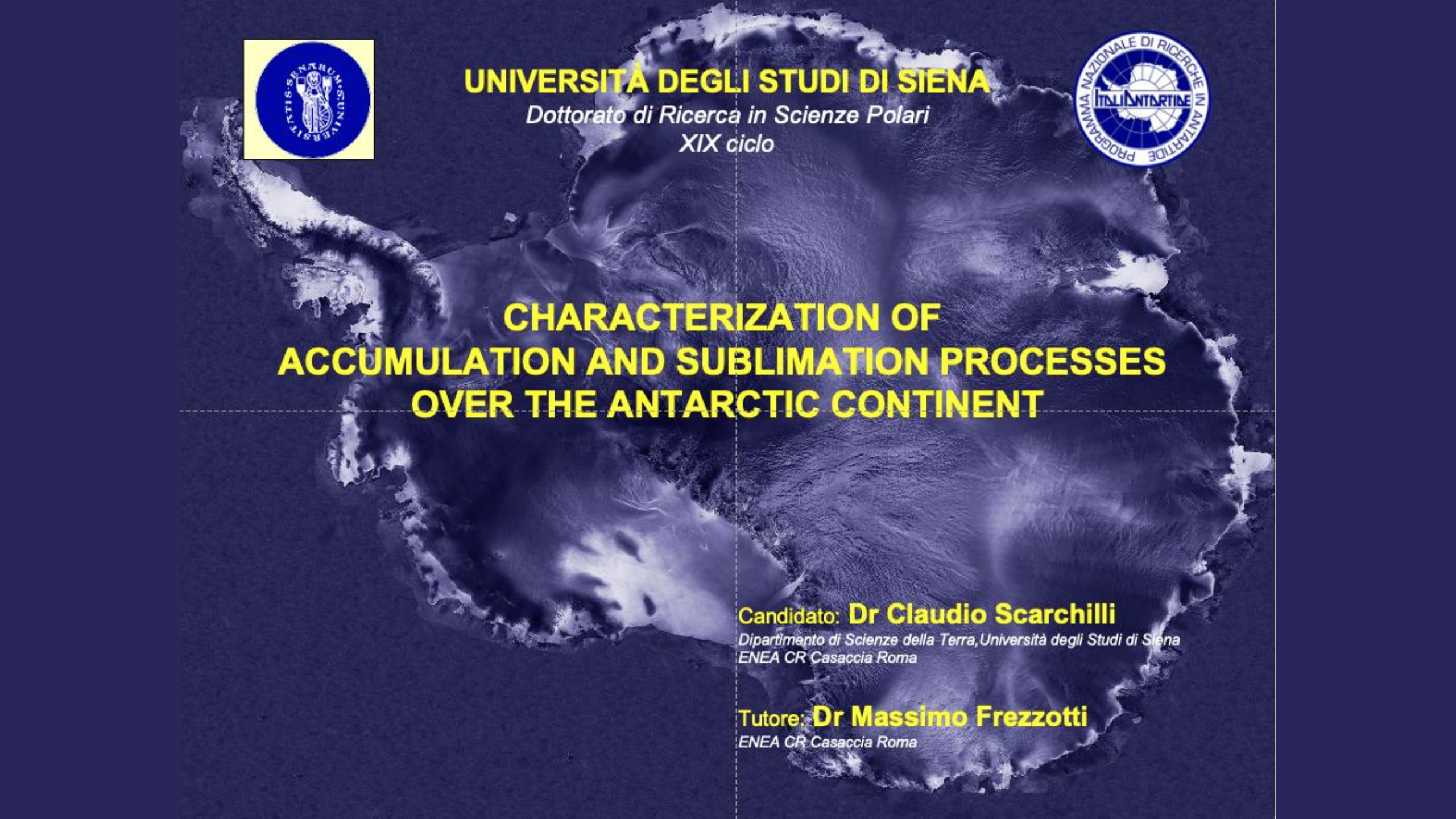
Per ricordare insieme Claudio

Claudio ha dedicato gran parte della sua attività lavorativa all'Antartide, fin dai tempi della tesi di Laurea sull'ozono stratosferico (Univ. La Sapienza-CNR 2002), poi con un dottorato in scienze polari (2007) con una tesi dedicata alla caratterizzazione dei processi di accumulo e precipitazione in Antartide.

Ricercatore a tempo indeterminato in ENEA dal 2010, Claudio ha avuto un ruolo importante nel gruppo di Osservazioni Climatiche di ENEA.



UNIVERSITÀ DEGLI STUDI DI SIENA

Dottorato di Ricerca in Scienze Polari

XIX ciclo

CHARACTERIZATION OF ACCUMULATION AND SUBLIMATION PROCESSES OVER THE ANTARCTIC CONTINENT

Candidato: **Dr Claudio Scarchilli**

Dipartimento di Scienze della Terra, Università degli Studi di Siena

ENEA CR Casaccia Roma

Tutore: **Dr Massimo Frezzotti**

ENEA CR Casaccia Roma

CONTENTS

ACKNOWLEDGMENTS

Daniela Meloni,
Paolo Ruti,
Lorenzo DeSilvestri,
Stefano Urbini,
Mauro Valt,
Stefano Dolci,
Tony Iaccarino,
Massimo Frezzotti,
Giorgio DiSarra,
Paolo Grigioni,
Guido DiDonfrancesco,
Francesco Coppola,
Giandomenico Pace.

GRAZIE

Clim Dyn
DOI 10.1007/s00382-010-0946-4

112 citazioni scopus

Snow precipitation at four ice core sites in East Antarctica: provenance, seasonality and blocking factors

Claudio Scarchilli · Massimo Frezzotti · Paolo Michele Ruti

Received: 27 April 2010 / Accepted: 11 November 2010

Abstract Snow precipitation is the primary mass input to the Antarctic ice sheet and is one of the most direct climatic indicators, with important implications for paleoclimatic reconstruction from ice cores. Provenance of precipitation and the dynamic conditions that force these precipitation events at four deep ice core sites (Dome C, Law Dome, Talos Dome, and Taylor Dome) in East Antarctica were analysed with air mass back trajectories calculated using the Lagrangian model and the mean composite data for precipitation, geopotential height and wind speed field data from the European Centre for Medium Range Weather Forecast from 1980 to 2001. On an annual basis, back trajectories showed that the Atlantic-Indian and Ross-Pacific Oceans were the main provenances of precipitation in Wilkes Land (80%) and Victoria Land (40%), respectively, whereas the greatest influence of the ice sheet was on the interior near the Vostok site (80%) and in the Southwest Ross Sea (50%), an effect that decreased towards the coast and along the Antarctic slope. Victoria Land received snowfall atypically with respect to other Antarctica areas in terms of pathway (eastern instead of western), seasonality (summer instead of winter) and velocity (old air age). Geopotential height patterns at 500 hPa at low (>10 days) and high (2–6 days) frequencies during snowfall cycles at two core sites showed large positive anomalies at low frequencies developing in the Tasman Sea-Eastern Indian Ocean at higher latitudes (60–70°S) than normal. This could be considered part of an atmospheric blocking event, with transient eddies acting to decelerate westerlies in a split region area and accelerate the flow on the flanks of the low-frequency positive anomalies.

Keywords Precipitation · Surface mass balance · Blocking high · Southern hemisphere dynamic

C. Scarchilli · M. Frezzotti (✉) · P. M. Ruti
ENEA, Rome, Italy
e-mail: massimo.frezzotti@enea.it

C. Scarchilli
Università degli studi di Trieste, Trieste, Italy

Published online: 03 December 2010

1 Introduction

Polar ice sheets are valuable archives of paleoclimate information, and deep ice cores have been drilled at several locations in the Antarctic and Greenland ice sheets. Ice core records provide a cornucopia of information about past climates, environments and atmospheric circulation (Barbante et al. 2010). These records, currently spanning the last 800,000 years (Jouzel et al. 2007), are key to the identification of the causes and forcing mechanisms of climate change. Ice cores are also especially valuable in remote areas such as Antarctica, where long-term observations or historical records are scarce and inadequate (Turner et al. 2005). The climate record derived from wet deposition in ice cores is determined mainly by the conditions that prevail when snow precipitation occurs and from post-deposition processes, such as wind-borne redistribution and surface and snowdrift sublimation (Frezzotti et al. 2007; Scarchilli et al. 2010). However, several factors, including the seasonality of snow precipitation and changes in moisture sources and pathway regions, may bias the interpretation of the ice record (e.g. Jouzel et al. 2003; Schlosser et al. 2008; Sime et al. 2009). An understanding of Antarctic snow accumulation is therefore necessary to determine the present state of the ice sheet and to make predictions regarding its potential contribution to rising sea

Clim Dyn (2010) 34:1195–1206
DOI 10.1007/s00382-009-0601-0

75 citazioni scopus

Extraordinary blowing snow transport events in East Antarctica

Claudio Scarchilli · Massimo Frezzotti · Paolo Grigioni · Lorenzo De Silvestri · Lucia Agnoletto · Stefano Dolci

Received: 18 November 2008 / Accepted: 25 May 2009 / Published online: 11 June 2009

Abstract In the convergence slope/coastal areas of Antarctica, a large fraction of snow is continuously eroded and exported by wind to the atmosphere and into the ocean. Snow transport observations from instruments and satellite images were acquired at the wind convergence zone of Terra Nova Bay (East Antarctica) throughout 2006 and 2007. Snow transport features are well-distinguished in satellite images and can extend vertically up to 200 m as first-order quantitatively estimated by driftometer sensor FlowCapt™. Maximum snow transportation occurs in the fall and winter seasons. Snow transportation (drift/blowing) was recorded for ~80% of the time, and 20% of time recorded, the flux is $>10^{-2}$ kg m^{-2} s^{-1} with particle density increasing with height. Cumulative snow transportation is ~4 orders of magnitude higher than snow precipitation at the site. An increase in wind speed and transportation (~30%) was observed in 2007, which is in agreement with a reduction in observed snow accumulation. Extensive presence of ablation surface (blue ice and wind crust) upwind and downwind of the measurement site suggest that the combine processes of blowing snow sublimation and snow transport remove up to 50% of the precipitation in the coastal and slope convergence area. These phenomena represent a major negative effect on the snow accumulation, and they are not sufficiently taken into account in studies of surface mass balance. The observed wind-driven ablation explains the inconsistency between atmospheric model precipitation and measured snow accumulation value.

Keywords Surface mass balance · Blowing snow · Climate impact · Snow transport · Katabatic wind · East Antarctica

C. Scarchilli · M. Frezzotti (✉) · P. Grigioni · L. De Silvestri · L. Agnoletto
ENEA, Rome, Italy
e-mail: massimo.frezzotti@enea.it

C. Scarchilli
e-mail: claudio.scarchilli@enea.it

P. Grigioni
e-mail: paolo.grigioni@enea.it

L. De Silvestri
e-mail: lorenzo.desilvestri@enea.it

L. Agnoletto
e-mail: lucia.agnoletto@enea.it

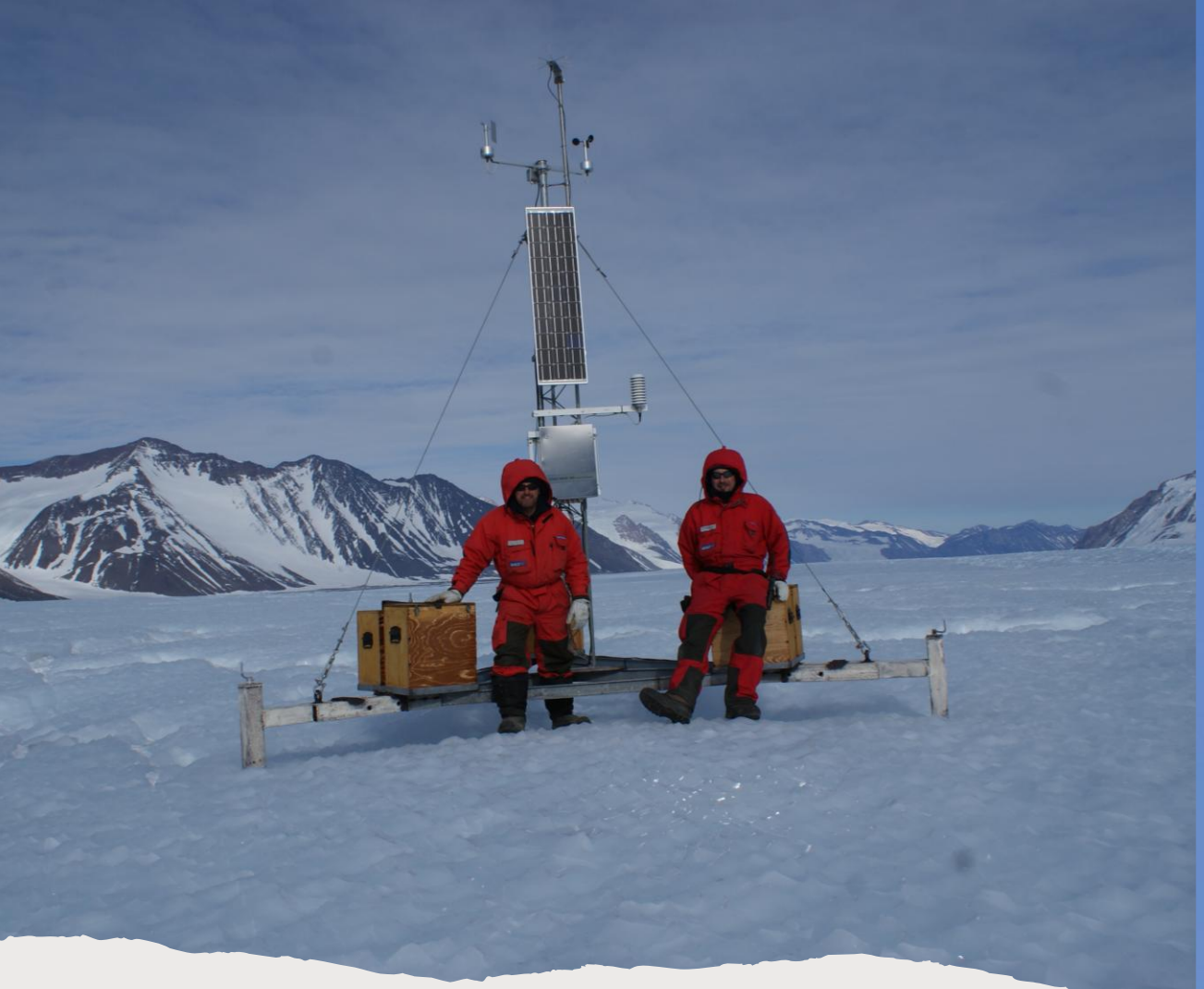
C. Scarchilli · L. Agnoletto
Dipartimento di Scienze della Terra, Università di Siena, Siena, Italy

S. Dolci
CNR, Rome, Italy
e-mail: stefano.dolci@cnr.it

S. Dolci
Consorzio P.N.R.A. S.C.r.l., Rome, Italy

1 Introduction

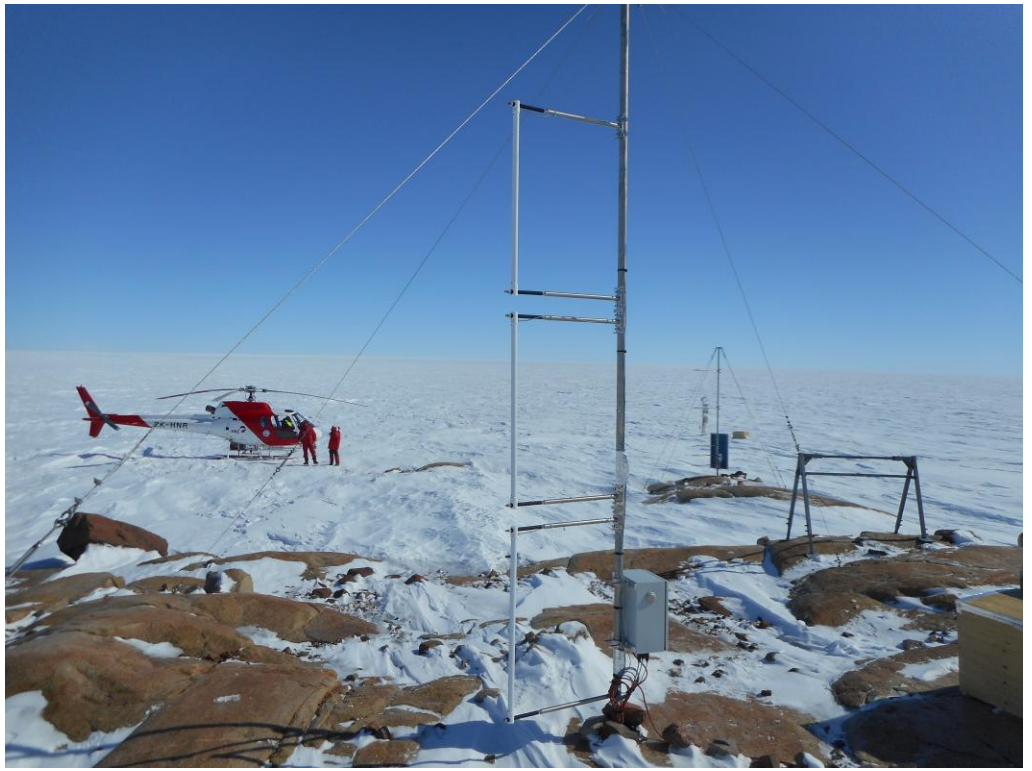
Since the first expedition of Scott, Priestley, and Mawson, the slope and coastal areas of the East Antarctic Ice Sheet are known as the area of our planet with the highest winds and blowing snow. Nowhere else on Earth does a single meteorological element (wind) has such an overwhelming influence on the climate of an entire continent (Wendler et al. 1993). Strong katabatic winds blow throughout the year, and a large but unknown fraction of the snow that falls on the ice sheet is continuously exported to the atmosphere and the Southern Ocean. These processes constitute a significant negative term in the surface mass balance (SMB). SMB is given by (Déry and Yau 2002):

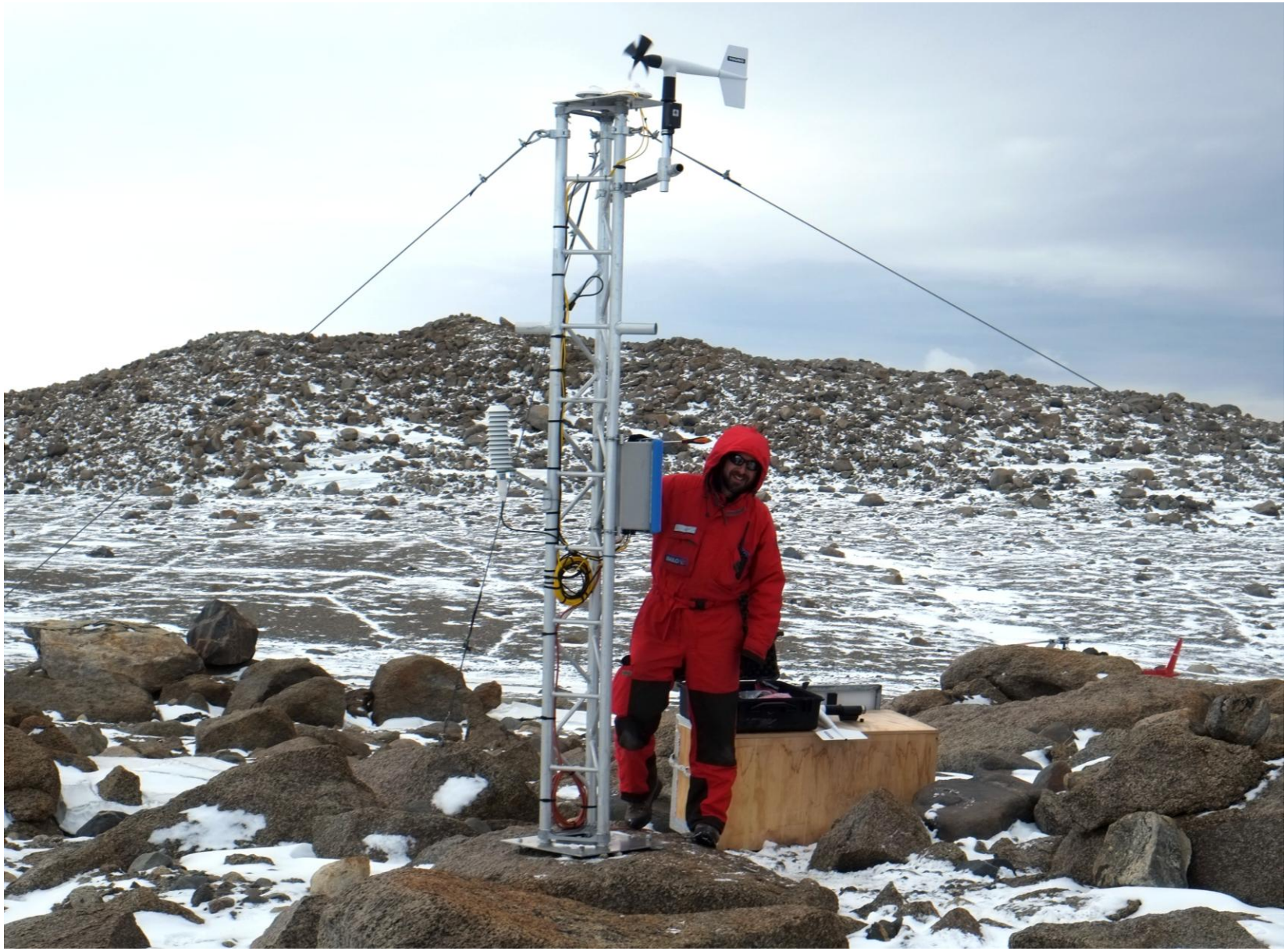


La sua prima spedizione in Antartide risale al 2005 ed ha poi partecipato ad altre 11 spedizioni.

Nel 2009 entra a far parte dello staff dell'Osservatorio Meteo-Climatologico Antartico.

Nel 2015 durante la campagna del progetto PNRA MALOX (MAss LOss in wind fluX), di cui è stato il PI, viene installata a BTN, Larsen Glacier e Inexpressible Island nuova strumentazione con la quale ricava, fra le altre cose, le prime misure di precipitazione nell'area di Baia Terra Nova.





Inexpressible Island, 2015 - installazione della stazione meteorologica Virginia – progetto MALOX

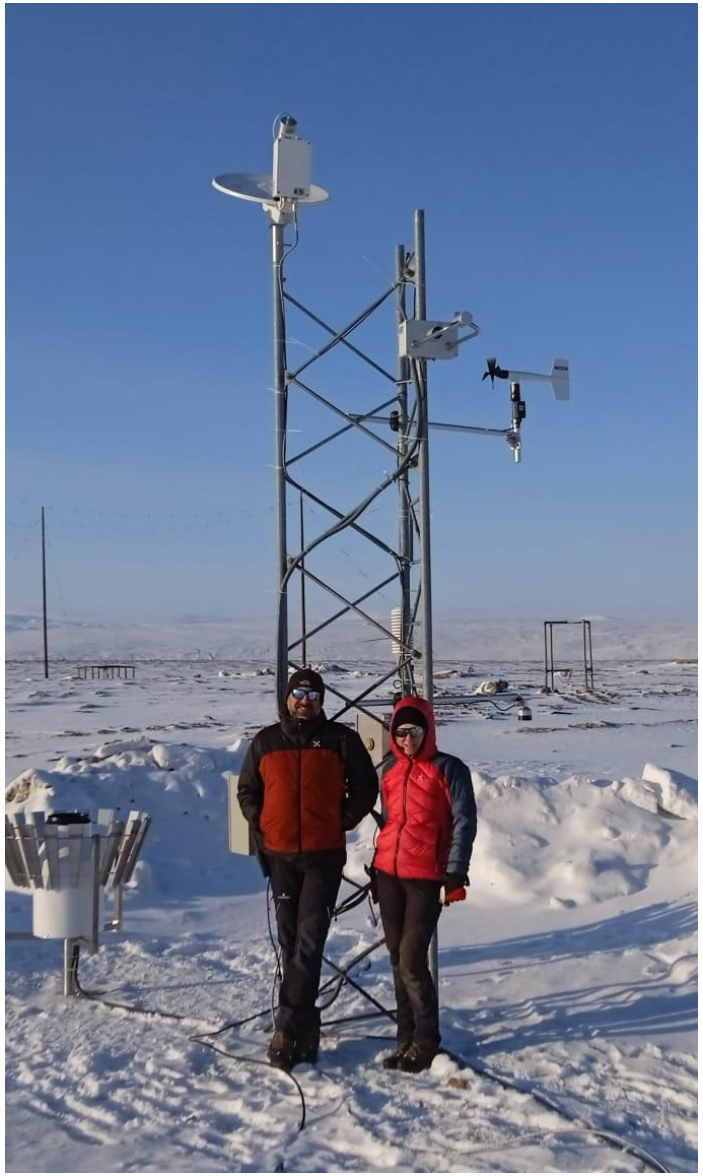
Claudio ha dedicato gran parte della sua carriera professionale all'Antartide ma non solo. Nel corso degli anni ha condiviso esperienza e conoscenza in particolar modo per quanto riguarda la strumentazione e le misure di precipitazione anche sugli altri Osservatori Climatici di ENEA, a Thule (Groenlandia) e a Lampedusa.

Ripensiamo al suo impegno alla Stazione di Osservazioni Climatiche di Lampedusa dove dal 2020 ha collaborato alle misure di precipitazione in area mediterranea nel contesto delle Infrastrutture di Ricerca europee ACTRIS e ICOS, mettendo a disposizione le sue competenze sviluppate in Antartide.

Lampedusa, aprile 2023 - lavori di installazione della strumentazione dell’Osservatorio dell’Ecosistema terrestre (ICOS)

Lavori per l’installazione del pluviometro e del disdrometro (ACTRIS) alla stazione di Osservazioni Climatiche ENEA sull'isola di Lampedusa

Brindisi 2017, installazione di un radiometro infrarosso nel contesto di una campagna della nave oceanografica Minerva.



Aprile 2023, durante la prima campagna del progetto ECAPAC PRA (Programma Ricerche in Artico) finalizzato allo studio degli effetti della precipitazione sull'albedo superficiale a Thule in Groenlandia, è stata installata una nuova stazione meteorologica e strumentazione per la misura della precipitazione (disdrometro, Micro Rain Radar e pluviometro a pesata), trasferendo in Artide le competenze acquisite e sviluppate in Antartide.

In Antartide, tra tutti, il Larsen Glacier, è un sito a cui Claudio ha dedicato molto impegno potenziandolo dal punto di vista strumentale.

Clim Dyn (2010) 34:1195–1206
DOI 10.1007/s00382-009-0601-0

Extraordinary blowing snow transport events in East Antarctica

Claudio Scarchilli · Massimo Frezzotti · Paolo Grigioni · Lorenzo De Silvestri · Lucia Agnoletto · Stefano Dolci

Received: 18 November 2008 / Accepted: 25 May 2009 / Published online: 11 June 2009

Abstract In the convergence slope/coastal areas of Antarctica, a large fraction of snow is continuously eroded and exported by wind to the atmosphere and into the ocean. Snow transport observations from instruments and satellite images were acquired at the wind convergence zone of Terra Nova Bay (East Antarctica) throughout 2006 and 2007. Snow transport features are well-distinguished in satellite images and can extend vertically up to 200 m as first-order quantitatively estimated by driftometer sensor FlowCapt™. Maximum snow transportation occurs in the fall and winter seasons. Snow transportation (drift/blowing) was recorded for ~80% of the time, and 20% of time recorded, the flux is $>10^{-2}$ kg m^{-2} s^{-1} with particle density increasing with height. Cumulative snow transportation is ~4 orders of magnitude higher than snow precipitation at the site. An increase in wind speed and transportation (~30%) was observed in 2007, which is in agreement with a reduction in observed snow accumulation. Extensive presence of ablation surface (blue ice and wind crust) upwind and downwind of the measurement site suggest that the combine processes of blowing snow sublimation and snow transport remove up to 50% of the precipitation in the coastal and slope convergence area. These phenomena represent a major negative effect on the snow accumulation, and they are not sufficiently taken into account in studies of surface mass balance. The observed wind-driven ablation explains the inconsistency between atmospheric model precipitation and measured snow accumulation value.

Keywords Surface mass balance · Blowing snow · Climate impact · Snow transport · Katabatic wind · East Antarctica

C. Scarchilli · M. Frezzotti (✉) · P. Grigioni · L. De Silvestri · L. Agnoletto
ENEA, Rome, Italy
e-mail: massimo.frezzotti@enea.it

C. Scarchilli
e-mail: claudio.scarchilli@enea.it

P. Grigioni
e-mail: paolo.grigioni@enea.it

L. De Silvestri
e-mail: lorenzo.desilvestri@enea.it

L. Agnoletto
e-mail: lucia.agnoletto@enea.it

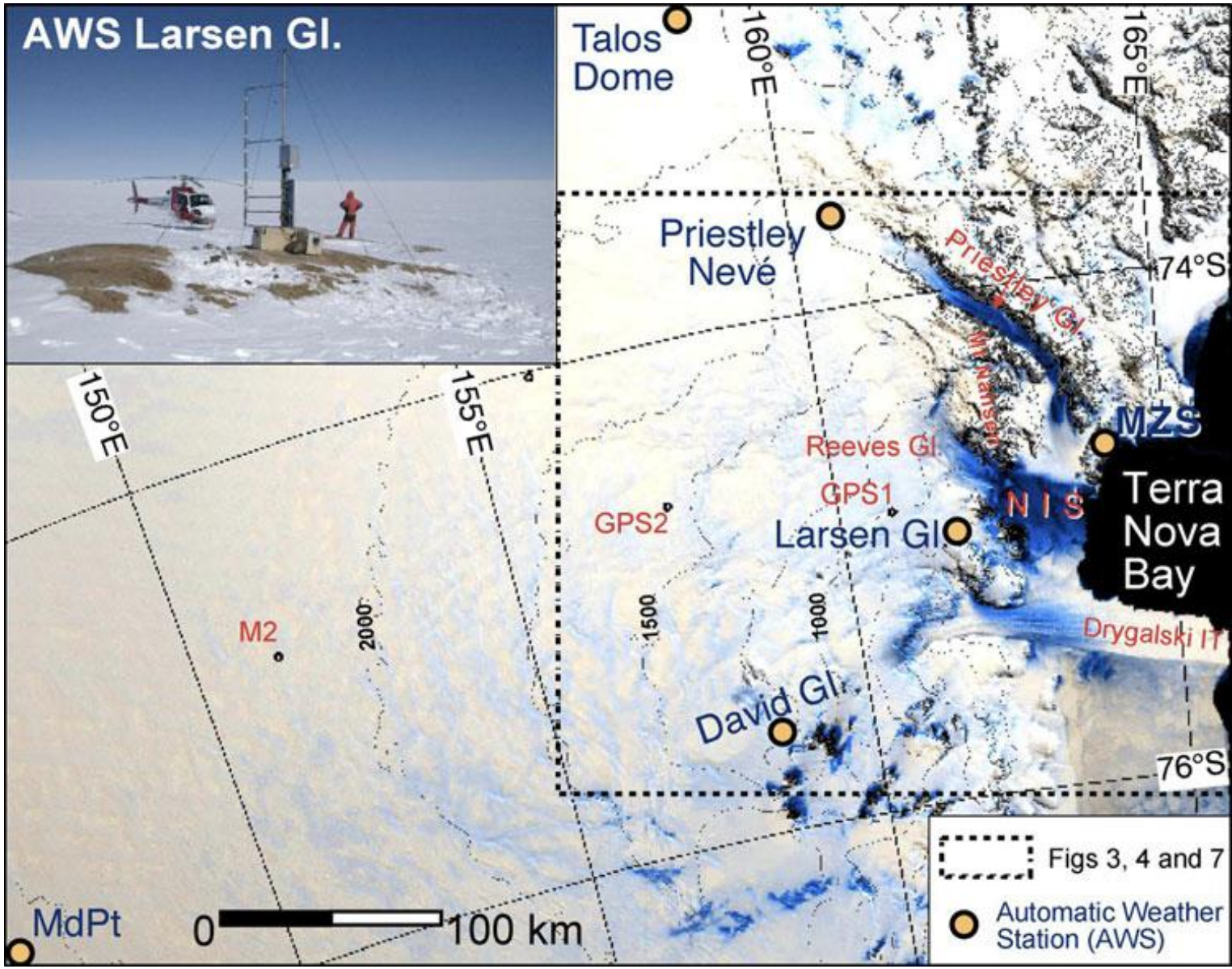
C. Scarchilli · L. Agnoletto
Dipartimento di Scienze della Terra, Università di Siena, Siena, Italy

S. Dolci
CNR, Rome, Italy
e-mail: stefano.dolci@cnr.it

S. Dolci
Consorzio P.N.R.A. S.C.r.l., Rome, Italy

1 Introduction

Since the first expedition of Scott, Priestley, and Mawson, the slope and coastal areas of the East Antarctic Ice Sheet are known as the area of our planet with the highest winds and blowing snow. Nowhere else on Earth does a single meteorological element (wind) has such an overwhelming influence on the climate of an entire continent (Wendler et al. 1993). Strong katabatic winds blow throughout the year, and a large but unknown fraction of the snow that falls on the ice sheet is continuously exported to the atmosphere and the Southern Ocean. These processes constitute a significant negative term in the surface mass balance (SMB). SMB is given by (Déry and Yau 2002):



COMPOSITE GAZETTEER OF ANTARCTICA

ENEA – P.N.R.A.

Scientific Committee on Antarctic Research (SCAR)
Collated by Programma Nazionale di Ricerche in Antartide (Italy)
in the framework of the SCAR Standing Committee on Antarctic Geographic Information (SCAGI)

SCAR Gazetteer | Search | Information | Login | Pass | Login

Welcome to the SCAR Composite Gazetteer of Antarctica

The SCAR Composite Gazetteer of Antarctica (CGA) has been compiled over a period of 34 years (commenced 1992) and consists of 39,187 names that correspond to 20,159 features. The place names information has been submitted by the national names committees from 22 countries and compiled by Roberto Cervellati and Chiara Ramorino from the Italian Antarctic names committee - Comitato per i nomi geografici antartici.

The SCAR CGA is now a relational database - related to the SCAR Map catalogue, SCAR Feature Catalogue and the SCAR Flora and Fauna databases (all developed by the Australian Antarctic Data Centre). This allows the search for Antarctic names, maps and flora and fauna information to be addressed via the gazetteer or map catalogue with results showing links to national names committees, map publishers, map retailers and small scale maps showing the distribution of flora and fauna.

GUIDELINES FOR NEW NAME PROPOSALS

The Gazetteer consider the naming of features after individuals who have demonstrable evidence of the following criteria.

- Significant and exceptional contribution to scientific understanding and/or life in the Antarctic.
- Major contributions to Antarctic matters.
- Contribution to government and policymaking with direct relevance to Antarctica.
- Association of the person with the proposed feature.

Naming of features after individuals is not justified based purely on longevity. Proposals for naming after individuals at the end of their career or commemorative naming must also meet these criteria. Where there is a proposal for naming after an individual still active in their field, nominations should be accompanied by at least one letter of support from someone other than the nominator. This letter should support the evidence of fit to the criteria. The Committee welcomes nominations for individuals from historically underrepresented groups.

COMPOSITE GAZETTEER OF ANTARCTICA

ENEA – P.N.R.A.

Scientific Committee on Antarctic Research (SCAR)
Collated by Programma Nazionale di Ricerche in Antartide (Italy)
in the framework of the SCAR Standing Committee on Antarctic Geographic Information (SCAGI)

SCAR Gazetteer | Search | Information | Login | Pass | Login

Show search terms

SCAR Gazetteer Information: Each place can have one or more entries in the SCAR Composite Gazetteer, dependant on its origin. By viewing an individual entry, you may see multiple references to the same place. SCAR uses a more general feature type coding, so each place will, in general, have multiple feature types.

Showing 1 place name.

Download as...

Name	Latitude	Longitude	Feature Type
Scarchilli Point (ITA)	74° 57' 02.0" S	161° 46' 10.0" E	

Name ID: 140448 Place ID: 20456

Discontinuous granitoid outcrop located at Larsen Glacier, 3 km NW of Tomowick Nunatak and 16 km SSW of Reed Nunatak. This site was established by Claudio Scarchilli and since 2005 it has been equipped with a number of instruments for the measurement of meteorological parameters, surface mass balance components and permanent GNSS Station.

Discontinuous granitoid outcrop located at Larsen Glacier, 3 km NW of Tomowick Nunatak and 16 km SSW of Reed Nunatak. This site was established by Claudio Scarchilli and since 2005 it has been equipped with a number of instruments for the measurement of meteorological parameters, surface mass balance components and permanent GNSS Station.

Named For

Claudio Scarchilli (PhD in Polar Sciences, researcher ENEA) who prematurely died, having dedicated his career to Antarctic research

Location

Latitude:	74° 57' 02.0" S	-74.95056°	Unknown precision
Longitude:	161° 46' 10.0" E	161.76944°	Unknown precision
Altitude:	948 m		Unknown precision

Images

No images of this place could be found.

Map

Discontinuous granitoid outcrop located at Larsen Glacier, 3 km NW of Tomowick Nunatak and 16 km SSW of Reed Nunatak. This site was established by Claudio Scarchilli and since 2005 it has been equipped with a number of instruments for the measurement of meteorological parameters, surface mass balance components and permanent GNSS Station.

Named For

Claudio Scarchilli (PhD in Polar Sciences, researcher ENEA) who prematurely died, having dedicated his career to Antarctic research

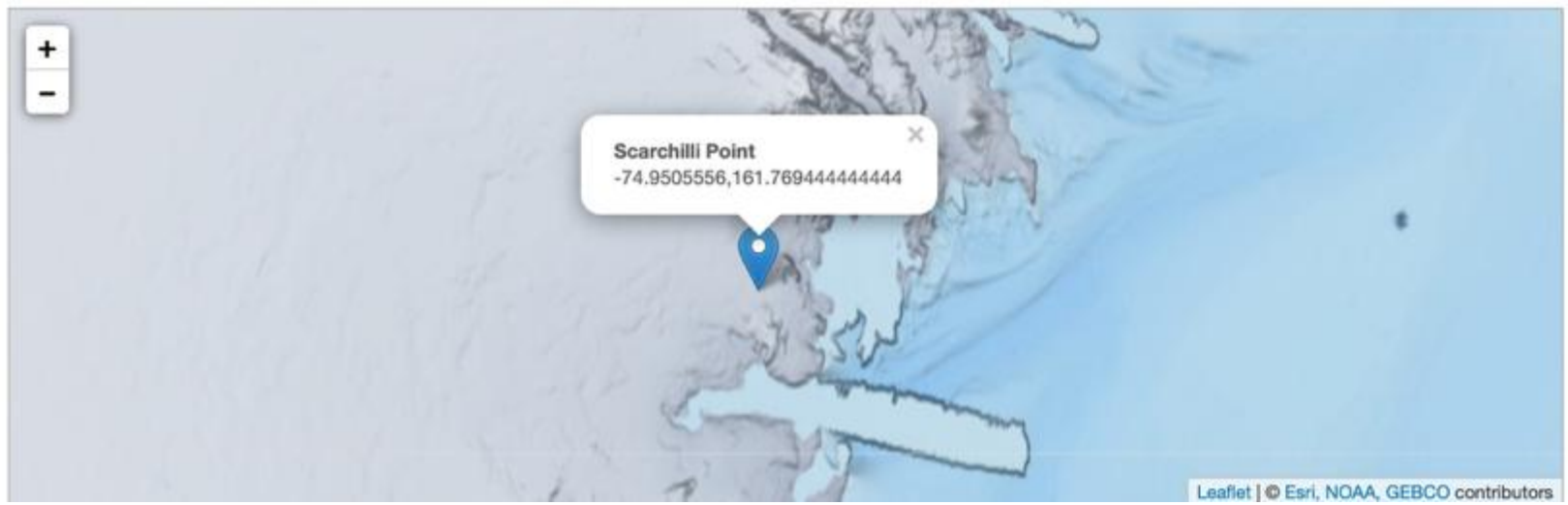
Location

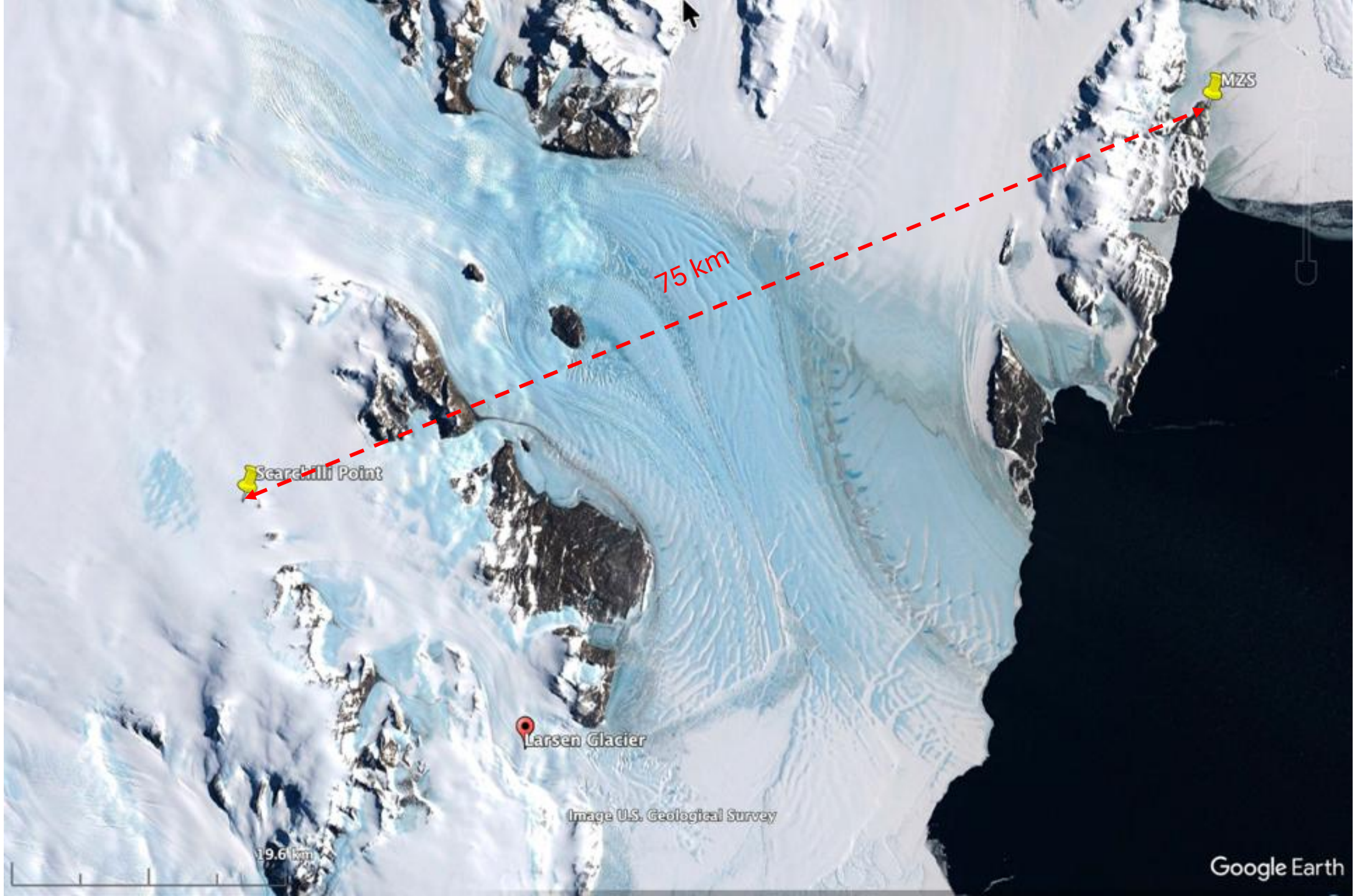
Latitude:	74° 57' 02.0" S	-74.95056°	Unknown precision
Longitude:	161° 46' 10.0" E	161.76944°	Unknown precision
Altitude:	948 m		Unknown precision

Images

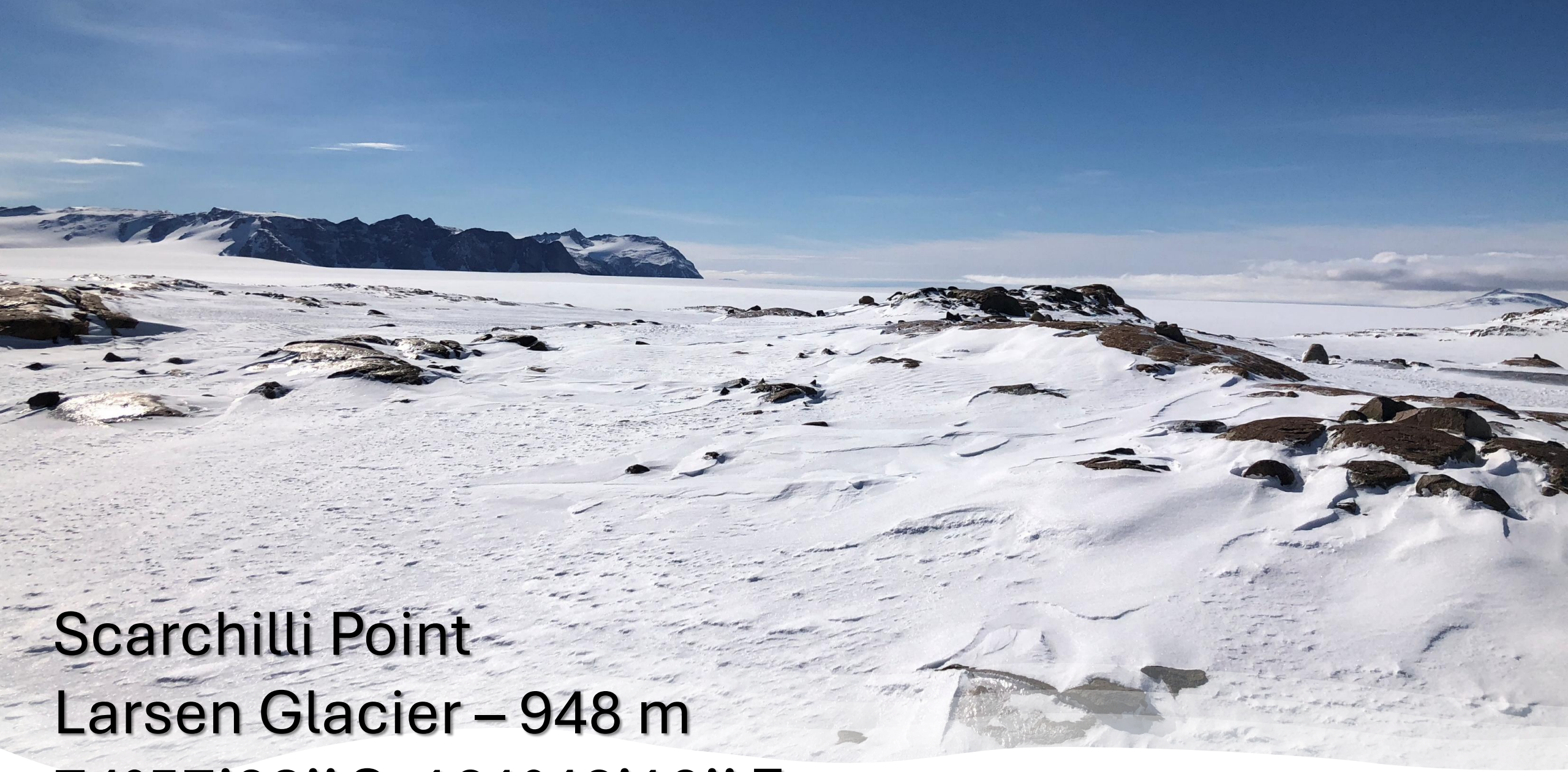
No images of this place could be found.

Map




MZS
75 km
Searchlight Point
Larsen Glacier
Image U.S. Geological Survey
19.6 km
Google Earth


MZS
Larsen Glacier



Scarchilli Point
Larsen Glacier – 948 m
74°57’02’’ S, 161°46’10’’ E

Scarchilli Point
Larsen Glacier – 948 m
74°57’02’’ S, 161°46’10’’ E


74° 57' 02" S 161° 46' 10" E
SCARCHILLI POINT
ANTARCTICA