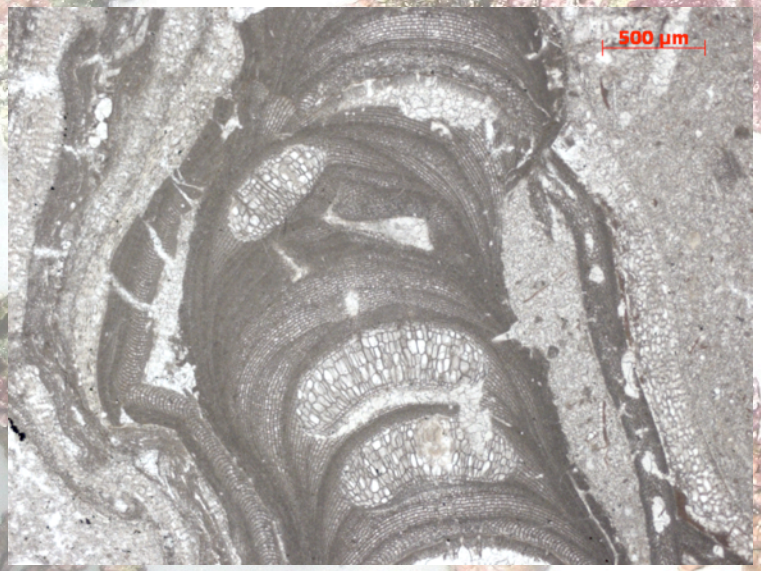
- Progress
- Next steps
- Publication plans

Anja Rösler,
Departamento de Estratigrafía y Paleontología
Universidad de Granada

Progress (1)

-Presentation of project (poster) on the Symposium of the IFAA in Romania

Data analysis:
- Study of thin sections of various TF stations, TF126 completely



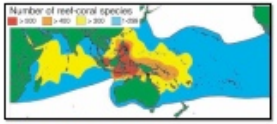
The origins and evolution of the modern Indo-Pacific reef algal flora: the coralline algae in the context of the THROUGHFLOW Project

Anja Rösler, Juan Carlos Braga, Francisco Perfectti, University of Granada, Spain

1. What is the TROUGHFLOW Project about?

Main subjects:
- What produced the onset of the biodiversity hotspot?
- How did the highly diverse coral reefs react to past climate changes?

11 PhD Students from 7 european academic institutions working on different organisms, chemical approaches or mathematical models, to reconstruct the paleoenvironment of the region of the Indonesian Throughflow.



Contours of species diversity of reef-corals in the Indo-Pacific. Limited data suggest that the diversity of most other marine groups follow a similar pattern. (Bellwood et al. 2005)

Recent geography of Southeast Asia showing main ocean currents, including the highly constricted flow along the Indonesian Throughflow (ITF). (Hall, 2010)

2. Subproject on Coralline algae

2a. Coralline algae as paleoenvironmental indicators

Coralline algae can give information about palaeo water depth, turbulence and turbidity

Two field seasons have taken place in 2010 and 2011 to collect fossil samples in Kalimantan.

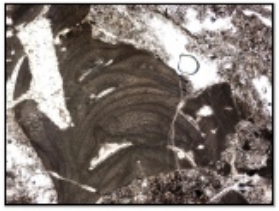
Coralline algae have been mainly found associated with corals in reefs.

Coralline algae encrusting a coral.

First studies of collected samples after preparation show a good conservation, especially in sites with fine-grained siliciclastic influx (Mahakam Delta). The sampled interval (Late Oligocene-Middle Miocene) should include the expected time of appearance of many common recent coralline taxa.

2b. Evolution and Diversification of Reef Coralline algae

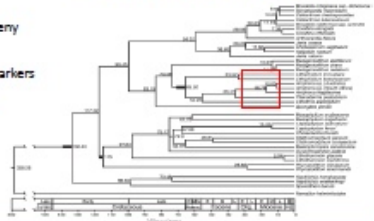
Coralline algae in a modern Indopacific reef; samples collected in May 2011.



Mastophoroid coralline alga in thin section.

Aims:
- To document the timing and patterns of diversification of Indo-Pacific reef-building coralline algae, the second most important builders in modern Indo-Pacific reefs.
- To integrate fossil and molecular studies to produce a time tree of the main reef building subfamilies (Mastophoroideae and Lithophylloideae) of the order Corallinales.

Molecular phylogeny
+
fossils as temporal markers
→ timetree!



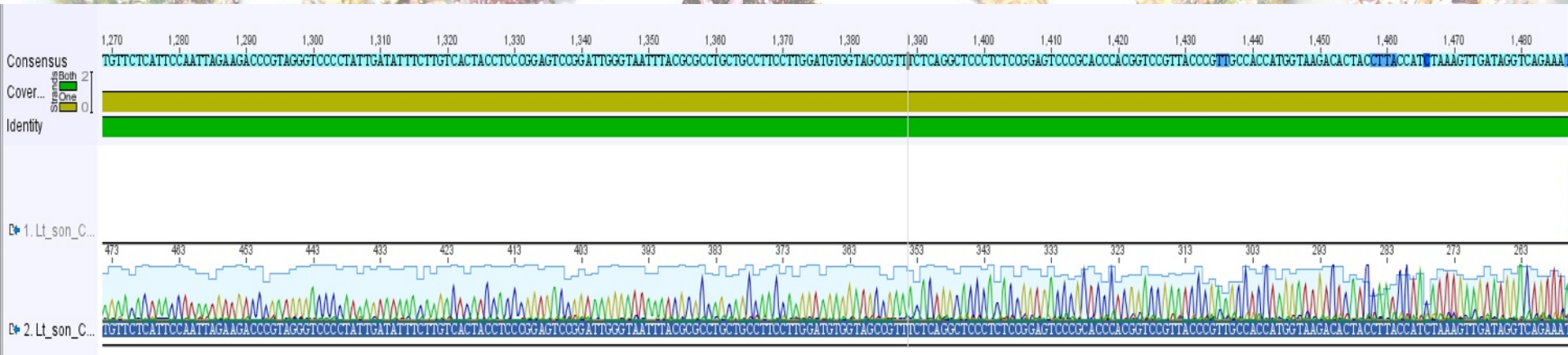
Acknowledgements: Thanks to all the members of the Throughflow team. This project is funded by the Marie Curie Actions Plan, Seventh Framework Programme (Grant No. 237922).

References:
Aguirre J et al. (2010) Integrating phylogeny, molecular clocks, and the fossil record in the evolution of coralline algae (Corallinales and Sporolithales, Rhodophyta) Palaeobiology, 36(4): 519-533
Avise JC (2004) Timetrees: beyond cladograms, phenograms and phylograms, Timetree of life, Oxford University Press
Bellwood DR et al. (2005) Environmental and geometric constraints on Indo-Pacific coral reef biodiversity, Ecology Letters 8: 643–651
Hall R (2010) Introductory course on Geology of SE Asia , Throughflow NTNI
Reaser M et al. (2008) Mapping Hotspots: Global Shifts in Marine Biodiversity, Science, 321: 654–657.

Progress (2)

Unit	Facies	CCA characteristics
1	Fine calcareous sandstone with scattered bioclasts	no CCA
2	Grey fine calcareous sandstone, more cemented than the previous layer; presence of some larger benthic forams, gastropods and rare small thin platy corals (SA089)	no CCA
3	Bioclastic packstone with modular structure and concentration of clay between the modules (seams); fossils: larger benthic forams, coralline algae, few thin platy corals (about 1 cm), small branching and solitary ones (SA090; SA091; SA092)	CCA in fragments in sediment, quite recrystalized. Some crusts with forams. Components: Mesophyllum (80%) mainly cores and few fine protuberances and geniculate/foliose fragments(15%), other 5%
4	Framestone with contorted thin platy corals and fragments of branching ones; some measures: 40 x 1; 38 x 3,5; 32 x 5; mostly between 1 – 2 cm thick, some <1 cm (SA093)	Majority (>60%) of CCA encrusting corals together with foraminifera. Partly recristalyzed. Components: Melobesoideae (Mesophyllum (MP),Lithothamnion (Lt.)) (35%), Sporolithon 25%, Lithoporella 18%, thin laminar 10%, geniculate fragments 10%, green Algae 1%, Peysonnelliaceae 1%; especially "thin laminar" in combination with encrusting forams
5	Framestone with dominant platy and massive corals; wackestone matrix with coralline algae; variable lateral thickness. Measures of some corals: 35 x 15; 75 x 10; 55 x 15; 33 x 12; 52 x 17 cm; platy corals: thickness >2 cm, up to 5 cm (SA097)	Majority of CCA in sediment, just about 25% encrusting corals. About 25% forming nodules together with forams. Many fragments, some crusts, but encrusted entity seldom identifiable. Components: Melobesioides (Lt/Mp) 38%, Sporolithon 20%, geniculate/foliose fragments 15%, thin laminar 15%, Lithoporella 10%, (?)Pneophyllum conicum 1%, green algae 1%
6	Bioclastic packstone/grainstone with very abundant coralline algae (crusts and nodules); big massive corals at the base. Thick bedding (some dm), presence of faint lamination in some layers, irregular base with lateral variations of the thickness (SA094; SA095; SA096)	Most CCA encrusting corals. About 25% forming nodules together with forams. Components: Melobesioideae (Mp, Lt, ?) 45%, Sporolithon 25%, Lithoporella 15%, thin laminar 10%,geniculate/foliose fragments 5%, Spongites 1%
7 (new)	very thin bed, thin platy corals with marly matrix	no samples yet
8	shale/sandstone	no CCA

Progress (3)



- About 100 genetic secuences of about 30 recent species obtained

Next steps

- More sequences of recent CCA to be obtained
- Process of those to obtain evolutionary and phylogentic information
- Further study of fossil samples
- Analyse all the data

Publication plans

- 2011: **Environmental reconstruction of a Serravalian patch reef in the Kutai Basin (East Kalimantan, Indonesia)** with VN, NS, EM and supervisors
- 2012 (1): **Environmental reconstruction of the top stadion reef (?)** (Title has Nadia) (with NS, VN, EM, ?) on TF 51, 57
- 2012 (2) **: Environmental reconstruction of Miocene reefs in the Mahakam Delta area (?)** (with NS, VN, EM, ?)
- 2012 (3): **Miocene Hapalidiaceae (Corallinales, Rhodophyta) from the Indopacific**
- 2013 (1): **Microbial structures associated with CCA in Miocene carbonates in East Kalimantan** (with the new ESR)
- 2013 (2): **Evolution of the Lithophylloideae (Corallinales, Rhodophyta) with taxonomical implications**
- 2013 (3): **Timetree of reefal coralline Algae**


Thanks!
Questions!