Near-Surface Thermal Inversions
in relation to Snow Cover in Estonia

Kuopio, 25th March 2010

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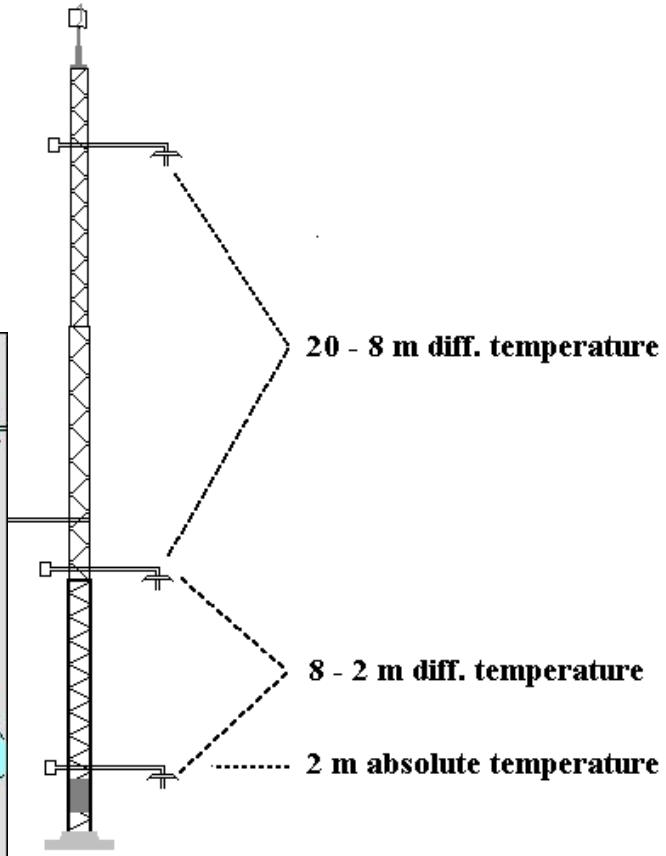
Used obserations -

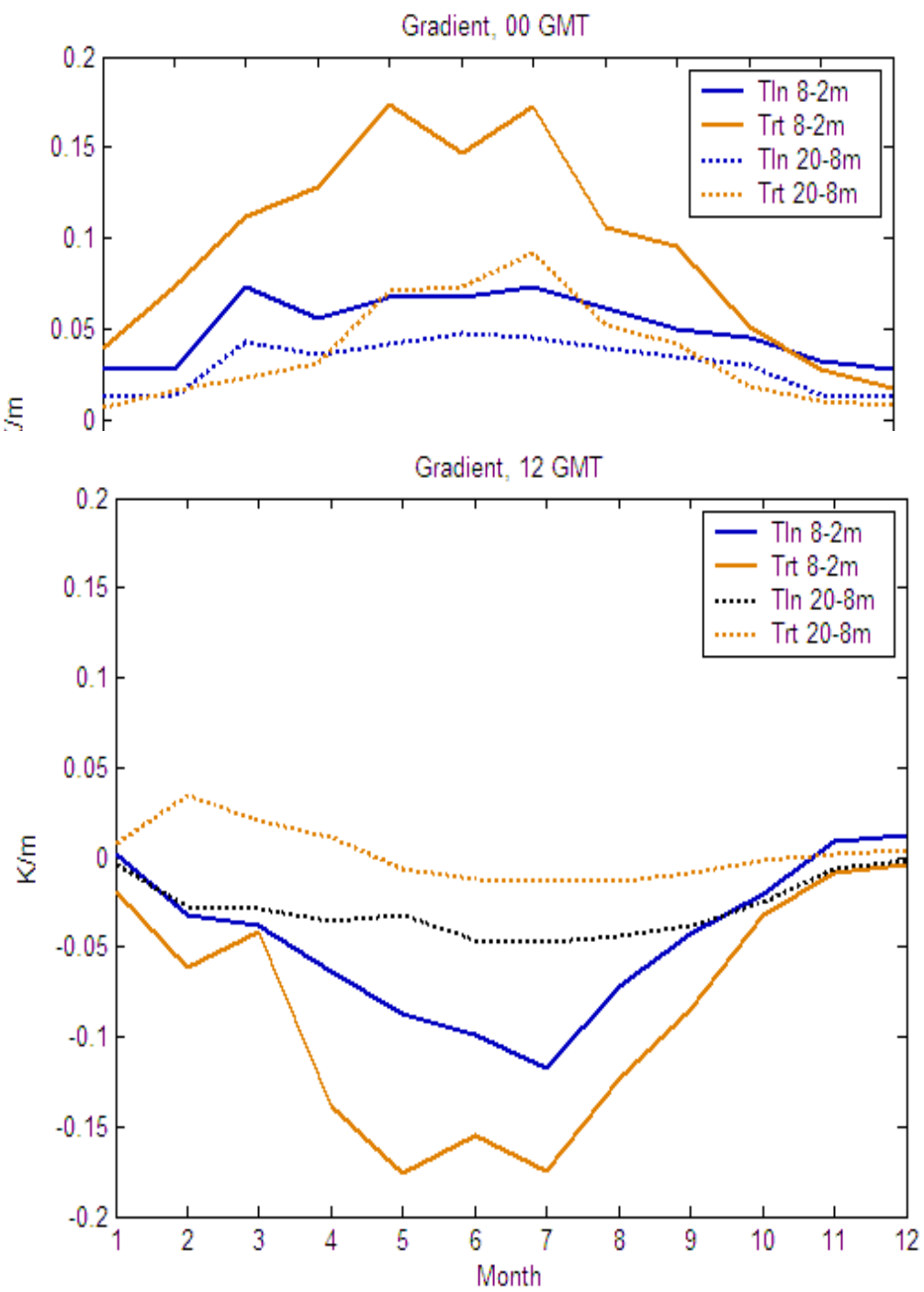
Meteomasts

Tallinn and Tartu

2005-2009

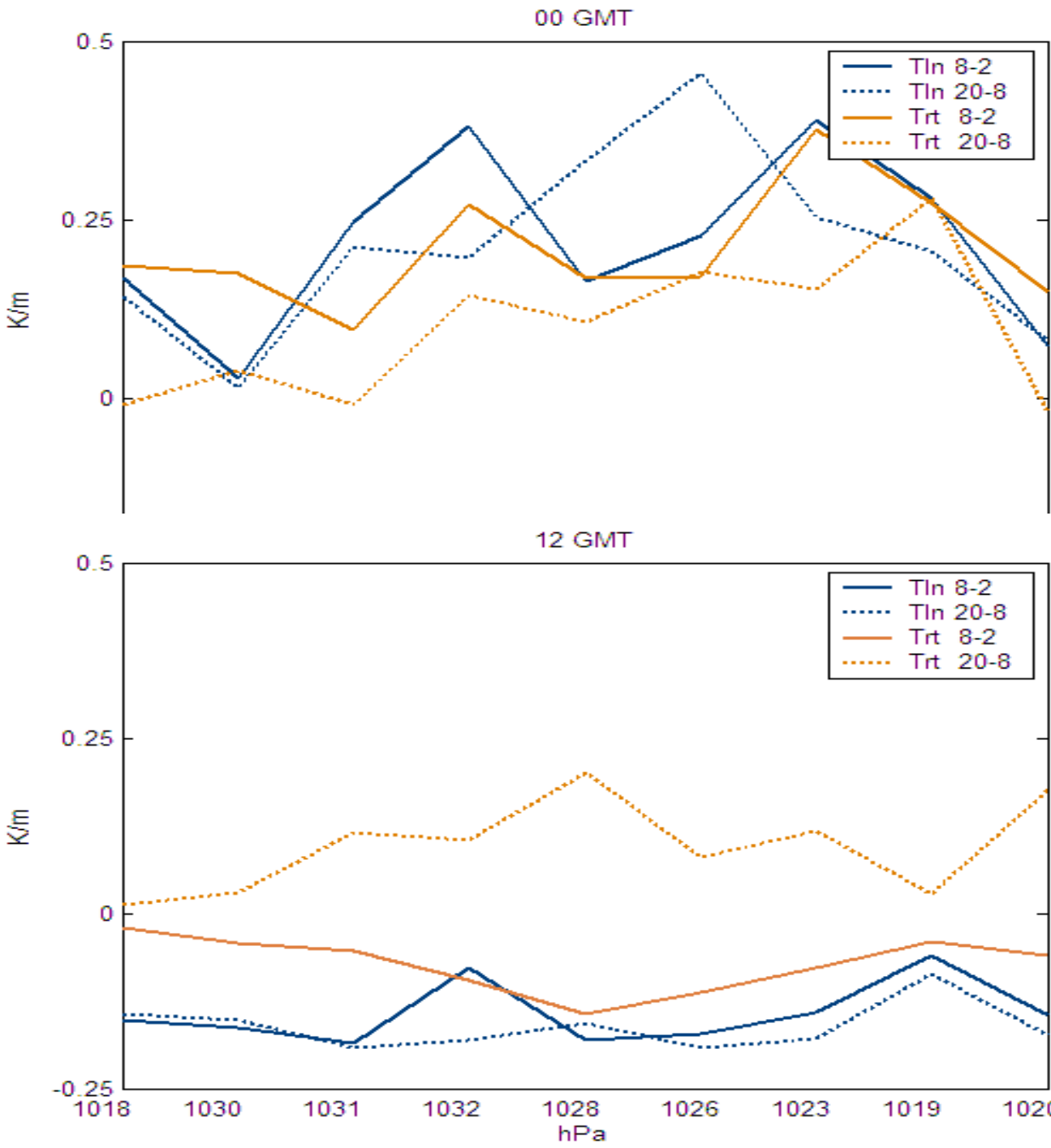


-Inverisons in daytime in winter
-Gradients peaking in March, especailly in the lower layer



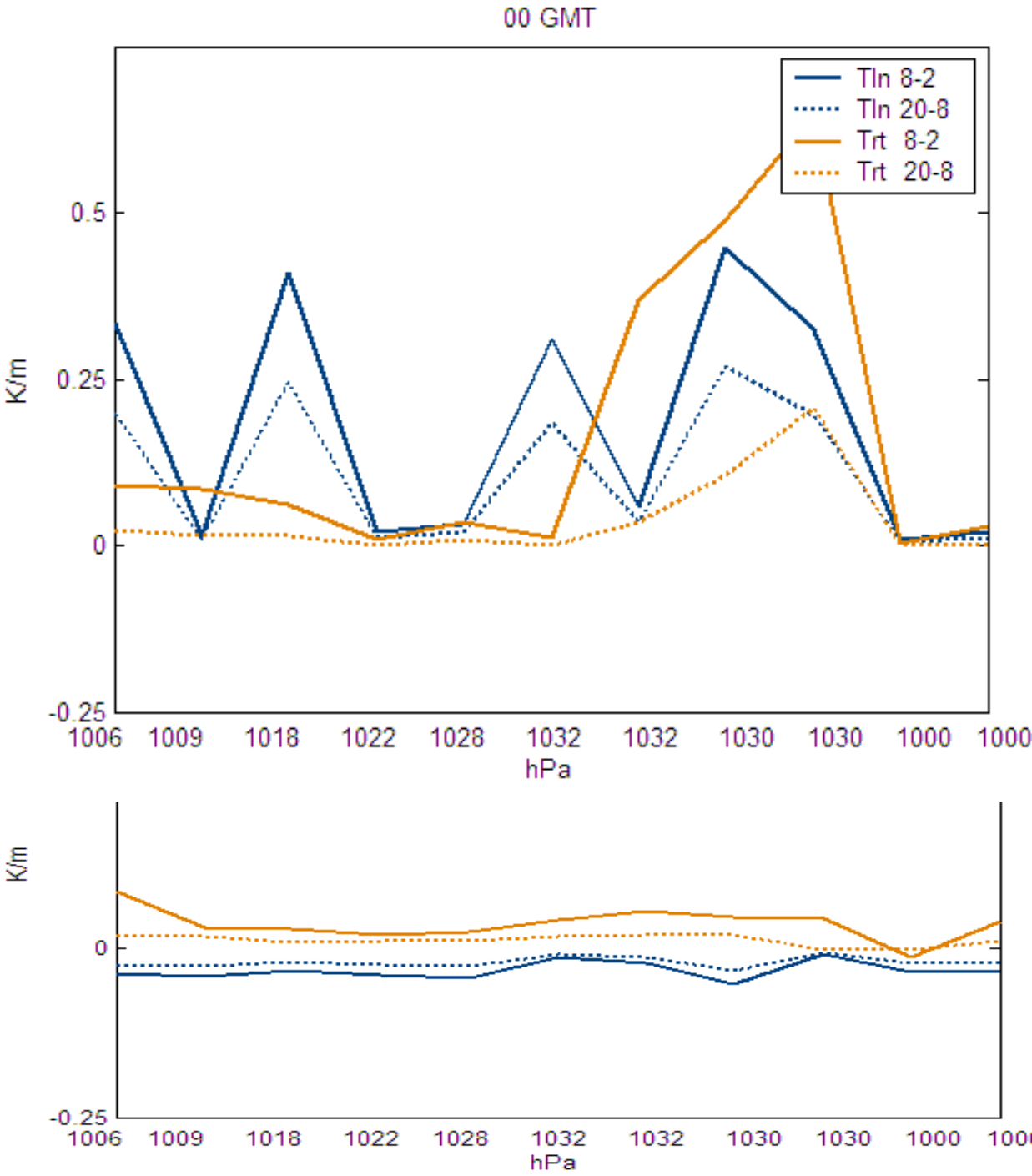
NO SNOW-COVER,
anticyclon
23-31 March 2007

-Diurnal air temp. variation 15˚ yields strong nocturnal inversions.
-Daytime gradients above bare ground are of ficle nature



<u>THICK SNOW-COVER,</u>
anticyclon
<u>10-20 March 2006</u>

-More even diurnal air temperature cycle than in the previous slide, still nocturnal inversions are stronger.
-Daytime inversions in the lower layer are stronger than in the upper.
-Daytime gradients do not vary much from day to day



FRESH SNOW-COVER

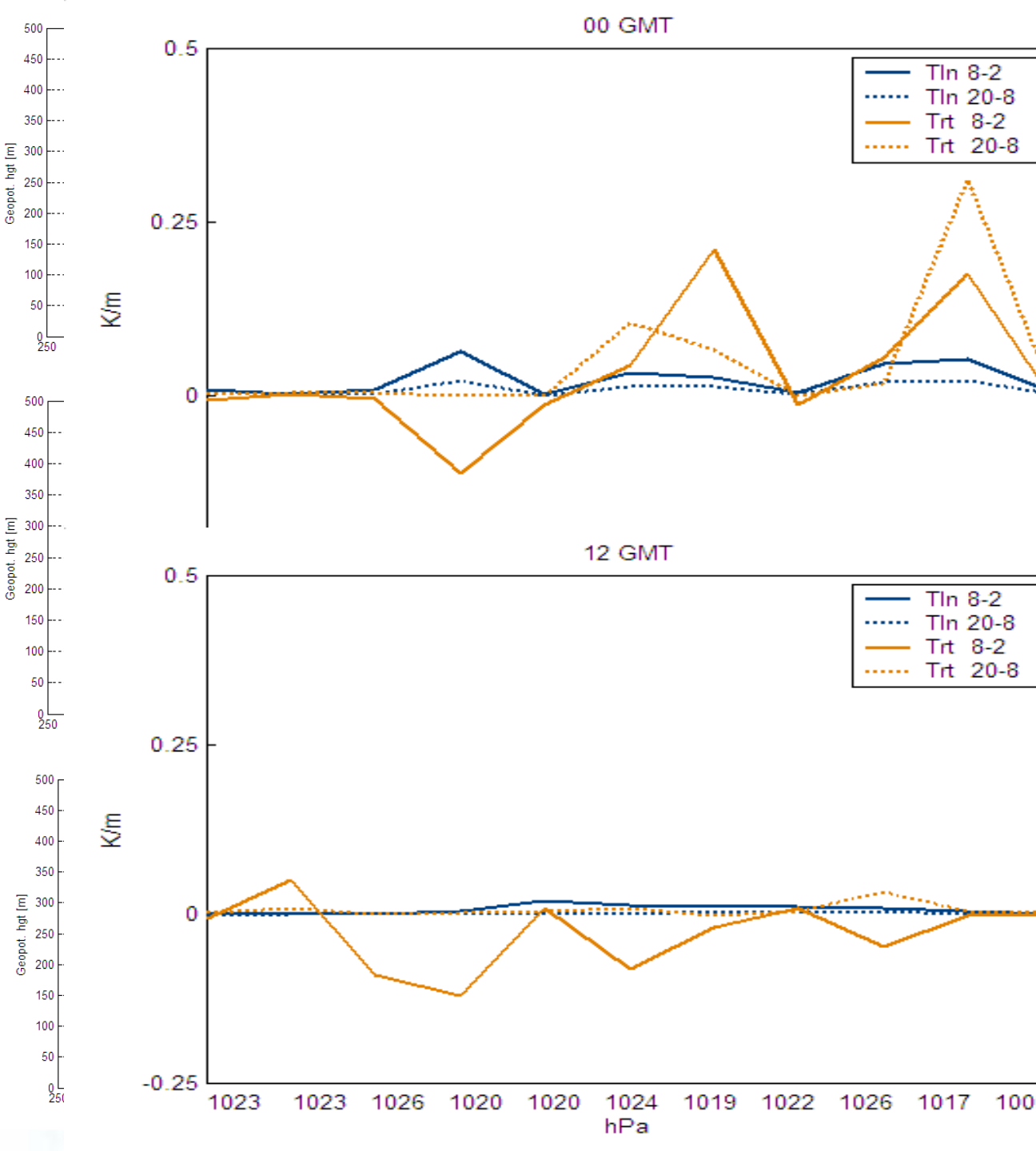
anticyclon

10-20 Dec 2009

-snow-cover is getting addition

-even cycle of diurnal air T - still nighttime inversions

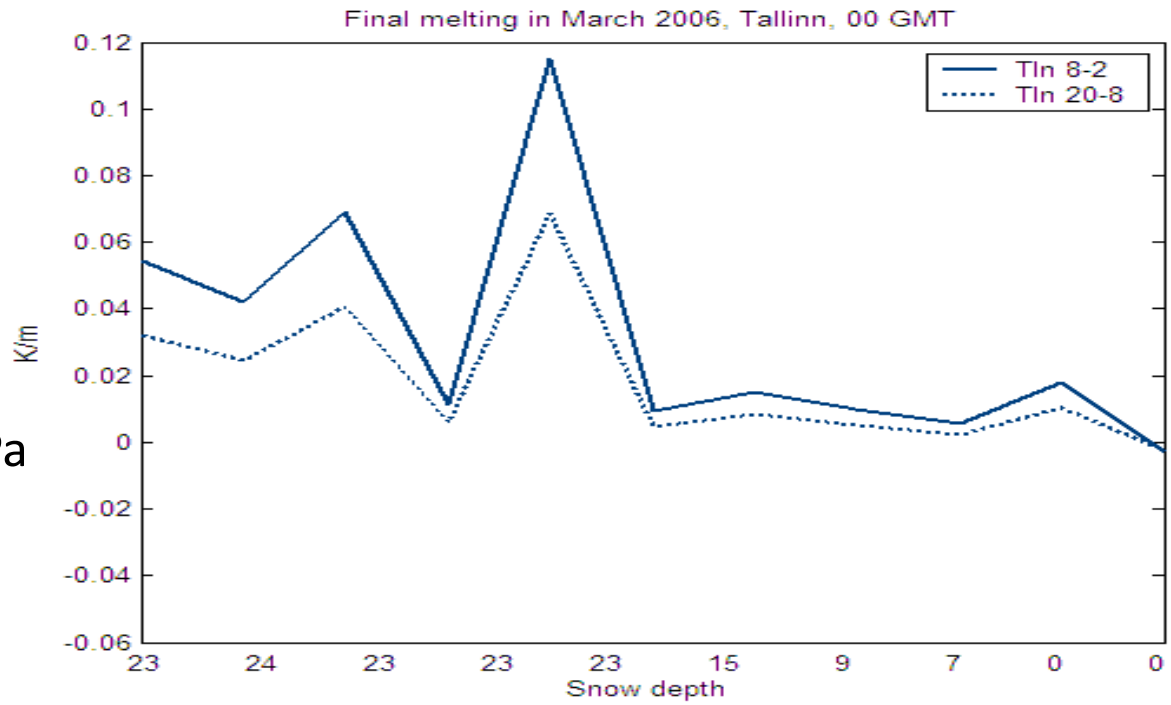
-in daytime only the gradient of the lower layer in Tartu is varying

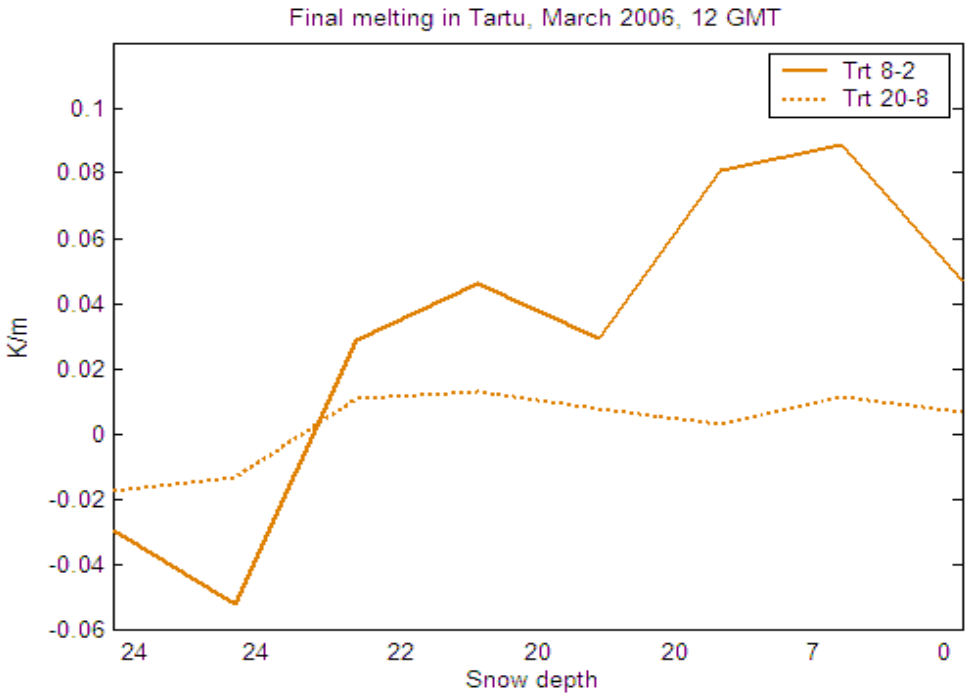


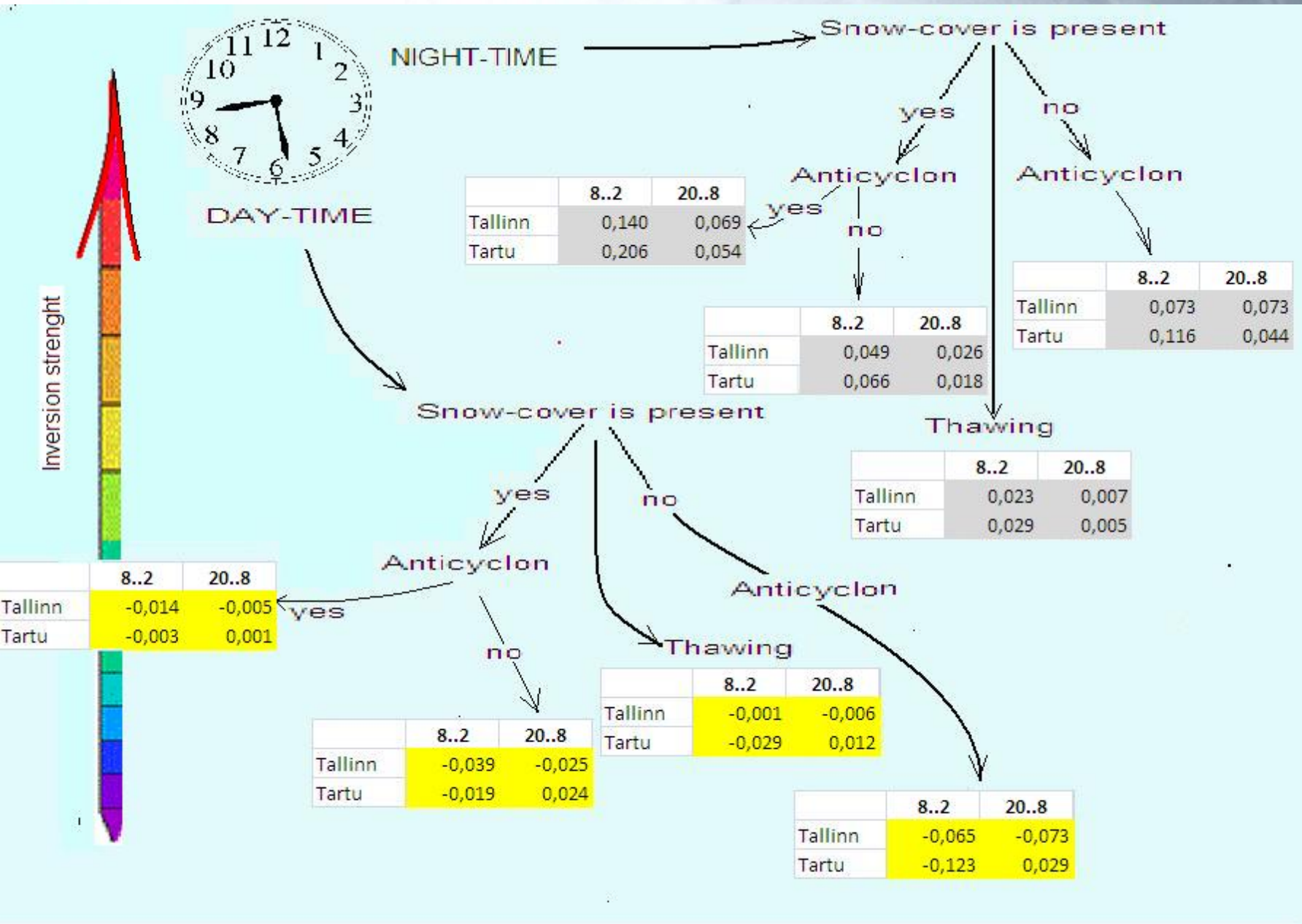
Final thawing
end of March 2006

-air presssure 1000 hPa

-snow-cover melts faster in Tartu
-thawing induces tougher inversions than the presence snow-cover in daytime, contrary to night-time.







	8..2	20..8
Tallinn	0,140	0,069
Tartu	0,206	0,054

	8..2	20..8
Tallinn	0,049	0,026
Tartu	0,066	0,018

	8..2	20..8
Tallinn	0,073	0,073
Tartu	0,116	0,044

	8..2	20..8
Tallinn	0,023	0,007
Tartu	0,029	0,005

	8..2	20..8
Tallinn	-0,014	-0,005
Tartu	-0,003	0,001

	8..2	20..8
Tallinn	-0,039	-0,025
Tartu	-0,019	0,024

	8..2	20..8
Tallinn	-0,001	-0,006
Tartu	-0,029	0,012

	8..2	20..8
Tallinn	-0,065	-0,073
Tartu	-0,123	0,029

a few conclusions -

- Snow-cover induced inversions are thin and strong (comperatively much stronger in the lower layer), subsicence inversions (during anticyclons) are stroner in the upper layer
- The effect of snow-cover and its thawing surpass the of effect of anticyclons in winter days.
- The contribution of snow-cover to inversions appears less in urban conditions.
- Contrary to daytime, nocturnal subsidence inversions have greater impact than snow-cover inversions, snow-cover has greater impact than melting.
- Snow-cover adds inertia to daytime near-surface temperature inversions.

Thank you!