Point 3 – Periglacial polygon *Localization: 77° 33' 20" N, 14° 29' 52" E*

Dynamics of active layer of permafrost

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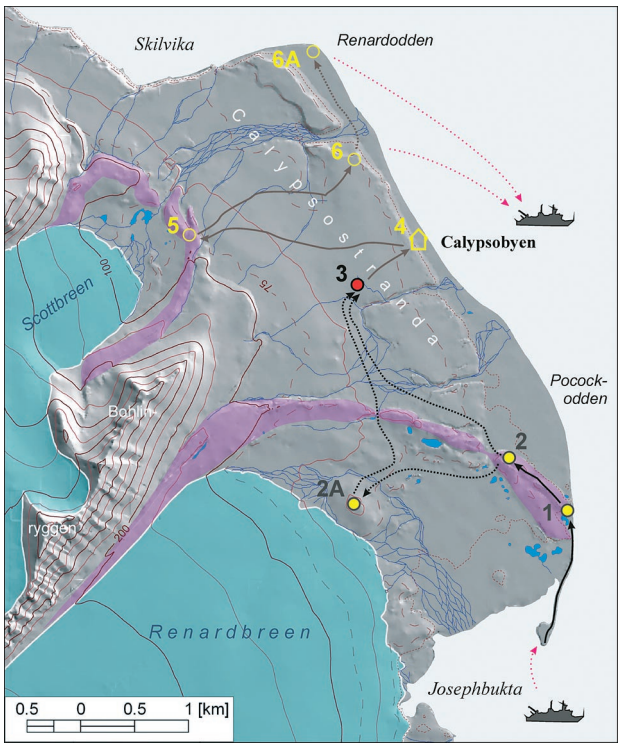

The fragment of Calypsostranda that was formed by cryogenic processes connected with frost segregation in different moisture conditions is characterised by the presence of structure soil (garland terraces, stone circle) of different size, shape and present active processes. That area is the polygon of periglacial study and monitoring of active layer of permafrost (Fig. 13, Table 1).

Within the confines of scientific programme of polar expeditions of M.C. Skłodowska University, during almost twenty seasons (1986–2005) the measurements of thickness of active layer were conducted. The main study polygon was Calypsostranda, the moraine plain located in the neighbour of Renard and Scott Glaciers (Fig. 13). The thickness of active layer of permafrost was stated with the use of the method of sounding with the metal rod and some Danilin's frostmeters were used, too. The measurement point's representative for tundra survey were located in various places of different degree of water mobility in covers, flora cover, inclination and exposition. They were on the surface of raised marine terrace of the height to 20–40 m a.s.l., and on the slopes of valleys cutting that terrace and on inclinated surfaces of dead cliff transformed by periglacial processes (Fig. 13). The maximum of Summer ground thaw were diverse (Table 1).

The maximum sizes of thawing were noticed at the point with movable water in covers (225 cm) while minimum – at the peat island (45 cm). For the inclined surface it was stated that except for obvious thermal privilege of the south exposed slope, also warming up was influenced by winds of foehn type which effect touched the slope III (S exposition). The speed of thaw was diverse, at the range from 0.25 to 6.0 cm per 24h. The biggest – at the first stage.

The studies on Calypsostranda show that diverse amounts of Summer thaw of the ground have also some local factors, like foehn phenomenon, mobility of non-permafrost water, flora, exposition and snow cover (Repelewska-Pękalowa et al. 1988).

The data from Calypsostranda area are included into International Monitoring System of permafrost active layer: CALM (*Circumpolar Active Layer Monitoring – Site P1 Calypsostranda*) and can be found in the database of *National Snow and Ice Data Center,*

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Table 1. Maximum thickness of active layer in Calypsostranda in chosen points (in cm)

Point Year	1	2	3	4	5	I	II	III	IV
1986	90	125	120	–	60	130	–	145	122
1987	111	175	175	175	68	124	150	165	130
1988	108	163	168	193	70	121	180	177	135
1989	145	165	157	180	83	135	160	186	139
1990	130	165	165	165	56	118	135	170	122
1991	127	148	163	170	75	141	150	165	121
1992	140	170	165	180	70	140	180	155	125
1993	112	180	180	196	70	130	180	180	140
1995	125	176	180	174	68	135	170	160	160
1996	125	154	178	168	65	132	160	151	128
1998	130	124	121	170	75	–	–	160	–
2000	108	175	155	130	45	126	135	160	150
2001	116	131	180	165	73	150	170	132	155
2002	130	155	170	154	81	139	160	150	143
2005	150	225	220	210	115	157	195	200	145

Points 1–5 along the NS and WE transects WE: 1 – flat marine terrace (sands and gravels, dry tundra), 2 – structure soils with movable water, sandy-gravel cover, moss on the peat surface, 3 – and 4 – patterned ground with movable water in covers, sands and gavels, without flora, 5 – peat island on little water basin.
Slopes: I – N exposition, I – S exposition, III – E exposition, IV – W exposition.

Boulder, Colorado (Repelewska-Pękalowa 2002, Repelewska-Pękalowa, Pękala 2003, Christiansen et al. 2003) (Fig. 14). The aim of CALM programme is to collect and share data which document the process of Summer thaw of the ground in zones of occurrence of permafrost on both hemispheres. The measurements are done in 117 areas and 15 countries are involved. Only two areas, not long ago did represent Spitsbergen: Kapp Linnee (S1) and Calypsostranda (P1). In 2000 the measurements were begun in Longyearbyen and Ny Ålesund, and very recently site P2 (Kaffiøyra). The CALM programme is designed for observation the reaction of active layer of permafrost to climate changes and by the decision of IPA it will be executed within the confines of projects of International Polar Year 2007–2008.

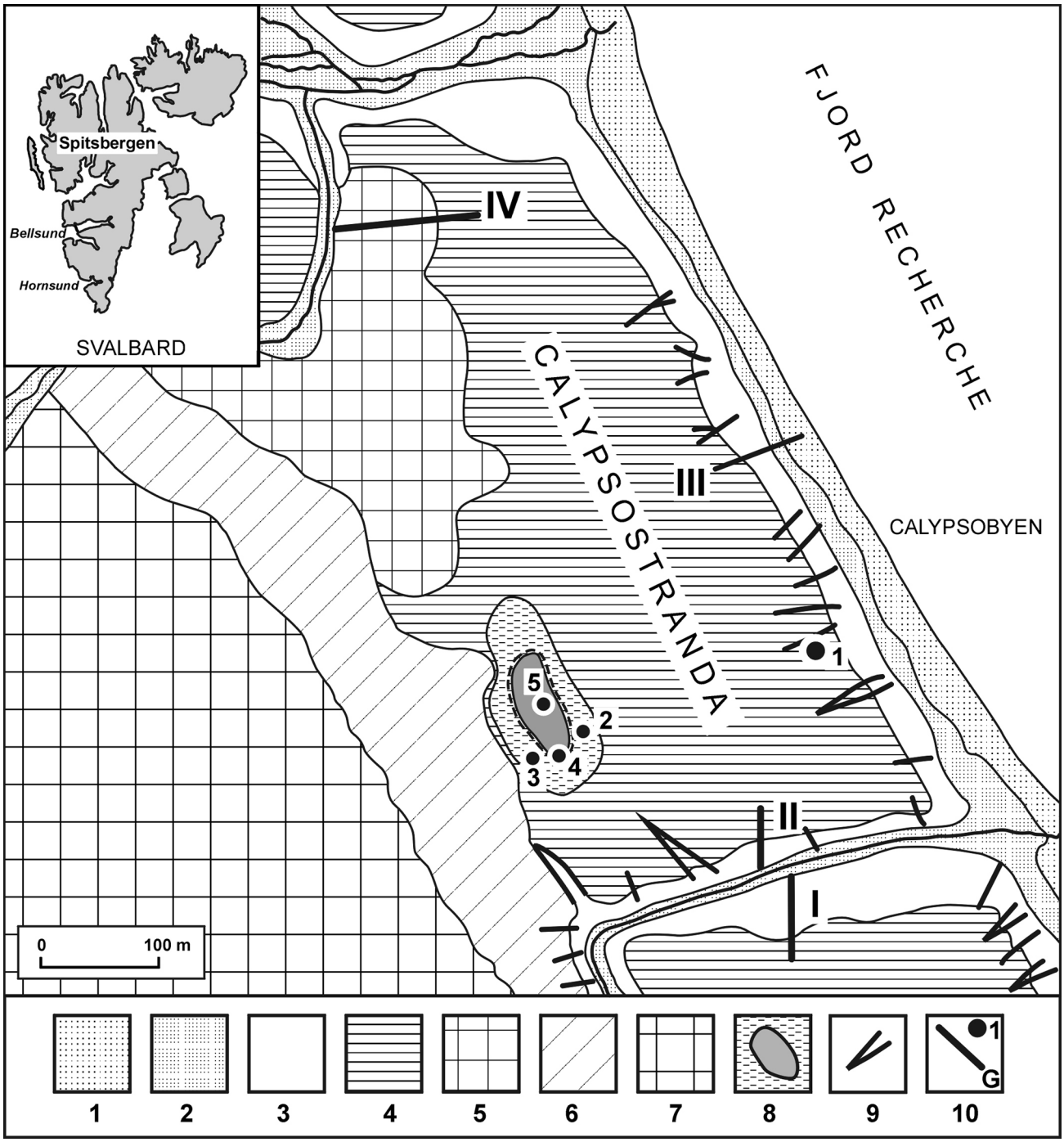

Fig. 13. Main sets of forms and localization of measurement points of active layer of permafrost (Repelewska-Pękalowa, Pękala, 2003)

1 – beach, 2 – floors of valleys and zones of alluvial cones at the cliff base, 3 – cliff and erosive edges of valleys, 4 – dry surfaces of marine terraces, 5 – zones of active solifluction, 6 – periodically wet terraces aggradated with alluvial cones, 7 – slopes and high marine terraces converted by weathering, cryoplanation and erosive processes, 8 – seasonal lake, 9 – erosive dissection, 10 – measurement points.

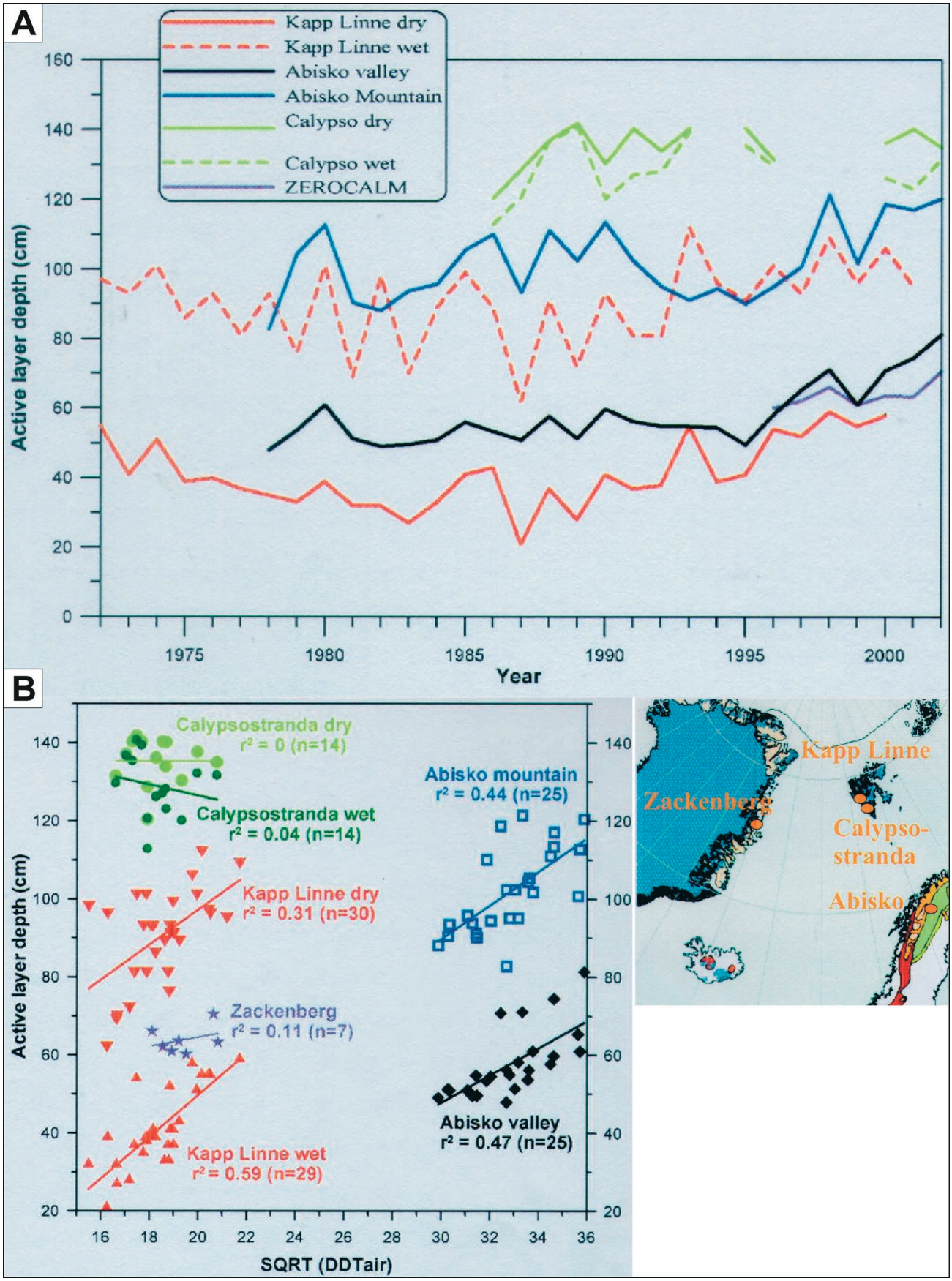

Fig. 14. Thickness of active layer of permafrost in dry and wet conditions, B: Correlation between thickness and air temperature (DDT – Daily Degree Thaw) (Christiansen et al. 2003)