Attila Balázs

PhD in Earth Sciences

Born: 20.01.1989, Szeged, Hungary

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PROFESSIONAL APPOINTMENTS

From 10/2022: **Senior Scientist and Lecturer (Oberassistent)**, *Geophysical Fluid Dynamics Group, ETH Zürich, Switzerland*

11/2019 – 10/2022: **ETH Zürich Postdoctoral Fellowship and researcher**, *Geophysical Fluid Dynamics Group, ETH Zürich, Switzerland*. Mentor: prof. Taras Gerya

11/2017 – 10/2019: **Postdoctoral researcher**, *Group of Experimental Tectonics, University of Rome III, Italy*. Mentor: prof. Claudio Faccenna

07/2017 – 10/2017: **Postdoctoral researcher**, *Tectonics Group, Utrecht University, the Netherlands*. Mentor: prof. Liviu Matenco

11/2013 – 07/2017: **PhD Research Fellow**, *Tectonics Group, Utrecht University, the Netherlands*. Supervisors: prof. Sierd Cloetingh and prof. Frank Horvath

09/2016 – 12/2016: **Research assistant**, *Department of Geophysics and Space Sciences, Eötvös Loránd University, Budapest, Hungary*

ACADEMIC QUALIFICATIONS

09/2013 – 08/2017: **Earth Sciences PhD School**, *Utrecht University, the Netherlands and Dept. of Geophysics, Eötvös Loránd University, Budapest, Hungary*.
Key accomplishment: New tectono-stratigraphic model for the evolution of continental back-arc basins.

09/2011 – 08/2013: **MSc in Geophysics**, *Eötvös Loránd University, Budapest, Hungary*. Thesis title: "*Stratigraphic and structural interpretation of regional seismic sections from the Pannonian Basin*", Master's degree grade: "with Honors" (highest recognition in Hungary)

09/2008 – 08/2011**: BSc in Earth Sciences**, *Eötvös Loránd University, Budapest, Hungary*. Thesis title "*Seismic data processing of the Lake Balaton surveys*", Bachelor's degree grade: "with Honors" (highest recognition in Hungary)

RESEARCH EXPERTISE

- 2D and 3D **thermo-mechanical numerical modelling** of continental rifting and seafloor spreading, orogenic processes, subduction dynamics, transform zones. Numerical codes: *2DELVIS, I3ELVIS, Flamar*
- 3D **surface and stratigraphical numerical forward modelling**
  Numerical codes: *DionisosFlow – IFP-EN, FDSPM, DAC*
- 2D and 3D **seismic interpretation** and attribute calculations, seismic data processing
- Sedimentary **basin analysis**, **geothermal evolution** of extensional basins
- Geodynamics, tectonics and sedimentation in the **Mediterranean** region
- **Biogeodynamics**: understanding the geodynamic, surface, atmospheric and biospheric evolution of planet Earth

TEACHING AND SUPERVISING EXPERIENCE

from 2023: **Finite element modelling** for Earth Scientists (*ETH Zürich*)
from 2023: **Dynamics of the mantle and lithosphere** (*ETH Zürich*)
2021, 2022: **Gravimetry** field course assistant *(ETH Zürich)*
2017 – 2019: **Tectonics** of orogens and sedimentary basins lecturer *(Eötvös University)*
2017: Dynamics of **Basins and Orogens** lecture assistant *(Utrecht University)*
2013 – 2016: Geophysics and geodynamics of the **Alpine-Carpathians-Dinarides** region lecturer *(Eötvös University)*
2014 – 2016: **Seismic interpretation** practice *(Eötvös University)*
2019 – 2022: (co-)Supervised **5 PhD projects** (1 defended, 4 active projects)
2014 – 2022: Supervised **9 MSc and BSc** thesis projects at *Utrecht University, Eötvös University and ETH Zürich*

EDITORIAL AND JOURNAL REVISION ACTIVITY

2020/2021: **Guest Editor** for the special volume "*Understanding the multi-scale and coupled evolution of orogens, sedimentary basins and their underlying lithosphere*" in **Global and Planetary Change**

Completed **manuscript revisions** for the following journals: *Nature Com.*, *Scientific Reports, Geophysical Research Letters, Earth and Planetary Science Letters, Gondwana Research, Solid Earth, Tectonophysics, Basin Research, Global and Planetary Change, G3, Pure and Applied Geophysics, Geol. Soc. London Spec. Pub., Geosciences, Acta Geodet. Geophys., Bull. French Geol. Soc., Bull. Hungarian Geol. Soc., etc.*

AWARDS AND GRANTS

2019: Flinn-Hart Award from the International Lithosphere Program
2019: ETH Zürich Postdoctoral Fellowship
2017: Best poster presentation award, International Lithosphere Program workshop, Limassol, Cyprus
Balázs et al. 2016, AGU Tectonics publication – EOS Research Spotlight
2015: SEG-Chevron Scholarship
2014: Chevron Student Leadership Symposium Grant, Denver, USA
2014: Best oral presentation award, 5th SEG-IGSC conference, Nizhny Novgorod, Russia
2014: ExxonMobil Student Education Program Grant, Nizhny Novgorod, Russia
2011: Szilárd József award from the Association of the Hungarian Geophysicists for the best young professional conference presentation

INVITED LECTURES AND SEMINARS

- 2023: Invited keynote speaker at Geomod Conference, Paris, France
- 2022: Rifts and Rifted Margins online seminar series invited speaker (organized by GFZ Potsdam)
- 2022: Invited keynote speaker at the ILP Sedimentary Basins Workshop
- 2021: Invited keynote speaker at the DGGV Annual Meeting, Karlsruhe, Germany
- 2021: CEED seminar, University of Oslo, Norway
- 2020: Utrecht University, Earth Structures and Simulations seminar
- 2018: Hungarian Academy of Sciences, Budapest, Hungary
- 2018: ETH-Zurich, Earth Surface Dynamics Seminar, Switzerland
- 2017: Roma Tre University, Earth Science Department Seminar, Italy
- 2017: Invited keynote speaker at the 12th Workshop of the International Lithosphere Program, Limassol, Cyprus

CONFERENCE AND WORKSHOP ORGANIZATION

2023: **Biogeodynamics Workshop** co-organizer, ETH Zurich, Switzerland

2022: **EGU Ada Lovelace Workshop** co-organizer. Hévíz, Hungary

2022: **AAPG** European Regional Conference **Advisory committee member and session convener,** Budapest, Hungary

from 2019: organizer of the **ETH Zurich Geophysical Fluid Dynamics Seminar** series

2019: **ILP** Sedimentary Basins 14th **Workshop co-organizer**. Hévíz, Hungary

2016: 3rd **Medmeet** conference **co-organizer**. Budapest, Hungary

FUNDED PROJECT PARTICIPATION

2021-2022: Influence of plate tectonics on life evolution and biodiversity: bio-geodynamical numerical modeling approach. Swiss National Science Foundation. **Post-doctoral researcher**, PI: Taras Gerya.

2020-2024: From rifting to neotectonic differential motions: coupling of crustal deformation, denudation, sedimentation and deep lithospheric processes – case studies in the Pannonian Basin. Hungarian National Research Fund. **Senior Researcher,** PI: Laszlo Fodor

2019-2021: Influence of surface processes on the thermal and subsidence anomalies in frontier basins: a coupled stratigraphic-thermomechanical modeling approach. ETH Research Committee. **PI**

2018-2022: Towards the high-resolution 3D geothermal model of Hungary: renewal of the geothermal database and its applications. Hungarian National Research Fund. **Researcher**, PI: Laszlo Lenkey

2015-2019: Correlation of tectonic units, deformation events and facies belts in the Pannonian-Alpine-Dinaridic domain: first step towards quantitative tectonic reconstruction. Hungarian National Research Fund. **Researcher**. PI: Laszlo Fodor

2013-2017: Dynamic model for the formation and evolution of the Pannonian Basin. ISES – Netherlands. **PhD student Researcher**

OUTREACH AND OTHER COMMUNITY SERVICE

- National Science Foundation (USA) proposal reviewer
- ETH Seed Grant panel member – 2021, ETH Zürich
- ETH PhD research plan defense committee and PhD examiner – 2021-2023 ETH Zürich
- EGU and AGU Outstanding Student Presentation judge since 2018
- Session convener: 2023 AGU, EGU; 2022 AAPG European Regional Conference
- Referee for the Hungarian National Scientific Students' Associations Conference 2021, Szeged, Hungary
- Hungarian National Research Fund reviewer - 2021
- Advertising Earth sciences to high school students via the SEG Student Chapter of Budapest (seg.elte.hu).
- Outreach presentation and workshop at the 7th Budapest Education Days, 2019, Budapest, Hungary

GEOPHYSICAL AND GEOLOGICAL FIELD EXPERIENCE

2016: Northern Calcareous Alps geological field excursion with Hugo Ortner and László Fodor (1 week)

2016: Bukk and Darno Hills (Hungary) geological field trip with László Fodor and Balázs Koroknai (4 days)

2015: Southern Carpathians – Pannonian Basin (Romania, Serbia) geological field excursion with Liviu Matenco (1 week)

2014: High Atlas (Morocco) geological field excursion with Aitaddi Abdellah and László Fodor (1 week) – **co-organized**

2013: Dolomites (Italy) geological field excursion with Piero Gianolla and János Haas (1 week)

2013: Moesian Basin and Eastern Carpathians (Romania) geological field excursion with Csaba Krézsek (1 week)

09/2012: 3-week-long **single- and multichannel seismic data acquisition**, Lake Balaton, Hungary

2011: Transylvanian Basin (Romania) sedimentological field trip with Orsolya Sztanó and Csaba Krézsek (1 week)

12/2010: 3-week-long participation in **marine seismic survey** in Italy on board of the Urania Research vessel in cooperation with CNR – Naples, Italy

ADDITIONAL SKILLS AND ACTIVITIES

08/2012: **Internship** at MOL Plc (Hungary) – **2D and 3D seismic interpretation and attribute calculations**

03/2012: **AAPG Imperial Barrel Award European Final** participant, Prague, Czech Republic

Language skills: **Native Hungarian**, **fluent English**, basic French and German

IT skills: Ms office, ProMAX, Surfer, Matlab, Corel Draw, IGMAS+, IHS-Kingdom, Petrel, Global Mapper, DionisosFlow, Flamar, 2DELVIS, I3ELVIS

Secretary and Treasurer of the **AAPG Eötvös Student Chapter** of Budapest – 2012/2013, 2011/2012

President and Secretary of the **SEG Eötvös Student Chapter** of Budapest – 2013/2014, 2014/2015

Driving license since 2007

Hobbies: Tennis, wall climbing, skiing, hiking

Zürich, 25th January 2024 — Attila Balázs

References:

Professor Taras Gerya
ETH Zürich
Zürich, Switzerland
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Professor Claudio Faccenna
University of Rome 3 & GFZ Potsdam
Rome, Italy
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Publications in international peer reviewed journals

H-index: 13, **citations: 710** (Scopus, 25.01.2024)

9 as first author, 12 as co-author

1. Ritter S., **Balazs A.**, Ribeiro J., Gerya T. 2024: Magmatic Fingerprints of Subduction Initiation and Mature Subduction: Numerical Modelling and Observations from the Izu-Bonin-Mariana System. Frontiers in Earth Science. Vol. 12, doi: 10.3389/feart.2024.1286468
2. Kalmar D., Petrescu L., Stipcevic J., **Balazs A.**, Kovacs J.I. 2023: Lithospheric Structure of the Circum-Pannonian Region Imaged by S-To-P Receiver Functions. Geochem. Geophys. Geosys. 24, e2023GC010937.
3. **Balazs A.**, Gerya T., May D., Tari G., 2023: Contrasting transform and passive margin subsidence history and heat flow evolution: insights from 3D thermo-mechanical modelling. *Geol. Soc. London Special Pub.* 524, https://doi.org/10.1144/SP524-2021-94
4. **Balazs A**., Faccenna C., Gerya T., Ueda K., Funiciello F., 2022: The dynamics of forearc - back-arc basin subsidence: numerical models and observations from Mediterranean subduction zones. *Tectonics*, 41, e2021TC007078, https://doi.org/10.1029/2021TC007078
5. Corradino M., **Balazs A.**, Faccenna C., Pepe F., 2022: Arc and forearc rifting in the Tyrrhenian subduction system. *Scientific Reports*, 12, 4728.
6. Matenco L., **Balázs A.**, Nader F. H., Haq B., Fodor L., 2022: Advances in the understanding of multi-scale and coupled evolution of orogens, sedimentary basins and the underlying lithosphere. *Global and Planetary Change*, 208, 103689.
7. **Balázs A.**, Faccenna C., Ueda K., Funiciello F., Boutoux A., Blanc J-P., Gerya T., 2021: Oblique subduction and mantle flow control on upper plate deformation: 3D geodynamic modeling. *Earth and Planetary Science Letters*, 569, 117056.
8. Kalmár D., Hetényi Gy., **Balázs A.**, Bondár I., AlpArray Working Group, 2021: Crustal thinning from orogen to back-arc basin: the structure of the Pannonian Basin region revealed by P-to-S converted seismic waves. *Journal of Geophysical Research: Solid Earth*, 126, e2020JB021309
9. **Balázs A**., Matenco L., Granjeon D., Alms K., Francois T., Sztanó O., 2021: Towards stratigraphic-thermo-mechanical numerical modelling: Integrated analysis of asymmetric extensional basins. *Global and Planetary Change*, 196, 103386.
10. Kovács Á., **Balázs A**., Spelic M., Sztanó O., 2021: Forced or normal regression signals in a lacustrine basin? Insights from 3D stratigraphic forward modeling in the SW Pannonian Basin. *Global and Planetary Change*, 196, 103376.
11. Fodor L., **Balázs A**., Csillag G., Dunkl I., Heja G., Jelen B., Kelemen P., Kover Sz., Nemeth A., Nyiri D., Selmeczi I., Trajanova M., 2021: Crustal exhumation and depocenter migration from the Alpine orogenic margin towards the Pannonian extensional back-arc basin controlled by inheritance. *Global and Planetary Change*, 201, 103475.
12. Ruszkiczay-Rüdiger Zs., **Balázs A**., Csillag G., Drijkoningen G., Fodor L., 2020: Uplift of the Transdanubian Range, Pannonian Basin: How fast and why? *Global and Planetary Change*, 192, 103263.
13. **Balázs A**., Magyar I., Matenco L., Sztanó O., Tokés L., Horváth F., 2018: Morphology of a large paleo-lake: analysis of compaction in the Miocene-Quaternary Pannonian Basin. *Global and Planetary Change*, 171, 134-147.
14. **Balázs A**., Matenco L., Vogt K., Cloetingh S., Gerya T., 2018: Extensional polarity change in continental rifts: inferences from 3D numerical modeling and observations. *Journal of Geophysical Research: Solid Earth*, 123, 8073-8094
15. Bartha A., **Balázs A.**, Szalay Á., 2018: On the tectono-stratigraphic evolution and hydrocarbon systems of extensional back-arc basins: inferences from 2D basin modelling from the Pannonian basin. *Acta Geodaetica et Geophysica*, 53, 369-394.
16. Békési E., Lenkey L., Limberger J., Porkoláb K., **Balázs A.**, Bonté D., Vrijlandt M., Horváth F., Cloetingh S., van Wees J.-D., 2018: Subsurface temperature model of the Hungarian part of the Pannonian Basin. *Global and Planetary Change*, 171, 48-64.

17. **Balázs A.**, Granjeon D., Matenco L., Sztanó O., Cloetingh S., 2017: Tectonic and climatic controls on half-graben sedimentation: inferences from numerical modeling. *Tectonics*, 36, 2017TC004647.
18. **Balázs A.**, Burov E., Matenco L., Vogt K., Francois T., Cloetingh S., 2017: Symmetry during the syn- and post-rift evolution of extensional back-arc basins: the role of inherited orogenic structures. *Earth and Planetary Science Letters*, 462, 86-98.
19. Panisova J., **Balázs A.**, Zalai Zs., Bielik M., Horváth F., Harangi Sz., Schmidt S., Götze H-J., 2017: Intraplate volcanism in the Danube Basin of NW Hungary: 3D geophysical modelling of the Late Miocene Pásztori volcano. *International Journal of Earth Sciences*, 107, 1713–1730.
20. **Balázs A.**, Matenco L., Magyar I., Horváth F., Cloetingh S., 2016: The link between tectonics and sedimentation in back-arc basins: New genetic constraints from the analysis of the Pannonian Basin. *Tectonics*, 35, 2015TC004109.
21. Horváth F., Musitz B., **Balázs A.**, Végh A., Uhrin A., Nádor A., Koroknai B., Pap N., Tóth T., Wórum G., 2015: Evolution of the Pannonian basin and its geothermal resources. *Geothermics*, 53, 328-352.

Further 5 publications are published in Hungarian journals

1. **Balázs A**., Matenco L., Granjeon D., 2019: Thermo-mechanical and stratigraphic numerical forward modelling: Recent advances and their joint application in the Pannonian basin. *Bull. Hungarian Geol. Soc.,* 149, 183-196.
2. Visnovitz F., Hegyi B., **Balázs A.**, et al., 2018: Magnetic surveys of Lake Balaton: Observed anomalies and interpretations. *Hungarian Geophysics*, 59, 117-128. (in Hungarian with English abstract).
3. **Balázs A**., Visnovitz F., Spiess V., Fekete N., Tóth Zs., Hámori Z., Kudó I., Horváth F., 2013: Report on new seismic surveys at the Lake Balaton (2011–2012). *Hungarian Geophysics,* 54, 67-76. (in Hungarian with English abstract).
4. Török Á., Ünnep V., **Balázs A**., Mindszenty A., Kele S., 2013: Complex sedimentological, geochemical and geophysical study of the Kápolna-hegy spring-cone (Buda Hills, Hungary). *Bull. Hungarian Geol. Soc.,* 143, 251-264. (in Hungarian with English abstract).
5. Visnovitz F., Tóth T., Hámori Z., Kudó I., **Balázs A**., Sacchi M., Surányi G., Horváth F., 2013: Reprocessing of the single channel high-resolution seismic data measured on the Lake Balaton. *Hungarian Geophysics*, 54, 77-88. (in Hungarian with English abstract).

Selected list of conference abstracts

Ritter S., **Balazs A**., Ribeiro J., Gerya T., 2023: Magmatic Fingerprints of Subduction Initiation and Mature Subduction of the Izu-Bonin-Mariana Subduction Zone: Numerical Modelling and Observations. EGU General Assembly 2023, EGU23-2071

Kalmar D., **Balazs A**. 2022: Crustal deformation and residual topography in the East Alpine-Carpathian-Pannonian system. AGU Fall Meeting S55C-0130

Oravecz É., **Balázs A**., Gerya T., May D., Fodor L., 2022: Structural inversion of sedimentary basins: insights from 3D coupled thermo-mechanical and surface processes models and observations from the Mediterranean. EGU General Assembly 2022, 23–27 May, EGU22-542 – **Highlighted** by conveners.

Stern R. J., Gerya T., Pellisser L., **Balazs A**., Stemmler D., Gray T., Rogger J., van Agtmaal L., 2021: Co-Evolution of Metazoan Life and Plate Tectonics: The Biogeodynamic Perspective on the Mesoproterozoic-Neoproterozoic Transitions. **AGU Fall Meeting**, New Orleans, USA.

Balázs A., Gerya T., Granjeon D., May D., Tari G., 2021: Transform and passive margin subsidence history and stratigraphy: inferences from 3D thermo-mechanical and surface processes models. **AGU Fall Meeting**, New Orleans, USA.

Balázs A., Kovacs A., Sztano O., Matenco L., Fodor L., Kovacs A., Granjeon D., Gerya T., 2020: Isostatic and dynamic controls on neotectonic differential vertical movements and sediment transport reorganization of the Pannonian Basin, Central Europe. Geophysical Research Abstracts, EGU2020-17900 **EGU**, online.

Balázs A., Ueda K., Boutoux A., Faccenna C., Funiciello F., Blanc E., Gerya T., 2019: The rise and demise of forearc and backarc basins: inferences from 2D and 3D numerical modelling. **ILP Task Force meeting**, Heviz, Hungary.

Matenco L., van Unen M., Demir V., **Balázs A**., 2019: Timing, kinematics and mechanics of the Adriatic indentation: lessons from Dinarides-Pannonian observations and modelling. Geophysical Research Abstracts, Vol. 21, EGU2019-12436 **EGU**, Wien, Austria

Balázs A., Matenco L., Granjeon D., 2018: Joint application of thermo-mechanical and stratigraphic numerical modeling: the tectono-sedimentary evolution of back-arc basins. Geophysical Research Abstracts, Vol. 20, EGU2018-1217, **EGU**, Wien, Austria. – **Highlighted** by conveners.

Balázs A., Matenco L., Magyar I., Sztanó O., Horváth F., Cloetingh S., 2017: The link between tectonics and sedimentation in the Pannonian basin: seismic analysis of structural and stratigraphic features and compaction effects. Geophysical Research Abstracts, Vol. 19, EGU2017-13312-2, **EGU**, Wien, Austria.

Zalai Zs., **Balázs A**., Balázs L., 2017: Tectonostratigraphic evolution of the Danube Basin: inferences from gravity, magnetic and seismic data. Geophysical Research Abstracts, Vol. 19, **EGU**2017-961., EGU, Wien, Austria.

Pánisová J., **Balázs A**., Zalai Zs., Bielik M., Horváth F., Schmidt S., Götze H-J., 2017: Intraplate volcanism in the Danube basin: 3D geophysical model of the Late Miocene Pásztori volcano. Geophysical Research Abstracts, Vol. 19, EGU2017-7851., **EGU**, Wien, Austria.

Balázs A., Matenco L., Granjeon D., Cloetingh S., 2016: Symmetry during the syn- and post-rift evolution of extensional back-arc basins: inferences from numerical modelling. In: From Deep Earth to Surface processes and sustainability: integrating lithosphere dynamics with rift basins and margins. A joint meeting of the TOPO-EUROPE Programme and **ILP** Task Forces. Clermont-Ferrand, France.

Balázs A., Matenco, L., Magyar I., Horváth F., Cloetingh S., 2016: The link between tectonics and sedimentation in the Pannonian Basin system. **AAPG Europe**, Bucharest, Romania.

Bonté D., **Balázs A**., Van Wees J-D., Cloetingh S., 2015: Thermal regime of back-arc region and geothermal energy. 10th workshop of the international lithosphere program **ILP**-Task Forces. 144 p., Tokyo, Japan.

Horváth F., Becker T., Faccenna C., **Balázs A**., 2014: Static and dynamic support of the Pannonian basin topography. Geophysical Research Abstracts, Vol. 16, EGU2014-7812-1., **EGU**, Wien, Austria.

Balázs A., Magyar I., Horváth F., 2013: Stratigraphic and structural interpretation of regional seismic sections from the Pannonian Basin. 14th **RCMNS congress**. 191 p., Istanbul, Turkey.

Horváth F., Fodor L., **Balázs A**., Musitz B., Koroknai B., 2013: New constraints on the mechanism for the formation of the Pannonian basin. Geophysical Research Abstracts, Vol. 16, EGU2013-12390., **EGU**, Wien, Austria.