Dr Joel Fiddes

Geoscientist

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Currently

I am a geoscientist with over 15 years of interdisciplinary experience working across research institutions, international organisations, government institutions and donor projects. My main interest is in the quantification of high mountain processes related to water resources and natural hazards, to better understand and mitigate impacts upon downstream communities. I use and develop geoscientific models and other datascience tools in combination with field campaigns to understand these processes and improve mapping and forecasting methods. Increasingly I am working with government institutions to support updating of hydro-meteorological forecasting procedures, particularly with respect to the cryosphere. I am currently working at the WSL Institute for Snow and Avalanche Research, based in Davos, Switzerland.

Education

2009-13 **University of Zurich** PhD Geoscience. Thesis: Subgrid Simulation of Land Surface Variables in Heterogeneous and Remote Environments: Application to Mountain Permafrost. Online pdf.

2006-07 **University of Edinburgh** MSc Environment & development. Thesis: Impact of climate change on snow-based water resources in Afghanistan.

2001-04 **University of Aberdeen** BSc Tropical Environmental Science. Thesis: Sustainability of subsistence hunting on Neotropical mammal species in North-East Peruvian Amazon.

Employment & Projects

Current Current **WSL Institute for Snow and Avalanche Research SLF** *Research scientist.* Investigating snow processes in High Asia using models, EO data and field measurements under SNF project "From Cloud to Ground: Snow Accumulation in Extreme Environments". SDC funded projects in Central Asia "Cryosphere Observations and Modelling for Improved Adaptation in Central Asia" (CROMO-ADAPT 2021-2025) and "Water, Weather and Climate Services" with CARITAS CH (WWCS 2021-2025). Both projects focus on mountain related water and hazards nexus and collaborate with an extensive network of regional partners. I am a Member of the Swiss Polar Institute flagship project "PAMIR" and contribute to data sharing projects of the WMO such as "Global Cryosphere Watch"

2022 __World Meteorological Organization *Consultant* Analysis and inventory of existing mountain observation and data sources related to snow, glaciers, permafrost, discharge, and ancillary data in Central Asia (Afghanistan, Tajikistan, Kyrgyzstan, Uzbekistan and Kazakhstan)

2021-23 **FutureWater** *Consultant* Developing a Glacio-Hydrological Model and IWRM Plan for a Selected Sub-basin in the Central Himalayas, Uttarakhand, India financed by the Swiss Agency Development Cooperation (www.futurewater.eu).

2021 **World Bank** *Consultant* Assessment Of Contributing Factors Of The May 2021 Disasters In Tajikistan. A forensic study under the Strengthening Critical Infrastructure against Natural Hazards Project (SCINHP, P158298)

2020-21 **Permian Global** *Consultant*. Supporting carbon prospecting projects through remote sensing analysis, code routines for carbon models. Tools for automated retrieval and analysis of remote sensing datsets to estimate deforestation rates.

2018-20 **Landell Mills Ltd** *Consultant* Zarafshan River Basin Programme, EU TA project with Ministry of Energy and Water Resources, Tajikistan. Develop pilot routines for monitoring and modelling snow based water resources.

2017-18 **University of Oslo** *Scientist* Swiss National Science Foundation research scholar. Developing data assimilation and uncertainty framework for large area snowpack simulations in mountain regions.

2017-18 __World Meteorological Organization *Consultant* for the WMO programme Global Cryosphere Watch. Developing a global solution for interoperability of CryoNet monitoring stations and GCW dataportal.

2014-17 **WSL Institute for Snow and Avalanche Research SLF** *Data scientist.* Developing and managing data systems for the SwissEx/ OSPER project a large interdisciplinary environmental data acquisition and management project with multiple ETH domain partners. The WSL/ SLF is a leading federal institute in Switzerland for both hydrology and natural hazard assessments.

2016 **Himalaya Permafrost ETH SEED** *Scientist* Establishment of high altitude permafrost monitoring sites Langtang, Nepal. Training young Nepalese scientists. International permafrost and data tools workshop with participants from Afghanistan, India and Nepal.

2014 **University of Zurich** *Scientist.* Managing PERMOS network of ground and rock temperature measurements at Jungfraujoch, Schilthorn, Piz Corvatsch. Including extensive fieldwork and rope-access work. Processing GST, meteorological station and borehole

data (www.permos.ch).

2014 **University of Zurich** *Scientist*. Swiss Development Cooperation/DEZA funded climate change adaptation programme (www.ihcap.in). Developing baseline maps for key land surface variables in the Indian Himalaya with direct coordination with several Indian Government agencies (lead Department of Science & Technology).

2012 _Afghanistan Research Evaluation Unit__ *Consultant*. Remote sensing analysis of water availability in irrigated zones in Sar-i-Pul River Basin.

2011 **GIZ/ Hydroc** *Consultant*. Disaster risk management project in Badahkshan, Afghanistan for GIZ. Component avalanche hazard risk zones.

2011 **Afghanistan Research Evaluation Unit** *Consultant*. Remote sensing analysis of water availability in irrigated zones in Panj Amu River Basin.

2010-11 **Landell Mills Ltd.** *Consultant*. As part of Panj-Amu River Basin Programme (P-ARBP) in north-east Afghanistan developed a strategy together with a range of tools to improve water resource management. Training the first government team in snow sampling techniques (training course Wakhan Corridor). Establishment of high altitude field sites.

2009 **Agha Khan Foundation** *Consultant*. Project "PMIS": Remote sensing analysis of irrigated zones in Baghlan NE AFghanistan. GIS & Remote Sensing – Applications in Social Water Management.

2009-13 **University of Zurich** *Scientific researcher/ PhD Candidate*. National science foundation funded research undertaken to develop and test tools that enable efficient application of numerical models driven by climate datasets in complex terrain. Work resulted in three first author publications. Oral and poster presentations at several international conferences. Supervision of MSc. and BSc. students. Fieldwork in high mountain environments. Large-scale deployment of temperature sensors.

2009 **Agha Khan Foundation** *Consultant*. Training in GIS systems and geospatial survey for AKF project engineers in Puli Khumri NE Afghanistan.

2007-17 **Independent Consultant** Projects mainly in field of water resources include: Environmental change analysis, capacity building, surveying / mapping, technical training. Clients include: multinational/ national donors, development consultancies, NGOs, e.g. European Commission, Landell Mills Ltd. Agha Khan Foundation, GIZ, Concern Worldwide.

2008 **Welt Hunger Hilfe** *Consultant*. Upper catchment protection project "PEEP": training in geospatial survey and GIS systems for PEEP project staff.

2008 **Concern Worldwide/ Welt Hunger Hilfe** *Consultant*. Social water management and upper catchment protection projects "SWIM/SMILE": Established GIS systems and conducted training in geospatial surveys for project staff. Surveying of irrigation channels and infrastructure.

2008 **Concern Worldwide** *Consultant*. Market analysis for natural resource based products in Takhar NE Afghanistan.

2007 **Landell Mills Ltd.** *Consultant*. Environmental screening report for irrigation rehabilitation component of Kunduz River Basin Programme. Additionally provided concept note on methods in snow and ice monitoring.

2007 **Mercy Corps** *Researcher*. Author of a policy document for global humanitarian agency Mercy Corps. Construction and analysis of a 30 year satellite data record to assess possible changes in snowcover area (SCA) over this period and implications for water resources of Northern Afghanistan. Collaboration with the Landell Mills led European Commission Kunduz River Basin Programme.

1999-04 **Formative research expeditions** Gulf apex predator prey project (*University Alaska Fairbanks, Alaska, 2004*). Subsistence hunting study (*University of Aberdeen/ Royal Geographical Society, Peruvian Amazon, 2003*), Coral reef biodiversity monitoring (*Greenforce/ University of Malaysia, Borneo, 2001*), Tian Shan biodiversity study (*BSES/CEH, Kyrgyzstan, 1999*).

Core competences

Tech Hydro-meteorological climate service development and delivery

Data systems, data sharing from technology to politics

Land-surface glacio-hydrological modelling and model development with focus on mountain environments.

Environmental analysis using climate data and other large datasets.

Remote sensing services, analysis of environmental change, snow cover, drought conditions, cropping patterns etc.

strategic documents, Proposal writing and Project management.

Field Establishment of field monitoring tools, deployment of sensors/ stations.

Scientific expedition planning and leadership.

Impact of climate change in mountain regions and implications for development activities/ communities.

`Training` Development of project specific modelling tools.

Workshops and lectures.

Field training in glacio-hydrological methods.

Technical skills

- Geospatial analysis
- Numerical models
- Remote sensing / image processing
- Statistical analysis
- Data exchange systems
- Large data processing
- SQL / Postgres
- Database management
- Server admin
- Cluster/HPC computing
- Linux
- R
- Python
- AWK
- Bash
- LaTeX

Publications

Peer reviewed

`2022` Alonso-González, E., Aalstad, K., Baba, M. W., Revuelto, J., López-Moreno, J. I., **Fiddes, J.**, Essery, R., and Gascoin, S.: MuSA: The Multiscale Snow Data Assimilation System (v1.0), Geosci. Model Dev. Discuss. [preprint], https://doi.org/10.5194/gmd-2022-137, in review, 2022.

Martin, L. C. P., Westermann, S., Magni, M., Brun, F., **Fiddes, J**., Lei, Y., Kraaijenbrink, P., Mathys, T., Langer, M., Allen, S., and Immerzeel, W. W.: Recent ground thermo-hydrological changes in a Tibetan endorheic catchment and implications for lake level changes, Hydrol. Earth Syst. Sci. Discuss. [preprint], https://doi.org/10.5194/hess-2022-241, in review, 2022.

Fiddes, J., K. Aalstad, and M. Lehning, 2022: TopoCLIM: rapid topography-based downscaling of regional climate model output in complex terrain v1.1. Geosci. Model Dev., 15, 1753–1768.

Kronenberg, M., W. van Pelt, H. Machguth, **J. Fiddes**, M. Hoelzle, and F. Pertziger, 2022: Long-term firn and mass balance modelling for Abramov glacier, Pamir Alay. The Cryosphere Discussions, 1–33.

Kruyt, B., R. Mott, **J. Fiddes**, F. Gerber, V. Sharma, and D. Reynolds, 2022: A Downscaling Intercomparison Study: The Representation of Slope-and Ridge-Scale Processes in Models of Different Complexity. Front Earth Sci. Chin., 10, 789332.

`2021` Shugar, D. H., **et al.** "A massive rock and ice avalanche caused the 2021 disaster at Chamoli, Indian Himalaya." Science (New York, NY) 373.6552 (2021): 300-306.

`2020` Barandun, Martina, **Joel Fiddes**, Martin Scherler, Tamara Mathys, Tomas Saks, Dmitry Petrakov, and Martin Hoelzle. 2020. "The State and Future of the Cryosphere in Central Asia." Water Security 11 (December): 100072.

Bavay, M., **Fiddes, J.** and Godøy, Ø., 2020. Automatic Data Standardization for the Global Cryosphere Watch Data Portal. Data Science Journal, 19(1), p.6. DOI: 10.5334/dsj-2020-006

Bender, E., Lehning, M., & **Fiddes, J.** 2020. Changes in climatology, snow cover and ground temperatures at high alpine locations, Front. Earth Sci. *In press.*

Philipson, Christopher D., Mark E. J. Cutler, Philip G. Brodrick, Gregory P. Asner, Doreen S. Boyd, Pedro Moura Costa, **Joel Fiddes**, et al. 2020. "Active Restoration Accelerates the Carbon Recovery of Human-Modified Tropical Forests." Science 369 (6505): 838–41.

`2019` **Fiddes, J.**, Aalstad, K., and Westermann, S.: Hyper-resolution ensemble-based snow reanalysis in mountain regions using clustering, Hydrol. Earth Syst. Sci., 23, 4717–4736, 2019._ 10.5194/hess-23-4717-2019

`2016` Allen, SK., **Fiddes J**., Linsbauer, A., Randhawa, S.S., Salzmann, N. 2016: Indo-Swiss partnership initiates first local permafrost studies in the Indian Himalaya. Current Science, 11, 3, 550-553, Researchgate

`2015` **Fiddes, J**., Endrizzi, S., and Gruber, S.: Large-area land surface simulations in heterogeneous terrain driven by global data sets:

application to mountain permafrost, The Cryosphere, 9, 411-426, doi:10.5194/tc-9-411-2015, 2015. 10.5194/tc-9-411-2015

2014 **Fiddes, J.** & Gruber, S. 2014: TopoSCALE v.1.0: downscaling gridded climate data in complex terrain, Geoscientific Model Development, 7, 387-405, 10.5194/gmd-7-387-2014

2013 Habib, H., Anceno, A. J., **Fiddes, J.,** Beekma, J., Ilyuschenko, M., Nitivattananon, V., & Shipin, O. V. (2013). Jumpstarting post-conflict strategic water resources protection from a changing global perspective: Gaps and prospects in Afghanistan. Journal of environmental management, 129, 244-259. Researchgate

2012 **Fiddes, J.** & Gruber, S. 2012: TopoSUB: a tool for efficient large area numerical modelling in complex topography at sub-grid scales, Geoscientific Model Development, 5, 1245–1257,10.5194/gmd-5-1245-2012

Schmid, M.-O., Gubler, S., **Fiddes, J.** & Gruber, S. 2012: Inferring snow pack ripening and melt out from distributed ground surface temperature measurements, The Cryosphere, 6, 1127–1139,10.5194/tc-6-1127-2012

2011 Gubler, S., **Fiddes, J.,** Keller, M., & Gruber, S. 2011. Scale-dependent measurement and analysis of ground surface temperature variability in alpine terrain. The Cryosphere, 5(2), 431-443, 10.5194/tc-5-431-2011

2010 Matthias Keller, Guido Hungerbuehler, Oliver Knecht, Suhel Sheikh, Jan Beutel, Stefanie Gubler, **Joel Fiddes,** and Stephan Gruber. 2010. iAssist: rapid deployment and maintenance of tiny sensing systems. In Proceedings of the 8th ACM Conference on Embedded Networked Sensor Systems (SenSys '10). ACM, New York, NY, USA, 401-402. 10.1145/1869983.1870043

Non-peer reviewed

2021 Bellprat, O., Spirig, C., Flubacher, M., Grandjean, J., Roulet, Y.-A., Moret, L., Bavay, M., **Fiddes, J.**, Orlowsky, B., Kassam, S., Kalandarov, H., Yatimov, S., Akmal, A., Strohmeier, S. M., Sharma, R., Haddad, M., Govind, A., Fatih, K., and Berod, D.: A low-cost approach to develop Weather, Water and Climate Services (WWCS) in rural areas of Tajikistan, EMS Annual Meeting 2022, Bonn, Germany, 5–9 Sep 2022, EMS2022-476, https://doi.org/10.5194/ems2022-476, 2022.

Allen, S., H. Frey, and **J. Fiddes**, 2021: Assessment of Contributing Factors of the May 2021 Disasters in Tajikistan : A Forensic Study Under the Strengthening Critical Infrastructure Against Natural Hazards Project.

2019 Muccione, V, and **Fiddes, J.** "State of the Knowledge on Water Resources and Natural Hazards under Climate Change in Central Asia and South Caucasus." Managing Disaster Risks and Water under Climate Change. 2019. reliefweb

The Status and Role of the alpine Cryosphere in Central Asia *(Book Chapter)*. Martin Hoelzle, Martina Barandun, Tobias Bolch, **Joel Fiddes**, Abror Gafurov, Veruska Muccione, Tomas Saks and Maria Shaghedanova *in* The Aral Sea Basin: Water for Sustainable Development in Central Asia eds.Stefanos Xenarios, Dietrich Schmidt-Vogt, Manzoor Qadir, Barbara Janusz-Pawletta, Iskandar Abdullaev, 2019, Routledge ISBN 9781138348882. Chapter 8 open access

2018 Muccione, Veruska; Huggel, Christian; Salzmann, Nadine; **Fiddes, Joel;** Nussbaumer, Samuel U; Novikov, Viktor; Hughes, Geoff (2018). Climate-cryosphere-water nexus: Central Asia outlook. Zoï Environment Network. doi: 10.5167/uzh-161876.

Mathias Bavay, **Joel Fiddes,** Charles Fierz, Michael Lehning, Fabiano Monti, Thomas Egger. The MeteoIO pre-processing library for operational applications. Proceedings, International Snow Science Workshop, Innsbruck, Austria, 2018 Montana Library.

2014 **Fiddes, J. T.** (2014). Subgrid Simulation of Land Surface Variables in Heterogeneous and Remote Environments: Application to Mountain Permafrost (Doctoral dissertation). ETH library.

2011 Beekma, J. and **Fiddes, J.** 2011. Floods and droughts: The Afghan water paradox. Centre for Policy and Human Development, Afghanistan Human Development Report 2011. online version

2010 Keller, M., Hungerbuehler, G., Knecht, O., Sheikh, S., Beutel, J., Gubler, S., **Fiddes, J.** and Gruber, S. (2010). iAssist: rapid deployment and maintenance of tiny sensing systems. In Proceedings of the 8th ACM Conference on Embedded Networked Sensor Systems (pp. 401-402). ACM.

Fiddes, J. (2010). Climbs and expeditions: Asia, Afghanistan, Hindu Kush, Koh-i-Beefy. American Alpine Journal. 52, 84, pp.255. online version BBC article

2007 **Fiddes, J.** (2007). Afghanistan: Implications Of Climate Change For Water Resources In The Kunduz River Basin in Climate Challenges: Bridging the Knowledge Gap.Mercy Corps Climate change unit. online version

Grants & Awards

2022 Cryospheric Observation and Modelling for improved Adaptation in Central Asia (CROMO-ADAPT) (Co-PI) (*1.3Mio CHF*)

2021 Swiss Agency for Development and Cooperation cryospheric Observation and Modelling for improved Adaptation in Central Asia (CROMO-ADAPT) Opening phase CROMO-ADAPT (Co-PI) (*120k CHF*)

2019 Expedition to install permafrost monitoring network in Northern Alai Range Tajikistan, Mount Everest Foundation (*4K CHF*)

2017 TopoSAT: High resolution surface modelling of the Himalayan cryosphere with satellite data assimilation. Swiss National Science Foundation Post-doc mobility (*120K CHF*)

2015 Data and monitoring tools for improved water resource management in Afghanistan. SEED Grant (*10K CHF*)

2001 Prince of Wales Student Scholarship (Tuition fees)

Professional memberships

- International Association of Cryospheric Sciences
- European Geosciences Union

Reviewer for

- The Cryosphere
- Geoscientific Model Development
- Remote Sensing
- Journal of Climatology
- Geograhpica Helvetica
- Environmental Earth Sciences
- Annals of Glaciology
- Journal of Geophysical Research

Languages

- English (*Mother tongue*)
- German (*Intermediate*)
- Romansh (*Basic*)
- Dari (*Basic*)

Country experience

- Afghanistan
- Borneo
- Kyrgyzstan
- India
- Nepal
- Norway
- Peru
- Switzerland
- Tajikistan

References

Available on request.

Short CV