

**Arzu Çöltekin**

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**Curriculum Vitae**

I am a professor of computer science in human-computer interaction (HCI) and extended reality (XR) at the Institute for Interactive Technologies of the University of Applied Sciences and Arts Northwestern Switzerland (FHNW); and a research affiliate at Harvard University's Harvard-Smithsonian Center for Astrophysics, 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, virtual/augmented 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. I organize/co-organize conferences, and serve in program committees of many scientific events, including the InfoVis, IEEE VisWeek, Geocomputation, ETRA, AutoCarto, ISPRS, AGILE, and the ICC. I am in the editorial boards of several journals such as the International Journal of Geographic Information Science (IJGIS), Journal of Geovisualization, and KN Journal of Cartography and Geographic Information, and have guest edited many journal special issues. 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 am a Council Member with the International Society of Digital Earth.

**Appointments**

2020-	Prof. , Inst. for Interactive Tech., 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

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2021	PI: InnoSuisse Grant (2 years, total CHF 828,300, PI's share CHF 200,000)
2020	PI: InnoSuisse Innovationscheque (2x 1 year: CHF 30,000) PI: R&D grant Medignition (CHF 13,000) PI: Leading house seed money grants: Switzerland-Brazil collaboration (CHF 23,000)
2019	PI: InnoSuisse Grant (2+1 years, total CHF 828,300, PI's share CHF 452,107) PI: InnoSuisse Grant (2.5 years, total CHF 714,960, PI's share CHF 519,432) PI: FHNW Lehrfonds (12 months, CHF 50,000) PI: InnoSuisse Innovationscheque (3x 1 year: CHF 15,000, total CHF 45,000)
2018	Co-I: <i>ETH Research Grant</i> (3 years: CHF 176,600)
2017	Principal Investigator (PI): <i>Swiss National Science Fund</i> (1 year: CHF 62,540) Co-PI: Innovation fund, UZH Geography (1 year: CHF 10,000)
2016	Co-I: <i>Swiss National Science Fund</i> (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: <i>Google Faculty Research Award</i> (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

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

## Honors

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2019	Invited as a Council Member at the International Society of Digital Earth Invited to the Scientific Advisory Board Austrian Science Foundation project DigitAS (Mixed Reality) Nominated and elected as <i>co-chair</i> Visual Analytics commission, ICC
2018	Invited <i>visiting professor</i> 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 <i>Full Prof.</i> in computer science, Uni. St. Gallen Shortlisted (top four) for an <i>Assoc. Prof.</i> in visualization, Uni. Michigan (withdrew, took the offer from FHNW) Best poster (3 <sup>rd</sup> place, voted) Spatial Cognition 2018
2017	Appointed <i>executive board</i> member Innovation Fund "InnoPool", UZH Geography
2016	Appointed <i>chair</i> , Geovisualization, Augmented and Virtual Reality working group, ISPRS
2015	Best short paper <i>award</i> at the IEEE EuroVis Conference (corresponding author)
2014	Invited researcher at Harvard University, continuing relationship as a <i>research affiliate</i>
2012	Appointed <i>co-chair</i> , 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)

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- 2021 **Special issue** Eye tracking IJGI (active)  
**Special issue** on State of the art and science in Cartography" IJC (incoming)  
 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)

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### Employer/manager

2020-current M. Lacayo, K. Koebel, C. Merz, A. Schneiter, M. Recher, M. Burri, C. Huesser, A. Zirn, M. Murali, L. Baumgartner; T. Figini, F. Millan, U. Molteni, L. Moguel; D. Vegh; 2019: 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 U. Molteni, L. Moguel, M. Lacayo (incoming); 2019 A. Wilk; 2018 A. Diehl (w/ UZH), M. Tomasic, 2017, G. Marbach, A. Brychtova

### PhD advisor

Current: I. Lochhead (2018, commt. member, SFU/CA), R. Schnuerer (2017, co-advisor, ETH), A. Amiraghdam (2017 co-advisor IFI/UZH, SNF grant), Completed: 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 (planned for 2021, Architectural and Urban Ambiances Laboratory of the 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. Schneiter (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. Tugener; 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)

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

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

### 2021

- \*\* Human cognition and visuo-spatial information: Experiments in visualization and virtual reality, **Keynote at the ISPRS “virtual keynotes” series** (large event). 30 September 2021
- Levels of detail, levels of realism: Controlling the information intensity in virtual environments, Workshop in VGE session at the the 28th International Conference on Geoinformatics, China, 9<sup>th</sup> July 2021
- 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
- Digital health from human-computer interaction and extended reality perspectives, Transfer Transparent faculty colloquium series, **School of Engineering, UAS NW, CH**, 1 June 2021
- \* Linking visuospatial cognition with visuospatial displays through empirical experiments (host: Zoya Bylinskii), **Adobe Research Seminars**, 13 May 2021
- Individual and group differences in human-information interaction (host: Jukka M. Krisp), **University of Augsburg, DE**, 10 May 2021
- \* 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**

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

- \* 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
  - Visuospatial complexity of information displays: A focus on an aging audience, Research colloquium, **School of Life Sciences UAS NW**, CH, 31 March 2021
- 2020
- Visuospatial information processing – Cognitive and computational explorations in technology and design (host: Stefano de Sabbata), University of Leicester, UK, 25 Nov 2020
  - \*\* 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
  - \* All downhill from here? Visualization and interpretation of landforms, ESRI GIS Day, Low Budget High Fidelity, USA, 18 Nov 2020
  - \* Illusion (and exclusion) of Talent, Geodes, Gender Diversity & Equality Workshop, ETH Zurich, 6 Nov 2020
  - Exploring perception for design and technology (guest lecture, host Davood Shojaei), University of Melbourne, AU, 19 Oct 2020
  - \* Virtual cities, visuospatial memory, and aging, DIMENSIONSZR Congress, organized by SSVAR, Zurich, 29 Oct 2020
  - 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
- \* Future of information displays: Aging and Technology, World Usability Day Switzerland, Zurich, 14 November 2019
  - Perceptual factors in human-visualization interaction (host: Hans-Balder Havenith, Geology), Liege University, Belgium, May 2
  - \*\* 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
  - Human factors in designing visuospatial displays, Transfer Transparent interdisciplinary colloquium, University of Applied Sciences and Arts Northwestern Switzerland FHNW, Switzerland, Mar 19
  - 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
- 10QViz: Evidence-based visual literacy (host: Alyssa Goodman, Astrophysics), Harvard University, USA, 27 Nov
  - 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
  - Thinking about visuospatial information displays - Perceptual and cognitive considerations (hosts: Alan MacEachren, Anthony Robinson, Geography), PennState, USA, 12 Nov
  - Elements of Visual Complexity in Geospatial Information Displays (host: Rob Roth, Geography) Uni Wisconsin, USA, 9 Nov
  - Vision inspired (geo)visualization, Harvard University, Visual Attention Lab (host: Jeremy Wolfe, Vision Science), USA, 6 Nov
  - Empirical experimentation in (geo)visualization: Examples, challenges, state of the art. DfKG, University of Bochum, Germany, 25 Jun
  - Foundations of Interaction for Information Visualization, Guest lecture, University of Zurich, Information Visualization MSc course, Switzerland, 11 Oct
  - Dimensions of visuospatial complexity (host: Nick Holliman). Newcastle University, UK, 16 Mar
  - Visuospatial complexity of human-computer interaction and scientific visualization as we age. University of St. Gallen, Switzerland, 15 Feb
- 2017
- \* Science down to earth: Metrics. InnoPool project, UZH, Switzerland, 5 May
  - \* Visual Complexity, Google Zurich, Switzerland, 22 Sep
- 2016
- Visual information processing and visualizing big data. University of Applied Sciences and Arts Northwestern Switzerland FHNW, Switzerland, 15 Jun

## 2015

- Understanding visual complexity from information processing and human-factors perspectives, City University, London, UK, 17 Jun
- \*\* Map complexity and its remedies. Keynote at the APCPP 2015 (Applying Principles of Cognitive Psychology in Practice), Brno, Czech Republic, 22 May
- \* 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

- \* Best practices in scientific visualization, Astrophysics Collquium, University of Zurich, Switzerland, Jul 1
- 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
- Eye movement metrics for evaluating geographic visualizations, Geomatics Colloquium, University of Applied Sciences and Arts Northwestern Switzerland FHNW, Switzerland, May 6
- Designing for complex contexts: interaction design for visualizing cities. UCL University Colleague London 24 Mar
- Understanding limits and strengths of our perception for geovisualization design. University of Olomouc, Geoinformatics Department, Czech Republic, 24 Feb

## 2013

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

## 2012

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

## 2011

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

- Stereoscopic Vision and Visualization for Three-Dimensional Geographic Information. IPEG meeting, Department of Geography, University of Zurich, 12 Jun
- Space-Variant Image Coding for Stereoscopic Media, Invited Speaker & Panelist in special session on Visual Attention and Efficient Image Coding, Chicago, US, 6 May

- Evaluating the Effectiveness of Interactive Map Interface Designs: A Case Study with Eye-Movement Analysis. Tobii EyeTrackUX 2009, Frankfurt, 22 Apr

## Reviewing (service, selected)

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<b>Grant panels</b>	UZH InnoPool (board member 2017-2019), ETH, national funding agencies in Norway, Belgium, Poland, and Canada, and European Union.
<b>Journals</b>	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,...
<b>Conferences</b>	IEEE VAST, InfoVis, ACM ETRA, EuroVis, Eurographics, INTERACT, ISPRS, Geocomputation, AGILE, Spatial Cognition, GIScience, ICA, IRTG DC (GIScience Doctoral Colloquium), CogSci, COSIT, ...

## Teaching experience

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### **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 (with embedded HCI concepts), Data visualization & Visual Analytics (data science, project based)

### **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-kdimensional 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

### **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

### **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

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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

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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 and Uighur)

## Personal and/or semi-professional activities

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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>). 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>

Also: 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>. Also see my Google Scholar profile here for an overview of my citation profile <https://scholar.google.ch/citations?user=G2PIX-0AAAAJ&hl=en>.

## 2021

Several manuscripts under review and in preparation.

### Peer-reviewed full papers

1. **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, arXiv preprint arXiv:1907.12879. *Transactions in Visualization*
2. \* Bragger, L., Baumgartner, L., Koebel, K., Scheidegger, J., **Çöltekin, A.** (corresponding author). Collaborative extended reality and digital twins for communicating about space: Exploring HCI modalities for multiple users. Submitted to CSCW2021 (under review)
3. \* Huesser, C., Schubiger, S., **Çöltekin, A.** (corresponding author). 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*. (accepted)
4. Tarnanas, I., Meier, I., Buegler, M., Harms, R., Seixas, A., **Çöltekin, A.** (2021) Using a Digital Neuro Signature to measure longitudinal individual-level change in Alzheimer's Disease: the Altoida large cohort study. *Nature Partner Journal npj Digital Medicine* (accepted)
5. **Çöltekin, A.**, Griffin, A., Robinson, A. (2021). Visualizations. *Oxford Bibliographies Online Research Guide*. Oxford University Press. (DOI: 10.1093/obo/9780199874002-0224)

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

1. 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)



2. 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.)
3. 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)
4. 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)
5. **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.)
6. **Çöltekin, A.** (2021). Effects of cue integration on three-dimensional shape from shading. *Vision Sciences Society, V-VSS 2021* May 21-16. (abstract)
7. 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)
8. **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. *Aging & Cognition 2021 (EUCAS2021)*, April 15th. (abstract)

## 2020

### Peer-reviewed full papers

6. 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>
7. **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>
8. \* 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>
9. **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)
10. \*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

11. **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]
12. Gołębiowska, I., **Çöltekin, A.** (2020). Chasing rainbows: Prevalence of the rainbow color scheme in scientific publications. *NACIS2020* [abstract only, oral presentation]
13. \* 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]
14. 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*

15. **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>
16. **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*

17. **\*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>
18. **\* 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*
19. **\* 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*

20. **\* 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*
21. **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*
22. **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*
23. **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*
24. **\* 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*

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

### *Peer-reviewed full papers*

26. **\*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*
27. **Çöltekin, A.,** Janetzko, H., Fabrikant, S. (2018). Geographic Visualization. Entry for the *Body of Knowledge in GIScience and Technology*
28. **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**

29. 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*
30. \* 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*
31. \* 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*
32. \* Bektaş, K., & Çöltekin, A. (2018). GeoGCD: Geographic Gaze Contingent Display. In *Eye Tracking for Spatial Research, Proceedings of the 3rd International Workshop*. ETH Zurich
33. \* 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**

34. 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)*
35. 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*
36. \*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>)
37. **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>)
38. \*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>)
39. **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>)
40. \*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>)
41. \*Brychtová, A., **Çöltekin, A.** (2017). Calculating color distance in choropleth maps with sequential colors – a case study with Color Brewer 2.0. *Kartographische Nachrichten*.
42. 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**

43. \*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]
44. **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]

45. \*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]
46. \*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]
47. \*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]
48. \*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)

49. 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

50. **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>
51. \*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>
52. \*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
53. \*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
54. **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
55. \*Thoresen, J. C., Francelet, 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
56. \*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

57. \*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]
58. \*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]

59. **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]
60. \*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)

61. **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
62. 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
63. 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)
64. **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

65. \*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
66. \*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
67. 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
68. 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
69. 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
70. \*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
71. 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

72. \*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]
73. **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]

74. **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]
75. \*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]
76. 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]
77. 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

78. 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>
79. \*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>
80. 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>
81. 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>
82. \*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

83. 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]
84. **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]
85. 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]
86. 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]
87. \*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]
88. 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

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