



# Zhihao LIU

**Nationality:** Chinese **Date of birth:** 25/03/1993

☎ **Phone number:** (+47) 48648781 ✉ **Email address:** [zhihaol@uio.no](mailto:zhihaol@uio.no)

🌐 **LinkedIn:** [www.linkedin.com/in/liuzhihao/](https://www.linkedin.com/in/liuzhihao/) 🌐 **Website:** [www.zhihaol.eu.org](http://www.zhihaol.eu.org)

📍 **Home:** Olav M. Troviks vei 10, H0412, 0864 OSLO (Norway)

## SUMMARY

### About me

As a geomatics professional with 5 years of experience in offshore geophysical surveys, I developed strong skills in data processing and spatial modeling. I have worked with diverse geodata sources, from offshore, **climate**, to **remote sensing**, adapting my solid geophysical expertise to different domains. I am passionate about delivering geodata as a service and providing data-driven solutions for the **energy and climate issues**. I am looking for interesting datasets, sharp minds, and cutting-edge projects to apply my expertise after summer (2023.08).

## WORK EXPERIENCE

### Research Assistant on Geomatics

*UiO* [ 11/2021 – Current ]

As a research assistant in the [SNOWDEPTH](#) project, I focused on developing a methodology to estimate snow depth using satellite laser altimetry. Key achievements:

- DEM expert: Developed a new co-registration algorithm for DEM: Gradient Descent Coregistration.
- Snow expert: Created the first dataset that addresses snow distribution at the hillslope scale.
- Handled various large datasets, such as ERA-5 (climate reanalysis), ICESat-2 (Laser Altimetry), Norway National DTM, and global DEMs (Copernicus, Arctic DEM, etc.).
- Contributed to [xDEM](#), an advanced DEM repository.

**Skills:** Geostatistics, Geospatial Modeling, Spatial Analysis, Automating GIS.

### Geomatics Professional

*BGP Offshore, China National Petroleum Corporation* [ 07/2014 – 06/2021 ]

As a field technician, I participated in over 12 offshore surveys (3D/4D/OBN/SideScanSonar) globally, including Norway, the UK, and West Africa, as part of a world-class seismic team, BGP Prospector. The focus is to deliver high-quality geophysical datasets. Key achievements:

- Conducted data processing and quality control for geophysical surveys.
- Developed a data processing pipeline using my own [software \(Python GUI\)](#).
- Took on technical responsibilities such as contract technical review, patents, and conference participation.
- Became a Licensed Surveyor in P.R.C. in 2018.
- Were promoted to a senior position as Assistant Manager in January 2021.

**Skills:** Data Processing, Quality Control, Python, Teamwork.

## EDUCATION AND TRAINING

### Master in Geoscience

*Universitetet i Oslo* [ 15/08/2021 – Current ]

My studies covered several keywords in the field of geophysics: change detection, terrain analysis, and cold processes. Additionally, I was admitted to IUGG 2023 (International Union of Geodesy and Geophysics) with traveling grant, a conference in Berlin in the summer, and was awarded a scholarship from the Industrial Liaison program.

**Courses** (GPA 3.75/4.0):

- **Advanced Remote Sensing and Topographic Analysis (A)**
- **Surveying, Photogrammetry and Spatial Analysis (A)**

- **Geophysical Data Science (A)**

- Remote Sensing
- Glacial and Periglacial Geomorphology
- Floods, Avalanches and Landslides
- The Surface Energy Balance in Cold Environments
- IPCC Climate Change 2021-The Physical Science Basis

**Thesis:** [Snow Depth Retrieval and Downscaling using Satellite Laser Altimetry, Machine Learning, and Climate Reanalysis](#)

**Poster:** [Snow Depth from Satellite Laser Altimetry: Co-registration, Bias Correction, and Statistical Downscaling](#)

## **Bachelor in Geodesy and Geomatics**

**South West Petroleum University (China)** [ 09/2010 – 07/2014 ]

Studied Engineering, Cartography, GNSS, Remote Sensing, and GIS (GPA 83/100).

A for Bachelor's thesis: A WebGIS system for urban infrastructure management.

## **PROJECTS**

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### **Bias-correction and spatial downscaling of weather data for energy system modelling.**

[ 04/04/2023 – Current ]

Understanding the resource availability and variability of solar and wind energy generation is essential to design and planning optimal energy systems. However, the resolution and bias from climate models play major limitations. In this summer research project ongoing, I **will** work as an assistant and help with:

- Organizing the historical weather dataset of Norway and Chile.
- Outcoming a machine learning technique for bias-correction and statistical downscaling.

**Skills:** Parallel Processing, Machine Learning, Statistical Downscaling.

### **SNOWDEPTH - Global snow depths from spaceborne remote sensing for permafrost, high-elevation precipitation, and climate reanalysis**

[ 01/2022 – Current ]

Snowmass is key to understanding the snow-depth-related climate mechanism or application, e.g. permafrost thawing, high-mountain precipitation, hydropower...

- Participated in [field trip](#) (drone lidar scanning) and worked on the ICESat-2 dataset and a variety of DEM products;
- Optimized the popular '[NuthKaab Coregistration](#)' and created one of the best co-registration algorithms: [gradient descending coregistraion](#).

**Skills:** Regression, Machine Learning, Terrain Analysis, Statistical downscaling, Multiprocessing, Git

### **North Sea Quad 35 Hybrid 3D seismic survey**

[ 07/2020 – 11/2020 ]

Quad 35 is a well-known commercial seismic project in Norway. Historically It combined streamers and node acquisition.

- Worked as a technician for contract technical review, onboard acquisition, data QC & reprocessing, and follow-up work.
- Got [the best commendation](#) from the client for modeling this novel acquisition to make it more efficient and understandable.

**Skills:** Offshore data acquisition, Quality Control, Technical Support, Follow-up

## **CREATIVE WORKS**

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### **Using 5.8 million to buy a unit in Oslo, which one is worth?**

The goal of this project was to determine which [unit to buy in Oslo](#) using multiple-criteria decision analysis (MCDA). The median price for a unit in Oslo is 5.8 million (2022.02).

The project involved scraping property data from Finn, cleaning the data, and gathering spatial information from open-access databases, OpenStreetMap, and satellite images. An MCDA model was then created to make the final decision.

**Skills:** Spatial Analysis, MCDA Modelling

### **What if the ice block expedition 1959 happens in 2021?**

In 1959, a three-ton block of ice from Mo i Rana by the Arctic Circle was trucked to Libreville by the Equator with an 11% mass loss. Was that true? What if we do it again in 2020 or 2021? Can we blame to climate change?

I simulated a historical event by energy balance model and coupled ERA 5, and revealed very interesting results.

**Skills:** Numerical Modeling, Climate Reanalysis, Time-series Analysis

### **How to bury Longyearbyen by an avalanche?**

Avalanches are rapid snow mass movements over snow-covered slopes, which could be dangerous for people living in mountainous terrain due to long-time exposure. So, how to bury a town with a designed avalanche?

I used Software RAMMS::Avalanche® to simulate slab avalanche movement by the Voellmy-fluid friction model. I found NVE's new report may overestimate the size of the avalanche in some scenarios.

**Skills:** Mass Movement Modelling, GIS

### **Agriculture change detection: The expansion of west Nile delta**

In the past three decades, Egypt got through the great challenge on food security because of doubling population. The Nile Delta area was getting crowded unprecedentedly. To address this issue, a study was conducted in the western Nile area using spectral analysis, NDVI, classification and change detection techniques. The aim of this study was to identify changes in agriculture practices and land use patterns over time.

**Skills:** Change Detection, Remote Sensing

## **CONFERENCES AND SEMINARS**

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### **Unlocking the secrets of snow depth - a study of satellite altimetry and high-precision digital elevation models**

Oral presentation at Sustainability Conference 2023, UiO

### **Wide-towed sources in streamer seismic: a case study from Norway Q35**

Zhihao Liu, Bo Wen, Yuanjie Liu, Xuebin Qin, Qian Zhao, Conference paper from Society of Petroleum Geophysicists 2021, Chengdu, China

### **A hybrid seismic acquisition: from wide-towed sources, sparse node to FWI**

Zhihao Liu, Yuanjie Liu, Bo Wen, BGP geophysical technology overseas workshop 2021, Beijing, China (not open access)

### **An identification system for underwater seismic devices**

Patent, PRC 201911154941X · Issued May 13, 2022.

### **Offshoreorinet v1.0 Offshore seismic QC software**

Software Copyright, 2020SR0194691 · Issued Mar 2, 2020.

## **LANGUAGE SKILLS**

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Mother tongue(s): **Chinese**

Other language(s): **English (professional working proficiency) | Norsk (beginner)**

## **HOBBIES AND INTERESTS**

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### **Marathon**

- Not bad runner with 130 (half-marathon) and 330 (marathon) of the personal best.
- Have organized medium size marathon (15K) and was in charge of supply and volunteers.

## **OSI Friluft - Volunteer**

- Board member - Media & Facebook.
- Tour leader of outdoor events.

## **IMO 2022 - Volunteer**

- Tour guide for International Mathematical Olympiad 2022, Oslo.

## **REFERENCES**

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### **2021 - Present**

Professor and Supervisor, Andreas Max Kääb, Email: [a.m.kaab@geo.uio.no](mailto:a.m.kaab@geo.uio.no), Mobile: +47 22855812

Project Leader and Co-supervisor, Désirée Treichler, Email: [desiree.treichler@geo.uio.no](mailto:desiree.treichler@geo.uio.no), Mobile: +47 22857869

### **2016 - 2021**

Chief geophysicist of BGP Prospector, Bo Wen, Email: [wenbo01@cnpc.com.cn](mailto:wenbo01@cnpc.com.cn), Mobile: +86 18622259275