

A Dendroclimatic Study of Qilian Juniper in the northeast Qinghai-Xizang (Tibet) Plateau

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Qilian juniper
(*Sabina przewalskii* Kom.)

is one of the long-lived
trees reported in China .



In 1970s:

Zhang Xiangong et al., 1978, Tree ring of Qilian Juniper and the climate trend in China, Collected paper of climate change, 26-35.

Zhuo Zhengda et al., 1978, Tree rings of the Qilianshan Region and changes of the climate during the recent thousand years in China , *J. Lanzhou Univ.* , 145-156.

In 1980s

Wang Yuxi et al. 1983, The relationships of tree rings of Qilianshan Juniper and climatic change and glacial activity during the past 1000 years in China, *Kexue Tongbao*, 28(12):746-750.

Liu Guangyuan et al. 1984, A thousand years' climate from tree rings and glacial activity in Qilianshan region, Collected papers of lanzhou institute of glaciology and cryopedology CAS, 5:97-108.

In 1990s

Kang Xingcheng et al., 1997, The last 1835 years climate changes inferred from tree ring records in Dulan Region , Qinghai, China, *Quaternary Sciences*, 1:70-74

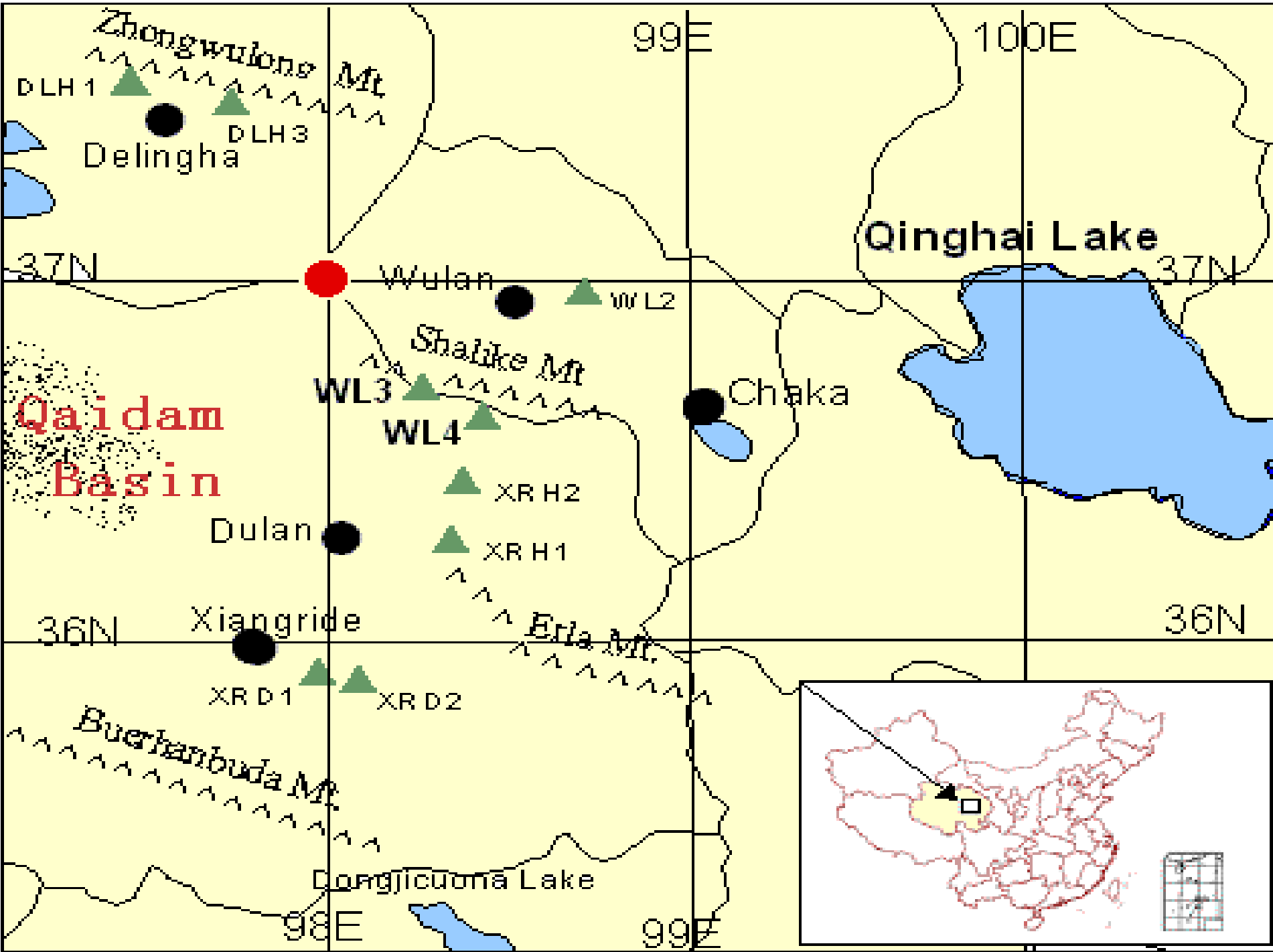
*Positive correlation between temperature and tree growth.

To investigate the dendroclimatic potential of the species
To find out the limiting factors to tree growth
To develop reliable tree-ring chronologies with 1000-years long



**Site information of Qilian juniper tree-ring samples from the
mountains
of the eastern extreme of the Qaidam Basin**

ID	Sites	Lat. (N)	Long. (E)	Elev. /m	Aspect	Slope	Sample Size (tree)
WL2	乌兰铜普哈里哈图	37°02'	98°40'	3620	SE10°	35°	50
WL3	乌兰赛什克乡牦牛山察汗阿孟	36°45'	98°13'	3730	NE15°	20°	43
WL4	乌兰赛什克乡南柯柯村夏日达无	36°41'	98°25'	3700	SW25°	18°	50
DLH1	德令哈宗务隆乡十八盘	37°28'	97°14'	3730	NW60°	38°	31
DLH2	德令哈宗务隆乡十八盘南坡	37°28'	97°13'	3780	SW20°	22°	34
DLH3	德令哈蓄集乡红山煤矿	37°27'	97°33'	3920	SW10°	20°	43
XRD1	都兰香加乡莫布里沟	35°58'	98°02'	3820	SE10°	38°	36
XRD2	都兰香加乡以克莫落	35°57'	98°09'	3840	SE15°	25°	38
XRH1	都兰夏日哈乡大卧龙沟	36°21'	98°22'	3910	SE70°	26°	32
XRH2	都兰夏日哈乡阿什扎山拉柴沟	36°31'	98°23'	3830	SE70°	22°	27





Climate characteristics of study area

	37° × 98°		Wulan		Dulan		Delingha		Chaka	
Longitude	37° E		98° 29 ¹ E		36° 18 ¹ E		97° 22 ¹ E		99° 05 ¹ E	
Latitude	98° N		36° 55 ¹ N		98° 06 ¹ N		37° 22 ¹ N		36° 47 ¹ N	
Elevation (m)			2950.0		3191.1		2981.5		3087.6	
	Temp. (°C)	Prep. (mm)	Temp. (°C)	Prep. (mm)	Temp (°C).	Prep. (mm)	Temp. (°C)	Prep. (mm)	Temp. (°C)	Prep. (mm)
Jan.	-12.3	2.0	-11.3	1.8	-10.2	4.1	-11.9	3.4	-12.3	0.9
Feb.	-8.8	2.6	-6.7	1.5	-7.0	5.4	-7.6	2.7	-8.2	1.6
Mar.	-2.3	5.2	-1.1	4.2	-1.3	7.7	-0.8	3.9	-2.8	3.9
Apr.	4.0	8.9	5.1	8.7	4.2	9.1	5.6	5.8	3.6	8.9
May	9.2	22.5	10.4	24.3	9.1	23.1	10.8	20.4	8.5	27.0
Jun.	12.8	38.6	13.5	40.2	12.4	40.5	14.1	34.4	11.7	44.9
Jul.	15.0	51.1	15.6	45.9	14.9	40.7	16.6	34.4	14.3	48.8
Aug.	14.2	47.3	15.0	26.3	14.2	28.1	15.9	28.7	13.5	40.3
Sep.	9.5	32.1	10.7	19.1	9.5	16.0	10.9	15.4	8.7	24.8
Oct.	2.7	12.0	3.9	5.1	2.8	6.8	3.5	5.9	1.5	7.2
Nov.	-5.2	2.2	-3.9	1.1	-4.3	3.7	-4.4	1.1	-6.4	1.0
Dec.	-11.0	1.3	-9.6	1.3	-8.6	3.5	-10.1	1.9	-11.0	0.3
Yearly	2.3	225	3.5	180	3.0	188	3.6	158	1.8	210



a

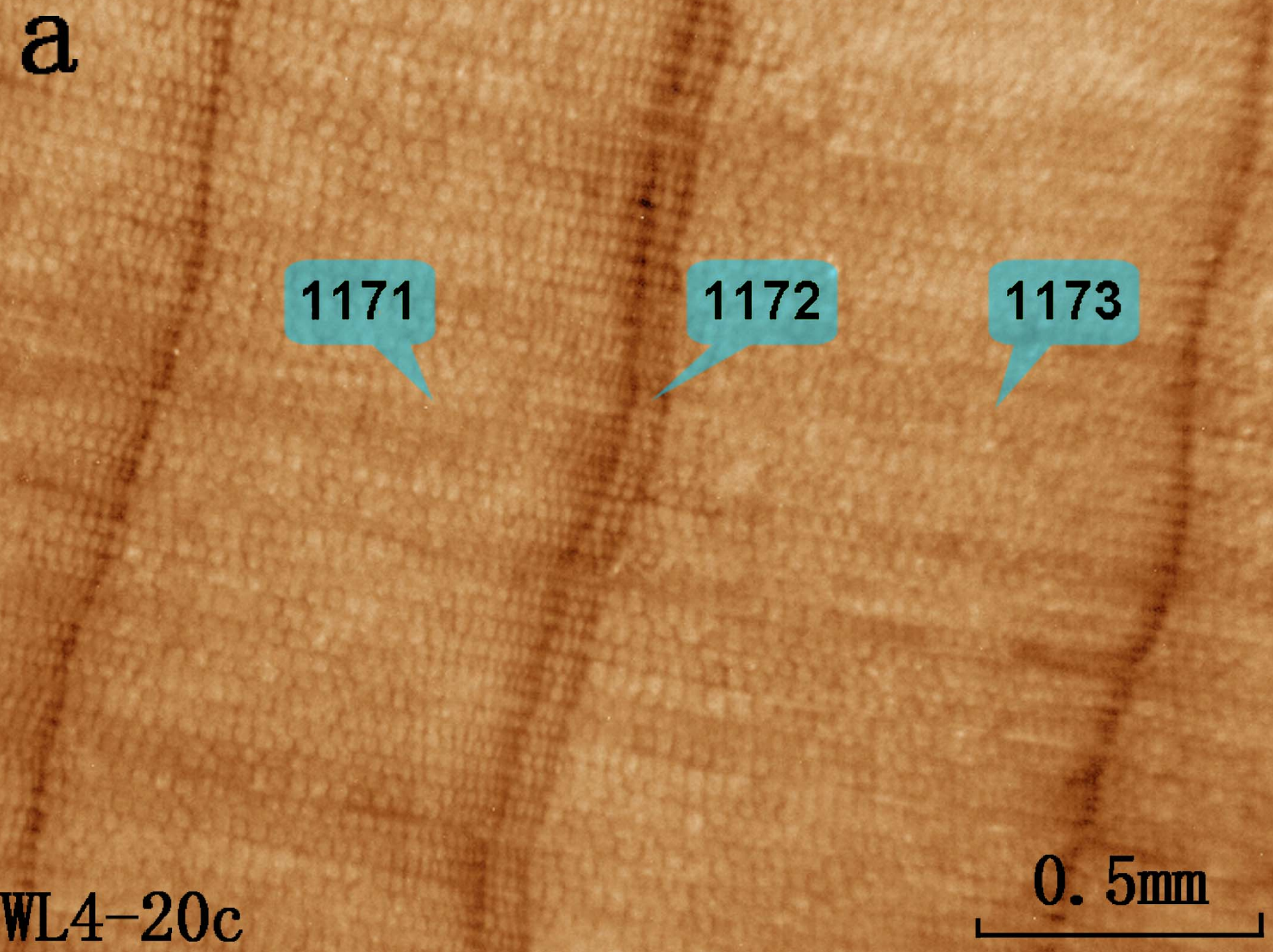
1171

1172

1173

WL4-20c

0.5mm



b

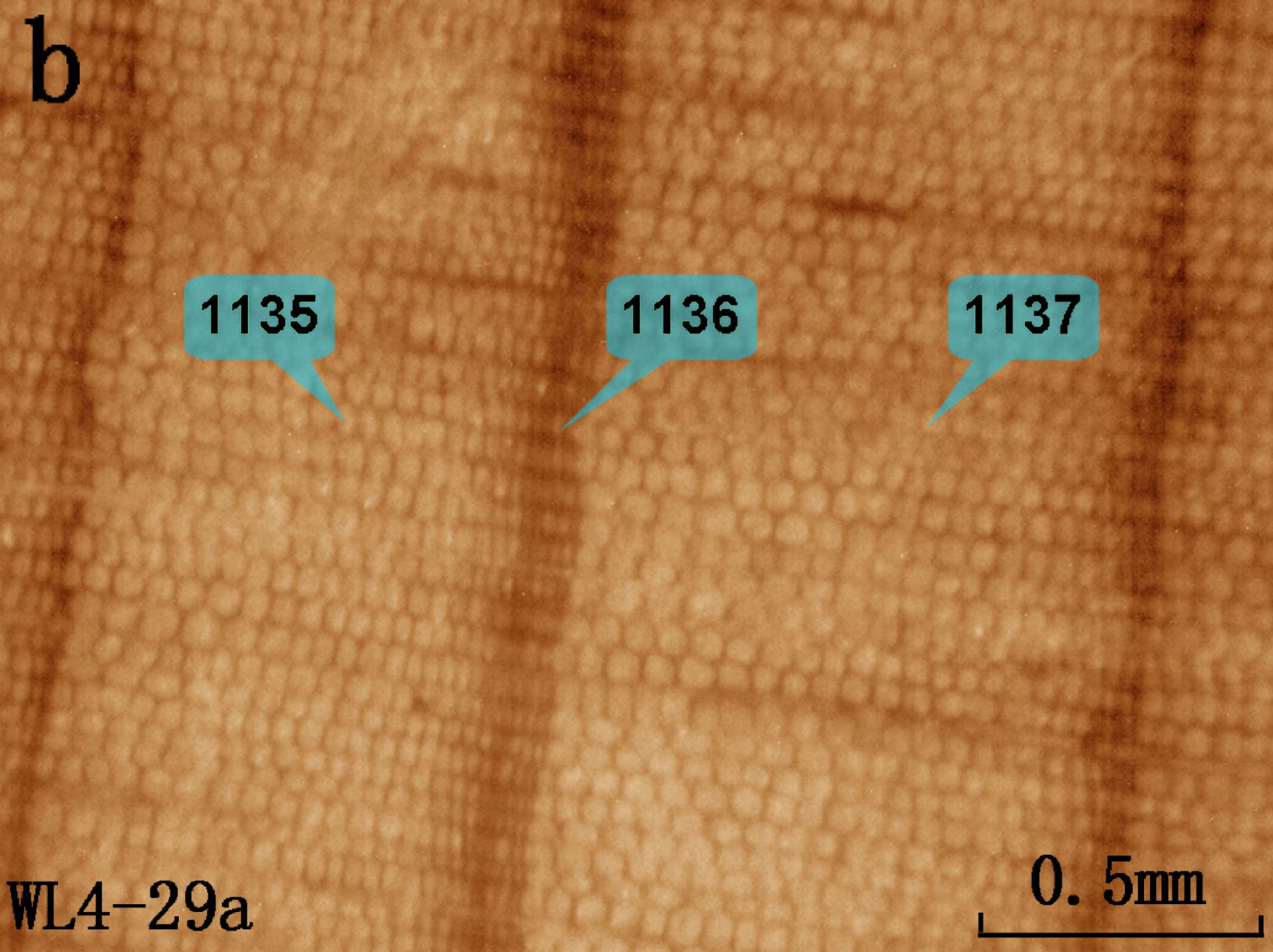
1135

1136

1137

WL4-29a

0.5mm



C

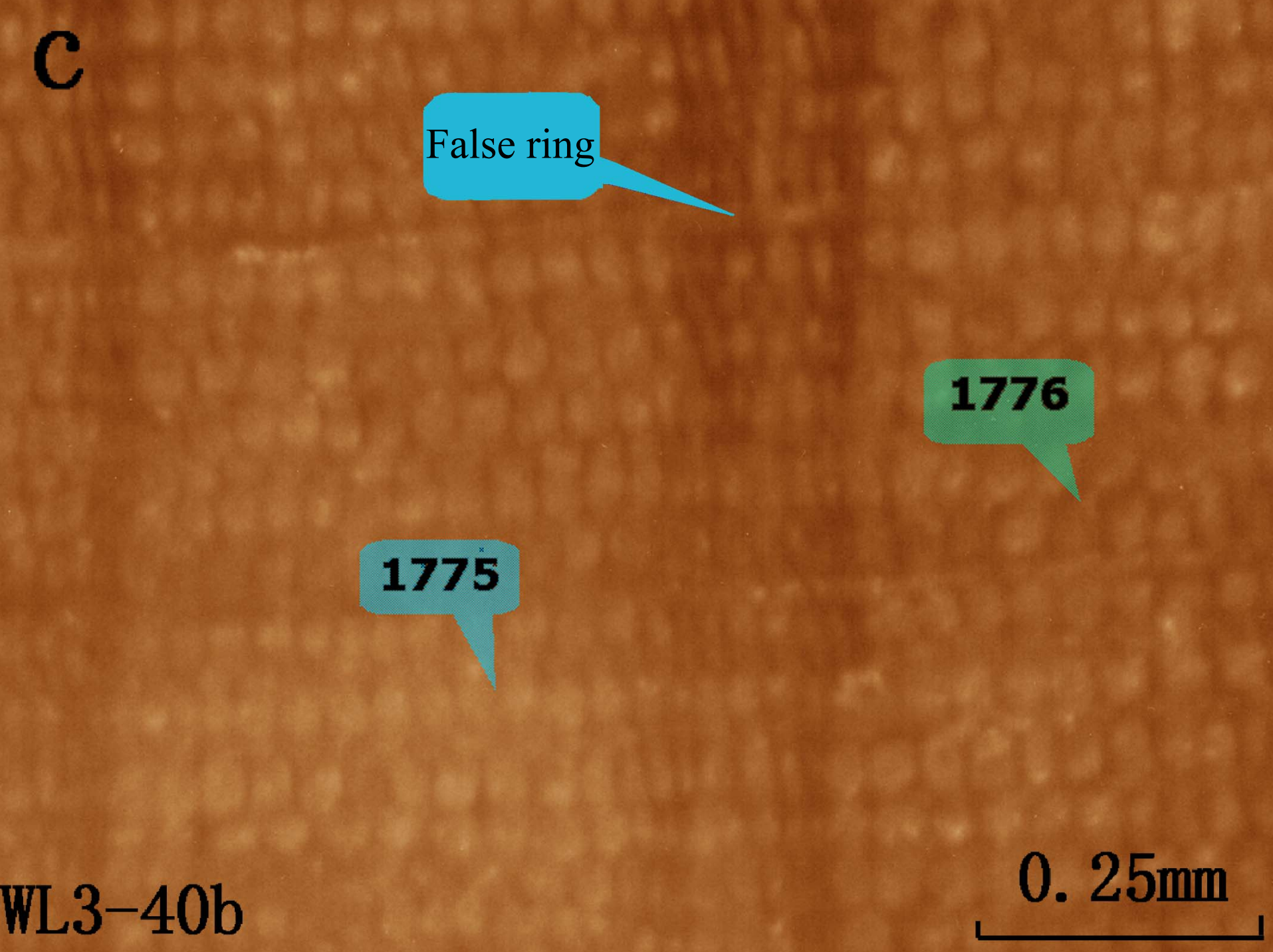
False ring

1776

1775

WL3-40b

0.25mm



a

1711

1732

WL3-37a

1mm



b

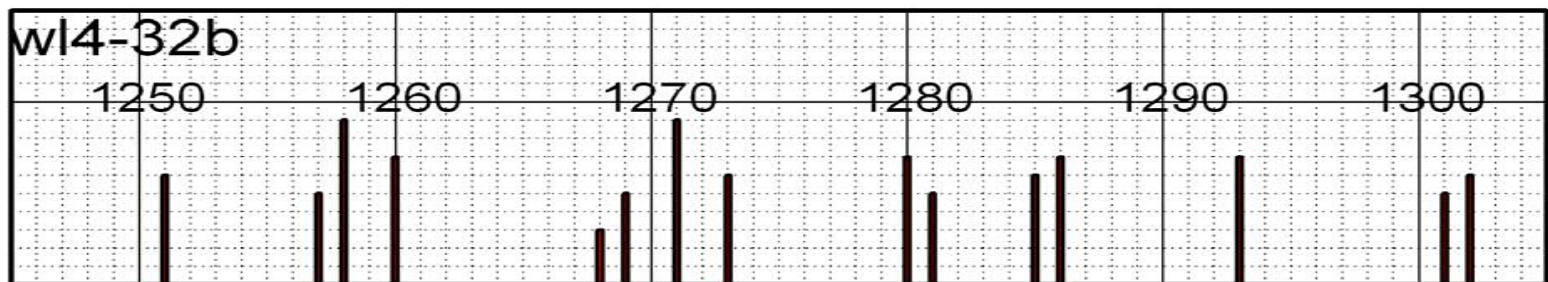
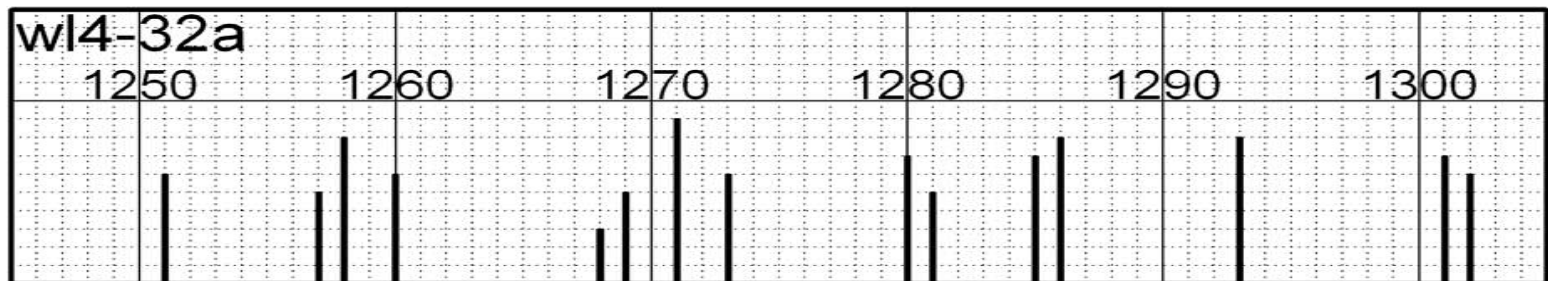
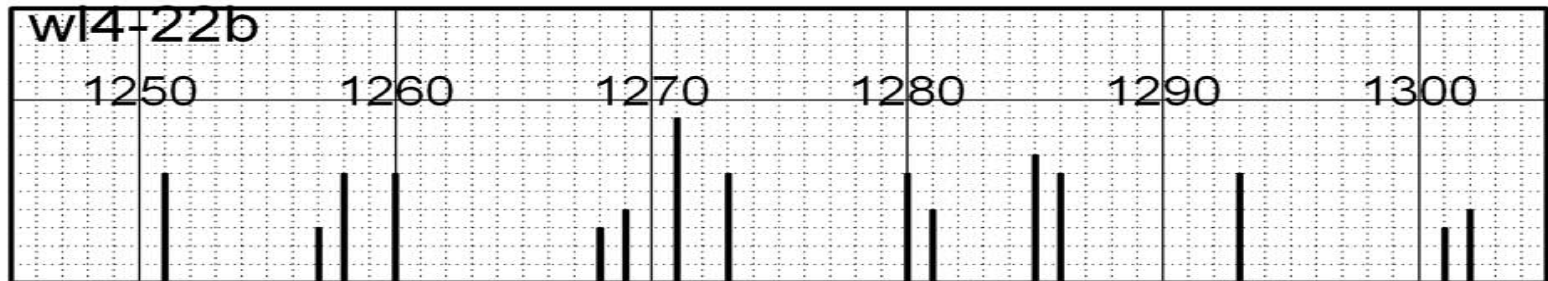
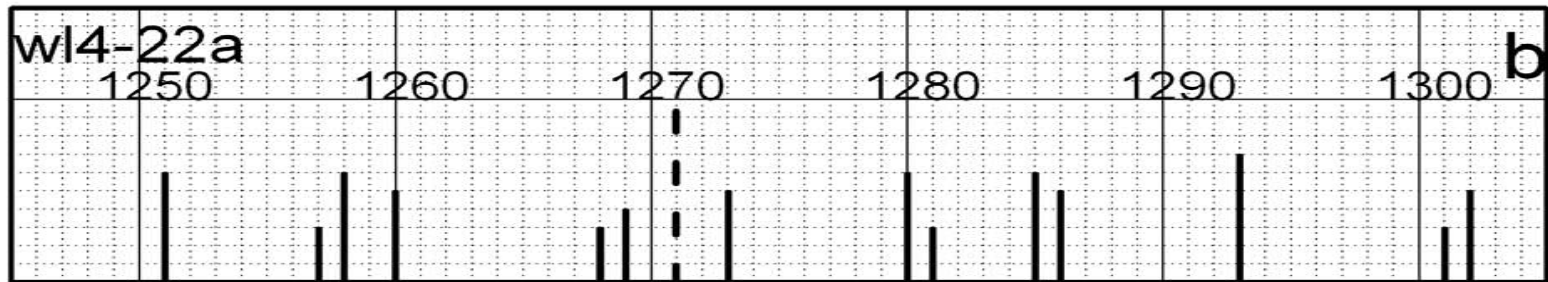
1450

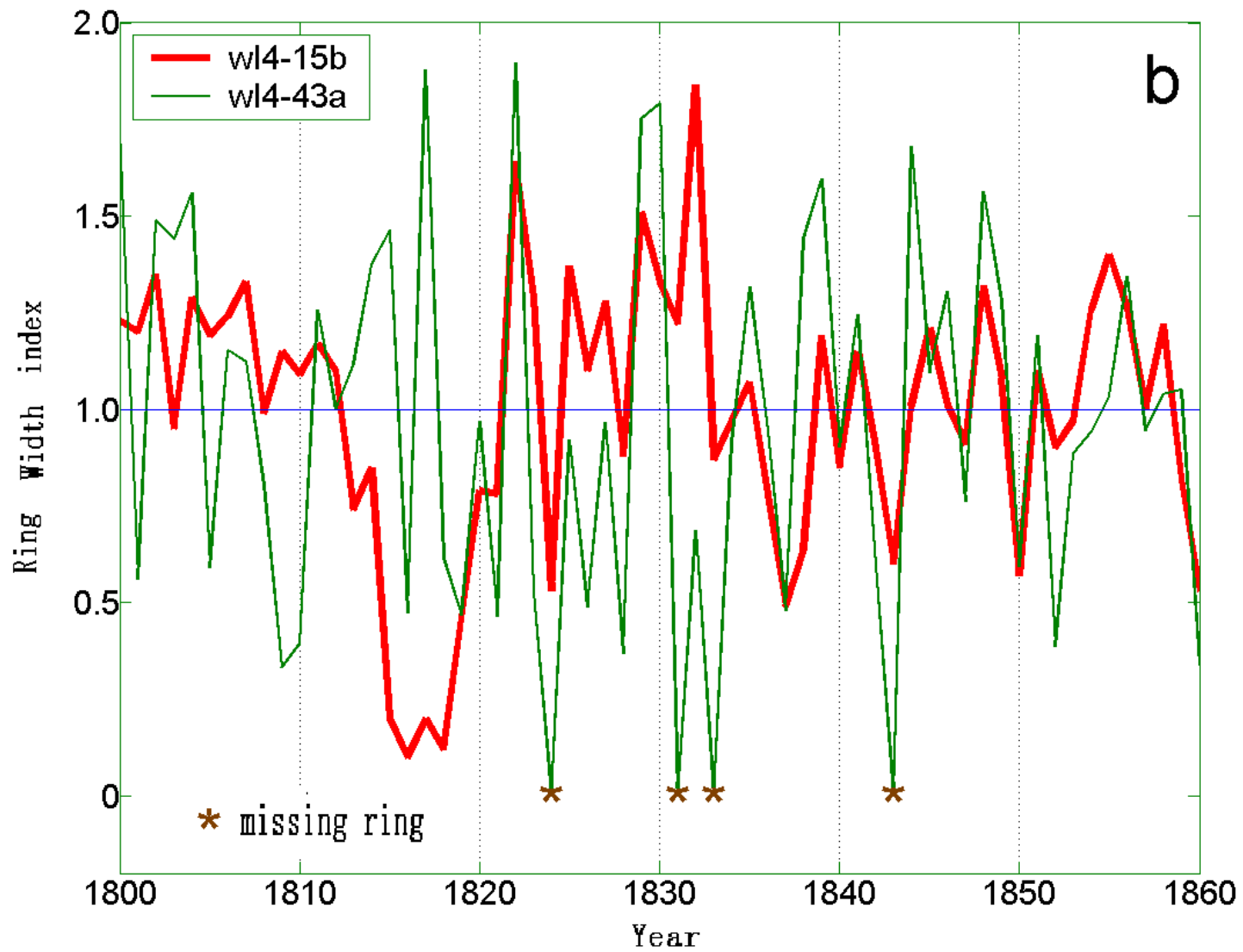
1470

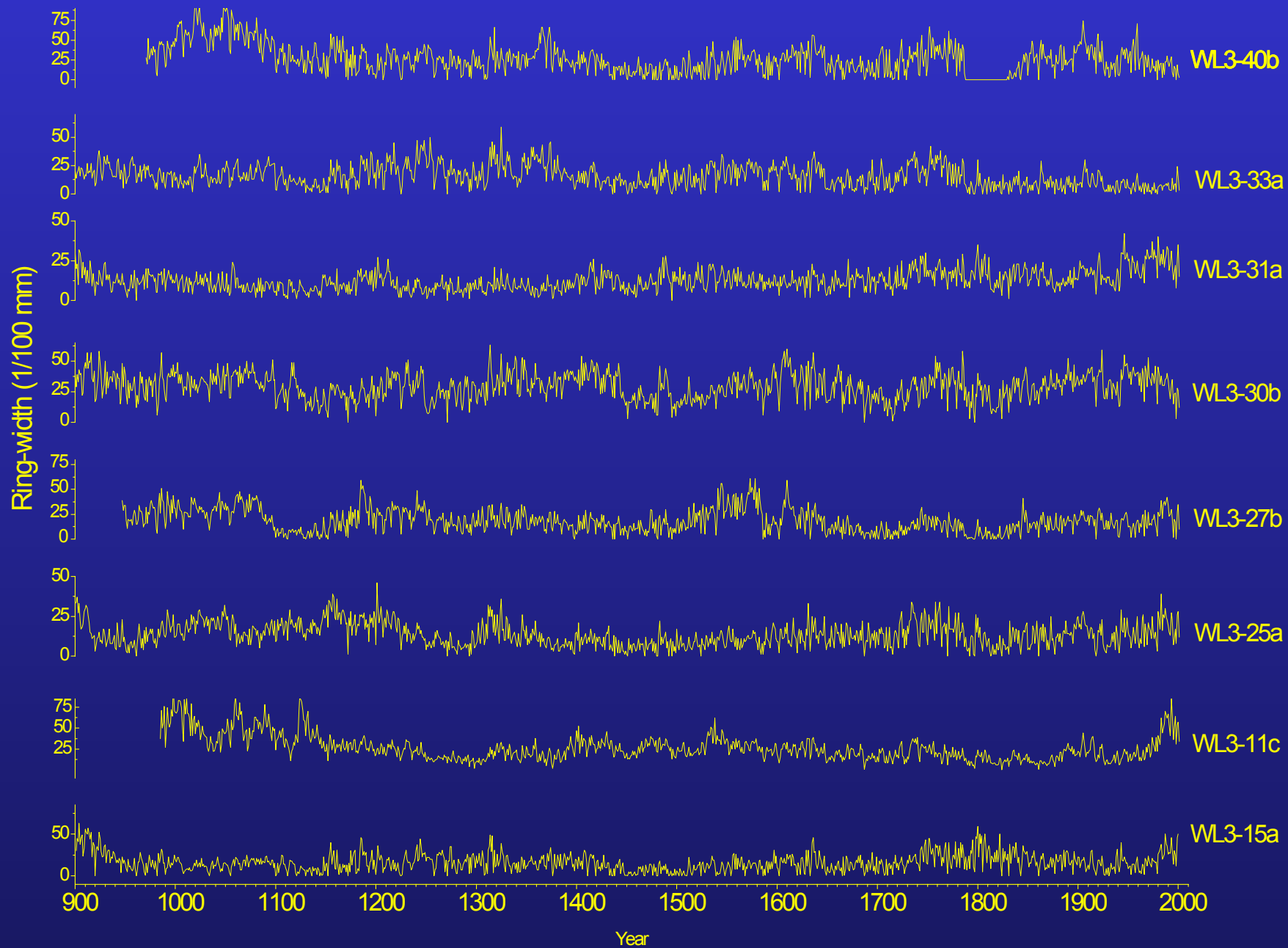
WL4-45a

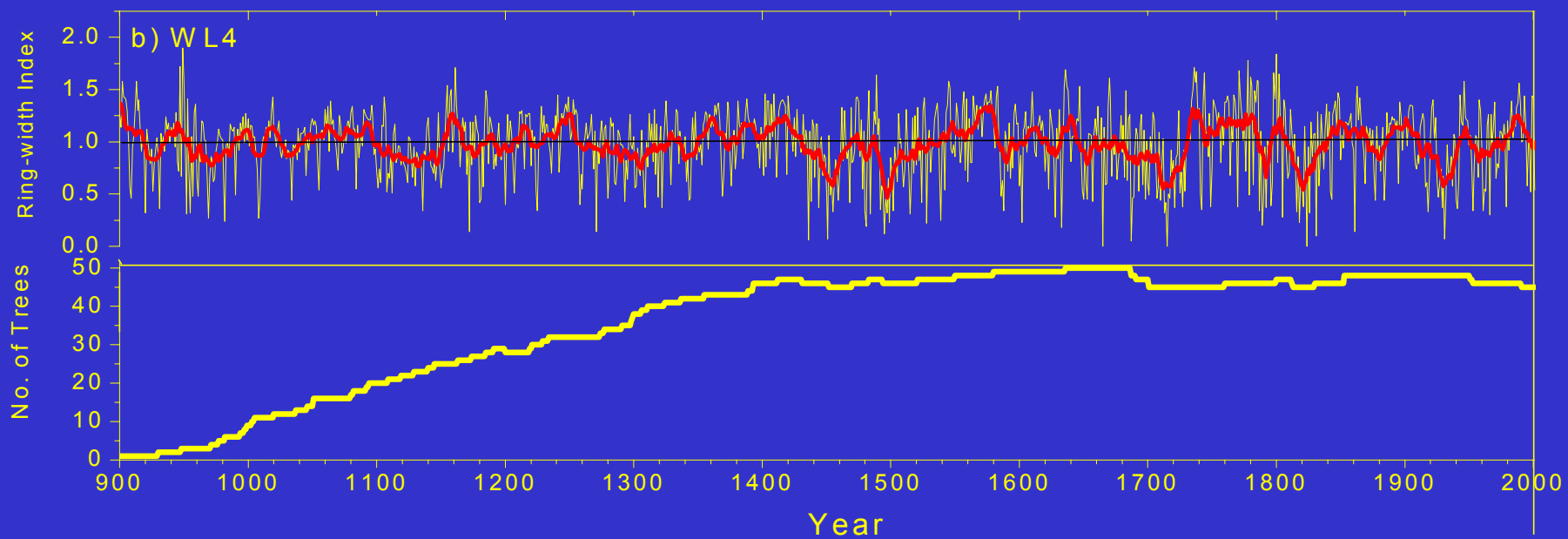
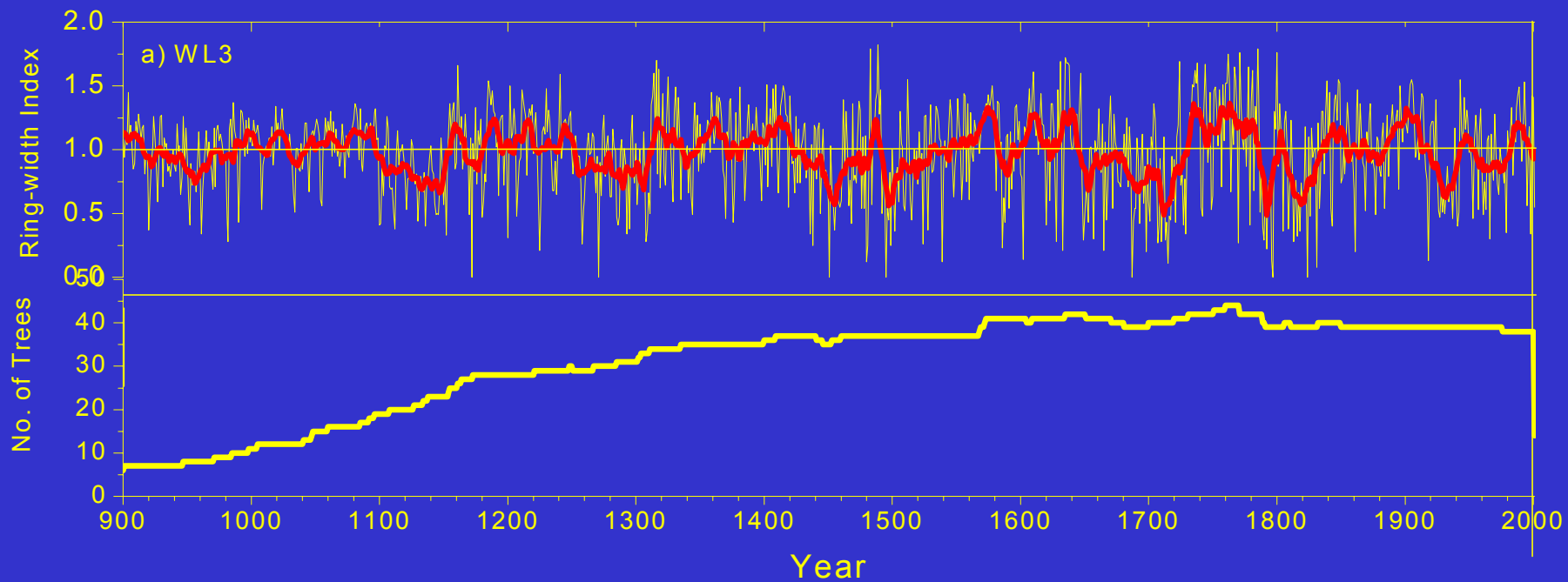
0.5mm











Ring-width chronology statistics:

	WL3 STD	WL4 STD
Standard Dev.:	0.33	0.32
Mean Sensitivity:	0.35	0.35
Per cent missing rings:	2.33	2.04

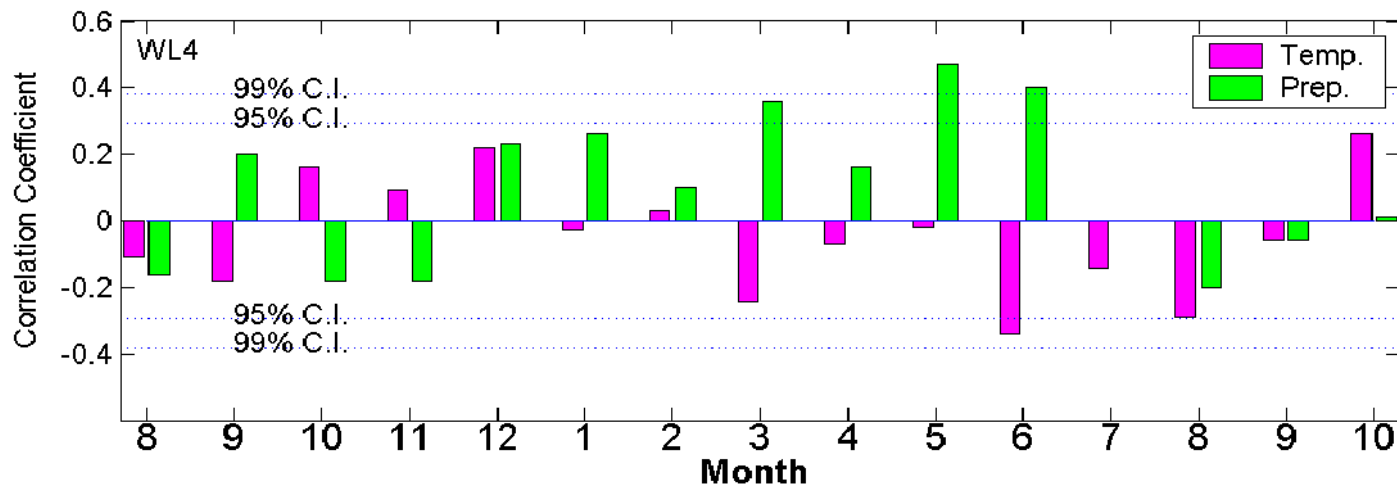
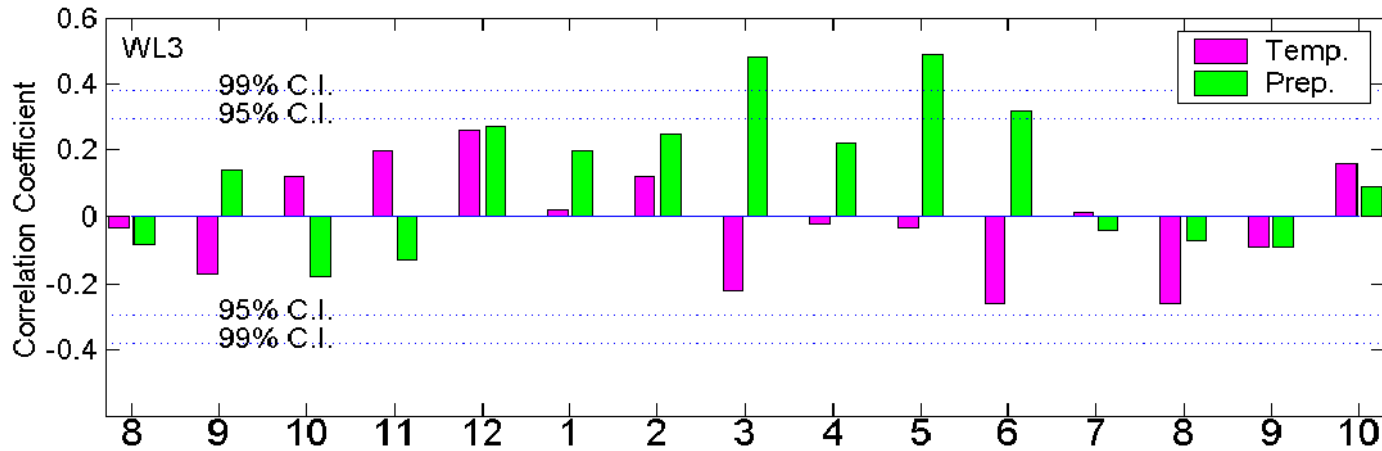
Common interval analyses (1400-1750)

Mean Correlations

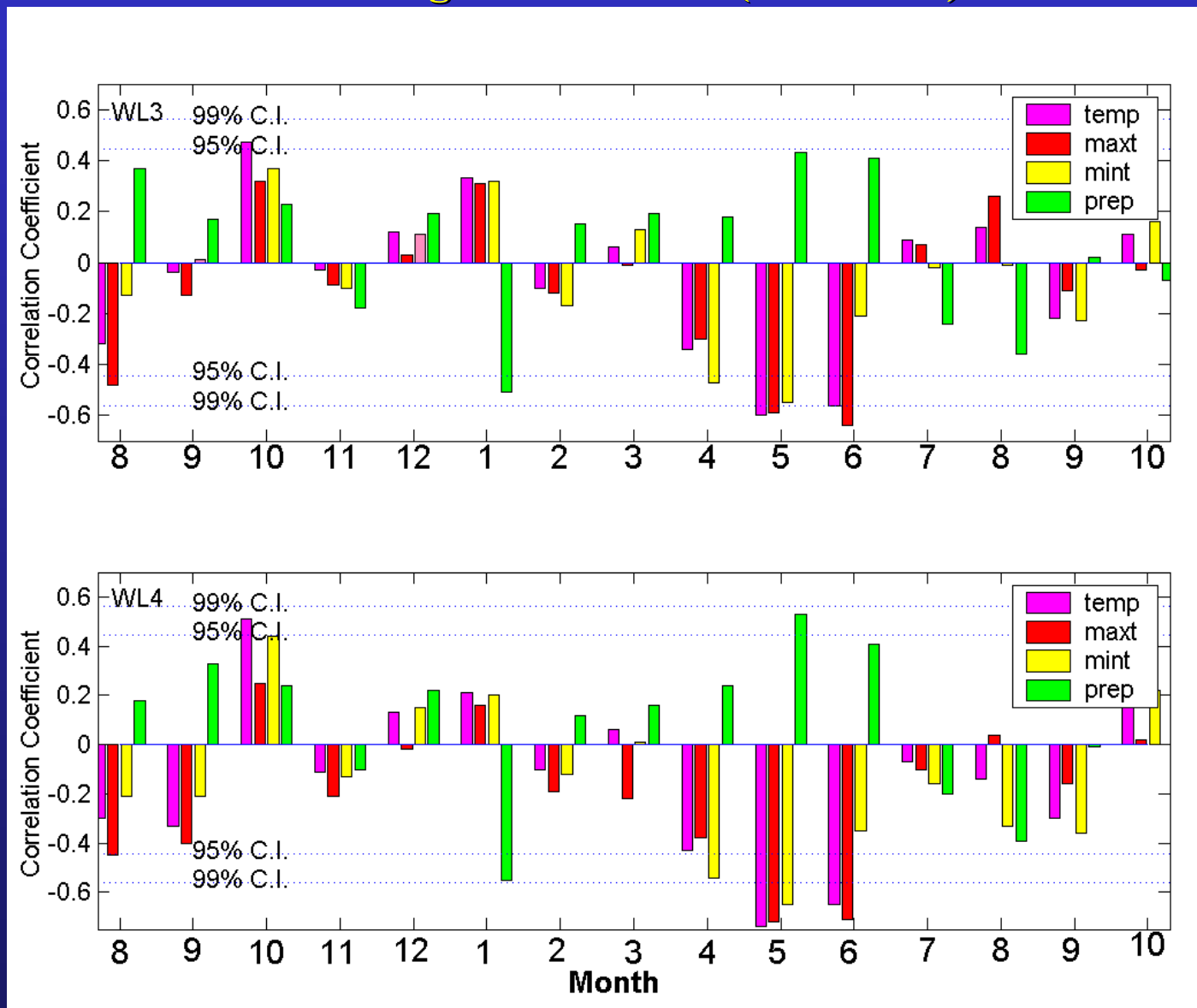
Among all radii:	0.57	0.57
between tree:	0.57	0.57
within trees:	0.79	0.84
Signal –to-noise ratio:	33.9	48.9
agreement with population Chron.:	0.97	0.98
Variance in first eigenvector:	59%	59%

Correlation coefficient of the two chronologies in high frequency variations is 0.88

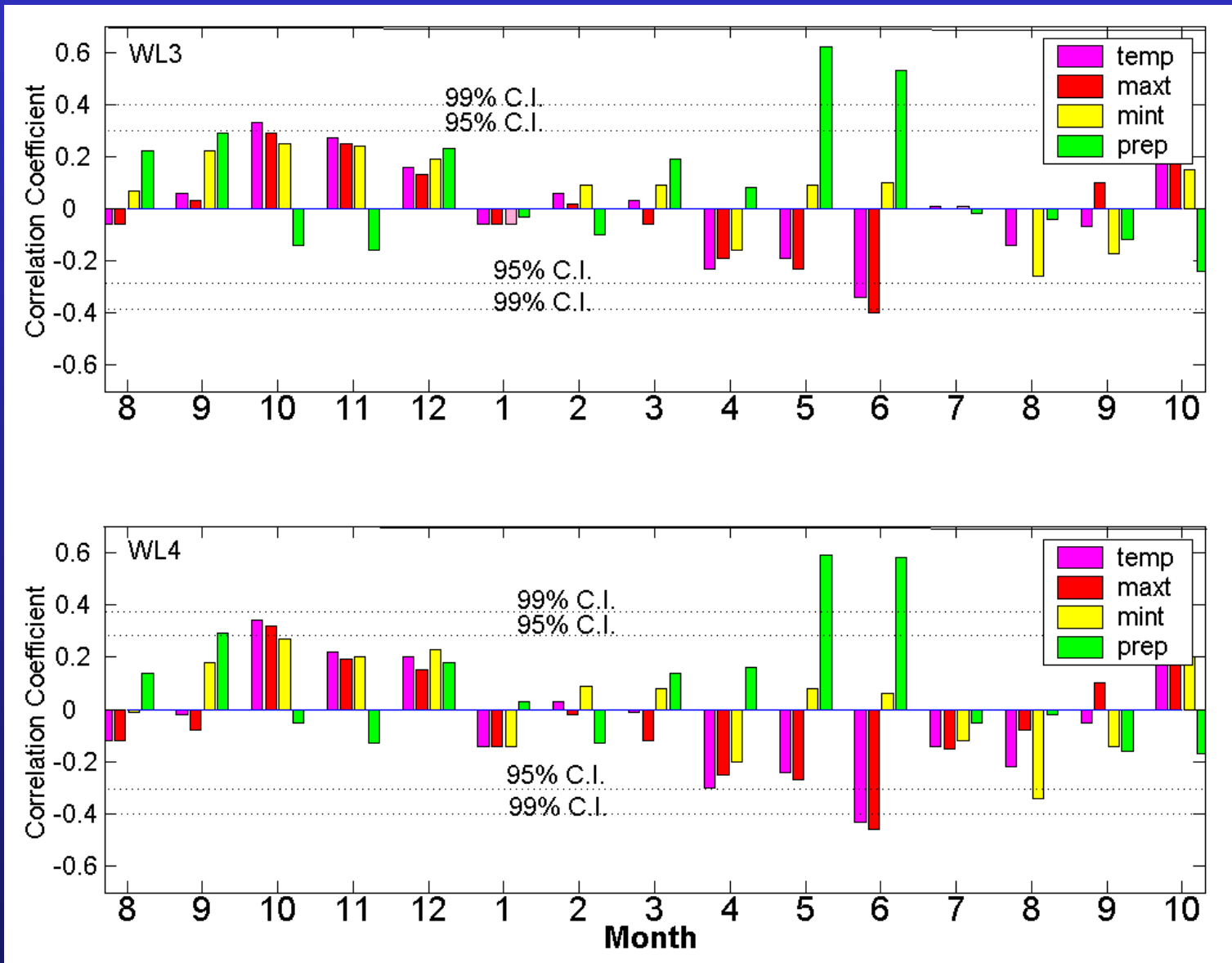
Correlation coefficients between grided climate data (37X98) and two ring-width indices (1951-1997)



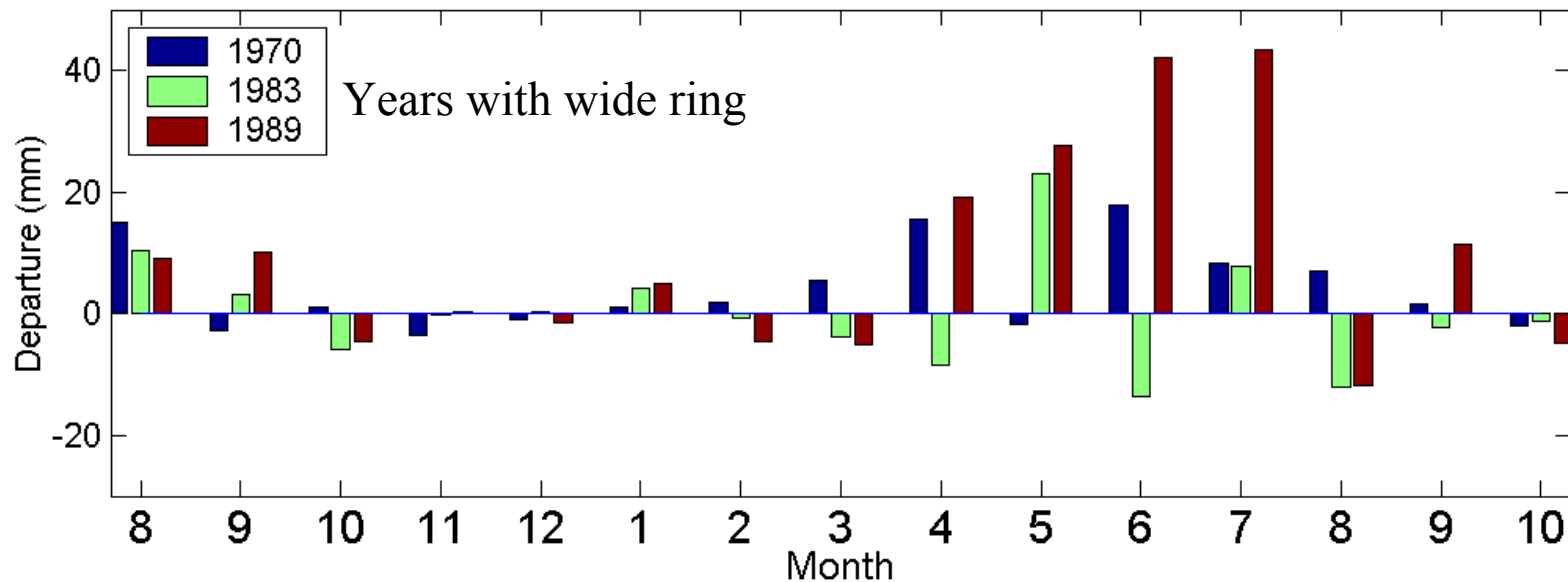
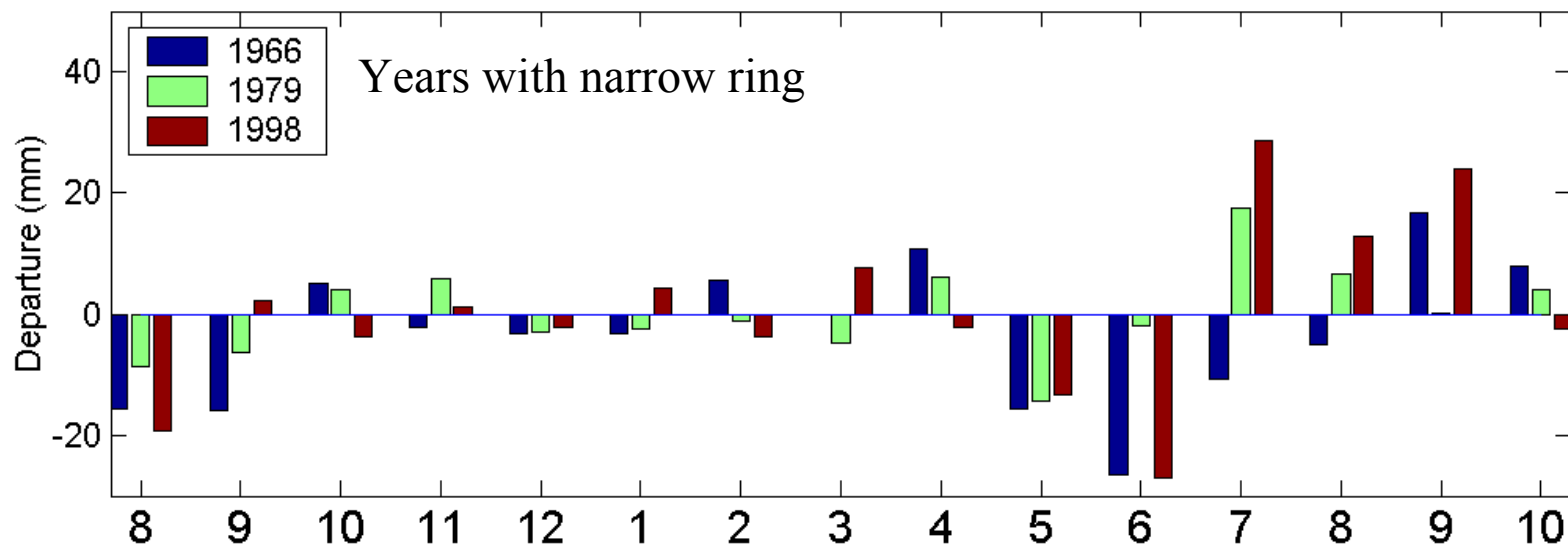
Correlation coefficients between climate data of Wulan station and two ring-width indices (1981-2000)



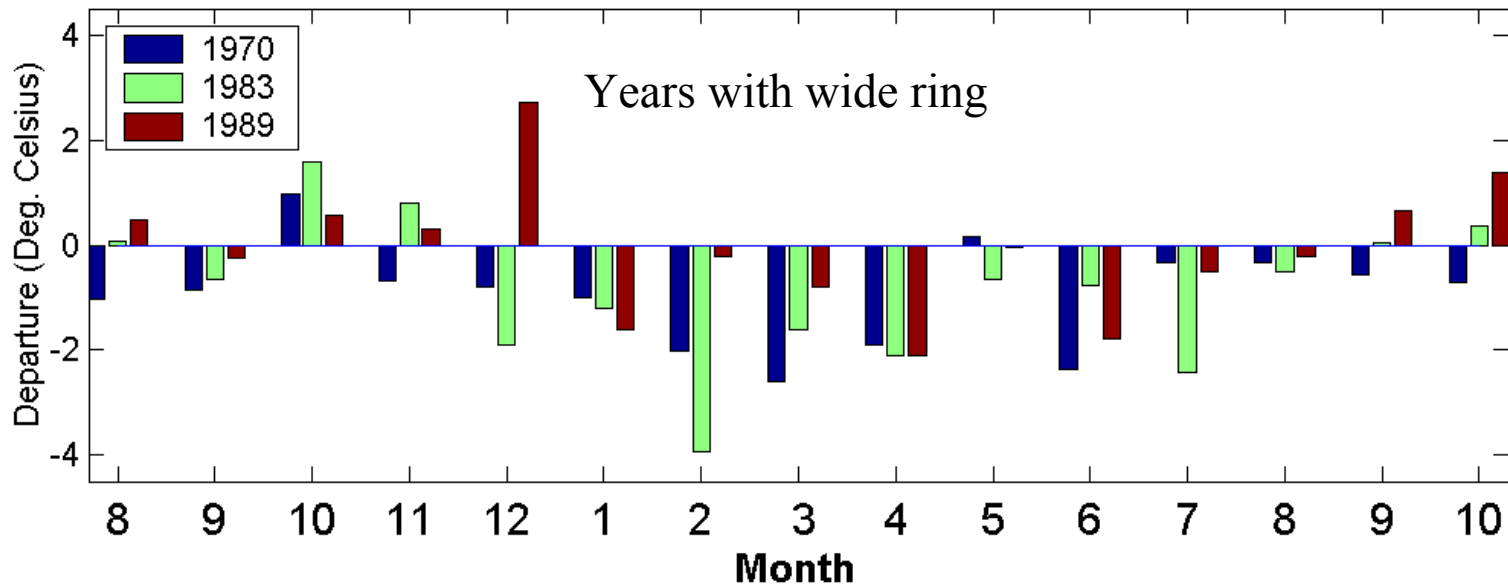
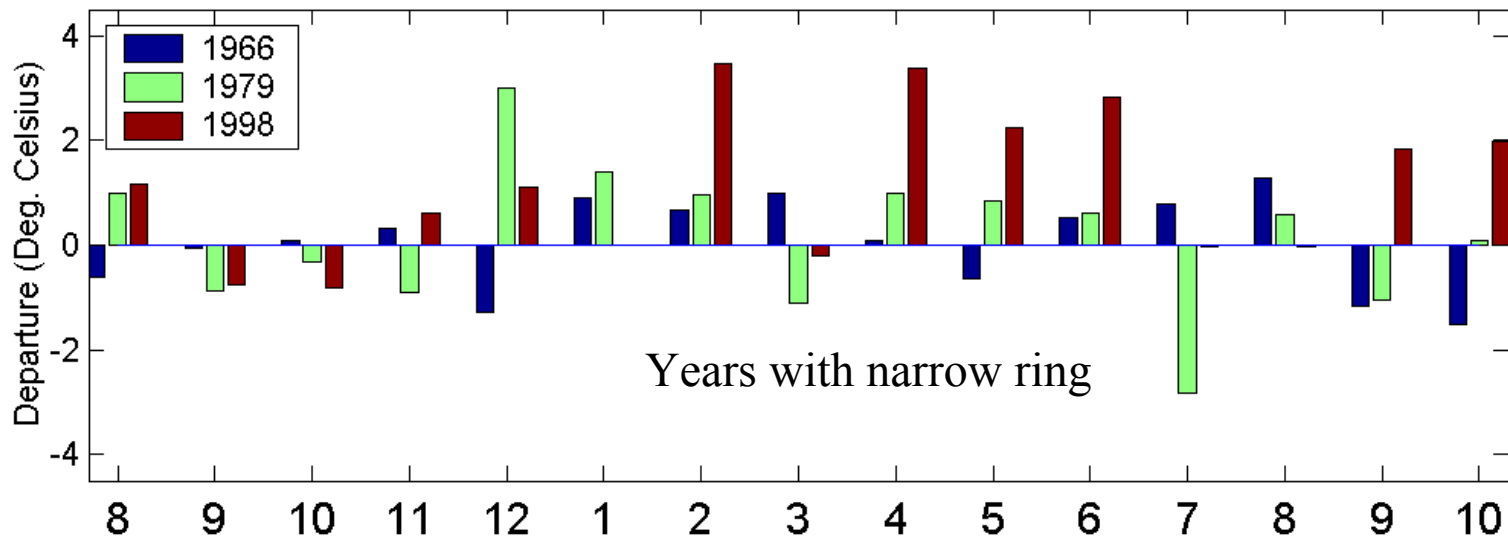
Correlation coefficients between climate data from Dulan station and two ring-width indices (1955-2000)



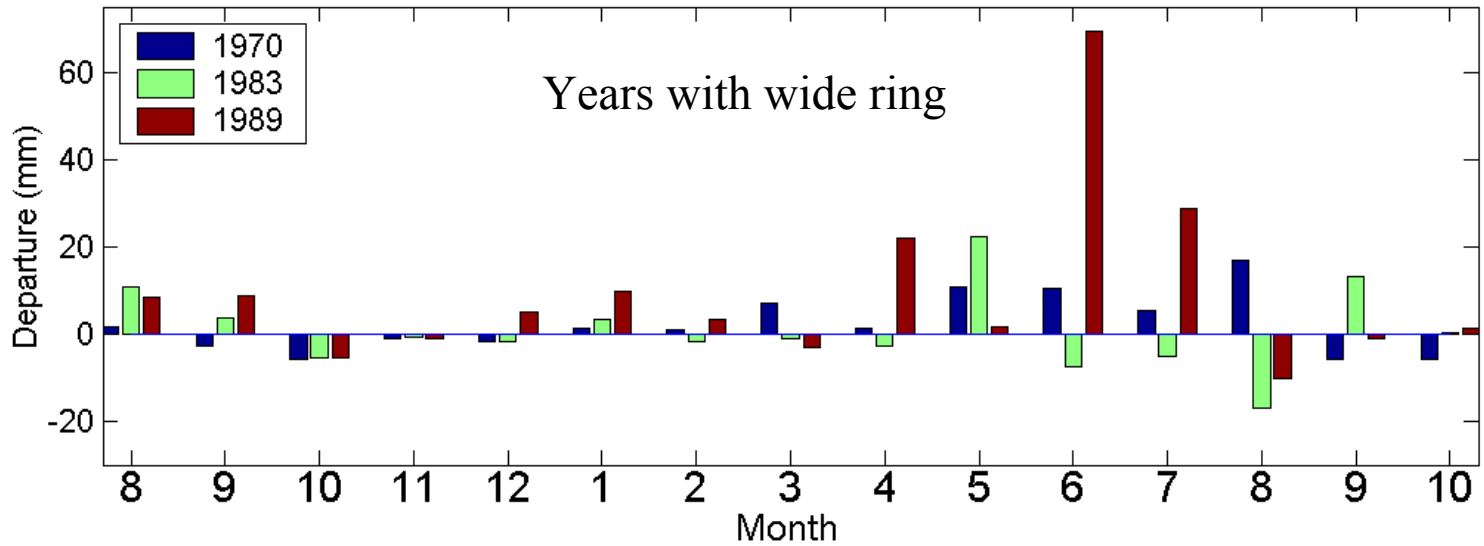
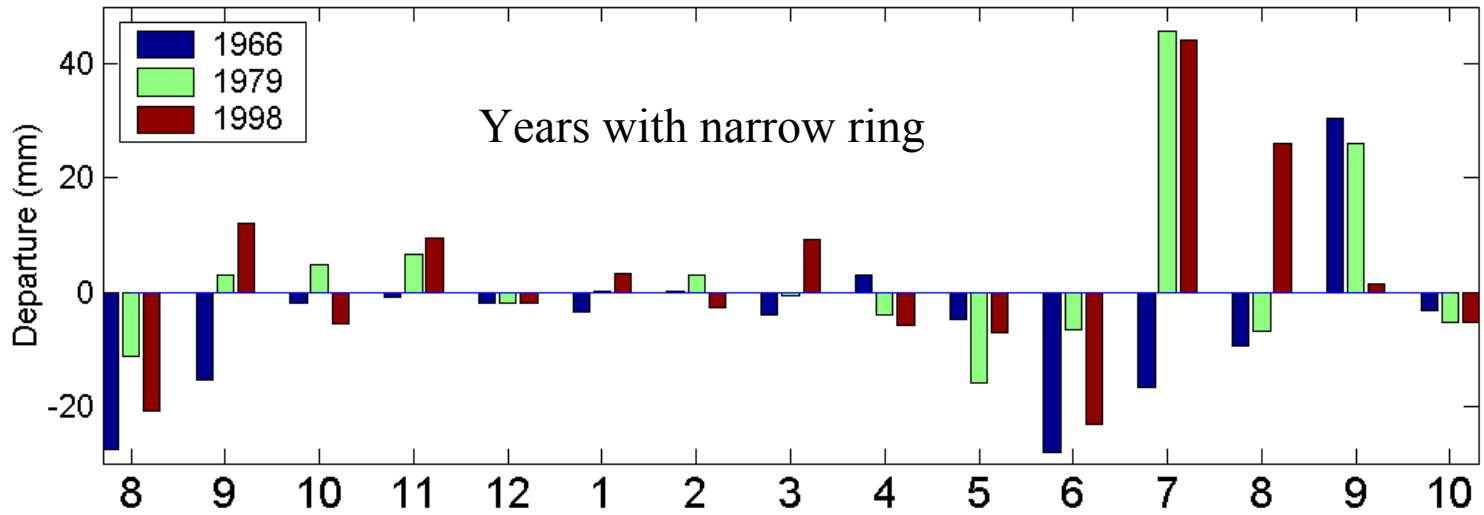
Monthly Precipitation Anomalies of Dulan



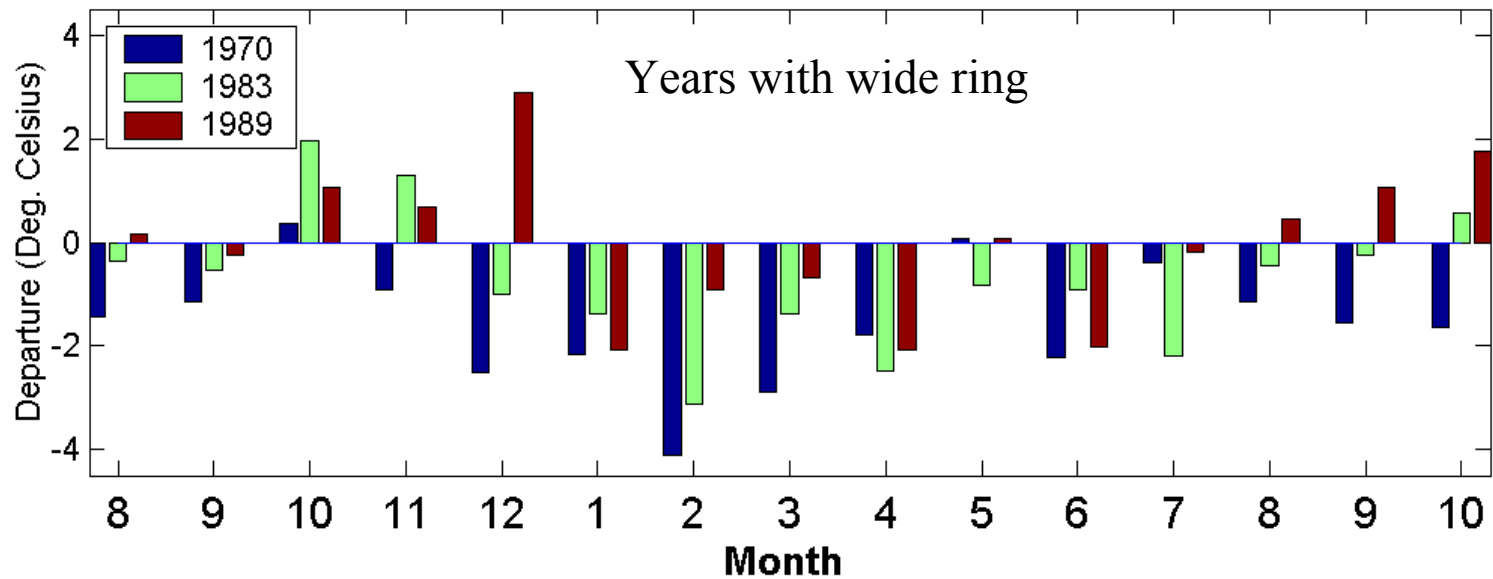
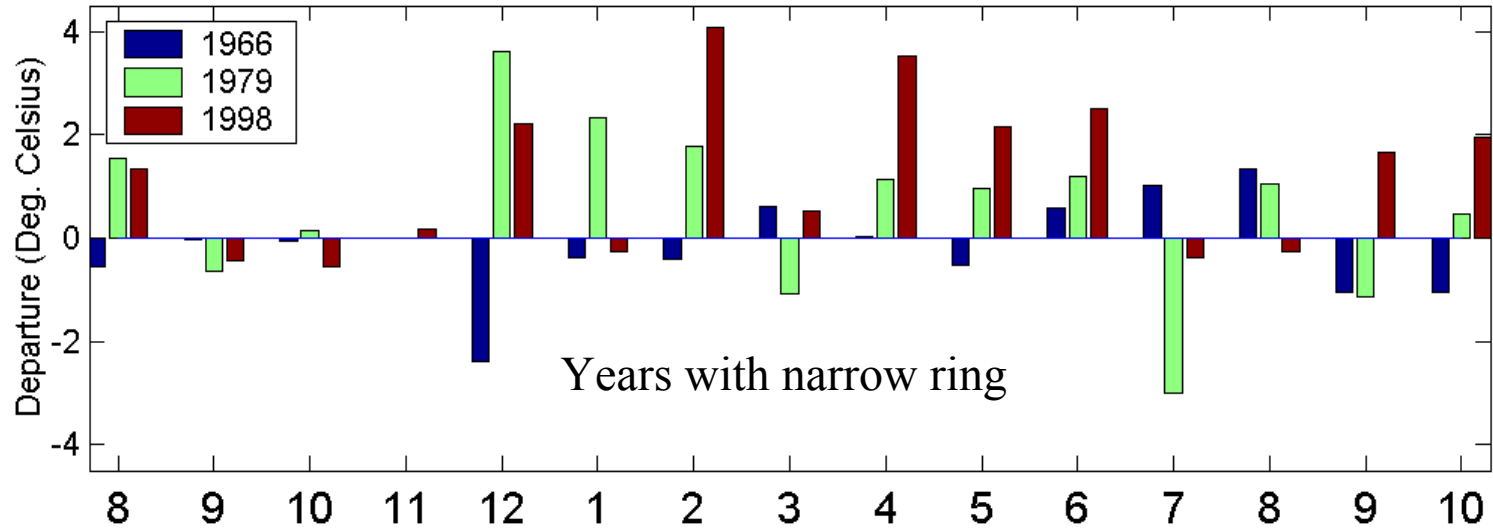
Monthly Temperature Anomalies of Dulan



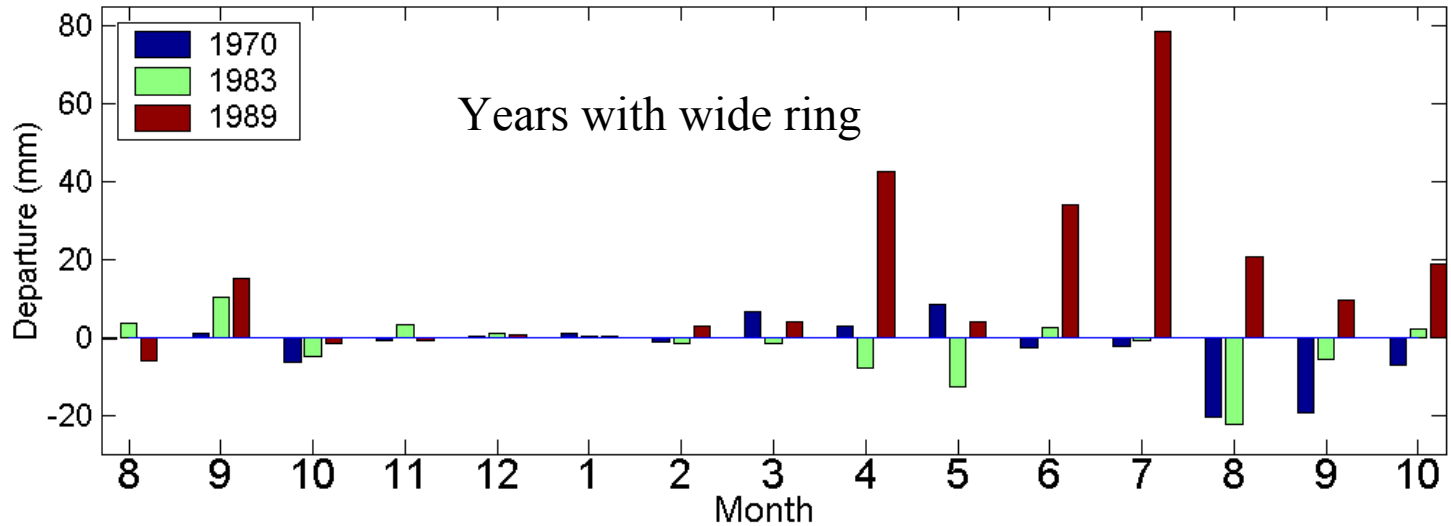
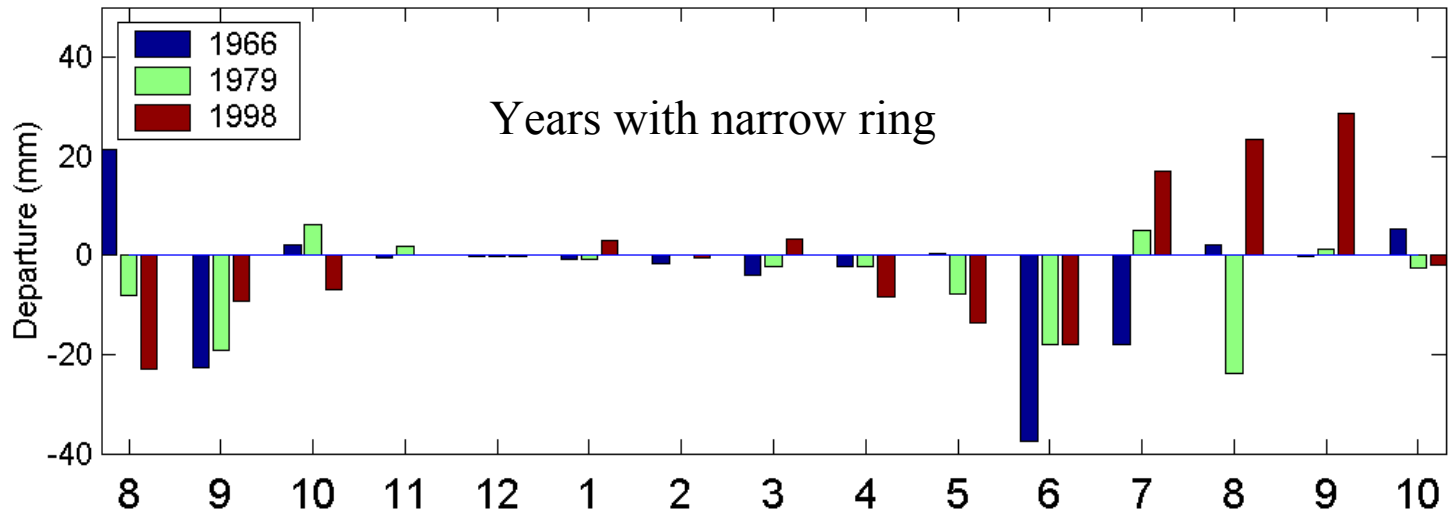
Monthly Precipitation Anomalies of Delingha



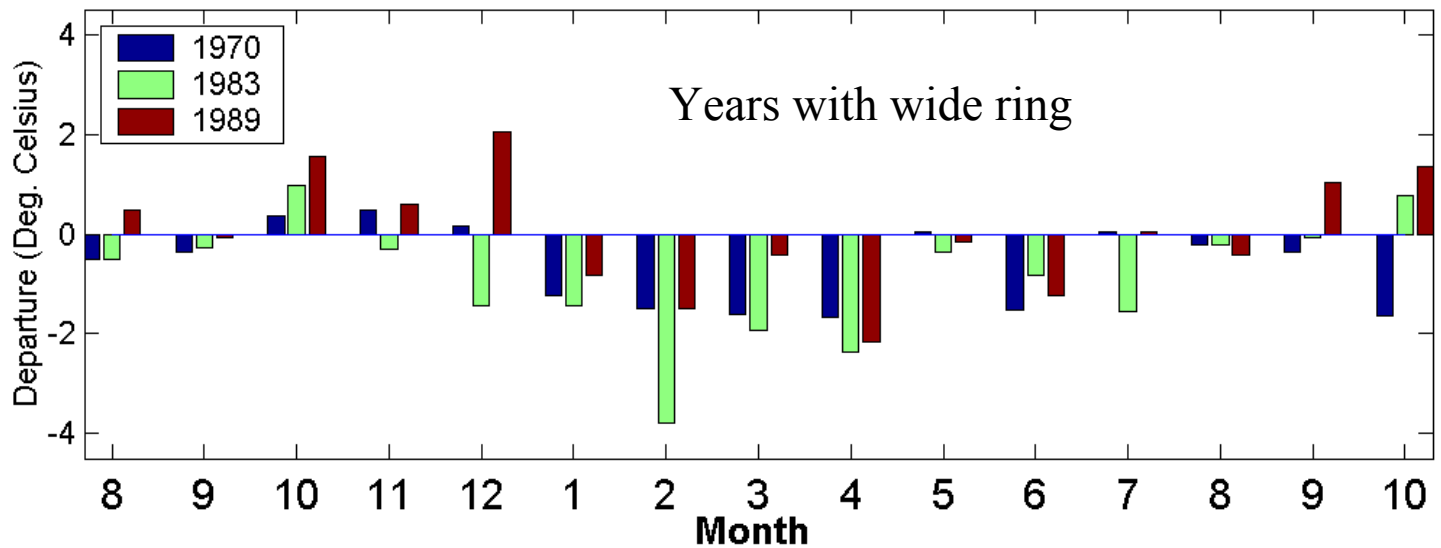
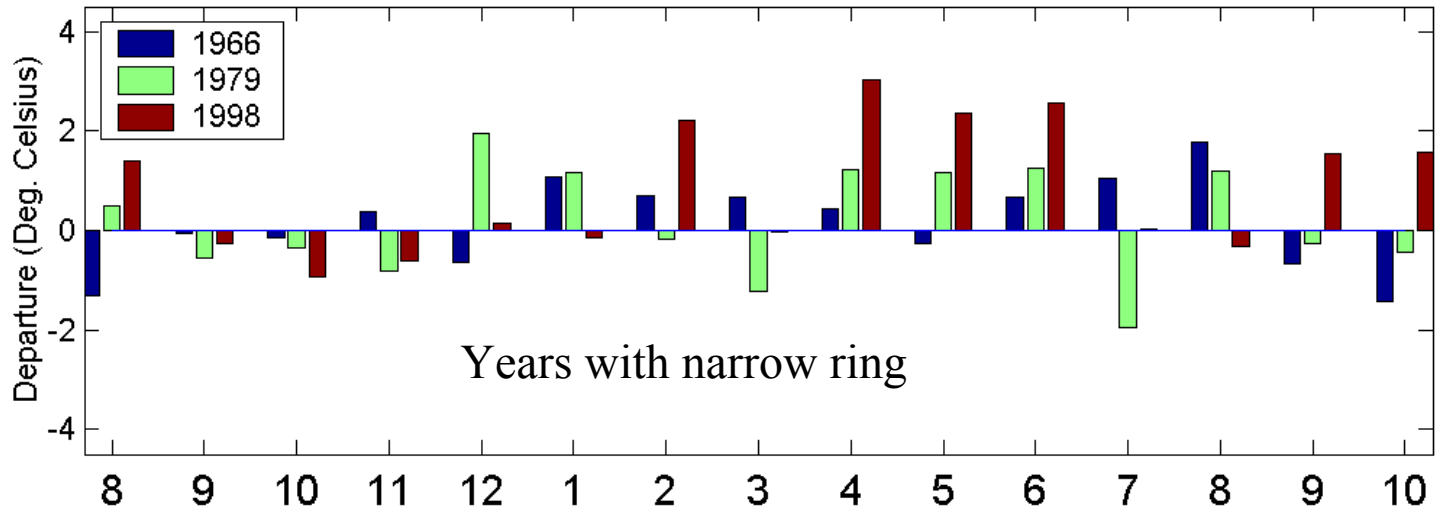
Monthly Temperature Anomalies of Delingha



Monthly Precipitation Anomalies of Chaka



Monthly Temperature Anomalies of Chaka



Conclusions

- 1. With a large number of specimens the reliable and thousand-year long ring-width Chronologies can be developed for Qilian Juniper growing in the arid region of northeast Tibet plateau;**
- 2. Precipitation and mean maximum temperature in May and June are highly limiting to growth of Qilian Juniper in study area; and**
- 3. Qilian Juniper is a potential species for dendroclimatic study.**

THANKS

