

## Dr Sarah Thompson

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### **RESEARCH PROFILE**

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I am a research scientist and educator specialising in glaciology, satellite remote sensing and applied geophysics. My research focuses on identifying and investigating the hazards associated with glaciers, ice sheets and snowpacks in a changing climate. Particularly in developing and adapting geophysical approaches to allow the prediction of hazards in the natural environments, and the assessment of risk to society on a global and local scale.

### **EDUCATION**

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**Ph.D. in Glaciology | Swansea University, UK (2008-2012)**

| **University Centre in Svalbard (UNIS), Norway**

**Title:** A novel integrated geophysical and glaciological assessment of the formation and evolution of potentially hazardous moraine-dammed glacial lakes.

**M.Sc. R. Geographical Information Science | University of Edinburgh, UK (2007-2008)**

**Title:** Investigating the possibilities of energy balance modelling with more moderate input data: Development and testing on the Griesgletscher, Switzerland.

**B.Sc. Honours in Geography 1st class | University of Edinburgh, UK (2003-2007)**

**Dissertation:** An investigation into the relationship between climatic variation and glacial volume change: Massif du Mont Blanc, European Alps.

### **EMPLOYMENT**

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**2019 - Present | Antarctic Glaciologist | IMAS, University of Tasmania, Australia**

Developing remote and field techniques for glacier crevasse detection for field safety assessment in conjunction with the Australian Antarctic Division, including trialing helicopter-based ground penetrating radar systems for glacier crevasse detection in East Antarctica. Developing geophysical laboratory methods to investigate the physical properties of glacial ice to improve interpretation of remotely-sensed data and existing in-situ observations.

**2017 - 2019 | Research Fellow | Swansea University, Wales, UK**

AXA Post-doctoral fellowship, Ice shelf control of Antarctic's sea level rise contribution in the next 200 years. Using a multi-technique approach, including feature mapping using optical satellite remote sensing data, velocity feature tracking using synthetic aperture radar (SAR) data, flowline modelling and airborne radar analysis.

**2016 | Post-doctoral research fellow | Centre for Climate and Cryosphere University of Innsbruck, Austria**

Part of the GIHima-Sat project, using high-resolution DSM based on Pléiades tri-stereo imagery to calculate the mass balance for the glaciers of the Khumbu Himal region in Nepal, particularly the role of avalanched snow to glacier mass change. In addition, characterising

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the electrical resistivity signal of both cold and temperate debris covered ice in a series of cold room surveys.

### **2014 - 2016 | Post-doctoral research fellow | University Centre in Svalbard (UNIS), Norway**

A Marie Curie Intra European Fellowship; Subsurface conditions in Himalayan glaciers and implications for outburst flood risk prediction, focusing on the development and testing of techniques for application to debris-covered glaciers, to allow the prediction of hazards as they respond to a changing climate. Integrating satellite remote sensing, field mapping and geophysical techniques.

### **2013 - 2014 | Post-doctoral research fellow | Eidgenössische Technische Hochschule (ETH), Zurich, Switzerland**

Investigating the accelerated release of persistent organic pollutants (POPs) from Alpine glaciers, [http://www.vaw.ethz.ch/people/gz/archive/gz\\_pop](http://www.vaw.ethz.ch/people/gz/archive/gz_pop). Characterisation of the near-surface meltwater system of Alpine glaciers, and the impact on the incorporation and release of POPs.

### **PEER-REVIEWED JOURNAL PUBLICATIONS**

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Benn, D. I., Thompson, S., Gulley, J., Mertes, J., Luckman, A., and Nicholson, L. (2017) **Structure and evolution of the drainage system of a Himalayan debris-covered glacier, and its relationship with patterns of mass loss**, *The Cryosphere Discussion*, doi:10.5194/tc-2017-29, in review, 2017.

Mertes, J.R., Gulley, J.D., Benn, D.I., Thompson, S.S., Nicholson, L., Accepted, **Using Structure from Motion to Extract 3-D Information Using Historical Oblique Aerial and Terrestrial Imagery: Case Studies from 1896, 1936 and 1978**, *EPSL*.

Thompson, S.S., Kulesa, B., Benn, D.I. & Mertes, J.R. (2017) **Anatomy of terminal moraine segments and implied lake stability on Ngozumpa Glacier Nepal, from electrical resistivity tomography (ERT)**, *Scientific Reports*, 7:46766, doi: 10.1038/srep46766.

Mertes, J.R., Thompson, S.S., Booth, A., Gulley, J., Benn, D.I. (2016) **A conceptual model of supraglacial lake formation on debris-covered glaciers based on GPR facies analysis**. *Earth Surface Processes and Landforms*, doi:10.1002/esp.4068.

Thompson, S.S., Benn, D.I., Mertes, J.R. and Luckman, A. (2016) **Stagnation and Mass Loss on a Himalayan Debris-covered Glacier: Processes, Patterns and Rates**, *Journal of Glaciology*, 62(233), 467-485, doi:10.1017/jog.2016.37.

Thompson, S.S., Kulesa, B., Essery, R.L.H., and Lüthi, M.P. (2016), **Bulk meltwater flow and liquid water content of snowpacks mapped using the electrical self-potential (SP), method** *The Cryosphere*, 10, 433-444, doi:10.5194/tc-10-433-2016.

Thompson, S.S., Kulesa, B. and Luckman, A. (2012), **Integrated electrical resistivity tomography (ERT) and self-potential (SP) techniques for assessing hydrological**

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**processes within glacial lake moraine dams**, Journal of Glaciology, 58 (211), 849-858, doi: 10.3189/2012JoG11J235.

Benn, D.I., Bolch, T., Hands, K., Luckman, A., Nicholson, L.I., Quincey, D., Thompson, S.S., Toumi, R., Wiseman, S. (2012), **Response of debris-covered glaciers in the Mount Everest region to recent warming, and implications for outburst flood hazards**, Earth-Science Reviews, 114, 156-174, doi:10.1016/j.earscirev.2012.03.008.

Thompson, S.S., Benn, D.I., Dennis, K. and Luckman, A. (2012), **A rapidly growing moraine-dammed lake on Ngozumpa Glacier, Nepal**, Geomorphology, 145-146, 1-11, doi: 10.1016/j.geomorph.2011.08.015.

### **OTHER PUBLICATIONS**

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Thompson, S.S. (2017) **Holocene book review: Climate Change, Glacier Response, and Vegetation Dynamics in the Himalaya: Contributions toward Future Earth Initiatives**, The Holocene, doi: 10.1177/0959683617712827.

### **TEACHING**

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**Lecturer (2015):** University Centre in Svalbard (UNIS)

- Preparing and delivering lectures, computer practicals and fieldwork for 1 week debris covered glaciers and glacial geophysics component of an international post-graduate course (Glaciology AG 347/847).

**Guest lecturer (2016):** University Centre in Svalbard (UNIS)

- Preparing and delivering lectures on Himalayan glaciers and glacial geophysics as part of an international graduate course (Snow and ice dynamics AGF 212).

**Course assistant (2014-2016):** University Centre in Svalbard (UNIS)

- Assisting with computer practices, fieldwork and student research projects for an international post-graduate course (Glaciology AG 325/825).

**Co course convener (2017):** University Centre in Svalbard (UNIS)

- Preparing course content, fieldwork and student projects with the focus of debris-covered glaciers and glacial moraines for an international post-graduate course (Arctic Glaciers and Landscapes AG 350/850).

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### **FIELD EXPERIENCE**

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I have designed, organised and participated in research programs to the Nepal Himalayas, the European Alps, Antarctica and have done extensive field research and teaching in Svalbard. Field research has involved successfully implementing a suite of surveys and techniques, a number applied in these environment for the first time, including, electrical resistivity tomography, self-potential, ground penetrating radar, sonar, dGPS mapping, deployment of automatic weather stations, mass balance measurements and glacier speleological surveying investigations.

### **GRANTS AND AWARDS**

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2016 | AXA Research Fund Post-Doctoral Fellowship - € 130 000

2014 | Marie Curie Intra European Fellowship - €216 000

2010 | National Geographic Society/Waite Grant - \$14 250

2010 | NERC Geophysical Equipment Facility Equipment Loan - Leica dGPS

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2009 | Royal Geographical Society with IBG Geographical Fieldwork Grant - £1000

2008 | NERC Case Studentship DTG and RTSG - 3.5 years

2007 | SAAS Postgraduate Student Allowance Scheme Award - 1 year

2007 | University of Edinburgh Bursary - 1 year

### MEMBERSHIPS AND SERVICES

- **Member:** International Geographical Society (IGS), American Geophysical Union (AGU), European Geophysical Union (EGU), Royal Geographical Society (RGS)
- **Journal Reviewer:** Journal of Glaciology, Earth and Planetary Science Letters, Journal of Geophysical Research, Environmental Research Letters, Progress in Physical Geography, The Cryosphere, Natural Hazards Earth Systems Science
- **Editorial board member:** Scientific Reports

### KEY SKILLS

**Computing Skills**      **GIS:** QGIS, ARCGIS, ENVI, ERDAS (Imagine), MatLab, PCI, Surfer  
**Geophysical:** DCIP2D/3D, RES2DINV, R2, Rt3, gmesh, REFLEXW  
**Operating Systems:** Windows, LINUX  
**Languages:** Java, SQL, Fortran  
**Other:** Microsoft Office, SPSS, Eclipse, Coral

**Languages**              **French:** Basic **German:** Basic **Spanish:** A Level

### PROFESSIONAL REFERENCES

Prof. Bernd Kulesa

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