



To the  
Secretary General and President of the  
International Cartographic Association ICA

Gunten, 06th March 2023

**Re-nomination of Prof. Dr Arzu Çöltekin as Co-Chair of the ICA Commission on Geovisualization for the next period of 2019–2023**

Dear Thomas, dear Tim,

It is my great pleasure as President of the Swiss Society of Cartography to propose to the next ICA General Assembly in Cape Town, according with articles 8, 10 and 24 of the ICA Statues, the nomination of Prof. Dr Arzu Çöltekin, Zurich, as co-chair for the ICA Commission on Geovisualization for the next quadrennial term, starting in 2023, together with co-chair Dr Florian Ledermann (AUS).

Prof. Dr Arzu Çöltekin (Fachhochschule Nordwestschweiz) has been actively engaged in the Commission already (Co-Chair with Anthony C. Robinson for the last 4 years) as well as in the community for many years. Together with the proposed co-chair Dr Florian Ledermann (Austria) she will guarantee not only for the continuation of the excellent work of this very important ICA Commission, but also foster new activities, some of which you can find in the proposed Terms of Reference attached.

The presented nomination has the full support and endorsement of the President and the Executive Committee of the Swiss Society of Cartography. We are proud to make this proposal, and we are also certain, that Prof. Dr Arzu Çöltekin is an excellent candidate for this position.

Please find attached, besides a declaration of her willingness to serve in this position, the proposed Terms of Reference for the Commission, and a short CV of Arzu, which provides you with more details on the candidacy.

If you or the Executive Committee have any questions on this nomination, please do not hesitate to contact either Arzu or myself.

Yours sincerely

Mark Wigley  
President SGK

Attachments:

Note of willingness to serve and motivation

Curriculum Vitae of Arzu Çöltekin

Terms of Reference for the Commission on Visual Analytics 2023-2027

## Arzu Çöltekin

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Northwestern Switzerland FHNW  
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Science, Institute for Interactive Technologies IIT  
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## Curriculum Vitae

I am the director of the Institute for Interactive Technologies (IIT) of the University of Applied Sciences and Arts Northwestern Switzerland (FHNW) and a professor of computer science in human-computer interaction and extended reality at the same institute. I am also a research affiliate at Harvard University's Seamless Astronomy group. My interdisciplinary work covers topics related to information science, visual analytics, visualization and cartography, vision (perception and cognition), eye tracking, gaze-contingent displays, extended (virtual, augmented, mixed) reality, and human-computer interaction. I am specifically interested how people can leverage technology and modern visuospatial displays for human environment interactions, health, and education (learning and training). I delivered many talks at internationally reputed universities (Harvard, MIT, others), as well as large public speaking events (TEDxZurich 2011, TEDGlobal 2013, WUD2019). I received many individual scholarships in the early days of my career from international institutions including IAESTE, CIMO Finland, The Scientific and Technological Council of Turkey, Finnish Cultural Foundation, National Research Center Canada, and acquired many research grants from various agencies over the course of my professional life including large and small industry-oriented translational projects which are listed below. I organize/co-organize conferences, and serve in program committees of many scientific events, e.g., at InfoVis, IEEE VisWeek, Geocomputation, ETRA, AutoCarto, ISPRS, AGILE, and the ICC. I am in the editorial boards of several journals such as the IJGIS, Journal of Geovisualization, and KN Journal of Cartography and Geographic Information, and many special issues as a guest editor as well as a book. I also review for a wide range of interdisciplinary journals and grant agencies. I am an active member of several international organizations, e.g., the ICA (International Cartographic Association), the ISPRS (International Society for Photogrammetry and Remote Sensing) and the ISDE (International Society of Digital Earth). I serve as the co-chair of the Visual Analytics Commission for the ICA, and I chair the international working group on Geovisualization, Virtual and Augmented Reality of the ISPRS' Spatial Information Sciences commission. Furthermore, I serve at the advisory board of the industry-driven 'data visualization Zurich' initiative, digitAS national project in Austria, and I am a Council Member with the International Society of Digital Earth.

## Appointments

2022-	Institute director, Institute of Interactive Technologies (IIT), Uni. Appl. Sci. & Arts Northwestern CH, CH
2020-	Full Prof. of Computer Science in HCI & XR, at the IIT., Uni. Appl. Sci. & Arts Northwestern CH, CH
2019- 2020	Assoc. Prof., Inst. for Interactive Tech., Uni. Appl. Sci. & Arts Northwestern CH, CH
2013- 2019	Group Leader & Senior Researcher/Lecturer, Department of Geography, UZH, CH
2006-2013	Senior Researcher/Lecturer, Department of Geography, UZH, CH
2005-2006	Postdoctoral researcher, Media Lab, University of Art & Design Helsinki, FI
2003-2003	Visiting researcher, NRC Ottawa Visual Information Technology Group, Canada
1998-2005	Researcher (50%), Photogrammetry & Remote Sensing Group, Helsinki Uni. Tech., FI
1998-2005	Teaching Assistant (50%), Geoinformatics & Cartography, Helsinki Uni. Tech., FI
1996-1998	Research/Teaching Assistant, Geographic Information Science, Yıldız Tech. Uni., TR
1994-1994	Visiting junior scientist/trainee, University of Delft, NL
1991-1996	Information Scientist/Engineer, Office Manager, Kartal Engineering Co., Istanbul, TR

## Education

- 2006 PhD – Doctor of Science in Technology, Helsinki University of Technology, FI
- 1998 MSc – Geographic Information Science and Engineering, Yıldız Tech. Uni, Istanbul, TR
- 1996 BSc – Geographic Information Science and Engineering, Yıldız Tech. Uni, Istanbul, TR

## Project Grants/Funding

Total grant acquisition to date (PI's share): CHF 4'238'639.94.

- 2023 PI: InnoSuisse Innocheque (CHF 10'000)  
Co-PI: Innosuisse (CHF 367'563)  
Co-I: SERI / EU project (EUR 499'375, i.e., CHF 496'625.94)
- 2022 PI: InnoSuisse Innocheque (3x6M: CHF 45'000)
- 2021 PI: Innosuisse Grant (2 years, total CHF 808'908, PI's share 623'348)  
Co-PI: Innosuisse Grant (2 years, total CHF 828'300, PI's share CHF 200'000)  
PI: FHNW Lehrfonds II (12 months, CHF 50'000)  
PI: Direct R&D funding Altoida (CHF 6'500)  
PI: Innosuisse Innocheque (3x 1 year CHF 45'000)
- 2020 PI: Innosuisse Innocheque (2x 1 year: CHF 30'000)  
PI: Direct R&D funding Medignition (CHF 13'000)  
PI: Leading house seed money grants: Switzerland-Brazil collaboration (CHF 23'110)
- 2019 PI: Innosuisse Grant (2+1 years, total CHF 828'300, PI's share CHF 452'107)  
PI: Innosuisse Grant (2+2 years, total CHF 714'960, PI's share CHF 519'432)  
PI: FHNW Lehrfonds (12 months, CHF 50'000)  
PI: Innosuisse Innocheque (3x 1 year: CHF 15'000, total CHF 45'000)
- 2018 Co-I: ETH Research Grant (3 years: CHF 176'600)
- 2017 Principal Investigator (PI): Swiss National Science Fund (1 year: CHF 62'540)  
Co-PI: Innovation fund, UZH Geography (1 year: CHF 10'000)  
SNSF International Exchange with Harvard (1 month: CHF 2050)
- 2016 Co-I: Swiss National Science Fund (PhD for 4 years, post-doc for 2 years, CHF 350'922)
- 2015 PI: GITTA Teaching content development award (1 year, CHF 3'000)
- 2014 PI: Google Faculty Research Award (1 year: USD 75'000)
- 2013 PI: Swiss National Science Fund (3 years: CHF 161'400)
- 2012 Co-PI: UK Royal Society Grant (1 year, ~CHF 10'000)  
Co-PI: EU Cost Action ENERGIC (on social media data) (4 years)  
Co-PI: Innovation fund, UZH Geography (1 year: CHF 10'000)
- 2011 PI: Innovation fund, UZH Geography (1 year: CHF 5'000)  
Co-PI: Swiss National Science Fund (1 year: CHF 49'906)
- 2010 PI: Swiss National Science Fund (2 years: CHF 110'336)
- 2008 PI: Swiss National Science Fund (2 years: CHF 93'775)  
Co-PI: Swiss National Science Fund (3 years: CHF 156'425)

## Personal Grants

- 2010 UZH peer mentoring grant in support of Harvard University research visits
- 2006 NATO grant Summer School on Imaging for Detection and Identification, Il Ciocco, Italy
- 2003 Grant from National Research Center (NRC) Canada as a guest researcher
- 2003 Grant by Maa- ja Vesi for visiting NRC in Canada
- 2003 Fellowship by Finnish Cultural Association (also in 2001, 2002, substantial salary contributions)
- 2002 Grant by Finnish Society of Surveyors (MIL) for FIG/ASPRS Congress in Washington DC
- 2001 Grant by Finnish Cartographic Association (SKS) for ICA Congress in Beijing, China.
- 1998 PhD support grant by TUBITAK, Scientific and Technological Council of Turkey
- 1997 Research grant CIMO, Finland
- 1994 Grant for undergraduate exchange studies IAESTE Netherlands

## Honors

- 2021 Invited visiting professor, University of Nantes, France
- 2019 Appointed Council Member at the International Society of Digital Earth  
Invited Scientific Advisory Board member Austrian Science Foundation project DigitAS (Mixed Reality)

- Nominated and elected as co-chair Visual Analytics commission, ICC
- 2018 Invited visiting professor at Harvard University  
Invited to the editorial board of IJGIS  
Invited to the editorial board of KN Journal of Cartography and Geo. Info. Sci.  
Shortlisted (top four) for a Full Prof. in computer science, Uni. St. Gallen  
Shortlisted (top four) for an Assoc. Prof. in Visualization, Uni. Michigan (withdrawn, joined FHNW)  
Best poster (3<sup>rd</sup> place, voted) Spatial Cognition 2018
- 2017 Appointed executive board member Innovation Fund "InnoPool", UZH Geography
- 2016 Appointed chair, Geovisualization, Augmented and Virtual Reality working group, ISPRS
- 2015 Best short paper award at the IEEE EuroVis Conference (corresponding author)
- 2014 Invited researcher at Harvard University, continuing relationship as a research affiliate
- 2012 Appointed co-chair, Geovisualization and Virtual Reality working group, ISPRS  
Invited researcher at Harvard University  
Invited researcher at University of Melbourne
- 2010 Offered an Assistant Professorship at the FAU Engineering and Computer Science, USA
- 2009 Appointed executive board member, Geovis. & Virtual Reality working group, ISPRS
- 1997 Science Support Award for outstanding young researchers, Yildiz Tech. Uni., Istanbul
- 1988 Award as an "Amateur Journalist" (Istanbul High Schools, special mention), City of Istanbul  
Award for best writing (Istanbul High Schools, 1<sup>st</sup> place) by Ministry of Education
- 1983 Award for best writing (Istanbul Secondary Schools, 1<sup>st</sup> place) by Ministry of Education

## Selected international activities (leadership roles)

- 2023 **Area chair**, IEEE Vis  
**Co-organizer** Cartography and AI, Pre-conference workshop at the ICA  
**Co-organizer** Color vision deficiencies and eye movement studies, Pre-conference tutorial at the ETRA
- 2022 **Guest editor**, Use of Immersive in Designing and Navigating built Environments, Frontiers in VR  
**Lead guest editor**, double **special issue** State of the art and science in cartography (active) IJC  
**Area chair**, ISPR 22, Nice France for: Geovisualization, Augmented and Virtual Reality, Digital Twins, and DeepSimVis sessions  
**Area chair**, Eye tracking Research and Applications, ETRA 22
- 2021 **Guest editor**, special issue Eye tracking in spatial sciences IJGI (active)  
**Area chair**, repeat **sessions** ISPRS (an online 2021 edition will contain our Digital Twins theme session, as well as regular conference sessions on Geovis/AR/MR)  
AGILE workshop on CyberCartography (supporting through ICA Vis Analytics commission and ISPRS Geovis/AR/VR working group)
- 2020 ACM ETRA2020 Stuttgart: **Co-organizer** of Eye tracking for spatial research (ET4S) workshop; **Scientific committee member** for Eye tracking for visualization (ETVIZ) workshop; **Scientific committee member/primary reviewer** at the main conference  
ISPRS2020 Main Congress, Nice, France: **Area chair** Geovisualization, virtual and augmented reality (4-6 technical sessions); **Lead** theme session **Digital Twins**; **Co-lead** theme session **Visualization of complex spatio-temporal data and phenomena on earth**; **Co-lead** tutorial on open geo/spatial education  
ICA/GIScience2020 (Warsaw, Poznan); **Co-lead 2020** ICA Workshop on Analytical Reasoning: Cartography, Visualization, Design
- 2019 **Lead guest editor** –special issue with *International Journal of Geo-Information* on Human-centered geovisual analytics and geovisualization design (completed)  
**Co-org.** – User Experience Design for Mobile Cartography: Setting the Agenda, *International Cartographic Association Joint Commission Workshop*, Beijing Normal University (BNU) | Beijing, China, Jul 11-12  
**Tutorial** on Human-centered virtual, augmented and mixed reality, at 27<sup>th</sup> *Conference of the International Committee of Architectural Photogrammetry*, Sep 1
- 2018 **Lead organizer** – two conference sessions at the ISPRS Midterm symposium (Delft) on data science, visualization, augmented and virtual reality, Oct 4  
**Lead organizer** – workshop/theme session at the ISPRS Midterm symposium (Delft) on Virtual & Augmented reality: Technology, Design & Human Factors, Oct 3 (<http://www.geo.uzh.ch/~arzu/arvr2018/>)  
**Lead organizer** – workshop at the Spatial Cognition conference (Tuebingen) on Virtual Environments as Geo/spatial labs, Sep 5 (<http://www.geo.uzh.ch/~arzu/sc2018ve/>)  
**Co-org.** – Reproducibility in Cartography, Feb 27 ([https://cogvis.icaci.org/18\\_reproducibility.html](https://cogvis.icaci.org/18_reproducibility.html))
- 2017 **Lead guest editor** –special issue with *International Journal of Digital Earth* on Human centered Virtual and Augmented Geovisualization environments (completed in 2018, editorial 2019)  
**Co-ed.** – book *Remote Sensing and Cognition: Human Factors in Image Interpretation*

- 2016 **Lead organizer** –session “User studies and visual complexity: 3D and VR”, ISPRS 2016, Prague  
**Lead organizer** – tutorial “Usability methods and eye movement analysis for understanding remotely sensed imagery, 3D geovisualizations and virtual reality”, ISPRS 2016, Prague  
**Co-organizer** –session “Smart Cities and big data”, ISPRS 2016, Prague  
**Co-organizer** – technical sessions on Geovisualization and Virtual Reality, ISPRS 2016, Prague
- 2015 **Co-ed.** – journal special issue ISPRS Journal of Photogrammetry and Remote Sensing  
**Co-org.** – workshop “Geovis’15 - Rendering and Cognition with Images and Hybrid Visualizations” at ISPRS Geospatial Week, France, Sep 31 – Oct 1
- 2014 **Lead org.** – workshop on “Geovisualization for smart cities, urban design and planning”, ISPRS/IGU Joint Conference, Toronto, Oct 8-10  
**Special Issue editor** – Vol 1 co-ed, Vol 2 lead editor, *International Journal of Digital Earth*
- 2013 **Co-org.** – workshop Uncertainty in Decision Making in a Changing Climate at the Uni Zurich, Mar 21-22  
**Co-org.** –sessions on Visualization and Virtual Reality at CUPUM, Utrecht, July 2-5
- 2012 **Co-ed.** – special issue, Future Internet (completed)  
**Co-org.** – workshop on Geovisual Analytics at the ISPRS 2012, Melbourne Aug 24  
**Co-org.** – workshop on Vis., Virtual & Augmented Reality at the ISPRS 2012, Melbourne Aug 21 - Sep 1
- 2011 **Co-org.** – workshop on Persistent Problems in Geovisualization at the ICA 2011, Paris, Jul 1  
**Co-org.** – conference on Spatial Thinking and GIScience, Tokyo, 14-16 Sep
- 2010 **Lead org.** – workshop on Digital Globes or Virtual Geographical Reality: How Much Detail Does a Digital Earth Require – at the AutoCarto/ASPRS, Orlando, Nov 16

## Advising/employer roles (team, group leadership)

**Employer/manager** ~40 institute members at the IIT including 3 professors and 3 group leaders.

Research team: Current (part-time project members are marked with an \*): M. Santaholma, L. Fernandez Moguel, M. Lacayo, C. Merz, C. Huesser, A. Leu, F. Broggle, J. Pariente; Former (between 2019-2022): , A. Zirn (\*), M. Murali, L. Baumgartner, A. Schneiter, M. Recher (\*), M. Burri, T. Figini, F. Millan, U. Molteni, D. Vegh; 2019-2020: A. Wilk, M. Stadte (\*), M. Dietsche(\*), M. Zmitko(\*); 2016 B. Flueck (\*); 2018: M. Tomasic, G. Marbach; 2017: A. Brychtova; 2014: O. Deseoe, I. Cammarotta, I., Lokka; 2009: K. Bektas.

**Post-doc advisor** 2020-current M. Santaholma, M. Lacayo, U. Molteni, L. Moguel; 2019 A. Wilk; 2018 A. Diehl (w/ UZH), M. Tomasic, 2017, G. Marbach, A. Brychtova.

**Mentor** Dr. E. O’Sullivan (Uni Bern, comet program), R. Gupana (EAWAG/UZH, FLP program), Dr. A. Bruno (lecturer in the UK), Dr. I. Gołębiowska (asst. prof. in Poland), Ece Takmaz (PhD candidate in NL)

**PhD advisor** Current: R. Schnuerer (2017, co-advisor, ETH), A. Amiraghdam (2017 co-advisor IFI/UZH, SNF grant), Completed: : I. Lochhead (2018, commt. member, SFU/CA), I. Lokka (2014-2020 main advisor, SNF), V. Rautenbach (2013-2017 co-advisor), K. Bektas (2009-2017, main advisor, SNF), A. Brychtova (2011- 2014, first advisor), T. Burke (2010-2015, co-advisor)

**PhD examiner:** M. Spur (2021, Ecole Centrale in Nantes), M. Keskin (2020, ULiege), I. Garonna (2018, UZH), K. Kollo (2015, Aalto University), A. Yilmaz (2014, METU)

**MSc advisor** 2019-current L. Fluri, T. Kaufmann, C. Huesser, M. Burri, A. Schneither (co-advisor), M. Murali (co-advisor); 2017-2018: R. Meier, 2016-2017: M. Riva, D. Oertle, F. Lutz, G. Buehler, 2015-2016: A. Wegmann, L. Strehenberger, T. Cervenka, G. Hartung, M. Ritzi, 2014-2015: M. Zahner M. Meyer, A. Brugger, B. Kalt, P. Kaelin, K. Sahile; 2013-2014: F. Perler, M. Mahrer, M. Kuhn, J. Biland, L. Bosshardt, R. Francelet, F. Heim, 2012-2013: J. Kleiner, K. Fischer; 2011-2012: A. Boer, L. Dall’Acqua, S. Tuggener; 2010-2011: M. Bernasocchi, J. Hull, P. Russo, R. Klausner (co-advisor); 2009-2010: S. Zanola (co-advisor), S. Maggi (co-advisor)

**Visiting scholars** 2020-current F. Millan (intern), T. Figini (MSc student), D. Vegh (MSc student); 2011: T. Burke (PhD student); 2009: X. Li (PhD Student); 2013: D. Haeusler (intern); 2012: J. Hempel (Erasmus intern); 2011: R. Haltner (external student); 2008-2009: M. Lacayo (Fulbright scholar)

**Bachelor’s** projects are too many to list – overall I advised or co-advised more than 50 individuals.

## Invited talks (selected)<sup>1</sup>

Public speaking events are marked with an \*. Keynotes are marked with \*\*.

### 2023

1. \*\* Human computer interaction for visualization VIZBI, 31 March 2023, Heidelberg, DE
2. \*\* Thinking with and without an extended version of reality: Forms of visuospatial knowledge representation and their effects on what we know. “Thinking Within” symposium, 13 April 2023, Wageningen
3. \* Visualization flows and the challenge of multivariate data visualization. Public transportation Switzerland,
4. In the eye of the beholder: Identifying emotions and cognitive state of a person from eye movement data, Eastern HCI, TR, September (TBD)
5. Virtual spaces, real emotions, King’s College London Master’s seminar, date (TBD)
6. Eye movements, cognition, aging. University of Lancaster, Department of Computer Science (H. Gellersen) date (TBD)
7. \*\* XR-mediated collaboration and spatial decision making: Where are now and what is next? Mixed Reality Settings for Collaboration in Spatial Design, Collaborative Digital Innovation event series, FHNW, Olten (TBD)

### 2022

8. \* Understanding, recognizing, and managing cognitive bias, **WeShapeTech** Switzerland, Sept 13th
9. Perception, cognition and human factors research in Extended Reality, Photogrammetric Week (U. Sörgel)
10. Rethinking our relationship with space: Modern forms of representation and spatial cognition. CUSP London Seminar, King’s College London, 30<sup>th</sup> of June 2022
11. Humans in their spatial context: From eye tracking to spatial computing. Invited talk for the pre-conference workshop on Cybercartography at AGILE 2022. Vilnius, Lithuania, June 14, 2022
12. \*\* Visualization, virtual reality and reproducibility: Challenges and opportunities. **Keynote at the Open Data Science Europe** workshop 2022, 13-16 June 2022
13. \* How unconscious is unconscious bias? WomenTech Global Conference 2022, Berlin, Germany, 7<sup>th</sup> of June, 2022
14. Mixed Reality to support collaborative planning processes / Mixed Reality zur Unterstützung kollaborativer Planungsprozesse, Geosummit 2022, Olten, Switzerland, 1<sup>st</sup> of June 2022
15. Invited panelist, Seeing the Future: What does the world of education, data (science), visualization and outer space look like in 50+ years? *A Conference in Honor of Alyssa Goodman*, Harvard University, 4th of May 2022
16. Visuospatial knowledge acquisition in virtual environments: Effects of age, visual realism and task types in navigational learning. **University of Geneva, Department of Psychology**, March 9<sup>th</sup> 2022
17. \* Implications of extended reality for the future of information societies: Information, interaction, visualization in extended reality, Zurich **World Information Architecture (WIAD) conference**, March 5<sup>th</sup>, 2022

### 2021

18. \*\* Extended reality for spatial sciences: Fundamental and translational considerations. **Keynote** at the ICC Workshop. 13<sup>th</sup> December 2021.
19. Remembering routes – how do the visual characteristics of a virtual environment affects short and long term recall? GI Forum Uni Muenster, 2nd November 2021
20. \*\* Human cognition and visuo-spatial information: Experiments in visualization and virtual reality, **Keynote** at the ISPRS “virtual keynotes” series (large event). 30 September 2021
21. Levels of detail, levels of realism: Controlling the information intensity in virtual environments, Workshop in VGE session at the 28th International Conference on Geoinformatics, China, 9<sup>th</sup> July 2021
22. Changing demographics and changing modes of spatial learning: Extended reality and what it offers in our understanding of the world. CYBERCARTOGRAPHY: A beyond state-of-the-art role of geovisualization in the understanding of the world, **AGILE 2021 workshop**, 8 June 2021
23. Digital health from human-computer interaction and extended reality perspectives, Transfer Transparent faculty colloquium series, **School of Engineering, UAS NW**, CH, 1 June 2021
24. \* Linking visuospatial cognition with visuospatial displays through empirical experiments (host: Zoya Bylinskii), **Adobe Research Seminars**, 13 May 2021
25. Individual and group differences in human-information interaction (host: Jukka M. Krisp), **University of Augsburg**, DE, 10 May 2021

<sup>1</sup> This list excludes conference & workshop presentations, and invited talks older than 10 years (prior to 2009)

26. \* Human factors in data visualization: What can eye movements tell us? Women in Machine Learning and Data Science **WiMLDS** (<http://wimlds.org/>) **Zurich chapter** public event, 27 April 2021, **Public speaking**
27. \* International and interdisciplinary adventures: Academic 'expat' experience from two perspectives (Uluslar ve disiplinler arasında köprüler kurmak: İki boyutlu 'akademik gurbetçilik' deneyimleri), Yıldız Technical University, **Istanbul**, TR, 14 April 2021
28. Visuospatial complexity of information displays: A focus on an aging audience, Research colloquium, **School of Life Sciences UAS NW**, CH, 31 March 2021

## 2020

29. Visuospatial information processing – Cognitive and computational explorations in technology and design (host: Stefano de Sabbata), University of Leicester, UK, 25 Nov 2020
30. \*\* The 'science' in geographic information science: Fundamental and applied questions (host: Seda Salap-Ayca), The University of Massachusetts, USA, GIS Day Keynote, 18 Nov 2020
31. \* All downhill from here? Visualization and interpretation of landforms, ESRI GIS Day, Low Budget High Fidelity, USA, 18 Nov 2020
32. \* Illusion (and exclusion) of Talent, Geodes, Gender Diversity & Equality Workshop, ETH Zurich, 6 Nov 2020
33. Exploring perception for design and technology (guest lecture, host Davood Shojaei), University of Melbourne, AU, 19 Oct 2020
34. \* Virtual cities, visuospatial memory, and aging, DIMENSIONSZR Congress, organized by SSVAR, Zurich, 29 Oct 2020
35. Sharing 'vis authority', questions vs. answers, **panelist** at the IEEE VisGuides Panel for the Workshop on the Creation, Curation, Critique and Conditioning of Principles and Guidelines in Visualization, Salt Lake City, Utah, USA, 25 Oct 2020

## 2019

36. \* Future of information displays: Aging and Technology, World Usability Day Switzerland, Zurich, 14 November 2019
37. Perceptual factors in human-visualization interaction (host: Hans-Balder Havenith, Geology), Liege University, Belgium, May 2
38. \*\* Mixed reality in society: The future of information displays, and their implications for varying user groups, Keynote at DigitAS workshop, University of Innsbruck, Austria, May 17
39. Human factors in designing visuospatial displays, Transfer Transparent interdisciplinary colloquium, University of Applied Sciences and Arts Northwestern Switzerland FHNW, Switzerland, Mar 19
40. Eye tracking in VR and AR Displays, ETIZ, ETH Switzerland, Mar 26  
Human-centered virtual, augmented and mixed reality Invited tutorial at CIPA, Spain, Sept 1

## 2018

41. 10QViz: Evidence-based visual Literacy (host: Alyssa Goodman, Astrophysics), Harvard University, USA, 27 Nov
42. Visual Complexity: Visual clutter, information overload and what we can remember (host: Ruth Rosenholtz, CSAIL and Brain Sciences), MIT Massachusetts Institute of Technology, USA, 16 Nov
  - Visualizing geo/spatial phenomena: A spatial cognition perspective (host: Michelle Borkin, Computer Science), Northeastern University, USA, 15 Nov
43. Thinking about visuospatial information displays - Perceptual and cognitive considerations (hosts: Alan MacEachren, Anthony Robinson, Geography), PennState, USA, 12 Nov
44. Elements of Visual Complexity in Geospatial Information Displays (host: Rob Roth, Geography) Uni Wisconsin, USA, 9 Nov
45. Vision inspired (geo)visualization, Harvard University, Visual Attention Lab (host: Jeremy Wolfe, Vision Science), USA, 6 Nov
46. Empirical experimentation in (geo)visualization: Examples, challenges, state of the art. DfKG, University of Bochum, Germany, 25 Jun
47. Foundations of Interaction for Information Visualization, Guest lecture, University of Zurich, Information Visualization MSc course, Switzerland, 11 Oct
48. Dimensions of visuospatial complexity (host: Nick Holliman). Newcastle University, UK, 16 Mar
49. Visuospatial complexity of human-computer interaction and scientific visualization as we age. University of St. Gallen, Switzerland, 15 Feb

## 2017

50. \* Science down to earth: Metrics. InnoPool project, UZH, Switzerland, 5 May
51. \* Visual Complexity, Google Zurich, Switzerland, 22 Sep

**2016**

- 52. Visual information processing and visualizing big data. University of Applied Sciences and Arts Northwestern Switzerland FHNW, Switzerland, 15 Jun

**2015**

- 53. Understanding visual complexity from information processing and human-factors perspectives, City University, London, UK, 17 Jun
- 54. \*\* Map complexity and its remedies. Keynote at the APCPP 2015 (Applying Principles of Cognitive Psychology in Practice), Brno, Czech Republic, 22 May
- 55. \* 3D Geovis: The good, the bad and the ugly. Invited talk, Geobeer Switzerland #11, hosted by the Geoinformation Unit of the Canton of Zürich, 05.11.2015

**2014**

- 56. \* Best practices in scientific visualization, Astrophysics Collquium, University of Zurich, Switzerland, Jul 1
- 57. Design considerations for information-rich visualization environments. Invited talk at HHSF14 Star Formation: Data, Models and Visualization: A Harvard-Heidelberg Workshop. Heidelberg, Germany, 23-16 Jun
- 58. Eye movement metrics for evaluating geographic visualizations, Geomatics Colloquium, University of Applied Sciences and Arts Northwestern Switzerland FHNW, Switzerland, May 6
- 59. Designing for complex contexts: interaction design for visualizing cities. UCL University Colleague London 24 Mar
- 60. Understanding limits and strengths of our perception for geovisualization design. University of Olomouc, Geoinformatics Department, Czech Republic, 24 Feb

**2013**

- 61. \* Illusions in geographic visualizations, Friday's Food for Thought event "Geography is What Geographers Do" – Science-public communication. Zurich, Switzerland, 29 Nov
- 62. \*\* Human factors in geovisualization design. **Keynote** at the doctoral (graduate) school workshop. University of Pretoria, UP GGM Postgrad, South Africa, 10 Oct
- 63. \* Three generations of Turkish women, TEDGlobal 2013, Public speaking, Edinburgh, Scotland, 11 Jun

**2012**

- 64. Cartography and Astronomy: Ancient and Modern Synergies ([video](#)). Department of Astronomy, Harvard University, Cambridge, USA, 19 Jul
- 65. What You See is What You Get? Experimenting with Vision. Department of Computer Science. Harvard University, Cambridge, USA, 24 Jul
- 66. Vision Inspired Visualization: A Geographic Perspective. Center for Geographic Analysis. Harvard University, Cambridge, USA, 17 Jul
- 67. Models of vision for visualization design, MIT Computer Vision, MIT Massatchuses Institute of Technology, Cambridge, USA 18 Jul
- 68. Visualization for Analysis: a Human-centric Approach. Department of Architecture, University of Melbourne, Australia, 6 Sep
- 69. Eye tracking for Geovisualization: Opportunities and Challenges, University of St. Andrews, UK, 25 Jun
- 70. Analyzing eye movement trajectories. COST workshop WG4: Future Directions in MOVEment, Invited as an activity highlight, Delft, The Netherlands, 15 Mar
- 71. \*\* Knowledge transfer from basic sciences to technology for geographic data management and quality. **Keynote** at the Academic Informatics National Conference, Usak, Turkey, 3 Feb
- 72. \* When we know where you look – eye tracking for usability studies, Usability Network Schweiz, 31 May

**2011**

- 73. \* Interdisciplinary Science. TEDxZurich, Public speaking, recorded in Swiss Television Studios (~3500 live viewers, following video on YouTube with thousands more). 04 Oct
- 74. \*\* Image to Imagination: Human Factors in Representing Graphics, **Keynote** in Geovisualization track in STGIS2011, Tokyo, Japan. 15 Sept
- 75. \*\* Graduate studies in Finland and in Switzerland – **Keynote** at the Graduate School Colloquium, Engineering Faculty, Aalto University, Finland, 10 Mar
- 76. Eye movement analysis for evaluating interactive geovisualization designs. NCG Seminar, University of Maynooth, Dublin, Ireland, 3 Feb



77. State of the art and research gaps –Information Visualization, Computer Science, Cognition and perception studies on movement. Invited talk at COST workshop WG4: Visual Analytics for Movement and Cognitive Issues, Mons, Belgium, 21 Jan

## 2009

78. Stereoscopic Vision and Visualization for Three-Dimensional Geographic Information. IPEG meeting, Department of Geography, University of Zurich, 12 Jun
79. Space-Variant Image Coding for Stereoscopic Media, Invited Speaker & Panelist in special session on Visual Attention and Efficient Image Coding, Chicago, US, 6 May
80. Evaluating the Effectiveness of Interactive Map Interface Designs: A Case Study with Eye-Movement Analysis. Tobii EyeTrackUX 2009, Frankfurt, 22 Apr

## Reviewing (service, selected)

- Grant panels** National funding agencies in Norway, Belgium, Poland, and Canada, and European Union, ETH Research Funds, UZH InnoPool (board member 2017-2019)
- Journals** IEEE Transactions in computer graphics and visualization (TGVC), Journal of Human Computer Interaction, Learning, memory and cognition, Lecture Notes in Computer Science, The Visual Computer, Information Visualization, Computers and Graphics, Journal of Eye Movement Research, Annals of GIS, International Journal of Geographical Information Science, International Journal of Digital Earth, CaGIS, Cartographica, Journal of Geoscience Education,...
- Conferences** CHI, IEEE VAST, InfoVis, ACM ETRA, ETVIS, CSCW, EuroVis, Eurographics, INTERACT, ISPRS, Geocomputation, AGILE, Spatial Cognition, GIScience, ICA, IRTG DC (GIScience Doctoral Colloquium), CogSci, COSIT, ...

## Teaching experience

### From Feb 2019-University of Applied Sciences and Arts Northwestern Switzerland

MSc / graduate level (besides advising):

Research seminars, winter school (“IPOLE”)

BSc level:

Information visualization (computer science), Media Computing (Sound, Image, Video, XR), Extended reality and HCI, Data visualization & Visual Analytics (data science, project based)

### From Dec 2018- Nov 2006 University of Zurich

PhD level (besides advising):

2009-2012 Statistics with R (initiated, coordinated for several years)

2007-2018 Organization of the GIScience Colloquium, reading groups, public demos

MSc level:

2017-2018 Thinking geographically: Analyzing and Visualization migration patterns

2016-2018 3D Geovisualization: Perception, Modelling, Analysis

2015-2018 Fundamental Challenges in Geographic Information Science (spec MSc, two semester)

2012-2016 Geographic Information Visualization and Analysis, including intro to programming

2007-2015 Geographic Information Science Seminar (topics vary, covered topics are: multi-dimensional geographic information, scale and level of detail, digital earth, eye tracking for geographic information visualization, usability and user experience)

2007- Field trips/excursions including e.g., IBM, Siemens, ESRI, Google

BSc level:

2016-2018 Statistics (~100 students, including labs using R)

2007-2016 Introduction to Cartography and Geovisualization (>100 students, incl. labs)

2010-2018 Small group teaching

2007-2018 Field trips/excursions including e.g., IBM, Siemens, ESRI, Google

### Between 1997-2006 Helsinki University of Technology (now Aalto) – Teaching assistant or coordinator

Spatial Data Structures and Algorithms, Introduction to Cartography and Geoinformatics, Cartographic Production, Visualization in Geographic Information, GIS Software Engineering, Development of Cartographic Information, Postgraduate course in Geoinformatics, Postgraduate Seminar in Geoinformatics, Geographic Data Administration, Geographic Data Management, WebGIS

### **Between 1995-1997 Yildiz Technical University – Teaching assistant or coordinator**

Teaching assistant for: Geoinformatics, Photogrammetry I, II, III, Digital Photogrammetry & Remote Sensing, Field Measurements

## **Computer languages**

I have started with BASIC, continued with FORTRAN, and then C. In more recent years, I used more Python than others (including giving some introductory lectures). I can find my way around in HTML, VRML/X3D, WebGL, Java/Javascript. I used Matlab and R for scientific programming in some of my projects, and I am quick in acquiring new tools/languages. I have used various GIS, CAD, statistics, eye tracking and virtual reality software running on Windows, Mac OS as well as Linux/Unix systems.

## **Human languages**

Turkish (mother tongue), English (proficient), German (intermediate B1/B2 level)

Others: Azerbaijani (can communicate), Finnish (beginner), Spanish (beginner), I also understand Turkic dialects in varying degrees (e.g., Turkmen, Kazakh, Uzbek, Tatar, Uighur etc.)

## **Personal and/or semi-professional activities**

- Co-lead 10qviz.org, an outreach effort to bring visualization knowledge across disciplines
- Co-lead ETIZ “Eye tracking interest group Zurich”
- Lead Zurich Chapter, TurkishWIN (Turkish Women’s International Network: <http://turkishwin.com>) 2010-2020. TurkishWIN is a global non-political non-profit organization for networking professional/academic/business women who have ties to Turkey. Other chapters are in New York, Boston, San Francisco, London and Istanbul. We organize events, record videos of the speakers to highlight role-models, provide mentorship.
- Lead “FIFFTH” Friday’s Food for Thought. Scientific communication effort within the department, and a public-science communication event <https://www.youtube.com/channel/UCUNP3j6ivJcKRLIBEUwCYfg>
- Public speaking: TEDxZurich, Interdisciplinary Science <https://www.youtube.com/watch?v=VJtvF1VrGjY>, Ignite Zurich, women in science: <https://www.youtube.com/watch?v=wjeZip6WBps>, TED Global 2013, three generations of women in Turkey: <https://www.youtube.com/watch?v=PjeZANOhJUQ>
- Traveling, photography, reading and writing, some acting (in my ‘previous life’).

## **Publication list**

Publications with my students/post-docs are marked with an asterisk (\*). PDF copies of most of my papers can be found at <http://coltekin.net/arzu/publications.html>. See my Google Scholar profile here for an overview of my citation profile <https://scholar.google.ch/citations?user=G2PIX-0AAAAJ&hl=en>.

### **2023**

Several manuscripts under review and in preparation.

### **Peer-reviewed full papers**

1. Gołębiowska, I., & Çöltekin, A. (2022). What’s wrong with the rainbow? An interdisciplinary review of empirical evidence for and against the rainbow color scheme in visualizations. *ISPRS Journal of Photogrammetry and Remote Sensing*, 194, 195-208. <https://doi.org/10.1016/j.isprsjprs.2022.10.002>
2. Keskin, M., Krassanakis, V., Çöltekin, A. (2023). Visual Attention and Recognition Differences Based on Expertise in a Map Reading and Memorability Study. *ISPRS Int. J. Geo-Inf.* **2023**, 12(1), 21; <https://doi.org/10.3390/ijgi12010021>

3. Anoni, A., ... Çöltekin, A. (2023). Digital Earth: Yesterday, today, tomorrow, *International Journal of Digital Earth* (accepted)
4. Chen M., Peng, P., Claramunt, C., Çöltekin, A, ... (2023): Human-in-the-loop artificial intelligence and visual analytics in spatial sciences and cyberspace: Research opportunities and challenges (under review)
5. Mueller G.D., Hollenstein, D., **Çöltekin, A.**, Bleisch, S. (under review) Square-glyphs: Assessing the readability of multidimensional spatial data visualized as square-glyphs, ICC 2023
6. Holliman, N., **Çöltekin, A.**, Fernstad, S.J., Simpson, M.D., Wilson, K.J., Woods, A.J. (under review) Visual Entropy and the Visualization of Uncertainty. *IEEE Transactions in Visualization*

#### **Abstract-Reviewed Full Papers, Abstracts, Short Papers**

7. Bonfa, A., Weiping, Z., Keller, Y., Barbisch, F., Schürmann, P., Moguel, L., Seixas, A., Ramos, A.R. Çöltekin, A. (corresponding author) Exploring the relationship between insufficient sleep and Alzheimer's disease using machine learning, *Sleep 2023*, June 3-7, Indianapolis, IN, USA (accepted)
8. Çöltekin, A., Griffin, A., Ganarin, R., Rautenbach, V., Coetzee, S., Mdleleni, A. (2023) What moderates the terrain reversal effect in shaded relief maps? ICC 2023 (under review)
9. Gołębiowska I., Çöltekin, A. (2023) Over the rainbow: An in-depth examination of the pervasiveness of the rainbow colour scheme (under review)
10. Gołębiowska I., Opach, T., Çöltekin, A., Korycka-Skorupa, J., Rød, J.K. (2023) Split legend or split attention? Evaluating layout designs of geodashboard interfaces. ICC 2023 (under review)
11. Jonas Oesch<sup>a</sup>, Tumasch Reichenbacher<sup>b</sup>, Arzu Çöltekin<sup>c\*</sup> (2023) User experience with smartphone based global-scale thematic maps in data journalism. ICC 2023 (under review)
12. Robert E. Roth<sup>a,\*</sup>, Arzu Çöltekin<sup>b</sup>, Luciene Delazari<sup>c</sup>, Bradley Denney<sup>d</sup>, André Mendonça<sup>e</sup>, Jie Shen<sup>f</sup>, Zdeněk Stachoň<sup>g</sup>, Mingguang Wu (2023) Making maps & visualizations for mobile devices: A collaborative research agenda. ICC 2023 (under review)
13. Landolt, ... Çöltekin, A. (corresponding author). Fixation and blink durations of older and younger adults during navigational learning in virtual environments, ETRA (under review)
14. Bruno, .... Çöltekin, A. (corresponding author) ETRA late breaking with Alessandro (under review)

## **2022**

#### **Peer-reviewed full papers**

15. Gołębiowska, I., **Çöltekin, A.** (2022). What is wrong with the rainbow? An interdisciplinary review of empirical evidence for and against the rainbow color scheme in visualizations. *JPRS*
16. \* Bragger, L., Baumgartner, L., Koebel, K., Scheidegger, J., **Çöltekin, A.** (corresponding author) (2022, in press). Interaction and visualization design considerations for gaze-guided communication in collaborative extended reality, *ISPRS Annals*
17. \* Baumgartner, L., Bragger, L., Koebel, K., Scheidegger, J., **Çöltekin, A.** (corresponding author) (2022, in press). Visually annotated responsive digital twins for remote collaboration in mixed reality environments *ISPRS Annals*
18. Tliba, M., Kerkouri, M.A, Ghariba, B., Chetouani, A., **Çöltekin, A.**, Shehata, M., Bruno, A. (2022). SATSal: A Multi-level Self-Attention Based Architecture for Visual Saliency Prediction, *IEEE access*
19. Lochhead I., Hedley N., **Çöltekin, A.**, Fisher, B. (2022) Evaluating Spatial Ability in Virtual Reality: An Immersive Mental Rotations Test, *Frontiers in Virtual reality*
20. \* Koebel, K., ... **Çöltekin, A.** (corresponding author) (2022). Expert insights for designing conversational user interfaces as virtual assistants and companions for older adults with cognitive impairment. In: *Proceedings of CONVERSATIONS2021*, Lecture Notes in Computer Science (LNCS).

#### **Abstract-Reviewed Full Papers, Abstracts, Short Papers**

21. **Çöltekin, A.**, Griffin A., et al. (2022) The hand or the hemisphere? NACIS 2022
22. Liu, X., Claramunt, C., Batty, M., Kwan, M-P., Senousi, A., Cheng, T., Strobl, J., **Çöltekin, A.**, Wilson, J., Bandrova, T., Konecny, M., Torrens, T., Li, H., Wang, J., Ratti, C., Kolditz, O., Klippel, A., Li, S., Lin, H., Zhangm F., Chen, M., Lü, G. Geographic information science (GIScience) in the era of geospatial big data: Opportunities and challenges from a cyberspace perspective. *The Innovation*

23. Şenol, H.İ., **Çöltekin, A.** (submitted) Building Footprint Extraction from High Resolution UAV Images Using Deep Learning Algorithms in the Context of Unplanned Urbanisation, *Eurocarto2022*
24. \* Ambuehl, A., Fluri, L., Zucker, C., Goodman, A., **Çöltekin, A.** (corresponding author) (2022). [Effectiveness and perceived usefulness of a handheld AR cube for examining 3D spatial structures.](#) Presented at [SpaceCHI Workshop](#) at the CHI2022.

## 2021

### Peer-reviewed full papers

25. \* Huesser, C., Schubiger, S., **Çöltekin, A.** (corresponding author) (2021). Gesture interaction in virtual reality: A low-cost machine learning system and a qualitative assessment of effectiveness of selected gestures vs. gaze and controller interaction. *INTERACT 2021*. Lecture Notes in Computer Science (LNCS)
26. Meier, I., Buegler, M., Harms, R., Seixas, A., **Çöltekin, A.**, Tarnanas, I. (2021) Using a Digital Neuro Signature to measure longitudinal individual-level change in Alzheimer's Disease: The Altoida large cohort study. *Nature npj Digit. Med.* 4, 101 (open source: <https://www.nature.com/articles/s41746-021-00470-z.epdf>). (DOI: 10.1038/s41746-021-00470-z)
27. **Çöltekin, A.**, Griffin, A., Robinson, A. (2021). Visualizations. *Oxford Bibliographies Online Research Guide*. Oxford University Press. (DOI: 10.1093/obo/9780199874002-0224)
28. \* Zmitko, M., Schwander, F., Agotai, D., **Çöltekin, A.** (corresponding author) (2021). Interactive videos as geospatial interfaces: A case study for regional promotion. *Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci.* (Vol/issue/doi TBD). (abstract-reviewed full paper) (open access)

### Abstract-Reviewed Full Papers, Abstracts, Short Papers

1. **Çöltekin, A., Oertle D., Brychtová, A.** Complexity and memorability of visuospatial displays, ICC2021 (to appear)
2. **Çöltekin, A.** (2021). An illusion of depth: shape from shading in terrain representations and satellite images. [2nd UNSW Workshop on Expectation, Perception & Cognition](#), School of Psychology, UNSW Sydney, December 1 & 2 (abstract)
3. \* Molteni U., **Çöltekin, A.** (corresponding author) (2021). Exploring pupil size variation as a cognitive load indicator in visualization studies. *Eye movements as an interface to cognitive state (EMICS2021): Workshop at the 2021 ACM CHI Conference*, May 14th. (short paper, 4p.)
4. \* Koebel K., Lacayo, M., Murali, M., Tarnanas, I., **Çöltekin, A.** (corresponding author) (2021). CUIs (conversational user interfaces) for older adults. *Let's talk about CUIs: Putting conversational user interface design into practice: Workshop at the 2021 ACM CHI Conference*, May 8th. (position paper, 4p)
5. \* Koebel K., Murali, M., Lacayo, M., Tarnanas, I., **Çöltekin, A.** (2021). Virtual companions for AD patients *Alzheimer's Association International Conference Satellite Symposium*, May 12-13. (abstract)
6. **Çöltekin, A.** (2021). Visual realism in extended reality and its possible effects on adherence to cognitive training of spatial abilities in older adults. *Designing Interactions for the Ageing Populations – Addressing Global Challenges. Workshop at the 2021 ACM CHI Conference*, May 9th. (position paper, 2p.)
7. **Çöltekin, A.** (2021). Effects of cue integration on three-dimensional shape from shading. *Vision Sciences Society, V-VSS 2021* May 21-16. (abstract)
8. \* Murali, M., **Çöltekin, A.** (2021). Conducting eye tracking studies online. *Workshop on Adaptable research methods for empirical research with map users, ICA Cognitive Visualization 2021*, May 6th. (abstract)
9. **Çöltekin, A.**, Murali, M., Lacayo, M., Koebel K., Tarnanas, I. (2021). Smartphone based cognitive training apps for prevention and rehabilitation of visuospatial memory decline: A human-computer interaction perspective. *Ageing & Cognition 2021 (EUCAS2021)*, April 15th. (abstract)

**2020****Peer-reviewed full papers**

29. Gołębiowska, I., **Çöltekin, A.** (2020). Rainbow Dash: Intuitiveness of the rainbow color scheme in data visualization (2020), *Transactions in Visualization and Computer Graphics*, DOI: <https://doi.org/10.1109/TVCG.2020.3035823>
30. **Çöltekin, A.**, Lochhead, I., Madden, M., Christophe, S., Devaux, A., Pettit, C., Lock, O., ..., & Hedley, N. (2020). Extended reality in spatial sciences: A review of research challenges and future directions, **Invited paper** *International Journal of Geographic Information (IJGI)*. 9(7), 439. (Open Access) <https://doi.org/10.3390/ijgi9070439>
31. \* Pulver, Y., Merz, C., Koebel, K., Scheidegger, J., **Çöltekin, A.** (2020). Telling engaging interactive stories with extended reality (XR): Back to 1930s in Zurich's main train station. *Annals of the ISPRS (International Society of Photogrammetry and Remote Sensing)*. V-4-2020, 171–178. <https://doi.org/10.5194/isprs-annals-V-4-2020-171-2020>
32. **Çöltekin, A.**, Griffin, A. L., Slingsby, A., Robinson, A. C., Christophe, S., Rautenbach, V., ... & Klippel, A. (2020). Geospatial Information Visualization and Extended Reality Displays. In *Manual of Digital Earth* (pp. 229–277). Springer, Singapore. (Open access). [https://doi.org/10.1007/978-981-32-9915-3\\_7](https://doi.org/10.1007/978-981-32-9915-3_7)
33. \*Schnürer, R., Ritzi, M., Çöltekin, A., & Sieber, R. (2020). An empirical evaluation of three-dimensional pie charts with individually extruded sectors in a geovisualization context. *Information Visualization*, 147387161989610. <https://doi.org/10.1177/1473871619896103>

**Abstract-reviewed full papers, short papers**

34. **Çöltekin, A.**, Griffin, A. L., Rautenbach, V., Coetzee, S., So, O., Mokwena, T. (2020). What is left bias, and why is it relevant to cartography? *NACIS 2020* [abstract only, oral presentation]
35. Gołębiowska, I., **Çöltekin, A.** (2020). Chasing rainbows: Prevalence of the rainbow color scheme in scientific publications. *NACIS2020* [abstract only, oral presentation]
36. \* Koebel, K., Agotai, D., **Çöltekin, A.** (2020) VaRt-DataExplorer – Exploration of Data Spaces in Virtual Reality in the context of Museological Cultural Heritage Collection. *Archives of the ISPRS (International Society of Photogrammetry and Remote Sensing)*. XLIII-B4-2020, 599–606. (Open Access). <https://doi.org/10.5194/isprs-archives-XLIII-B4-2020-599-2020> [Full paper]
37. Coetzee, S., Rautenbach, V., **Çöltekin, A.**, Madden, M., Pettit, C., Christophe, S., Lkhamjav, O., (2020, accepted). Towards SDG 4: Trade-offs for geospatial open educational resources. *Archives of the ISPRS (International Society of Photogrammetry and Remote Sensing)*. XLIII-B4-2020, 599–606. (Open Access). <https://doi.org/10.5194/isprs-archives-XLIII-B5-2020-199-2020> [Full paper]

**2019****Editorials, monographs, book reviews**

38. **Çöltekin, A., Oprean, D., Wallgruen, J., Klippel, A.** Human-Centered Virtual and Augmented Reality Geovisualization Environments. *International Journal of Digital Earth*. 12(2): 119-122. Editorial. ). <https://doi.org/10.1080/17538947.2018.1560986>
39. **Çöltekin, A.**, Christophe, S., Robinson, A., Demšar, U. (2019). Designing Geovisual Analytics Environments and Displays with Humans in Mind. *International Journal of Geographic Information* (Open access). <https://doi.org/10.3390/ijgi8120572>

**Peer-reviewed full papers**

40. \*Hartung, G., **Çöltekin, A. (corresponding author)** (2019). Fixing an illusion - An empirical assessment of correction methods for the terrain reversal effect in satellite images. *International Journal of Digital Earth*, <https://doi.org/10.1080/17538947.2019.1681526>

41. \* Bektaş, **Çöltekin, A. (corresponding author)**, Krüger, J., Duchowski, A., Fabrikant, S.I. (2019). GeoGCD: Improved Visual Search via Gaze-Contingent Displays, In: *Proceedings of the ACM Eye Tracking Research and Applications*
42. \* Lokka & **Çöltekin, A.** (2019). Perspective switch and spatial knowledge acquisition: Effects of age, mental rotation ability and visuospatial memory capacity on route learning in virtual environments with different levels of realism. *Cartography and Geographic Information Science*

#### **Abstract-reviewed full papers, short papers**

43. \* Lokka, I. E., & Çöltekin, A. (2019). Age differences in attention and memory in a virtual reality route learning task, In: *Proceedings of the Aging and Cognition 2019, Apr 24-26*
44. **Çöltekin, A., Hartung, G., Meyer, M., (2019)**. Deconstructing the relief inversion illusion: Contributors of the problem and its solutions. In: *Proceedings of the ICC2019, Tokyo, Japan, Jul 15-20*
45. **Çöltekin, A. (2019)**. What is spatial computing? 3D User interfaces, human factors and augmented-and-mixed reality as maps. *User Experience Design for Mobile Cartography: Setting the Agenda, International Cartographic Association Joint Commission Workshop, Beijing Normal University (BNU) | Beijing, China, Jul 11-12*
46. **Çöltekin, A.** (2019). What contributes to the complexity of visuospatial displays? *Abstraction, Scale and Perception, International Cartographic Association Joint Commission Workshop, Jul 15, Tokyo, Japan*
47. \* **Rautenbach, V., Coetzee, S., Pijper, L., Pettit, C., Çöltekin, A.**, Madden, M., Christophe, S., Lkhamjav, O. (2019). Towards establishing an open catalogue for geospatial educational resources, In: *Proceedings of the ISPRS Geospatial week Delft, Archives of the ISPRS.*

## **2018**

#### **Editorials, monographs, book reviews**

48. **Bianchetti, R., Çöltekin, A., Hoffman, R.** *Remote Sensing and Cognition – Human Factors in Image Interpretation*. Taylor and Francis. (edited book)

#### **Peer-reviewed full papers**

49. \***Lokka, I.E., Çöltekin, A. (corresponding author)**, Wiener, J., Fabrikant, S.I., Roecke, C. (2018). Virtual environments as memory training devices in navigational tasks for older adults. *Nature Scientific Reports*
50. **Çöltekin, A.**, Janetzko, H., Fabrikant, S. (2018). Geographic Visualization. Entry for the *Body of Knowledge in GIScience and Technology*
51. **Çöltekin, A.**, Biland, J. (2018). Terrain Reversal Effect in Satellite Images versus the Shaded Relief Maps. *International Journal of Digital Earth*

#### **Abstract-reviewed full papers, short papers**

52. Çöltekin, A., Rautenbach V., Coetzee, S., Mokwena, T. (2018). The accuracy of landform perception in shaded relief maps based on light direction: a replication study confirms that NNW is better than NW. *ISPRS Midterm Symposium, Delft*
53. \* Lokka, I. E., & Çöltekin, A. (2018) Evaluating route learning performance of older and younger adults in differently-designed virtual environments: A task-differential analysis, *ISPRS Midterm Symposium, Delft*
54. \* Lokka, I. E., & Çöltekin, A. (2018). Do age differences affect performance in 2D sketching based on a first-person perspective (3D) route learning task in *differently-designed* virtual environments? *Spatial Cognition, Tuebingen*
55. \* Bektaş, K., & Çöltekin, A. (2018). GeoGCD: Geographic Gaze Contingent Display. In *Eye Tracking for Spatial Research, Proceedings of the 3rd International Workshop*. ETH Zurich
56. \* Lokka, I. E., & Çöltekin, A. (2018). A virtual reality experiment for improving the navigational recall: What can we learn from eye movements of high-and low-performing individuals?. In *Eye Tracking for Spatial Research, Proceedings of the 3rd International Workshop*. ETH Zurich

2017

**Peer-reviewed full papers**

57. Voinov, A., **Çöltekin, A.**, Chen M., Beydoun, G., (2017) Virtual Geographic Environments in Socio-Environmental Modeling: A fancy distraction or a key to communication? *International Journal of Digital Earth (position paper)*
58. Demšar, U., **Çöltekin, A.** (2017). Fields of influence: Quantifying gaze and mouse interactions with spatial visual interfaces: novel methods using concepts from computational movement analysis and visualisation. *PlosOne*
59. \*Lokka, I-E., **Çöltekin, A.** (2017). Towards optimizing the design of virtual environments for route learning: An empirical study of memorability with changing levels of realism. *International Journal of Digital Earth*. (DOI: <http://dx.doi.org/10.1080/17538947.2017.1349842>)
60. **Çöltekin, A.**, Francelet, R., Richter, K-F., Thoresen J., Fabrikant S. (2017). The effect of visual realism, spatial abilities, and competition on performance in map-based route learning in men. *Cartography and Geographic Information Science*. (DOI: <https://doi.org/10.1080/15230406.2017.1344569>)
61. \*Schnur, S., Bektaş, K., **Çöltekin, A.** (2017). Measured and Perceived Visual Complexity: A Comparative Study among Three Online Map Providers. *Journal: Cartography and Geographic Information Science (CaGIS)*. (DOI: <https://doi.org/10.1080/15230406.2017.1323676>)
62. **Çöltekin, A.**, Bleisch, S., Andrienko, G., Dykes J. (2017). Persistent research challenges in geovisualization. *International Journal of Cartography* (DOI <https://doi.org/10.1080/23729333.2017.1302910>)
63. \*Roth, R., **Çöltekin, A.**, Delazari, L., Fonseca Filho , H., Griffin, A., Hall, A., Korpi, J., Lokka, I., Mendonça, A., Ooms, K., van Elzakker, C. P. (2017). User Studies in Cartography: Opportunities for Empirical Research on Interactive Maps and Visualizations. *International Journal of Cartography* (DOI: <https://doi.org/10.1080/23729333.2017.1288534>)
64. \*Brychtová, A., **Çöltekin, A.** (2017). Calculating color distance in choropleth maps with sequential colors – a case study with Color Brewer 2.0. *Kartographische Nachrichten*.
65. Krejtz, K., **Çöltekin, A.**, Duchowski, A., Niedzielska, A. (2017) Using Coefficient K to Distinguish Ambient/Focal Visual Attention During Map Viewing. *Journal of Eye Movement Research*, 10 (2). (DOI: <https://doi.org/10.16910/jemr.10.2.3>)

**Abstract-reviewed full papers, short papers**

66. \*Brychtová, A., **Çöltekin, A.** (2017). Towards assessing generalization quality with visual complexity measures. In *Proceedings of the 28th International Cartographic Conference (ICC2017)*, July 1-8th, Washington DC, USA.[abstract, oral presentation]
67. **Çöltekin, A.**, Bleisch, S., Andrienko, G., Dykes, J. (2017). Long-standing research challenges in geographic visualization. In *Proceedings of the 28th International Cartographic Conference (ICC2017)*, July 1-8th, Washington DC, USA. [abstract, oral presentation]
68. \*Lokka, I.E., **Çöltekin, A.** (2017). Remembering what we see: Designing virtual environments to improve visuo-spatial recall for navigation tasks. In *Proceedings of the 28th International Cartographic Conference (ICC2017)*, July 1-8th, Washington DC, USA. [abstract, oral presentation]
69. \*Lokka, I.E., **Çöltekin, A.** (2017). Navigational learning in virtual environments that are designed to improve memory– Individual and group differences based on spatial abilities and age. Workshop on *Urban Wayfinding & the Brain*, June 14th, 2017, UCL, London, UK. [abstract, poster presentation]
70. \*Lokka, I.E., **Çöltekin, A.** (2017). Designing memorable 3D geovisualizations for the older adults. *Aging & Cognition 2017*, EUCAS, April 20-22, Zurich, CH. [abstract, poster presentation]
71. \*Lokka, I.E., **Çöltekin, A.** (2017). Virtual environments as memory training devices for navigational tasks as we age: A design perspective. 2nd International Workshop on *Models and Representation in Spatial Cognition*, April 6-7, Tuebingen, DE.[abstract, poster presentation]

**2016****Editorials, book reviews**

We finalized a theme section (special issue) as guest editors with the *ISPRS Journal of Photogrammetry and Remote Sensing* (IF 6.387, 5-year IF 6.547)

72. Guilbert, É., **Çöltekin, A.**, Castro, F. A., & Pettit, C. (2016). Theme section: Multi-dimensional modelling, analysis and visualization. *ISPRS Journal of Photogrammetry and Remote Sensing*, 117, 173-174. (doi:<https://doi.org/10.1016/j.isprsjprs.2016.05.001>)

**Peer-reviewed full papers**

73. **Çöltekin, A.**, Brychtova, A., Griffin, A., Robinson, A., Imhof, M., Pettit, C. (2016) Perceptual complexity of soil-landscape maps: a user evaluation of color organization in legend designs using eye tracking. *International Journal of Digital Earth*. <https://doi.org/10.1080/17538947.2016.1234007>
74. \*Rautenbach, V., Coetzee, S., & **Çöltekin, A.** (2016). Development and evaluation of a specialized task taxonomy for spatial planning: A map literacy experiment with topographic maps. *ISPRS Journal of Photogrammetry and Remote Sensing*. <https://doi.org/10.1016/j.isprsjprs.2016.06.013>
75. \*Bruegger, A., Fabrikant, S., **Çöltekin, A.** (2016). An empirical evaluation of three elevation change symbolization methods along routes in bicycle maps. *Cartography and Geographic Information Science*, 44(5), 436-451. DOI:10.1080/15230406.2016.1193766 DOI:10.1080/15230406.2016.1193766
76. \*Biland, J., & **Çöltekin, A. (corresponding author)** (2016). An empirical assessment of the impact of the light direction on the relief inversion effect in shaded relief maps: NNW is better than NW. *Cartography and Geographic Information Science*. DOI: 10.1080/15230406.2016.1185647
77. **Çöltekin, A.**, Hempel, J., Brychtova, A., Giannapoulos, I., Stellmach, S., & Dachstelt, R. (2016). Gaze and feet as additional input modalities for interaction with geospatial interfaces. *ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences*. DOI:10.5194/isprs-annals-III-2-113-2016
78. \*Thoresen, J. C., Francalet, R., **Çöltekin, A.**, Richter, K.-F., Fabrikant, S. I., & Sandi, C. (2016). Not all anxious individuals get lost: trait anxiety and mental rotation ability interact to explain performance in map-based route learning in men. *Neurobiology of Learning and Memory*. DOI: 10.1016/j.nlm.2016.04.008
79. \*Brychtová, A., & **Çöltekin, A.** (2016). The effect of spatial distance on the discriminability of colors in maps. *Cartography and Geographic Information Science*, 1-17. doi:10.1080/15230406.2016.1140074

**Abstract-reviewed full papers, short papers**

80. \*Brychtová, A., **Çöltekin, A.**, & Paszto, V. (2016). Do the visual complexity algorithms match the generalization process in geographical displays? In *ISPRS - International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*. Prague. [full paper]
81. \*Rautenbach, V., Coetzee, S., & **Çöltekin, A.** (2016). Investigating the use of 3D geovisualizations for urban design in informal settlement upgrading in South Africa. In *ISPRS - International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*. Prague. [full paper]
82. **Çöltekin, A.**, Lokka, I.-E., & Zahner, M. (2016). On the usability and usefulness of 3D (geo)visualizations - A focus on virtual reality environments. In *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*. Prague. [full paper]
83. \*Lokka, I.-E., & **Çöltekin, A.** (2016). Simulating navigation with virtual 3D geovisualizations - A focus on memory related factors. In *ISPRS - International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*. Prague. [short paper]



**2015****Editorials, book reviews**

We published a two-volume special issue as guest editors with the IJDE (2014 IF 3.291)

84. **Çöltekin, A.**, Pettit, C., & Wu, B. (2015). Geovisual analytics: human factors. *International Journal of Digital Earth*, 8(8), 595–598. doi:10.1080/17538947.2015.1047173
85. Pettit, C., **Çöltekin, A.**, & Wu, B. (2015). Geovisual analytics: design and implementation. *International Journal of Digital Earth*, 8(7), 517–521. doi:10.1080/17538947.2015.1047172
86. Christophe, S., **Çöltekin, A.** (2015). Editorial preface for the ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume II-3/W5, 2015 (Contributions from ISPRS Geospatial Week 2015, 28 Sep – 03 Oct 2015, La Grande Motte, France)
87. **Çöltekin, A.** (2015). Book review: Dimitris Ballas, Danny Dorling and Benjamin Hennig, The social atlas of Europe. *Environment and Planning B: Planning and Design*. doi:10.1177/0265813515621425 [Book review]

**Peer-reviewed full papers**

88. \*Brychtova, A., & **Çöltekin, A.** (2015). Discriminating classes of sequential and qualitative colour schemes. *International Journal of Cartography*, 1(1), 62–78. doi:10.1080/23729333.2015.1055643
89. \*Rautenbach, V., **Çöltekin, A.** & Coetzee, S. (2015). Exploring the impact of visual complexity levels in 3D city models on the accuracy of individuals' orientation and cognitive maps. *ISPRS Annals of Photogrammetry, Remote Sensing and Spatial Information Sciences, II-3/W5*, 499–506. doi:10.5194/isprsannals-II-3-W5-499-2015
90. Biljecki, F., Stoter, J., Ledoux, H., Zlatanova, S., & **Çöltekin, A.** (2015). Applications of 3D city models: State of the art review. *ISPRS International Journal of Geo-Information*, 4(4), 2842–2889. doi:10.3390/ijgi4042842
91. Addor, N., Ewen, T., Johnson, L., **Çöltekin, A.**, Derungs, C., & Muccione, V. (2015). From products to processes: Academic events to foster interdisciplinary and iterative dialogue in a changing climate. *Earth's Future*, n/a–n/a. doi:10.1002/2015EF000303
92. Egli, M., Maisch, M., Purves, R., **Çöltekin, A.**, & Hilbich, C. (2015). Multi-methodological reconstruction of the lake level at Morgarten in the context of the history of the Swiss Confederation. *The Holocene*, 25(11), 1727–1741. doi:10.1177/0959683615591360
93. \*Schnürer, R., Sieber, R., & **Çöltekin, A.** (2015). The next generation of atlas user interfaces: A user study with “Digital Natives.” In *Modern Trends in Cartography - Lecture Notes in Geoinformation and Cartography* (pp. 23–36). doi:10.1007/978-3-319-07926-4\_3
94. Li, S., Dragicevic, S., Castro, F. A., Sester, M., Winter, S., **Çöltekin, A.**, ... Cheng, T. (2015). Geospatial big data handling theory and methods: A review and research challenges. *ISPRS Journal of Photogrammetry and Remote Sensing*. doi:10.1016/j.isprsjprs.2015.10.012

**Abstract-reviewed full papers, short papers**

95. \*Bektas, K., **Çöltekin, A. (corresponding author)**, Krüger, J., & Duchowski, A. T. (2015). A testbed combining visual perception models for geographic gaze contingent displays. In E. B. and J. K. and E. Puppo (Ed.), *Eurographics Conference on Visualization (EuroVis)*. The Eurographics Association. doi:10.2312/eurovisshort.20151127 [Best paper award]
96. **Çöltekin, A.** (2015). Mix well before use: Understanding the key ingredients of user studies. In *ICC2015 Workshop on “Envisioning the Future of Cartographic Research.”* Curitiba, Brazil. [position paper]
97. **Çöltekin, A.**, Lokka, I.-E., & Boer, A. (2015). The utilization of publicly available map types by non-experts -- A choice experiment. In *Proceedings of the 27th International Cartographic Conference (ICC2015)*. [full paper]
98. \*Rautenbach, V. Coetzee, S., Schiewe, J., **Çöltekin, A.** (2015). An assessment of visual variables for the cartographic design of 3D informal settlement models. In *27th International Cartographic Conference, ICC2015, Rio De Janeiro, Brazil*. [full paper]

99. Richter, K-F., Tomko, M., **Çöltekin, A.** (2015). Are we there yet? Spatial cognitive engineering for situated Human-Computer Interaction. In *CESIP 2015: Cognitive engineering for spatial information processes: From user interfaces to model-driven design. Workshop at COSIT 2015, October 12, 2015. Santa Fe, NM, USA.* [short paper]
100. De Sabbata, S., **Çöltekin, A.**, Eccles, K., Hale, S., Straumann, R. (2015). Collaborative visualizations for Wikipedia critique and activism. In *Ninth International AAAI Conference on Web and Social Media.* [short paper]

## 2014

### Peer-reviewed full papers

101. Bernabé Poveda, M. A., & **Çöltekin, A (corresponding author).** (2014). Prevalence of the terrain reversal effect in satellite imagery. *International Journal of Digital Earth*, 8(8), 640-655. doi: <https://doi.org/10.1080/17538947.2014.942714>
102. \*Brychtova, A., & **Çöltekin, A.** (2014). An empirical user study for measuring the influence of colour distance and font size in map reading using eye tracking. *The Cartographic Journal*, 51(4), 1743277414Y.000. doi: <https://doi.org/10.1179/1743277414Y.0000000103>
103. Straumann, R. K., **Çöltekin, A.**, & Andrienko, G. (2014). Towards(re)constructing narratives from georeferenced photographs through visual analytics. *The Cartographic Journal*, 51(2), 152–165. doi: <https://doi.org/10.1179/1743277414Y.0000000079>
104. Ooms, K., **Çöltekin, A.**, De Maeyer, P., Dupont, L., Fabrikant, S., Incoul, A., ...Van der Haegen, L. (2014). Combining user logging with eye tracking for interactive and dynamic applications. *Behavior Research Methods*. doi: <https://doi.org/10.3758/s13428-014-0542-3>
105. \*Russo, P., Pettit, C., **Çöltekin, A. (corresponding author)**, Imhof, M., Cox, M., & Bayliss, C. (2014). Understanding soil acidification process using animation and text: An empirical user evaluation with eye tracking. In *Cartography from Pole to Pole - Lecture Notes in Geoinformation and Cartography* (pp. 431–448). Springer-Verlag Berlin Heidelberg.

### Abstract-reviewed full papers, short papers

106. Ooms, K., Fabrikant, S., **Çöltekin, A.**, & Maeyer, P. (2014). Eye tracking with geographic coordinates: methodology to evaluate interactive cartographic products. In *GIScience2014, Vienna*. Vienna, Austria. [short paper]
107. **Çöltekin, A.**, Demsar, U., Brychtova, A., & Vandrol, J. (2014). Eye-hand coordination during visual search on geographic displays. In *Proceedings of the 2nd International Workshop on Eye Tracking for Spatial Research, GIScience2014*. Vienna, Austria. [short paper]
108. Krejtz, K., Duchowski, A. T., & **Çöltekin, A.** (2014). High-level gaze metrics from map viewing: Charting ambient/focal visual attention. In *Proceedings of the 2nd International Workshop on Eye Tracking for Spatial Research, GIScience2014*. Vienna, Austria. [short paper]
109. Demsar, U., & **Çöltekin, A.** (2014). Quantifying the interactions between eye and mouse movements on spatial visual interfaces through trajectory visualisations. In *Proceedings of the Workshop on Analysis of Movement Data, GIScience2014*. Vienna, Austria. [short paper]
110. \*Rautenbach, V., Coetzee, S., & **Çöltekin, A.** (2014). Towards evaluating the map literacy of planners in 2D maps and 3D models in South Africa. In *AfricaGEO2014 Conference Proceedings*. Cape Town, South Africa. [full paper]
111. Ewen, T., Addor, N., Johnson, L., Çöltekin, A., Derugns, C., Muccione, V. (2014). Creating dialogue: a workshop on “Uncertainty in Decision Making in a Changing Climate”, In *Proceedings of the EGU General Assembly 2014, Vienna, Austria, Vol. 16, EGU2014-6019-2, 2014* [abstract]

## 2013

112. \*Russo, P., Pettit, C., **Çöltekin, A.**, Imhof, M., Cox, M., & Bayliss, C. (2013). Presenting complex environmental information online: A comparative empirical evaluation of animation versus text. In *International Cartographic Conference, ICC 2013, Dresden, Germany*. Dresden. [abstract reviewed full paper, a full-paper review version appeared in 2014]

113. \*Dall'Acqua, L., **Çöltekin, A.**, & Noetzli, J. (2013). A comparative user evaluation of six alternative permafrost visualizations for reading and interpreting temperature information. In *GeoViz Hamburg 2013 Interactive Maps that Help People Think*. [extended abstract]
114. \*Boér, A., **Çöltekin, A.**, & Clarke, K. C. (2013). Evaluating Web-based geovisualizations online: A case study with abstraction-realism spectrum in Focus. In *International Cartographic Conference, ICC 2013, Dresden, Germany*. Dresden. [abstract reviewed full paper]

## 2012

### Peer-reviewed full papers

115. \*Bernasocchi, M., **Çöltekin, A. (corresponding author)**, & Gruber, S. (2012). An open source geovisual analytics toolbox for multivariate spatio-temporal data for environmental change modeling. *ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, 1-2(2), 123–128.
116. \*Bektas, K., **Çöltekin, A.**, & Straumann, R. (2012). Survey of true 3D and raster level of detail support in GIS software. In *True 3D in Cartography - Lecture Notes in Geoinformation and Cartography* (pp. 43–65). doi: <https://doi.org/10.1007/978-3-642-12272-9>

### Abstract-reviewed full papers, short papers

117. \*Bektaş, K., & **Çöltekin, A.** (2012). Area of interest based interaction and geovisualization with WebGL. In *Proceedings of The Graphical Web Conference*. Zurich, Switzerland. [short paper]
118. \*Tuggener, S., **Çöltekin, A.**, & Fabrikant, S. I. (2012). Mobility and social inequality: exploring the nexus by the means of sequence analysis and geovisualisation. In *Proceedings of International Symposium Masculine/feminine: Geographical Dialogues and Beyond*. [full paper]
119. \*Russo, P., **Çöltekin, A.**, Thieme, S., & Bayliss, C. (2012). The migration story of a Kyrgyz family father - a mixed media approach. In *Cartography & Narratives, Workshop organized by the Commission on Art and Cartography of the International Cartographic Association*. [extended abstract]

## 2011

### Editorials

120. **Çöltekin, A.**, & Clarke, K. C. (2011). A representation of everything. *Geospatial Today (Guest Editorial)*, 26–28.

### Peer-reviewed full papers

121. **Çöltekin, A.**, & Reichenbacher, T. (2011). High quality geographic services and bandwidth limitations. *Future Internet*, 3(4), 379–396. doi: <https://doi.org/10.3390/fi3040379>
122. Gobron, S., **Çöltekin, A.**, Bonafos, H., & Thalmann, D. (2011). GPGPU computation and visualization of three-dimensional cellular automata. *The Visual Computer*, 27(1), 67–81. doi: <https://doi.org/10.1007/s00371-010-0515-1>
123. \*Nussbaum, M., Ettlin, L., **Çöltekin, A.**, Suter, B., & Egli, M. (2011). The relevance of scale in soil maps. *BGS Bulletin*, 32, 63–70.

### Abstract-reviewed full papers, short papers

124. **Çöltekin, A.**, Sabbata, S. De, Willi, C., Vontobel, I., Pfister, S., Kuhn, M., & Lacayo, M. (2011). Modifiable temporal unit problem. In *ISPRS/ICA Workshop "Persistent Problems in Geographic Visualization" - ICC2011*. Paris, France. [extended abstract]
125. \*Bektaş, K., & **Çöltekin, A.** (2011). An approach to modeling spatial perception for geovisualization. *Procedia - Social and Behavioral Sciences*, 21, 53–62. doi: <https://doi.org/10.1016/j.sbspro.2011.07.027>
126. Bernabe, M. A., Ortega, I. S., & **Çöltekin, A.** (2011). Techniques for highlighting relief on orthoimagery. *Procedia - Social and Behavioral Sciences*, 21, 346–352. <https://doi.org/10.1016/j.sbspro.2011.07.028>

127. \*Kuhn, M., Pfister, S., Vontobel, I., Willi, C., De Sabbata, S., & **Çöltekin, A.** (2011). *TIMELINE: A tool for the video analysis and visualisation of geographic phenomena over time*. In *International Cartographic Conference, ICC 2011, Paris, France*. [short paper]

## 2010

### Peer-reviewed full papers

128. **Çöltekin, A.**, Fabrikant, S. I., & Lacayo, M. (2010). Exploring the efficiency of users' visual analytics strategies based on sequence analysis of eye movement recordings. *International Journal of Geographical Information Science*, 24(10), 1559–1575. doi: <https://doi.org/10.1080/13658816.2010.511718>
129. \*Li, X., **Çöltekin, A.**, & Kraak, M.-J. (2010). Visual exploration of eye movement data using the Space-Time-Cube. *Lecture Notes in Computer Science*, 6292, 295–309.

### Abstract-reviewed full papers, short papers

130. \*Schnur, S., Bektas, K., Salah, M., **Çöltekin, A.** (2010). A comparison of measured and perceived visual complexity for dynamic Web maps. In *GScience 2010*. [short paper]

## 2009

### Peer-reviewed full papers

131. **Çöltekin, A.**, Heil, B., Garlandini, S., & Fabrikant, S. I. (2009). Evaluating the effectiveness of interactive map interface designs: A case study integrating usability metrics with eye-movement analysis. *Cartography and Geographic Information Science*, 36(1), 5–17. doi:10.1559/152304009787340197
132. **Çöltekin, A.** (2009). Space-variant image coding for stereoscopic media. In *2009 Picture Coding Symposium* (pp. 1–4). IEEE. doi: <https://doi.org/10.1109/PCS.2009.5167396>

### Abstract-reviewed full papers, short papers

133. \*Bektaş, K., & **Çöltekin, A.** (2009). A survey of stereoscopic visualization support in mainstream Geographic Information Systems. In *True 3D in Cartography: 1st International Conference on 3D Maps* (pp. 200606–200606). [full paper]
134. \*Zanola, S., Fabrikant, S. I., & **Çöltekin, A.** (2009). The effect of realism on the confidence in spatial data quality. In *International Cartographic Conference, ICC 2009, Santiago, Chile*. [full paper]

## 2008 and earlier

135. **Çöltekin, A.**, Garlandini, S., Heil, B., & Fabrikant, S. (2008). Evaluating the effectiveness of interactive map interface designs: A case study with eye movement analysis. In *Proceedings of AutoCarto 2008, Shepherdstown, West Virginia, US*. [abstract-reviewed full paper, a full-paper review version appeared in 2014]
136. **Çöltekin, A.** (2007). An empirical evaluation: Visual attention management by foveation? In *ICA Commission on Visualization and Virtual Environments Annual Commission Meeting*. Helsinki, Finland. [extended abstract]
137. Duchowski, A. T., & **Çöltekin, A.** (2007). Foveated gaze-contingent displays for peripheral LOD management, 3D visualization, and stereo imaging. *ACM Transactions on Multimedia Computing, Communications, and Applications*, 3(4), 1–18. doi: <https://doi.org/10.1145/1314303.1314309> [peer-reviewed full paper]
138. **Çöltekin, A.** (2006). *Foveation for 3D visualization and stereo imaging (PhD Thesis)*. Helsinki, Finland. [Monograph]
139. **Çöltekin, A.**, & Haggren, H. (2006). Stereo foveation. *The Photogrammetric Journal of Finland*, 20(1), 45–54. [peer-reviewed full paper]

140. **Çöltekin, A.** (2005). A visualization method based on foveation. In *International Cartographic Conference, ICC 2005, A Coruna, Spain*. A Coruna, Spain. [abstract-reviewed full paper]
141. **Çöltekin, A.** (2005). Stereo-foveation for anaglyph imaging. In A. J. Woods, M. T. Bolas, J. O. Merritt, & I. E. McDowall (Eds.), *Proc. SPIE* (Vol. 5664, pp. 48–55). doi:10.1117/12.587982 [reviewed short paper]
142. **Çöltekin, A.** (2004). Foveation support in current photogrammetric software. In *International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences*. Istanbul, Turkey. [abstract-reviewed full paper]
143. **Çöltekin, A.**, Kremenova, O., & Virrantaus, K. (2003). A survey on the present online education offered in the fields of Cartography and Geoinformatics. In *International Cartographic Conference, ICC 2003, Durban, South Africa*. [abstract-reviewed full paper]
144. **Çöltekin, A.** (2003). Virtual reality as an interface to GIS - Focus on WWW. In *21st International Cartographic Conference (ICC) - 10-16 August*. Durban, South Africa. [abstract-reviewed full paper]
145. **Çöltekin, A.** (2002). A prototype of FIG surveying education portal. In *Proceedings of the FIG - April 19-26*. Washington, D.C., USA. [abstract-reviewed full paper]
146. **Çöltekin, A.** (2002). A search for the optimum image database for handling the ortho-textures in VRML. In *Proceedings of the ASPRS 2002*. [abstract-reviewed full paper]
147. **Çöltekin, A.** (2002). An analysis of VRML-based 3D interfaces for online GISs: Current limitations and solutions. *Finnish Journal of Surveying Sciences*, 20(1/2), 80–91. [peer-reviewed full paper]
148. **Çöltekin, A.** (2001). Exercises in cartography and geoinformatics: Teaching the colours. In *Proceedings of the ICC, August 6-10*. Beijing, China. [abstract-reviewed full paper]
149. **Çöltekin, A.** (2000). Comparing the Nordic education to the Mediterranean. In *Proceedings of the Mediterranean Surveyor in the New Millennium - September 18-21*. Malta. [abstract-reviewed full paper]
150. **Çöltekin, A.**, & Haggren, H. (2000). VRML as a tool for WEB-based, 3D, photo-realistic GIS. In *International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences* (pp. 143–148). [abstract-reviewed full paper]
151. **Çöltekin, A.**, Vartiainen, M., Koc, M. (1999). Consequences of computer breakdowns on time usage. In *HCI International, the 8th International Conference on Human-Computer Interaction (Vol.1)* (pp. 1078–1082). Munich, Germany: Lawrence Erlbaum Associates, Publishers, London. [peer-reviewed full paper]
152. **Çöltekin, A.**, Hekkinen, J., Ronnholm, P. (1999). Studying geometry color and texture in VRML. *Surveying Science in Finland*, 17(1-2), 65–90. [peer-reviewed full paper]
153. **Çöltekin, A.** (1998). Geometrically correct VRML models: A case study for a campus information system for Helsinki University of Technology. In J. Santala (Ed.), *Multi-dimensional Modeling and Visualization*. Helsinki, Finland: Helsinki University of Technology Publications. [abstract-reviewed full paper]
154. **Çöltekin, A.**, Hatem, V., Çöltekin, C., & Vural, A. (1997). Internet and GIS. In *2nd Turkish-German Geodetic Joint Days, 28-30 May*. Berlin, Germany. [abstract-reviewed full paper]
155. **Çöltekin, A.** (1997). Yıldız Teknik Üniversitesi Bilgi Sistemi (YTU Information System). *Sanal Gazete*. [popular science outlet]
156. **Çöltekin, A.**, & Duzgun, F. (1996). Uydu görüntüleriyle (SPOT) sayısal arazi modeli üretimine yönelik bir uygulama (Generating a DEM using non-stereographic SPOT imagery). In *GIS'96 Symposium*. Istanbul, Turkey. [extended abstract]

**Prof. Dr. Arzu Çöltekin**

Head of the Institute for Interactive Technologies IIT

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March 7<sup>th</sup> 2023

To the  
Secretary-General and Treasurer of the ICA  
Thomas Schulz  
Federal Department of Home Affairs FDHA  
Swiss Federal Statistical Office FSO  
Espace de l'Europe 10  
CH-2010 Neuchâtel  
Switzerland

**Declaration of willingness to serve**

To Whom It May Concern:

Dear Secretary-General, honored delegates of the General Assembly,

I hereby declare that I am willing to serve as a co-chair of the ICA commission on Geovisualization (previously named Visual Analytics), for a period of four years, starting with and under the condition of election and instantiation of such commission by the ICA General Assembly in Cape Town, South Africa, on August 18, 2023.

If you have any questions, please do not hesitate to contact me.

Sincerely,



Prof. Dr. Arzu Çöltekin

# Current Terms of Reference

(2019-2023)

The Commission on Visual Analytics will:

1. Promote and advance visual analytics in cartography, which is the science of analytical reasoning as supported by interactive visual interfaces to spatio-temporal data.
2. Develop science, technology, and design approaches to address major challenges associated with geographic information analysis and synthesis that enable users to solve key societal and environmental problems.
3. Foster interdisciplinary and international collaboration between potential users of geospatial visual analytics and researchers, as well as between allied research communities in other disciplines and other ICA Commissions.

The Commission will achieve this vision by:

1. Actively disseminating technical and methodological advances in cartographic visual analytics through workshops, seminars, edited special issues of journals, and peer-reviewed publications - with linkages to other ICA Commissions and allied organizations in other fields.
2. Conducting annual meetings, workshops, or tutorials to develop research in key thematic areas, partnering with international conferences and other ICA commissions to expand our reach beyond traditional venues and audiences and to diversify who engages with visual analytics in the ICA.
3. Recruiting and retaining a co-chair and bolstering the core membership to help guide Commission activities and foster collaboration within and outside of the ICA.
4. Maintaining a dedicated web presence and engaging with members via social media to highlight Commission activities and promote participation beyond attendance at in-person meetings through new forms of distance collaboration.

# Proposed Terms of Reference

(For the period 2023-2027)

The **Commission on Geovisualization\*** will:

1. Promote and advance geovisualization in cartography, which is the science and technology of interactive visual interfaces for solving problems with spatio-temporal data. Geovisualization can take a variety of forms, ranging from desktop tools to virtual, immersive environments.

2. Develop science, technology, and design approaches to address major challenges associated with geographic information visualization, analysis, and synthesis that enable users to solve key societal and environmental problems.
3. Foster interdisciplinary and international collaboration between potential users of geovisualization and researchers, as well as between allied research communities in other disciplines and other ICA Commissions. Particular emphasis shall be put on forming an inclusive and truly global community of geovisualization practitioners and researchers, and on supporting the next generation of cartographers and early-career scholars to engage with the activities of the commission.

The Commission will achieve this vision by:

1. Actively disseminating technical and methodological advances in geovisualization through workshops, seminars, edited special issues of journals, and peer-reviewed publications - with linkages to other ICA Commissions and allied organizations in other fields.
2. Conducting annual meetings, workshops, or tutorials to develop research in key thematic areas, partnering with international conferences and other ICA commissions to expand our reach beyond traditional venues and audiences and to diversify who engages with geovisualization in the ICA.
3. Recruiting and retaining one or multiple vice-chairs and bolstering the core membership to help guide Commission activities and foster collaboration within and outside of the ICA.
4. Maintaining a dedicated web presence and engaging with members via social media to highlight Commission activities and promote participation beyond attendance at in-person meetings through new forms of distance collaboration.

\* Note, we propose changing the name from *Visual Analytics* to **Geovisualization**. The former term was intended to draw closer connections to the burgeoning field in Computer Science and Visualization, but in the intervening period since the name change (beginning in 2015), Geovisualization has garnered greater interest within Cartography, and VA has not really grown beyond a small number of conferences. We also wish to more tightly focus on visualization as a tool and method used in *Cartography*.