

# THOMAS E. SHAW

## Postdoctoral Researcher in Glaciology

@ thomas.shaw@wsl.ch    +44 7311469487    Zurcherstrasse 111  
8903 Birmensdorf, Switzerland    www.tempestglacier.com    @tomshaw3000  
thomas-shaw-92b84258    ElTombre    0000-0001-7640-6152



## EXPERIENCE

### Marie-Curie Research Fellow

#### Swiss Federal Institute WSL

Oct 2021 – Sep 2023    Birmensdorf, Switzerland

- Global Air Temperature Estimation on Mountain Glaciers (TEMPEST)

### Postdoctoral Researcher

#### Swiss Federal Institute WSL

Oct 2020 – Sep 2021    Birmensdorf, Switzerland

- Understanding Snow, Glacier and Rivers Response to Climate in High Mountain Asia (ASCENT)

### Glaciologist/Collaborator

#### Fundación Glaciares Chilenos

Dec 2018 – Dec 2022    Santiago, Chile

- Voluntary Position in a recently established Chilean NGO.

### FONDECYT Postdoctoral Researcher

#### Universidad de Chile

May 2018 – Aug 2020    Santiago, Chile

- Observation and modelling of high elevation snow accumulation and its importance to streamflow in the semi-arid Andes of central Chile.

### Postdoctoral Researcher

#### Universidad de Chile

Dec 2017 – Apr 2018    Santiago, Chile

- Snow contributions to streamflow in central Chile.

### Postdoctoral Research Assistant

#### Northumbria University

Jan 2017 – Jun 2018    Newcastle, UK

- Snow cover trends in Eastern Kazakhstan.

### Student Lecturer/Demonstrator

#### Northumbria University

Jan 2014 – Jan 2017    Newcastle, UK

- Meteorology and Modelling, Advanced GIS, Coastal Environments.

## BIO

- Postdoctoral researcher with expertise in glacier meteorology and mass balance.
- Strong background in field-based research.
- Working with large datasets in the disciplines of meteorology and remote sensing of ice and snow.

## EDUCATION

### Ph.D. Glaciology

#### Northumbria University, UK

Dec 2013 – Jan 2017

### M.Sc. Polar and Alpine Change

#### University of Sheffield, UK

Sep 2011 – Sep 2012

### B.Sc. Geography

#### University of Derby, UK

Sep 2007 – Jun 2010

## LANGUAGES

English ●●●●●

Spanish ●●●●●

German ●●●●●

## SOFTWARE

Matlab Python R

ArcGIS QGIS  
Riegl RiScan Pro Agisoft Photoscan  
Cloud Compare

Microsoft Suite L<sup>A</sup>T<sub>E</sub>X

Illustrator Photoshop

Campbell HOBO  
Tinytag DAVIS

## AWARDS

### Postdoctoral research grant (TEMPEST)

#### H2020 Marie-Sklodowska Curie Actions Grant

📅 Sep 2021 – Sep 2023

- Temperature estimation on mountain glaciers globally. WSL, Birmensdorf, CH. €191,000 (£164,000)

### Postdoctoral research grant (3180145)

#### FONDECYT, Chile

📅 May 2018 – Aug 2020

- Observation and modelling of high elevation snow accumulation and its importance to streamflow in the semi-arid Andes of Chile. Universidad de Chile. 52,416,000 CLP (£59,000).

### 'The Grand Tour' Expedition Grant

#### Land Rover and Royal Geographical Society

📅 Jun – Aug 2014

- A member of Land Rover and Royal Geographical Society bursary (<https://www.rgs.org/in-the-field/in-the-field-grants/expedition-grants/the-land-rover-bursary/>). Landslides above retreating Alpine glaciers. £30,000.

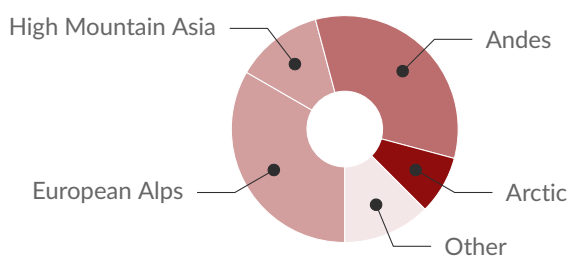
### Scholarship Grant

#### NERC

📅 Dec 2013 – Nov 2016

- Postgraduate scholarship funding: Northumbria University, Newcastle, UK.

## FIELDWORK



Fieldwork expertise includes:

- **Glacier mass balance** using stake and snow depth measurements and snow pits.
- **DGPS and total station** surveying of mountain glaciers.
- **UAV and ground based structure-from-motion surveys** of glacier ablation, debris re-mobilisation and rock wall stability.
- **Terrestrial laser scanning** of coastal erosion, glacier retreat, snow depths and debris flows above transport infrastructure.
- Installation and maintenance of **automatic weather stations and eddy covariance equipment** on Alpine and Arctic glaciers.
- Geophysical surveys of Arctic glaciers using **ground penetrating radar (GPR)**.

## PROFESSIONAL ACTIVITIES

- Co-Organiser Alpine Glaciology Meeting Conference - **WSL, Switzerland. 2023**
- Co-Organiser INARCH Conference - **Portillo, Chile. 2018**
- Summer School: Surface-atmosphere exchange over mountainous terrain. **Innsbruck, Austria. 2015**
- Winter School: Glaciology winter school course - **UNIS, Svalbard. 2015**
- Summer Course: Arctic glaciers and landscapes - **UNIS Svalbard. 2012**

## TEACHING

Academic lecturing and demonstrating at Northumbria University, UK:

- Tutorial module GE0152 (2014-2017).
- Meteorology and modelling GE0326 (2015-2016).
- Skills module GE0328 (2015-2016).
- GIS Applications GE0315 (2015-2016).
- Coastal Environments GE0305 (2017).

## ADDITIONAL

- Postgraduate research representative (Northumbria University, 2014-2017).
- Member of Research Ethics Committee (Northumbria University, 2015).
- Associate fellow of the Higher Education Academy (AFHEA).
- Reviewer for: The Cryosphere, WRR, Journal of Glaciology, JGR: Atmos, ESSD.

## REFEREES

### Prof. Francesca Pellicciotti

@ ISTA, Austria

✉ francesca.pellicciotti@ist.ac.at

☎ +41 447 392 345

### Dr. James McPhee

@ Universidad de Chile, Chile

✉ jmcphoe@uchile.cl

☎ +56 2678 4397

### Prof. Benjamin Brock




@ Northumbria University, UK

✉ benjamin.brock@northumbria.ac.uk




☎ +44 191 227 3225

# SUPERVISION

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 **Achille Jouberton (PhD)** -  Feb 2021 - present  WSL/ETH Zürich, Switzerland  
Importance of Snow Process to the Hydrology of High Mountain Glacierized Catchments

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 **Yuwei Lyu (Master)** -  Dec 2021 - June 2022  WSL/ETH Zürich, Switzerland  
Re-evaluating Gradients of Temperature and Precipitation for Hydrological Modelling in a Glacierized Catchment of the Nepalese Himalaya.




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 **Achille Jouberton (Master)** -  Apr 2020 - Dec 2020  WSL/EPFL Lausanne, Switzerland  
Warming-induced monsoon precipitation phase change intensifies glacier mass loss in the southeastern Tibetan Plateau

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 **Alonso Mejias (Bachelor)** -  Aug 2019 - Jun 2020  Universidad de Chile, Chile  
Retrosceso en el Glaciar Colgante Morado: Cuantificación Según Mediciones Dron, LiDAR y Causantes Meteorológicas.

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 **Genesis Ulloa (Bachelor)** -  May 2019 - Jan 2020  Universidad de Chile, Chile  
Evolución Temporal de Albedo en Función de la Variabilidad Climática en Glaciares de Los Andes SemiÁridos, Zona Central de Chile

# PUBLICATIONS

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**Shaw, T. E.**, Buri, P., McCarthy, M., Miles E. S., Ayala, Á., Pellicciotti, F. (2023) The Decaying Near-Surface Boundary Layer of a Small Alpine Glacier. *Geophysical Research Letters*, 50, e2023GL103043.  
<https://doi.org/10.1029/2023GL103043>

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Kneib, M., Fyffe, C. L., Miles, E. S., Lindemann, S., **Shaw, T. E.**, Buri, P., McCarthy, M., Ouvry, B., Vieli, A., Sato, Y., Kraaijenbrink, P. D. A., Zhao, C., Molnar, P., Pellicciotti, F. (2023) Controls on Ice Cliff Formation, Distribution and Characteristics on Debris-Covered Glaciers. *Geophysical Research Letters*, 50, e2022GL102444.  
<https://doi.org/10.1029/2022GL102444>

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Jouberton, A., **Shaw, T. E.**, Miles, E., McCarthy, M., Fugger, S., Ren, S., Dehecq, A., Yang, W., Pellicciotti, F. (2022). Warming-induced monsoon precipitation phase change intensifies glacier mass loss in the southeastern Tibetan Plateau. *Proceedings of the National Academy of Sciences of the United States of America*, 119(37), 1–7.  
<https://doi.org/10.1073/pnas.2109796119>

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Kneib, M., Evan S. Miles, E. S., Buri, P., Fugger, S., McCarthy, M., **Shaw, T. E.**, Zhao, C., Truffer, M., Westoby, M. J., Yang, W., Pellicciotti, F. (2022), Sub-seasonal variability of supraglacial ice cliff melt rates and associated processes from time-lapse photogrammetry, *The Cryosphere*, 16, 11, (4701-4725).  
<https://doi.org/10.5194/tc-16-4701-2022>

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**Shaw, T. E.**, Miles, E. S., Chen, D., Jouberton, A., Kneib, M., Fugger, S., Ou, T., Lai, H. W., Fujita, K., Yang, W., Fatichi, S., Pellicciotti, F. (2022). Multi-decadal monsoon characteristics and glacier response in High Mountain Asia. *Environmental Research Letters*, 17(10).  
<https://doi.org/10.1088/1748-9326/ac9008>.

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McCarthy, M., Meier, F., Fatichi, S., Stocker, B. D., **Shaw, T. E.**, Miles, E., Dussailant, I., Pellicciotti, F. (2022). Glacier Contributions to River Discharge During the Current Chilean Megadrought. *Earth's Future*, 10(10), 1–15.  
<https://doi.org/10.1029/2022ef002852>.

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Menenti, M.; Li, X.; Jia, L.; Yang, K.; Pellicciotti, F.; ..... **Shaw, T. E.**; ..... Multi-Source Hydrological Data Products to Monitor High Asian River Basins and Regional Water Security. *Remote Sens*. 2021, 13, 5122.  
<https://doi.org/10.3390/rs13245122>

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Fugger, S., Fyffe, C. L., Fatichi, S., Miles, E., McCarthy, M., **Shaw, T. E.**, Ding, B., Yang, W., Wagnon, P., Immerzeel, W., Liu, Q., and Pellicciotti, F.: Understanding monsoon controls on the energy and mass balance of Himalayan glaciers, *The Cryosphere*, 16(5), 1631–1652.  
<https://doi.org/10.5194/tc-16-1631-2022>

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Ren, S.; Miles, E.S.; Jia, L.; Menenti, M.; Kneib, M.; Buri, P.; McCarthy, M.J.; **Shaw, T. E.**; Yang, W.; Pellicciotti, F. Anisotropy Parameterization Development and Evaluation for Glacier Surface Albedo Retrieval from Satellite Observations. *Remote Sens.* 2021, 13, 1714.  
<https://doi.org/10.3390/rs13091714>

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**Shaw, T. E.**, Yang, W., Ayala, Á., Bravo, C., Zhao, C., and Pellicciotti, F. (2021) Distributed summer air temperatures across mountain glaciers in the south-east Tibetan Plateau: temperature sensitivity and comparison with existing glacier datasets, *The Cryosphere*, 15, 595–614,  
<https://doi.org/10.5194/tc-15-595-2021>

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Mendoza, P. A., **Shaw, T. E.**, McPhee, J., Musselman, K. N., Revuelto, J., Macdonell, S. (2020). Spatial distribution and scaling properties of lidar-derived snow depth in the extratropical Andes. *Water Resources Research*, 56.  
<https://doi.org/10.1029/2020WR028480>

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**Shaw, T. E.**, Deschamps-Berger, C., Gascoin, S., McPhee, J. (2020). Monitoring Spatial and Temporal Differences in Andean Snow Depth Derived From Satellite Tri-Stereo Photogrammetry. *Frontiers in Earth Science*, 8(December), 1–16.  
<https://doi.org/10.3389/feart.2020.579142>

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**Shaw, T. E.**, Ulloa, G., Farias-Barahona, D., Fernandez, R., Lattus, J., McPhee J (2020) Glacier albedo reduction and drought effects in the extratropical Andes, 1986-2020. *Journal of Glaciology*.

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Westoby, M., Rounce, D., **Shaw, T. E.**, Moore, P., Fyffe, C., Stewart, R., Brock, B. W. (2020) Multi-annual geomorphological evolution of debris-covered glacier surfaces, *Earth Surface Processes and Landforms*. 45: 3431– 3448.  
<https://doi.org/10.1002/esp.4973>.

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Fariás-Barahona, D., Wilson, R., Bravo, C., Vivero, S., Caro, A., **Shaw, T. E.**, Casassa, G., Ayala, Á., Iribarren-Anaconda, P., Schaefer, M., Mejías, A., Harrison, S., Glasser, N. F., McPhee, J., Braun, M. H. (2020) Glacier changes and proglacial lake evolution using a multi-source dataset in the El Morado Glacier, central Andes of Chile. *Journal of Glaciology*. 1–15.  
<https://doi.org/10.1017/jog.2020.52>

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**Shaw, T. E.**, Caro, A., Mendoza, P., Ayala, Á., Pellicciotti, F., Gascoin, S., McPhee, J. (2020) The utility of optical satellite winter snow depths for initializing a glacio-hydrological model of a high elevation, Andean catchment. *Water Resources Research*, 56, e2020WR027188.  
<https://doi.org/10.1029/2020WR027188>

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Fugazza, D., **Shaw, T. E.**, Mashtayeva, S., Brock, B. (2020) Inter-annual variability in snow cover depletion patterns and atmospheric circulation indices in the Upper Irtysh basin, Central Asia. *Hydrological. Processes*. 1–20.  
<https://doi.org/10.1002/hyp.1384320>

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Troxler P, Ayala Á, **Shaw, T. E.**, Nolan M, Brock BW, Pellicciotti F (2020). Modelling spatial patterns of near surface air temperature over a decade of melt seasons on McCall Glacier, Alaska. *Journal of Glaciology*. 1–15.  
<https://doi.org/10.1017/jog.2020.12>.

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**Shaw, T. E.**, Gascoin, S., Mendoza, P. A., Pellicciotti, F., McPhee, J. (2020). Snow depth patterns in a high mountain Andean catchment from satellite optical tri-stereoscopic remote sensing. *Water Resources Research*, 56, e2019WR024880.  
<https://doi.org/10.1029/2019WR024880>.

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Burger, F., Ayala, Á., Farias-Barahona, D., **Shaw, T. E.**, MacDonell, S., Brock, B., McPhee, J. Pellicciotti, F. (2018). Inter-annual variability in glacier contribution to runoff from a high - elevation Andean catchment: understanding the role of debris cover in glacier hydrology. *Hydrological. Processes., SI-Latin* (January), 1–16.  
<https://doi.org/10.1002/hyp.13354>.

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**Shaw, T. E.**, Brock, B. W., Ayala, Á., Rutter, N., Pellicciotti, F. (2017). Centreline and cross-glacier air temperature variability on an Alpine glacier: assessing temperature distribution methods and their influence on melt model calculations. *Journal of Glaciology.*, 1–16.

<https://doi.org/10.1017/jog.2017.65>.

**Shaw, T. E.**, Brock, B., Fyffe, C., Pellicciotti, F., Rutter, N., and Diotri, F. (2016) Air temperature distribution and energy balance modelling of a debris-covered glacier. *Journal of Glaciology*.  
<https://doi.org/10.1017/jog.2016.31>

## CONFERENCE PROCEEDINGS

**Shaw, T. E.**, Buri, P., McCarthy, M., Miles, E., Ayala, Á., Pellicciotti, F. (2023). Meteorological Feedbacks on a Decaying Alpine Glacier [Techreport]. Copernicus Meetings.

Buri, P., Fatichi, S., **Shaw, T. E.**, Miles, E. S., McCarthy, M., Fyffe, C., Fugger, S., Ren, S., Kneib, M., Fujita, K., Pellicciotti, F. (2022). Dissecting the subseasonal and altitudinal water balance of a high-elevation Himalayan catchment using a land surface model. *EGU General Assembly Conference Abstracts*, EGU22-6871.

Fugger, S., Buri, P., **Shaw, T. E.**, Fatichi, S., Miles, E. S., McCarthy, M., Fyffe, C., Kneib, M., Jouberton, A., Pellicciotti, F. (2022). Modelling blue-green water fluxes in mountain headwaters at the climatic ends of High Mountain Asia. *EGU General Assembly Conference Abstracts*, EGU22-11243.

McPhee, J., **Shaw, T. E.**, Gascoïn, S., Deschamps-Berger, C., Mendoza, P., Ayala, Á., Pellicciotti, F. (2022). The Applicability of Optical Satellite Photogrammetry for Snow Depth Derivation and Streamflow Estimates [Techreport]. Copernicus Meetings.

Fyffe, C. L., Potter, E., Orr, A., **Shaw, T. E.**, Loarte, E., Medina, K., Miles, E., von Ah, F., Baraer, M., Cochachin, A., Pellicciotti, F. (2022). Modelling the glacier-hydrology of two large catchments in the Peruvian Andes. *EGU General Assembly Conference Abstracts*, EGU22-10540.

Pellicciotti, F., Fontrodona-Bach, A., Rounce, D. R., Fyffe, C. L., McCarthy, M., Miles, E., **Shaw, T. E.** (2022). DCG-MIP: The Debris-Covered Glacier melt Model Intercomparison exPeriment. *EGU General Assembly Conference Abstracts*, EGU22-11904.

Jouberton, A., Sato, Y., Hashimoto, A., Niwano, M., **Shaw, T. E.**, Miles, E. S., Buri, P., Fugger, S., McCarthy, M., Fujita, K., Pellicciotti, F. (2022). Combining high resolution atmospheric simulations and land-surface modelling to understand high elevation snow processes in an Himalayan catchment. *EGU General Assembly Conference Abstracts*, EGU22-8896.

Kneib, M., Miles, E. S., Buri, P., Fugger, S., McCarthy, M., Zhao, C., **Shaw, T. E.**, Truffer, M., Westoby, M., Yang, W., Pellicciotti, F. (2022). Sub-seasonal evolution of ice cliffs captured with time-lapse photogrammetry. *EGU General Assembly Conference Abstracts*, EGU22-6163.

Fyffe, C. L., Potter, E., Fugger, S., Orr, A., Fatichi, S., Medina, K., Hellström, R. Å, **Shaw, T. E.**, Bernat, M., Llacza Rodriguez, A., Pellicciotti, F. (2021). Quantifying the controls of Peruvian glacier response to climate.

Jouberton, A., **Shaw, T. E.**, Miles, E., Ren, S., Yang, W., Zhao, C., McCarthy, M., Fugger, S., Dehecq, A., Pellicciotti, F. (2021). Reconstructing the runoff and mass changes of a maritime Tibetan glacier since 1975. *EGU General Assembly Conference Abstracts*, EGU21-14976.

Fyffe, C., Miles, E., Kneib, M., Shrestha, R., Stewart, R., Fugger, S., Westoby, M., **Shaw, T. E.**, Yang, W., Pellicciotti, F. (2020). A comparison of the drainage systems of two High Asian debris-covered glaciers. *EGU General Assembly Conference Abstracts*, 10593.

Kneib, M., Miles, E. S., Buri, P., Molnar, P., **Shaw, T. E.**, McCarthy, M., Fugger, S., Pellicciotti, F. (2020). A stochastic birth and death model to represent the evolution of ice cliff population and their total contribution to melt at the glacier scale. *AGU Fall Meeting Abstracts*, 2020, C042-08.

Escobar, F. P., Mendoza, P. A., **Shaw, T. E.**, Revuelto, J., Musselman, K., McPhee, J. (2020). Wind effects on the spatial distribution of snow and seasonal water balance in two Mediterranean basins [Techreport]. Copernicus Meetings.

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McCarthy, M., Burger, F., Ayala, A., Fugger, S., **Shaw, T. E.**, Miles, E., MacDonell, S., Bhattacharya, A., Bolch, T., McPhee, J., Pellicciotti, F. (2020). The impact of glaciers on the long-term hydrology of a high-elevation Andean catchment. EGU General Assembly Conference Abstracts, 21463.

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Mendoza Zúñiga, P., **Shaw, T. E.**, McPhee, J., Musselman, K. N., Revuelto, J., MacDonell, S. (2020). Spatial Distribution and Scaling Properties of Lidar-Derived Snow Depth in the Extratropical Andes.

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Pinto Escobar, F., Mendoza, P. A., Shaw, T. E., Revuelto, J., Musselman, K., McPhee, J. (2020). Wind effects on the spatial distribution of snow and seasonal water balance in two Mediterranean basins. EGU General Assembly Conference Abstracts, 10994.

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von Ah, F., Miles, E., Dussaillant, I., **Shaw, T. E.**, Molnar, P., Pellicciotti, F. (2021). Decadal altitudinal glacier mass balance for the Maipo and Santa basins of South America. EGU General Assembly Conference Abstracts, EGU21-12009.

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Westoby, M., Rounce, D., **Shaw, T. E.**, Fyffe, C., Moore, P., Stewart, R., Brock, B. (2020). Improving geomorphological process understanding of complex glacier surfaces using aerial robotics. EGU General Assembly Conference Abstracts, 8475.

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**Shaw, T. E.**, Mendoza, P. A., Oberli, C., McPhee, J. (2019). Snow depth variability and storm events of high mountain central Chile. AGU Fall Meeting Abstracts, 2019, C41B-07.

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**Shaw, T. E.**, Mendoza, P. A., Ayala, Á., Gascoin, S., Pellicciotti, F., McPhee, J. (2019). Monitoring Snow Depth Patterns in a High Mountain Andean Catchment using Optical Tri-Stereoscopic Remote Sensing. IUGG 27th Assembly, Montreal, Canada. 2019.

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**Shaw, T. E.**, Ayala, Á., Ding, B., Yang W., Yang, K., Pellicciotti, F., Static Precipitation Thresholds Obscure Tibetan Glacier Mass Response to the Summer Monsoon (2019). Dragon 4 Symposium, Ljubljana, Slovenia, June 2019.

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Ding, B., Yang, W., Pellicciotti, F., Ayala, Á., **Shaw, T. E.**, Fugger, S., Yang, K. Development of a Water and Enthalpy Budget-based Glacier mass balance Model (WEB-GM) and its preliminary validation (2019). Dragon 4 Symposium, Ljubljana, Slovenia, June 2019.

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Meneti, M., Li, J., ... **Shaw, T. E.**, Ding, B., Yang, W. High Elevation Energy and Water Balance: Coupling Surface and Atmospheric Processes (2019). Dragon 4 Symposium, Ljubljana, Slovenia, June 2019.

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**Shaw, T. E.**, Caro, A., Mendoza, P., Gascoin, S., Pellicciotti, F., McPhee, J. Estimating high elevation snow depths with optical remote sensing: Challenges and application to streamflow estimation (2019). SOCHICRI workshop, La Serena, Chile, May, 2019.

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**Shaw, T. E.**, Pellicciotti, F., Ayala, Á., Ding, B., Yang, W., Yang, K., Menenti, M. The Effect of Rain Events on the Mass Balance of a Monsoon-dominated, Summer Accumulation Glacier (2018). Dragon 4 Symposium, Xi'an, China, June, 2018

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**Shaw, T. E.**, McPhee, J., Ayala, Á., Pellicciotti, F., Gascoin, S. High Elevation Snow Depth and Importance to Streamflow in the Andes of Chile (2018). Polar2018, Davos, Switzerland, June, 2018.

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Brock B, **Shaw, T. E.**, Mashtayeva, S. Satellite monitoring of spring snowmelt patterns between 2000-2016 on the Upper Irtysh River Basin, Central Asia (2017). International Glaciological Society British Branch Meeting, Lancaster, UK, September 2017.

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Westoby M, Brock B, **Shaw, T. E.**, Fyffe C, Woodward J. Geomorphological evolution of supraglacial debris cover using UAV-SfM (2017). BSG conference, September 2017.

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**Shaw, T. E.**, Pellicciotti F, Ayala Á, Yang K, Yang W, Ding B, Mo X, Meneti M. Melt and Surface Sublimation across a Glacier of the Tibetan Plateau: Distributed Energy Balance Modelling of the Parlung No. 4 Glacier and Comparison of Scales (2017). Dragon 4 Symposium, Copenhagen, Denmark, June, 2017.

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**Shaw, T. E.**, Brock B, Ayala Á, Rutter N, Pellicciotti F, Fyffe C and Troxler, P. Distributed fields of temperature for glacier melt modelling: current uncertainties and future challenges (2016). International Glaciological Society Nordic Branch Meeting, Tromsø, Norway, October, 2016.

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**Shaw, T. E.**, Brock, B., Ayala, Á., Rutter, N. (2016). Controls of air temperature variability over an Alpine Glacier. EGU General Assembly Conference Abstracts, EPSC2016-495.

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**Shaw, T. E.**, Brock B, Fyffe C, Pellicciotti F and Rutter N. Air temperature distribution and melt modelling of an Alpine debris-covered glacier (2015). International Glaciological Society Nordic Branch Meeting, Copenhagen, Denmark, October, 2015.

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**Shaw, T. E.**, Brock B, Fyffe C, Pellicciotti F and Rutter, N. Significance of distributed air temperatures to energy balance modelling of a debris-covered glacier (2015). International Glaciological Society British Branch Meeting, Durham, UK, September, 2015.

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**Shaw, T. E.**, Brock B, Rutter, N. (2014) Air temperature distribution across melting Alpine glaciers. International Glaciological Society British Branch Meeting, Bristol, UK, September, 2014