



T-SECTOR: Testing Solid Earth Climate connections Through mid Ocean Ridge time series

Third General Assembly



GA Agenda – day 1, Tuesday 7 July



13 ⁰⁰ – 13 ¹⁵ 07 ⁰⁰ – 07 ¹⁵	Welcome	Intro and Goals of the meeting by Kaj Hoernle
13 ¹⁵ – 14 ⁴⁵ 07 ¹⁵ – 08 ⁴⁵	Theme 1: Geophysics Chair: Heidrun Kopp	Brief intro of the group (main achievements, activities and developments) Benedikt. Bauer – 40 min. presentation plus 10 min. discussion – Benchmarking multiple methods for the spectral analysis of seafloor morphology and deglaciation induced faulting at the SEPR Anke Dannowski & Anna Jegen - 15 min. presentation plus 5 min. discussion – SO314 - An update on OBS Data analyses Peter Haas - 15 min. presentation plus 5 min. discussion – SO314 - Gravity measurements
14 ⁴⁵ – 15 ⁰⁵ 08 ⁴⁵ – 09 ⁰⁵	Chair: Heidrun Kopp	Discussion of theme 1
15 ⁰⁵ – 15 ²⁰ 09 ⁰⁵ – 09 ²⁰	Coffee break	



GA Agenda – day 1, Tuesday 7 July



15²⁰ – 16⁵⁰

09²⁰ – 10⁵⁰

Theme 2: Igneous
geochemistry

Chair: **Kaj Hoernle**

Brief intro of the group (main achievements, activities and developments)

20 minutes presentations plus 10 minutes discussion

Pauline Verdurme - “Magma fragmentation processes at a slow-spreading center recorded in the morphology and texture of glass shards from the Reykjanes Ridge”

Jonas Schneider – “From plumes to plumelets: Geochemical evidence for variable-scale mantle upwelling beneath the South Pacific Superswell”

Antina Lippert - “High resolution isotopic evidence for Cobb Plume capture at the Cleft Segment, Juan de Fuca Ridge”

16⁵⁰ – 17¹⁰

10⁵⁰ – 11¹⁰

Chair: **Kaj Hoernle**

Discussion of theme 2

17¹⁰ – 17³⁰

11¹⁰ – 11³⁰

Health break

17³⁰ – 19⁰⁰

11³⁰ – 13⁰⁰

Expedition planning

SO321-1 – **Christian Timm** (30 minutes)

SO321-2 – **Heidrun Kopp** (30 minutes)

Discussion – moderation Kaj Hoernle (30 minutes)



GA Agenda – day 2, Wednesday 8 July



13 ⁰⁰ – 14 ³⁰ 07 ⁰⁰ – 08 ³⁰	Theme 3: Igneous petrology Chair: Charles Langmuir	Brief intro of the group (main achievements, activities and developments) 20 minutes presentations plus 10 minutes discussion Mingzhen Yu – “Southern Reykjanes Ridge SHGs: Follow-up on MSM119 and Preliminary Results from M213” Siyu Zhao - “Geochemical Composition of SHGs at Juan de Fuca Ridge: Preliminary Results from SR2510” Charles Langmuir - title: tbc
14 ³⁰ – 14 ⁵⁰ 08 ³⁰ – 08 ⁵⁰	Chair: Charles Langmuir	Discussion of theme 3
14 ⁵⁰ – 15 ¹⁰ 08 ⁵⁰ – 09 ¹⁰	Coffee Break	



GA Agenda – day 2, Wednesday 8 July



15 ¹⁰ – 16 ⁴⁰ 09 ¹⁰ – 10 ⁴⁰	Theme 4: Hydrothermal activity and sedimentology Chair: Martin Frank	Brief intro of the group (main achievements, activities and developments) Jorit Kniest – “Stratigraphy of sediment cores - Cleft Segment (Juan de Fuca) & Southeast Pacific Rise” Melanie Siegburg - “Constraining hydrothermal activity at Juan de Fuca Ridge” Julia Warnatz - “Reconstructing hydrothermal activity at the South East Pacific Rise – Preliminary results”
16 ⁴⁰ – 17 ⁰⁰ 10 ⁴⁰ – 11 ⁰⁰	Chair: Martin Frank	Discussion of theme 4
17 ⁰⁰ – 17 ²⁰ 11 ⁰⁰ – 11 ²⁰	Health Break	
17 ²⁰ – 19 ⁰⁰ 11 ²⁰ – 13 ⁰⁰	Jorit Kniest	Age model workshop / tutorial on time series and dating including discussion



Major Developments since the last GA



- The first periodic (financial) reporting after 18 months was approved by the ERC-EA and the first interim payment was received; **Next report due end of Nov. 2026**
- The first (scientific) progress report after 24 months was submitted and approved ; **Next report due end of Nov. 2027**
- Cruises

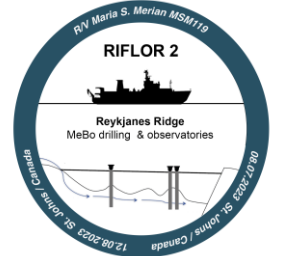


T-SECTOR cruises



2023

- MSM119 with R/V Maria S. Merian – Expedition to the Reykjanes Ridge (slow spreading) – 08/07 – 12/08/2023



2025

- SR2510 with R/V Sally Ride – Expedition to the Cleft Segment, Juan de Fuca Ridge 30/04 – 11/05/2025

Langmuir et al. (2025) *Sally Ride 2510 Cruise Report*. GEOMAR, Kiel, Germany, 37 pp. DOI 10.3289/T-Sector_SR2510.



- SO314 with R/V Sonne – Expedition to the Southern EPR (fast spreading) – 13/08 – 05/10/2025

Frank et al. (2025) Testing Solid Earth - Climate Connections and Generation of Crust at the Fast-Spreading Southeast Pacific Rise using time series, Cruise No. SO314, 13th August 2025 - 5th October 2025, Pepeeete (French Polynesia) - Antofagasta (Chile), T-SECTOR SEPR. Sonne-Berichte, SO314.



- M213 with R/V Meteor - Expedition to the Reykjanes Ridge (slow spreading) – 06/09 – 07/10/2025





Upcoming Cruises



- **Cruises:**

- SO321-1: Vancouver (CA) to Longview (USA) from 7 to 23 August 2026

Unfortunately no drilling.

- SO321-2: Longview (USA) to Vancouver (CA) from 26 August to 16 September 2026
- Cruise with R/V Atlantis planned for 15 August to 5 September 2027



Major Developments since the last GA



- The first periodic reporting (financial reporting) after 18 months was approved by the ERC-EA and the first interim payment was received; Next report due end of Nov. 2026
- The first progress report (scientific reporting) after 24 months was submitted and approved
- Cruises
- Purchase and set up of all new instruments completed (Mass spectrometers = 4 and seismic instruments)

Geophysics: Bathymetry & Crustal Thickness (PI: Kopp)

Ocean Bottom : to spatially enlarge the arrays of the off-axis ocean crust survey



shrimp prototype (developed in-house)

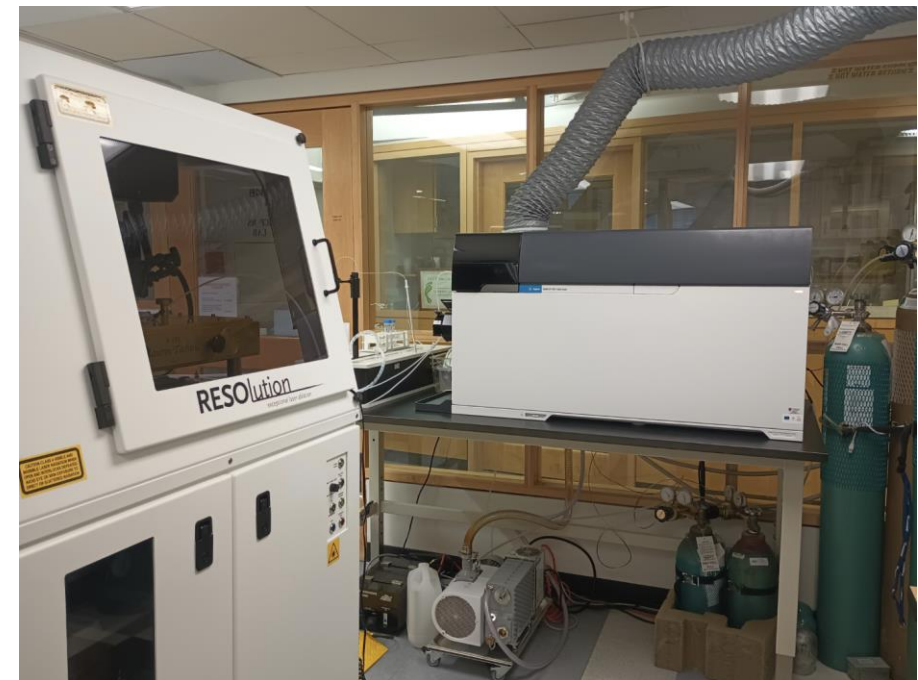
Paleo-Oceanography & Hydrothermalism (PI: Frank)

MAT253 Plus IRMS: Including a KIEL iV carbonate preparation the MAT253 enables high precision, high throughput of C and O isotope analysis on foraminifera to establish high resolution geochronology in the cores.



Igneous petrology of MORB glass shards (PI: Langmuir)

AGILENT 8900 TQ-ICP-MS: High precision, high throughput determination of element concentrations throughout the periodic table of N-MORB glass by Laser Ablation.



Isotope geochemistry of MORB glass shards (PI: Hoernle)

iCAP-TQ ICP-MS: The iCAP is used for calibration of chemistry, obtaining correct dilutions for MC-ICPMS analyses and cross checking of element concentrations (Li to U) on pooled SHG's dissolutions with LA-ICPMS data of single SHG's from the same core interval.



NEOMA MC-ICP-MS: The NEOMA is used for determination of high precision radiogenic Sr-Nd-Pb-Hf isotope ratios on minute amounts of MORB type glass.





Peer-reviewed articles not directly from T-SECTOR



All publications which T-SECTOR members have written or contributed to while being funded by T-SECTOR should be listed as contributions

- Kimura et al. (2026) *Global Variation of Mid-Ocean Ridge Basalt Chemistry: Conditions and Composition of the Source Mantle and Physical Properties of the Ridges*. Journal of Petrology, doi 10.1093/petrology/egag047
- Murray-Bergquist et al. (2025) *Lessons Learned from Marine Refraction Seismic Experiments in the Ligurian Sea*. BSGF - Earth Sciences Bulletin, doi 10.1051/bsgf/2025009
- Warwel et al. (2025) *Seismic Structure and Tectonics of the North-Central Chilean Subduction Zone Along the Copiapó Ridge From Amphibious Seismic Refraction Tomography and Local Seismicity*. Geochemistry, Geophysics, Geosystems, doi 10.1029/2024GC011829
- de Melo et al. (2025) *Relationship Between Rupture Length and Magnitude of Oceanic Transform Fault Earthquakes*. Geophysical Research Letters, doi 10.1029/2024gl112891
- **T-SECTOR must be mentioned in Acknowledgements**
- ~~Ou et al. (2024) *Magmatic processes within the plumbing system of the ultraslow spreading southwest Indian ridge: constraints from olivine, plagioclase and melt inclusions*. Contributions to Mineralogy and Petrology, doi 10.1007/s00410-024-02098-0~~



T-SECTOR Publications



- The following text is required in the acknowledgements to make a publication a T-SECTOR contribution:

This project has received funding from the European Union's Horizon Europe ERC Synergy Grant programme under grant agreement No 101071713 – T-SECTOR. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Council Executive Agency. Neither the European Union nor the granting authority can be held responsible for them.



T-SECTOR Publications – data from T-Sector cruises



Author list: first author, co-authors who contributed significantly to the manuscript (provided data, helped writing / revisions, etc.), *if samples obtained during cruises in the project* then PIs should be listed (if not already) at end of manuscript and at very end T-SECTOR Team (to be defined in acknowledgements if possible

Example:

Sensitivity of Reykjanes Ridge volcanism to glacial cycles over the last 130,000 years

Mingzhen Yu^{1*}, Charles H. Langmuir¹, Jacek Raddatz², Julie Belo², Jonas Schneider², Pauline Verdurme², Michael Riedel², Achim J. Kopf³, Kaj Hoernle², Martin Frank², Heidrun Kopp² and T-SECTOR TEAM^{1,2}

¹Department of Earth and Planetary Sciences, Harvard University, Cambridge 02138, United States

²GEOMAR Helmholtz Centre for Ocean Research Kiel, 24148 Kiel, Germany

³MARUM-Center for Marine Environmental Sciences, University of Bremen, Bremen 28359, Germany

*Correspondence to: myu@g.harvard.edu



Manuscripts in preparation



- Nadolsky et al. - Raddatz and Sieburg together with colleagues from AWI, Uni Bremen, MARUM, Utrecht University: *Alternation of oxic and ferruginous intervals in pond sediments of Reykjanes Ridge, North Atlantic*. To be submitted (soon) to Geochemistry, Geophysics, Geosystems.
- Schneider et al. together with colleagues from GEOMAR, Harvard University, University of Cape Town: *From plumes to plumelets: Geochemical evidence for variable-scale mantle upwelling from near-ridge seamount volcanism at the South East Pacific Rise*. To be submitted (in August) to Earth and Planetary Science Letters.
- Verdurme et al. together with colleagues from GEOMAR, Harvard University, and University of Otago: *Magma fragmentation processes at a slow spreading center recorded in the morphology and texture of glass shards from the Reykjanes Ridge*. Most likely to be submitted to Geochemistry, Geophysics, Geosystems
- Bauer et al. together with colleagues from GEOMAR, Harvard University, Hamburg University: *Deglaciation-induced faulting at the Southern East Pacific Rise*.
- Bauer et al. together with colleagues from GEOMAR, University of Athens, Hamburg University: *Tsunamigenic potential of a flank collapse from the Kameni Volcano inside the caldera of Santorini, southern Aegean*



Manuscripts in preparation



- Yu et al. - together with colleagues from Harvard, GEOMAR, and MARUM: *Rapid Sea-Level Change Modulates Reykjanes Ridge Magmatism*. To be submitted to Earth and Planetary Science Letters.
- Yu et al. - together with colleagues from Harvard, GEOMAR, and MARUM: *Iceland Volcanism Revealed by Sediment-Hosted Glasses*. To be submitted to Earth and Planetary Science Letters.
- Chen et al. - together with colleagues from Harvard: *A Unified LA-ICP-MS Protocol for Simultaneous Major and Trace Element Analysis of Silicate Samples without Matrix-Matched Calibration Standards*. To be submitted to Chemical Geology.



Conference contributions



- Bauer, B. (2025) – talk: *Impact of glacial cycles and tectonics on crustal accretion revealed through spectral analysis of seafloor morphology*. 2. Joint International Earthquake Science Symposium. , 22.-23.05.2025, Yokohama, Japan
- Yu et al. (2025) – poster: *A 73,000 Year Time-Series of Volcanism from the Reykjanes Ridge and Iceland from Sediment-Hosted Glasses*. Goldschmidt Conference 2025. , 6.-11.07.2025, Prague, Czech Republic .
- Zhao et al. (2025) – poster: *2.54–2.65 Ma time-series geochemical variation in sediment-hosted glasses at Reykjanes ridge*. Goldschmidt Conference 2025. , 6.-11.07.2025, Prague, Czech Republic .
- Langmuir et al. (2024) – poster: *Geochemical Databases: Promise, Problems, and Prospects*. Goldschmidt Conference 2024. , 18.-23.08.2024, Chicago, USA .
- Langmuir & Yu (2024) – poster: *Constraints on the Geochemical Consequences of Periodically Replenished Magma Chambers from Theory, Calculations, Data and Field Observations*. AGU Fall Meeting 2024. , 09.-13.12.2024, Washington DC, USA .



Conference contributions



- [Yu et al.](#) (2024) – poster: *LA-ICP-MS Analysis of Major, Minor and Trace Elements in Olivine and Basaltic Glasses in a Single Run with Non-Matrix-Matched Calibration Standards*. AGU Fall Meeting 2024. , 09.-13.12.2024, Washington DC, USA .
- [Langmuir et al.](#) (2023) – poster: *Wax Core Sediments and Associated Glasses as a Novel Exploration Tool at Ocean Ridges*. AGU Fall Meeting 2023. , 11.-15.12.2023, San Francisco .

University and institute talks:

- [Bauer B.](#) (2025) GEOMAR, Kiel, Germany,
- [Hoernle K.](#) (2025) Heidelberg University, Germany
- [Hoernle K.](#) (2025) University of South Carolina, USA
- [Langmuir](#) (2024) Guangzhou Institute of Geochemistry, China
- [Langmuir](#) (2025) University of Liege, France,

Degrees:

[Yu M.](#) (2026) Geochemical and temporal constraints on mantle heterogeneity and climate/volcano connections using sediment-hosted glasses and basalt olivine. PhD, Harvard University.



Upcoming Meetings



- **Meetings ??:**

- 4th GA – after AGU Washington DC – Dec. 2027 ± online meeting before Oct. 1, 2027
- 5th GA –after EGU Vienna - April 2028
- 6th and final GA – Harvard University – late summer 2029



Suggestion to use the European flag and funding statement for presentation (**infos on website**):

If funded by EU ERC SyG T-SECTOR only:



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If **co-funded** by EU ERC SyG T-SECTOR :



Co-funded by the
European Union



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**Funded by
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European Research Council
Established by the European Commission

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Personnel working in T-SECTOR



PI Prof. Heidrun Kopp - Geophysics

Objective: Time Series of Crustal Thickness Variations (Geophysical Surveys)

Research Scientist:

Dr. Michael Riedel



Doctoral Researcher:

Benedikt Bauer



PostDoc:

Dr. Anna Jegen



B.Sc. Student

Johanna Salg



Scientist:

**Christian Filbrandt
now at K.U.M.**



Associated Team members: Dr. A. Dannowski, Dr. J. Bialas, Dr. I. Klaucke, Dr. D. Lange, Dr. P. Haas



PI Prof. Kaj Hoernle – Igneous Geochemistry

Objective: Radiogenic Isotope Variations in a 1.5 Ma MORB Time Series
Volcanological Study of Glass Shards and Discrete Ash Layers



Postdoc:

Dr. Jonas Schneider



Dr. Pauline Verdurme



Doctoral Researcher:

Antina Lippert



Technician:

Jannes Hoffmann



Associated Team members: Dr. J. Belo, Dr. F. Hauff, Dr. C. Timm, Dr. M. Portnyagin, Dr. J. Geldmacher, Dr. S. Kutterolf,
Dr. A. Reitz





Personnel working in T-SECTOR



PI Prof. Martin Frank - Hydrothermalism

Objective: Time Series of Hydrothermal Activity

Postdoc:

Dr. Jorit Kniest



Dr. Melanie Sieburg



Doctoral Researcher:

Julia Warnatz



Associated Team members: Dr. Edmund Hathorne, Dr. Chris Siebert, Dr. Jacek Raddatz, Dr. Marcus Gutjahr





Personnel working in T-SECTOR



PI Prof. Charles Langmuir – Igneous Petrology

Objective: Analyzing Major and Trace Elements in a 1.5 Ma MORB Glass Time Series



Postdoc:

Dr. Siyu Zhao



Doctoral Researcher:

Mingzhen Yu



Associated Team members: Dr. Zhongxing Chen, Cody Crosby





Major Developments since the last GA



- Cruises: **SO314** with R/V Sonne – Expedition to the Southern EPR (fast spreading) – 13/08 – 05/10/2025 (Chief Scientists: Frank & Kopp) and **M213** with R/V Meteor - Expedition to the Reykjanes Ridge (slow spreading) – 06/09 – 07/10/2025
- Preparations for SO321/1-2 are ongoing; unfortunately Seas Geosciences will not be providing the Nautilus One Seabed drill for Leg 1
- The first periodic reporting (financial reporting) after 18 months was approved by the ERC-EA and the first interim payment was received; **Next report due end of Nov. 2026**
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