High Arctic Fuglebekken experimental catchment on Spitsbergen, Svalbard

Bartłomiej Luks, Adam Nawrot, Marzena Osuch, Michał Posyniak, Tomasz Wawrzyniak, Ekaterina Rets*

Institute of Geophysics, Polish Academy of Sciences, Warszawa, 01-452, Poland

ekaterina.p.rets@gmail.com

Institute of Geophysics
Polish Academy of Sciences

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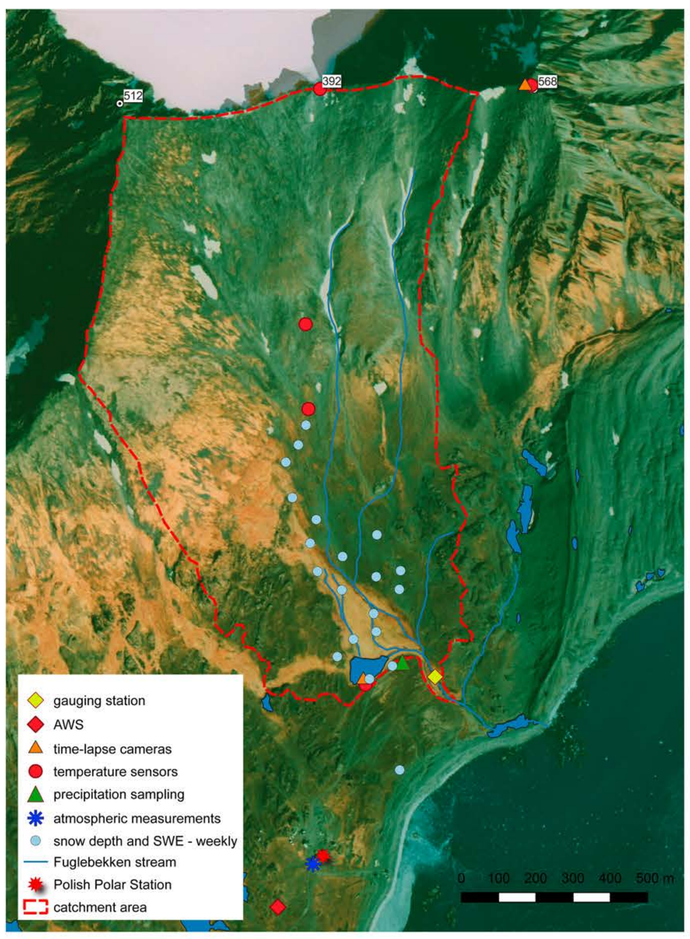
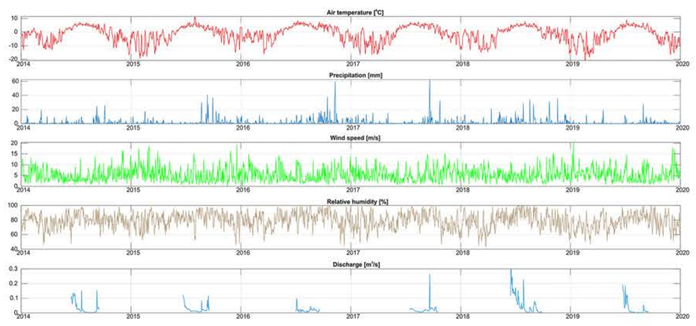
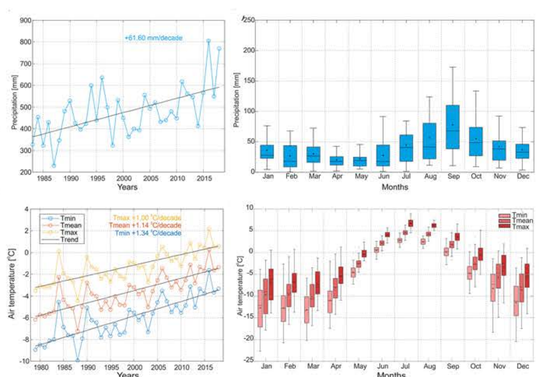
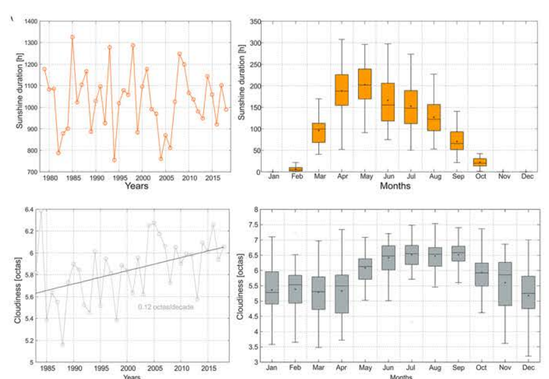
Fuglebekken is a small unglaciated catchment of 1.27 km² situated in the southwest Spitsbergen with a history of hydrometeorological experimental observations going back to late 1970s. It represents sea terraces and coastal mountains catchments becoming more and more common in SW Spitsbergen as a consequence of deglaciation. Here the recent observational program and available datasets of the Polish Polar Station Hornsund in Fuglebekken catchment is presented, including meteorological, hydrological observations, hydrochemical monitoring and snow survey.

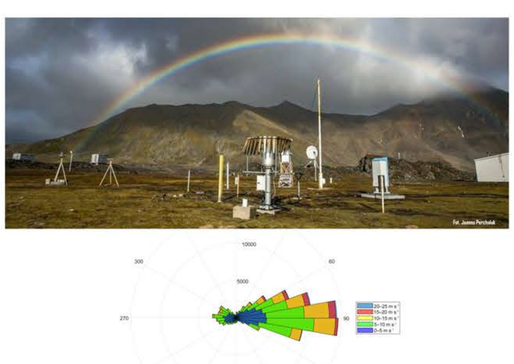


#	Site	Characteristic	Unit	Time intervals	Method and Equipment	Period of measurements	PI
1	Polish Polar Station Hornsund meteorological station	Air Temperature 2 m	∘C	3 hours	Traditional thermometer in a Stevenson screen, Vaisala HMP 45D (since January 2001), HMP155 (since January 2018)	1979–ongoing	Tomasz Wawrzyniak
2		Relative humidity 2 m	%	3 h	Hygrometer, HMP45D (since January 2001), HMP155 (since January 2018)	1979-ongoing	
3		Precipitation 1 m	mm	6 hours	Hellmann rain gauge D-200	1979–ongoing	
4		Atmospheric pressure	hPa	3 h	Mercury barometer, PTB200A (since January 2001), Baro-1QML-AV (since January 2018)	1983–ongoing	
5		Wind speed and direction	m s−1	3 h	Fuess 90z wind meter, Vaisala WAA151 (since January 2001), Vaisala WMT702 (since January 2018)	1983–2000, 2001–2016, 2017–ongoing	
6		Sunshine duration	h	24 hours	Campbell–Stokes heliograph	1979–ongoing	
7		Cloudiness	oktas	3 h	Visual observations	1983–ongoing	
8		Visibility	marine sc	3 h	Visual observations	1983–ongoing	
9		Sunshine duration	h	1 min	Kipp & Zonen Sunshine Duration Detector CSD3	2005–ongoing	Posyniak/ Sobolewski
10		Shortwave radiation	W m-2	1 min	Kipp & Zonen Pyranometers CM11 and CMP21	2005–ongoing	
11		UV radiation	W m-2	1 min	Kipp & Zonen UVbiometers UVAB and UVSET	2005–ongoing	
12		Longwaveradiation	W m-2	1 min	Kipp & Zonen Net Radiometer CNR4	2022–ongoing	Posyniak
13		Albedo/NetRadiation	1 / 1	1 min	Kipp & Zonen Net RadiometerCNR4	2017–ongoing	
14		Cloud base/Cloudiness	km / octas	2 min	Luft Ceilometer CHM15k	2017–ongoing	
15		Aerosol Optical Depth	1	position	Cimel Sun/Star Photometer (Diferent models)	2005–ongoing	Sobolewski/NASA
16		snow depth	cm	daily	snow stakes	1983–ongoing	Bartłomiej Luks/Tomasz
17		snow water equivalent (SWE)	mm	every 5 days	VS-43 snow tube	1983–ongoing	
18	Fuglebekken gauging station	discharge measurements	m3/s	twice a week	time interval	2008-ongoing	Adam Nawrot
19		Water level, water temperature	m; ∘C	10 min (Jun-Oct)	Onset HOBO U20; before 2014 Ejkelkamp	2008-ongoing	
20		Conductivity, water temperature	µS/cm; m	10 min (Jun-Oct)	Onset HOBO U24; before 2014 Ejkelkamp	2008-ongoing	
21		water chemical composition: pH, C25 [µS/cm]; Ion composition: Cl-, NO3-, SO42-, Na+, NH4+, K+, Ca2+, Mg2+; HCO3-	µS/cm; mg/L;	daily (18:00 UTC; June-October)	pH, conductivity: Elmetron ; Ion chromatography: Metrohm 930 Compact IC Flex; Bicarbonates: Metrohm Titrino 702 SM Titrino	2004-ongoing	
22		Precipitation (rain and snow) water chemical composition: pH, C25 [µS/cm]; Ion composition: Cl-, NO3-, SO42-, Na+, NH4+, K+, Ca2+, Mg2+; HCO3-	µS/cm; mg/L;	daily (every precipitation event)	pH, conductivity: Elmetron CPC-505; Ion chromatography: Metrohm 930 Compact IC Flex; Bicarbonates: Metrohm Titrino 702 SM Titrino	2004-ongoing	
23		Snow chemical composition in the vertical transect (pH, C25 [µS/cm]; Ion composition: Cl-, NO3-, SO42-, Na+, NH4+, K+, Ca2+, Mg2+; HCO3-)	µS/cm; mg/L; mm	every 3-4 weeks	pH, conductivity: Elmetron ; Ion chromatography: Metrohm 930 Compact IC Flex; Bicarbonates: Metrohm Titrino 702 SM Titrino	2015-ongoing	
24		snow depth	cm	weekly	snow probing at 20 points	2014–ongoing	Bartłomiej Luks/Tomasz
25		snow water equivalent (SWE)	mm	weekly	measurements with VS-43 snow tube at 20 points	2014–ongoing	
26	Fuglebekken catchment	Snow Cover Extent	mm	daily (April-July)	Time lapse camere installed at the summut of Fugleberget, overloooking the bottom of the catchment. Harbortronics Time lapse System till 2017, Cyclapse since 2018. Gaps due to camera	2014 - ongoing (with gaps)	
27	Slopes of Fugleberg	air temperature	∘C	15 min	5 TinyTag temperature sensors (TGP-4017) installed along the altitudinal profile	Spring 2022 - ongoing	Bartłomiej Luks









Snow survey

River water autosampler

Collection of precipitation samples

Metrohm 930 Compact IC Flex

Cimel photometer

Month	TA_{min} (°C per decade)	TA_{mean} (°C per decade)	TA_{max} (°C per decade)	RH (% per decade)	Precip (mm per decade)	PA (hPa per decade)	WS (m per decade)	SD (h per decade)	Cloudiness (octas per decade)	VV (change per decade)
January	**2.70**	**2.29**	**1.86**	−0.33	**3.51**	**1.54**	−0.14	0.00	0.12	−0.03
February	**2.46**	**2.14**	**1.74**	−0.41	1.48	**0.50**	0.06	**1.38**	−0.01	−0.06
March	0.74	0.57	**0.34**	**−1.13**	−1.61	**−0.27**	−0.13	5.52	0.04	**0.15**
April	**1.37**	**1.00**	**0.79**	−0.64	−0.41	**−0.66**	−0.12	2.36	0.16	0.11
May	**0.97**	**0.70**	**0.49**	−0.27	1.92	**−0.10**	**0.40**	−10.07	0.00	−0.06
June	**0.61**	**0.52**	**0.54**	**−0.65**	−3.23	**0.27**	0.23	−1.80	0.11	0.13
July	**0.36**	**0.27**	**0.31**	0.26	1.11	**0.67**	0.12	−5.92	0.12	−0.07
August	**0.37**	**0.33**	**0.33**	0.00	7.49	**0.30**	0.09	5.18	0.02	−0.02
September	**0.73**	**0.67**	**0.62**	0.62	**19.67**	**0.18**	**0.50**	−1.33	0.16	−0.10
October	**1.16**	**1.07**	**1.01**	**1.50**	**13.53**	**1.15**	0.05	0.79	0.28	−0.08
November	**1.73**	**1.46**	**1.37**	0.30	5.43	**−0.60**	0.24	0.00	**0.26**	**−0.17**
December	**2.56**	**2.39**	**2.18**	0.18	5.24	**−0.95**	−0.06	0.00	**0.13**	−0.10
Annual	**1.34**	**1.14**	**1.00**	0.10	**61.60**	**0.25**	0.08	−8.39	**0.12**	−0.02

The slope of the trend in monthly and annual data (air temperature – TA, relative humidity – RH, precipitation – Precip, atmospheric pressure at sea level – PA, wind speed – WS, sunshine duration – SD, cloudiness and visibility – VV)

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