

Manu Tom

Professional experience

- Aug'23 – present • **NASA Jet Propulsion Laboratory, Pasadena, USA, Post-doctoral researcher**
Summary: Remote sensing (SWOT) and modelling of Earth's surface water
- Jun'21 – Jul'23 • **University of Zurich, Zurich, Switzerland, Post-doctoral researcher**
Summary: Study of glacial lakes; Applied deep learning; Toolbox development
- Jun'21 – Jul'23 • **Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, Switzerland, Post-doctoral researcher**
Summary: Study of glacial lakes; Applied deep learning
- Nov'16 – May'21 • **ETH Zurich, Zurich, Switzerland, Scientific assistant and PhD student**
Summary: Study of lake ice; Computer vision; Applied deep learning
- Oct'15 – Aug'16 • **RWTH Aachen University, Aachen, Germany, Master thesis student**
Summary: Computer vision; Machine learning
- Apr'15 – Sept'15 • **Fraunhofer FKIE, Wachtberg, Germany, Summer intern**
Summary: Computer vision; Machine learning
- Jul'12 – Jun'13 • **Indian Institute of Science, Bangalore, India, Research assistant**
Summary: Computer vision; Machine learning
- Jan'11 – Jun'12 • **CoreEL Technologies, Bangalore, India, Design engineer**
Summary: Multimedia systems design

Educational qualifications

- Nov'16 – May'21 **PhD, Geomatics engineering**, ETH Zurich, Zurich, Switzerland
Advisors: Prof. Dr. Konrad Schindler, Dr. Emmanuel Baltsavias
- Oct'13 – Sep'16 **MSc., Electrical engineering**, RWTH Aachen University, Aachen, Germany
- Aug'06 – Mar'10 **B.Tech., Electronics and communication engineering**, University of Kerala, Thiruvananthapuram, India

Project experience

- Jun'21 – present • **GLOFCA: Reducing vulnerabilities of populations in the Central Asia region from glacier lake outburst floods in a changing climate**
Funding: UNESCO Adaptation Fund
Webpage: <https://glofca.org/>
Role: Project scientist
Tasks: Toolbox development and study of glacial lakes using deep learning
- Jun'21 – present • **AlpGlacier: Glacier science in the Alps**
Funding: European Space Agency
Webpage: <https://alpglacier.geo.uzh.ch/>

- Role:* Project scientist
Tasks: Study of glacial lakes using deep learning
 Nov'18 – Oct'20 • **Lake Ice Project 2:** Integrated lake ice monitoring and generation of sustainable, reliable, long time-series
Funding: Swiss GCOS office
Webpage: <https://lakeiceproject2.ethz.ch/>
Role: Project scientist
Tasks: Ice monitoring in Swiss lakes; Study of lake ice trends using machine learning
 Nov'16 – Oct'18 • **Lake Ice Project:** Integrated monitoring of ice in selected Swiss lakes
Funding: Swiss GCOS office
Webpage: <https://lakeiceproject.ethz.ch/>
Role: Project scientist
Tasks: Lake ice monitoring in Switzerland using machine learning

Technical skills

- Languages Python, C++, C, Matlab
 Libraries Tensorflow, OpenCV, NumPy, SciPy, Matplotlib, Scikit-learn, Tkinter
 VCS, APIs, IDEs Git, Keras, Spyder, Eclipse, Microsoft Visual Studio
 Platforms Jupyter Notebook

Prizes and Awards

- 2017 Best poster runner-up, out of 25 PhD students at IGP colloquium, ETH Zurich
 2006 State rank 95, 0.001 percentile, Kerala state engineering entrance examination
 2006 State rank 24, 0.001 percentile, All India architecture entrance examination
 2004 School topper, Tenth grade, St. Kuriakose Public School, Kottayam, Kerala, India

Personal information

- Languages spoken English (business fluent), German (level B_1), Malayalam (native speaker)
 DOB, Nationality May-12, 1988, Indian
 Hobbies Motorbiking, Travelling, Gaming, Cooking, Gardening, Chelsea FC fan

References

Prof. Dr. Konrad Schindler

Professor, ETH Zurich, Zurich, Switzerland
schindler@ethz.ch

Dr. Daniel Odermatt

Group leader, Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, Switzerland
daniel.odermatt@eawag.ch

Dr. Holger Frey

Group leader, University of Zurich, Zurich, Switzerland
holger.frey@geo.uzh.ch

PhD Thesis

ETH Zurich, Switzerland, 2021,

Title: Lake Ice Monitoring from Space and Earth with Machine Learning

Advisors: Konrad Schindler, Emmanuel Baltsavias

Committee (defence: 02 Sep 2021): Irena Hajsek (chair), Konrad Schindler, Emmanuel Baltsavias, Andreas Kääb, Devis Tuia

DOI: <https://doi.org/10.3929/ethz-b-000513831>

Journal Publications

• **Transactions on Geoscience and Remote Sensing, IEEE, impact factor: 8.13, 2022, vol 60, 1-15, *Learning a Joint Embedding of Multiple Satellite Sensors: A Case Study for Lake Ice Monitoring***

M. Tom, Y. Jiang, E. Baltsavias, K. Schindler

DOI: <https://doi.org/10.1109/TGRS.2022.3211184>

• **Remote Sensing, MDPI, impact factor: 5.35, 2020, vol 12, issue 21, 3555, *Ice Monitoring in Swiss Lakes from Optical Satellites and Webcams using Machine Learning***

M. Tom, R. Prabha, T. Wu, E. Baltsavias, L. Leal-Taixe, K. Schindler

DOI: <https://doi.org/10.3390/rs12213555>

• **PFG – Journal of Photogrammetry, Remote Sensing and Geoinformation Science, Springer, impact factor: 3.29, 2022, vol 90, 413-431, *Recent Ice Trends in Swiss Mountain Lakes: 20-year Analysis of MODIS Imagery***

M. Tom, T. Wu, E. Baltsavias, K. Schindler

DOI: <https://doi.org/10.1007/s41064-022-00215-x>

• **ISPRS Open Journal of Photogrammetry and Remote Sensing, Elsevier, 2023, vol 8, 100033, *Pixel-based mapping of open field and protected agriculture using constrained Sentinel-2 data, 2023***

D. la Cecilia, M. Tom, C. Stamm, D. Odermatt

DOI: <https://doi.org/10.1016/j.ophoto.2023.100033>

• **Multimedia Tools and Applications, Springer, impact factor: 2.58, 2016, vol 75, issue 2, 1043-1078, *A Survey on Compressed Domain Video Analysis Techniques***

R. V. Babu, M. Tom, P. Wadekar

DOI: <https://doi.org/10.1007/s11042-014-2345-z>

• **Multimedia Tools and Applications, Springer, impact factor: 2.58, 2015, vol 74, issue 21, 9323-9338, *Compressed Domain Human Action Recognition in H.264/AVC Video Streams***

M. Tom, R. V. Babu, R. G. Praveen

DOI: <https://doi.org/10.1007/s11042-014-2083-2>

• **Applied Soft Computing, Elsevier, impact factor: 8.26, 2015, vol 36, 218-227, *Human Action Recognition in H.264/AVC Compressed Domain using Meta-cognitive Radial Basis Function Network***

R. V. Babu, B. Rangarajan, S. Sundaram, M. Tom

DOI: <https://doi.org/10.1016/j.asoc.2015.06.054>

Conference Publications (full-paper, peer-reviewed)

- **ISPRS Congress**, Nice, France, September 2020,
Lake Ice Detection from Sentinel-1 SAR with Deep Learning
M. Tom*, R. Aguilar*, P. Imhof, S. Leinss, E. Baltsavias and K. Schindler (*equal contribution)
DOI: <https://doi.org/10.5194/isprs-annals-V-3-2020-409-2020>
- **ISPRS Congress**, Nice, France, September 2020,
Lake Ice Monitoring with Webcams and Crowd-sourced Images
R. Prabha, M. Tom, M. Rothermel, E. Baltsavias, L. Leal-Taixe and K. Schindler
DOI: <https://doi.org/10.5194/isprs-annals-V-2-2020-549-2020>
- **ISPRS Technical Commission II Symposium**, Riva del Garda, Italy, June 2018,
Lake Ice Detection in Low-Resolution Optical Satellite Images
M. Tom, U. Kälin, M. Sütterlin, E. Baltsavias and K. Schindler
DOI: <https://doi.org/10.5194/isprs-annals-IV-2-279-2018>
- **ISPRS Technical Commission II Symposium**, Riva del Garda, Italy, June 2018,
Lake Ice Monitoring with Webcams
M. Xiao, M. Rothermel, M. Tom, S. Galliani, E. Baltsavias and K. Schindler
DOI: <https://doi.org/10.5194/isprs-annals-IV-2-311-2018>
- **IEEE Winter Conference on Applications of Computer Vision**,
Santa Rosa, USA, March 2017,
3D Semantic Segmentation of Modular Furniture using rjMCMC
I. Badami*, M. Tom*, M. Mathias, B. Leibe (*equal contribution)
DOI: <https://doi.org/10.1109/WACV.2017.15>
- **IEEE National Conference on Computer Vision, Pattern Recognition, Image Processing and Graphics**, Mumbai, India, December 2013,
Fast Moving-Object Detection in H.264/AVC Compressed Domain for Video Surveillance
M. Tom, R. V. Babu
DOI: <https://doi.org/10.1109/NCVPRIPG.2013.6776202>
- **IEEE Visual Communications and Image Processing**, Kuching, Malaysia, November 2013,
Rapid Human Action Recognition in H.264/AVC Compressed Domain for Video Surveillance
M. Tom, R. V. Babu
DOI: <https://doi.org/10.1109/VCIP.2013.6706430>

Presentations (invited)

- **NASA JPL**, Water and Ecosystems Group, Pasadena, USA, March 2023,
A Deep Learning-based Toolbox for Mapping Glacial Lakes From Space
Oral presentation (virtual)
- **MIT Media Lab**, Space Enabled Group, Cambridge, USA, March 2023,
A Deep Learning Approach for Mapping and Monitoring Glacial Lakes From Space
Oral presentation (virtual)

- **Lake Ice Workshop**, Madison, USA, February 2023,
Lake Ice Monitoring from Space and Earth with Machine Learning
Oral presentation (virtual)
- **GLOFCA Regional Exchange Workshop**, organized by UNESCO, Almaty, Kazakhstan, November 2022,
A Toolbox for Mapping and Monitoring Central Asian Glacial Lakes
Oral presentation (onsite)
- **GLOFCA Regional Exchange Workshop**, organized by UNESCO, Tashkent, Uzbekistan, November 2021,
A Toolbox for Mapping Central Asian Glacial Lakes
Oral presentation (onsite)
- **ETH Zurich**, Photogrammetry and Remote Sensing Group, Zurich, Switzerland, August 2016, *Semantic Segmentation of Modular Furniture using rjMCMC*
Oral presentation (onsite)

Presentations

- **EGU General Assembly**, Vienna, Austria, April 2023,
A Deep Learning-based Toolbox for Automated Monitoring of Central Asian Glacial Lakes from Space
M. Tom, H. Frey, S. Allen, A. Cicoira, L. Niggli, C. Huggel
- **ESA Living Planet Symposium**, Bonn, Germany, May 2022,
Glacial Lake Water Extent Mapping from Space
M. Tom, M. Santoro, D. Odermatt, H. Frey
- **ESA Living Planet Symposium**, Bonn, Germany, May 2022,
The ESA project AlpGlacier: Monitoring glaciers in the Alps from Space
F. Paul, E. Ducasse, N. Jones, L. Keuris, N. Mölg, J. Mouginot, T. Nagler, D. Odermatt, A. Rabatel, P. Rastner, M. Santoro, G. Schwaizer, T. Strozzi, M. Tom
- **EGU General Assembly**, Vienna, Austria, May 2022,
A Deep Learning Approach for Mapping and Monitoring Glacial Lakes from Space
M. Tom, H. Frey, D. Odermatt
- **EGU General Assembly**, Vienna, Austria, May 2022,
A knowledge and capacity building concept for reducing vulnerabilities from Glacier Lake Outburst Floods in Central Asia
A. Cicoira, S. Allen, H. Frey, C. Huggel, L. Niggli, M. Tom, A. Diebold, O. Kodirov, Z. Mamadalieva, B. Otambekzoda, Z. Zhurumbetova, G. Abdaliyeva, N. Kim, K. Tovmasyan
- **Swiss Remote Sensing Days**, Ascona, Switzerland, May 2022,
Recent Ice Trends in Swiss Alpine Lakes: 20-Year Analysis of MODIS Data
M. Tom, T. Wu, E. Baltsavias, K. Schindler
- **Swiss MLEG Workshop**, Dübendorf, Switzerland, January 2019,
Semantic Segmentation of Ice in Selected Swiss Lakes
M. Tom, M. Rothermel, E. Baltsavias, K. Schindler

- **EUMETSAT Meteorological Satellite Conference**, Tallinn, Estonia, September 2018,
Integrated Lake Ice Monitoring in Swiss Lakes
M. Tom, M. Sütterlin, D. Bouffard, M. Rothermel, U. Hamann, A. Duguay-Tetzlaff, S. Wunderle, E. Baltsavias
- **Asian Conference on Remote Sensing**, New Delhi, India, October 2017,
Ice Detection in Swiss Lakes using MODIS Data
M. Tom, C. Lanaras, E. Baltsavias, K. Schindler
- **SPIE Medical Imaging**, Orlando, USA, February 2015,
Automated Detection of Schlemm's Canal in Spectral-domain Optical Coherence Tomography
M. Tom, Vignesh Ramakrishnan, Christian Van Oterendorp, Thomas M. Deserno