

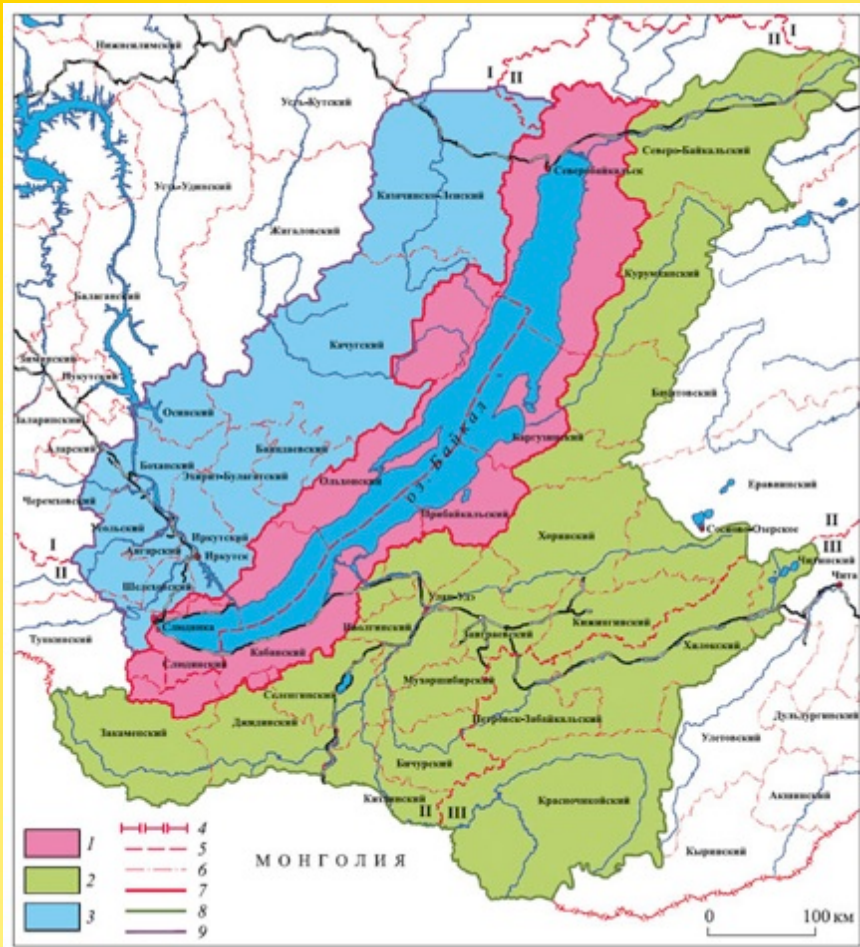


Analysis and Reconstruction of Droughts and Waterlogging Periods in the Baikal Natural Territory

Voropay N.N. Maksyutova E.V. Balybina A.S.

V.B. Sochava Institute of Geography SB RAS, Irkutsk, Ulan-Batorskaya st. 1

e-mail: nadya@irigs.irk.ru, emaksyutova@irigs.irk.ru; balybina@irigs.irk.ru



Baikal Natural Territory according to *Federal law #94-FZ from 1 May 1999 “On protection of the Baikal Lake”* is the area with square 386 km² including the Baikal Lake, water protection area, Baikal drainage basin within the Russian Federation, specially protected natural areas adjoining the Baikal Lake and 200 km belt at the west and north-west of the lake.

The Baikal Natural Territory have three **ecological zones**:

- 1. Central ecological zone
- 2. Buffer ecological zone
- 3. Ecological zone of atmospheric impact

Ped' landscape index of drought [1975]

$$S = \frac{\Delta T}{\sigma_T} - \frac{\Delta R}{\sigma_R}$$

$\Delta T, \Delta R$ - monthly anomaly of temperature and precipitation

σ_T, σ_R - standard deviation of monthly temperature and precipitation

For drought

$$\Delta T > 0 \text{ и } \frac{\Delta T}{\sigma_T} > 0, \Delta R < 0 \text{ и } \frac{\Delta R}{\sigma_R} < 0, \text{ then } Si > 0$$

For excessive moisture conditions

$$\Delta T < 0 \text{ и } \frac{\Delta T}{\sigma_T} < 0, \Delta R > 0 \text{ и } \frac{\Delta R}{\sigma_R} > 0, \text{ then } Si < 0$$

Intensity:

Drought

Weak	$1,0 < Si < 2,0$
Medium	$2,0 \leq Si < 3,0$
Strong	$Si \geq 3,0$

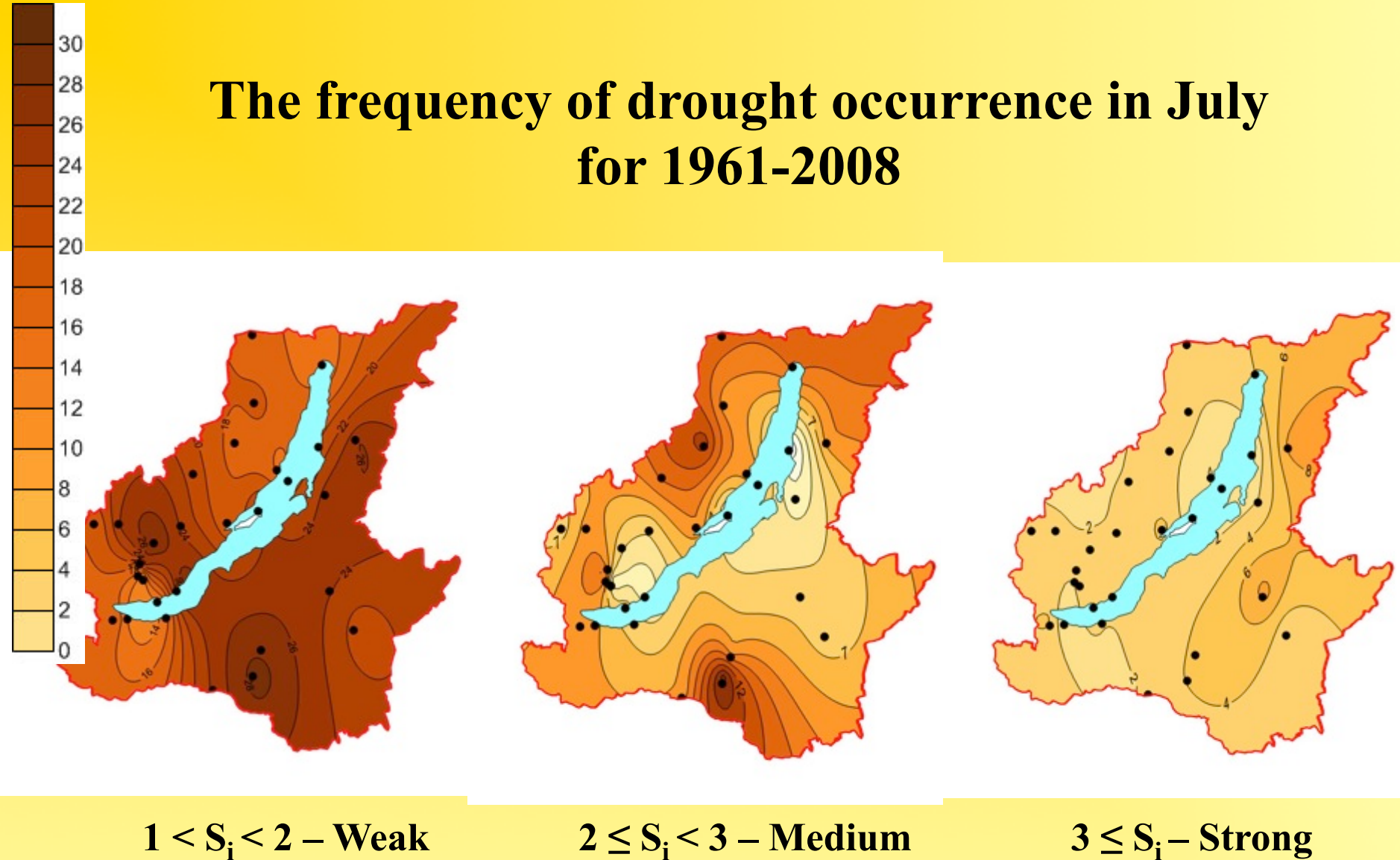
Excessive moisture

Weak	$-2,0 < Si < -1,0$
Medium	$-3,0 < Si \leq -2,0$
Strong	$Si \leq -3,0$

Weather observation network

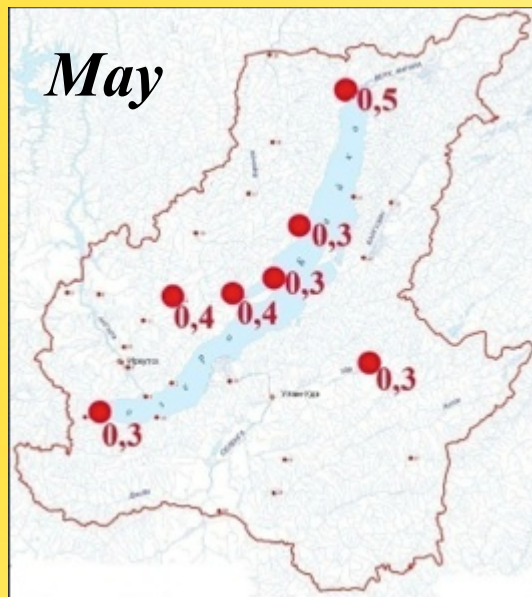


The frequency of drought occurrence in July for 1961-2008

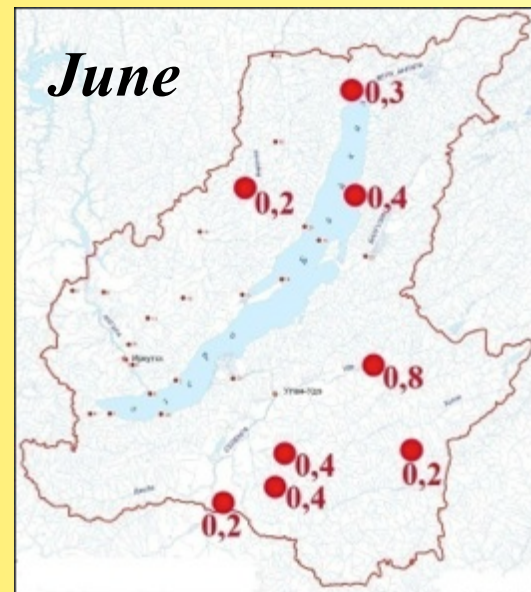


Trend of S_i index for 1961-2008

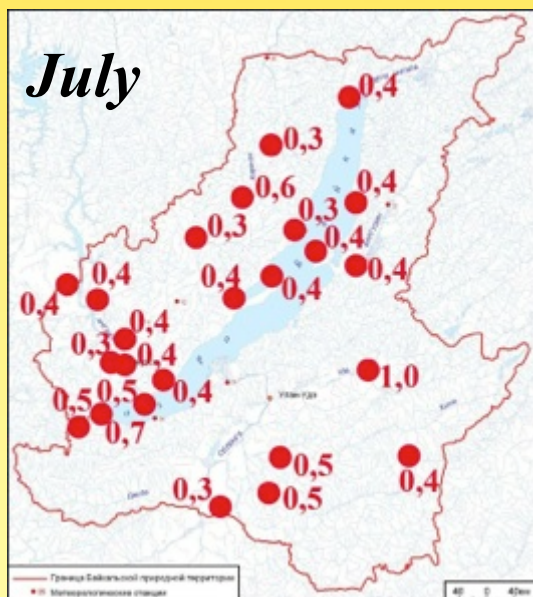
May



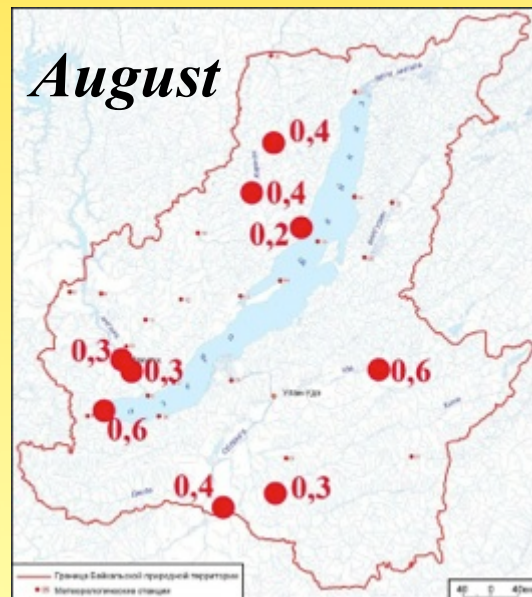
June



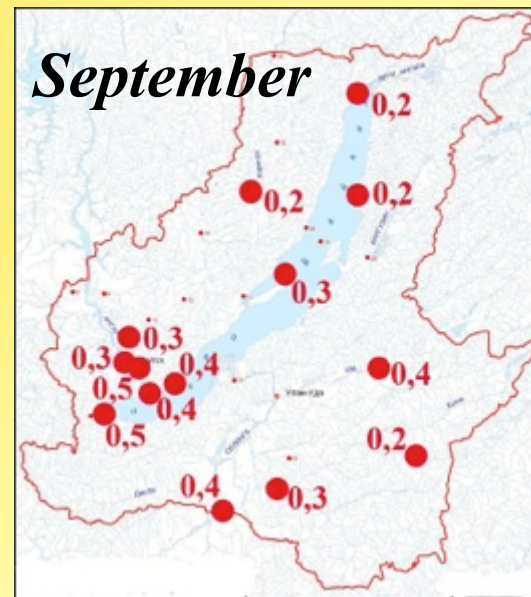
July



August



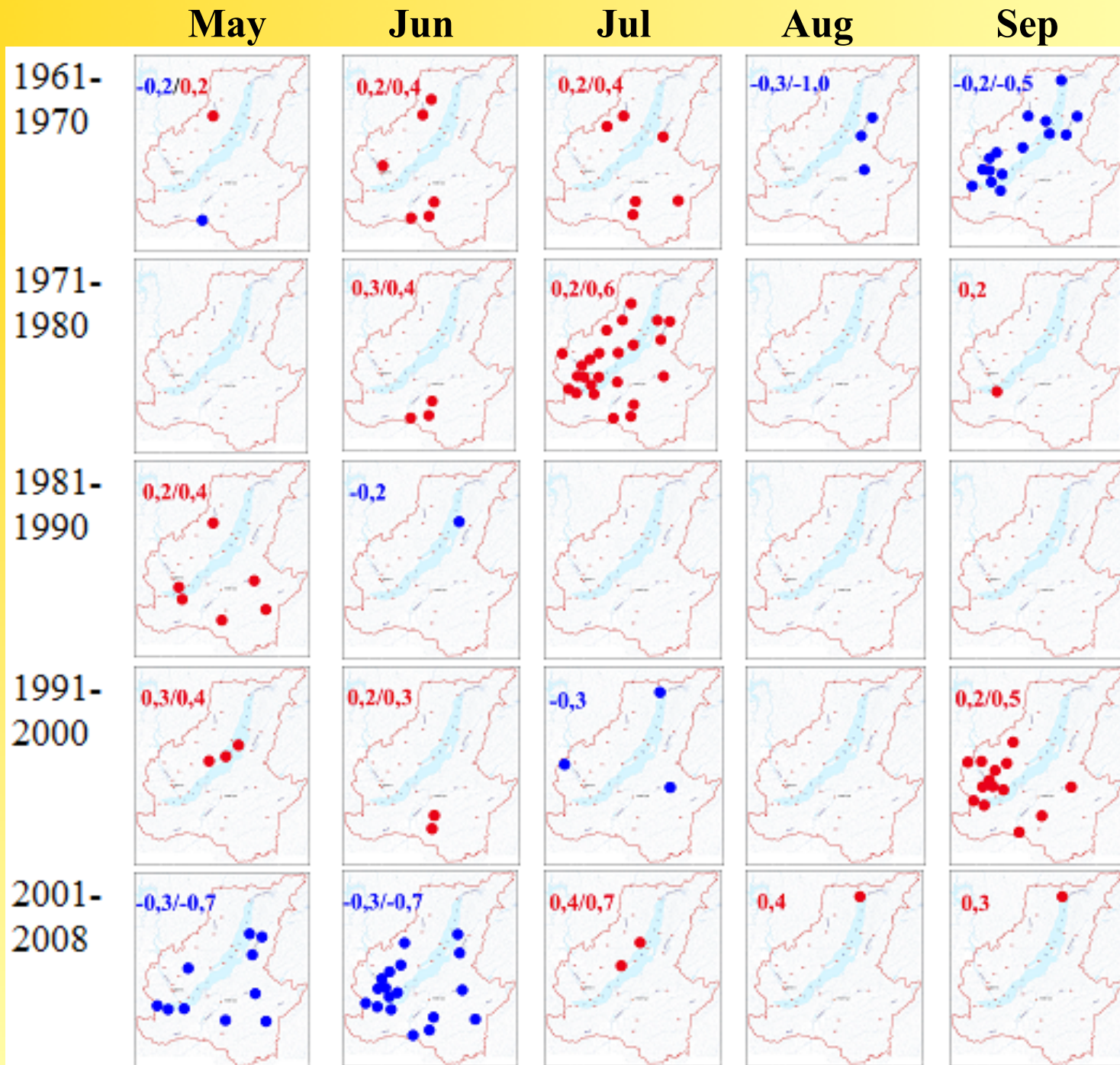
September



Trend of S_i for decades

● Negative

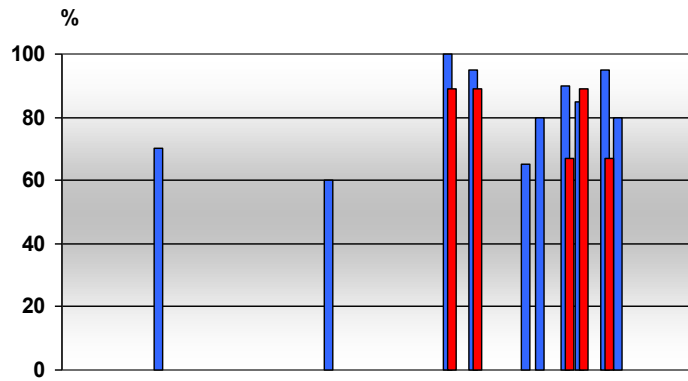
● Positive



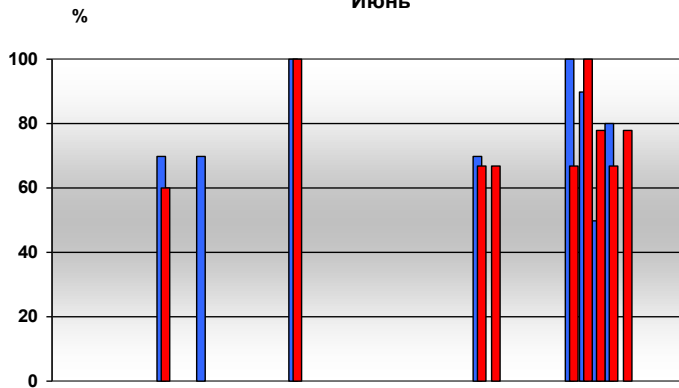
Large (area > 60%) drought events at:

 **Predbaikale**
 **Zabaikalie**

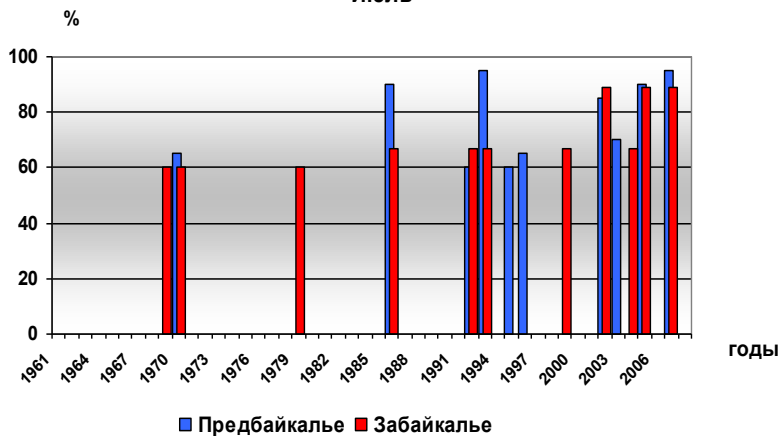
Май



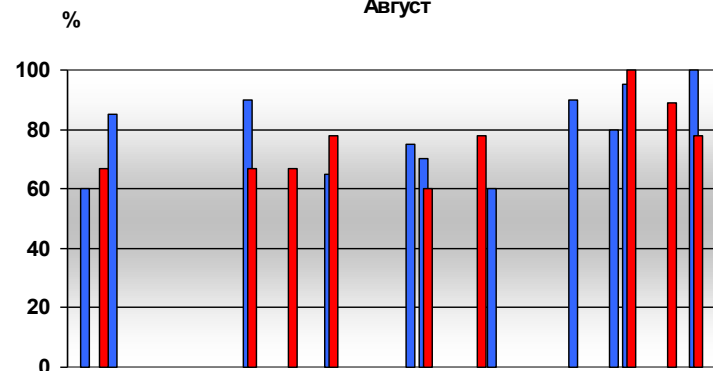
Июнь



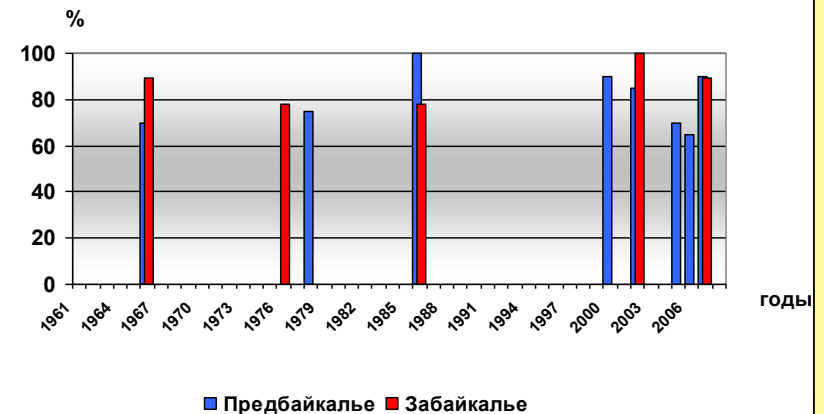
Июль



Август



Сентябрь



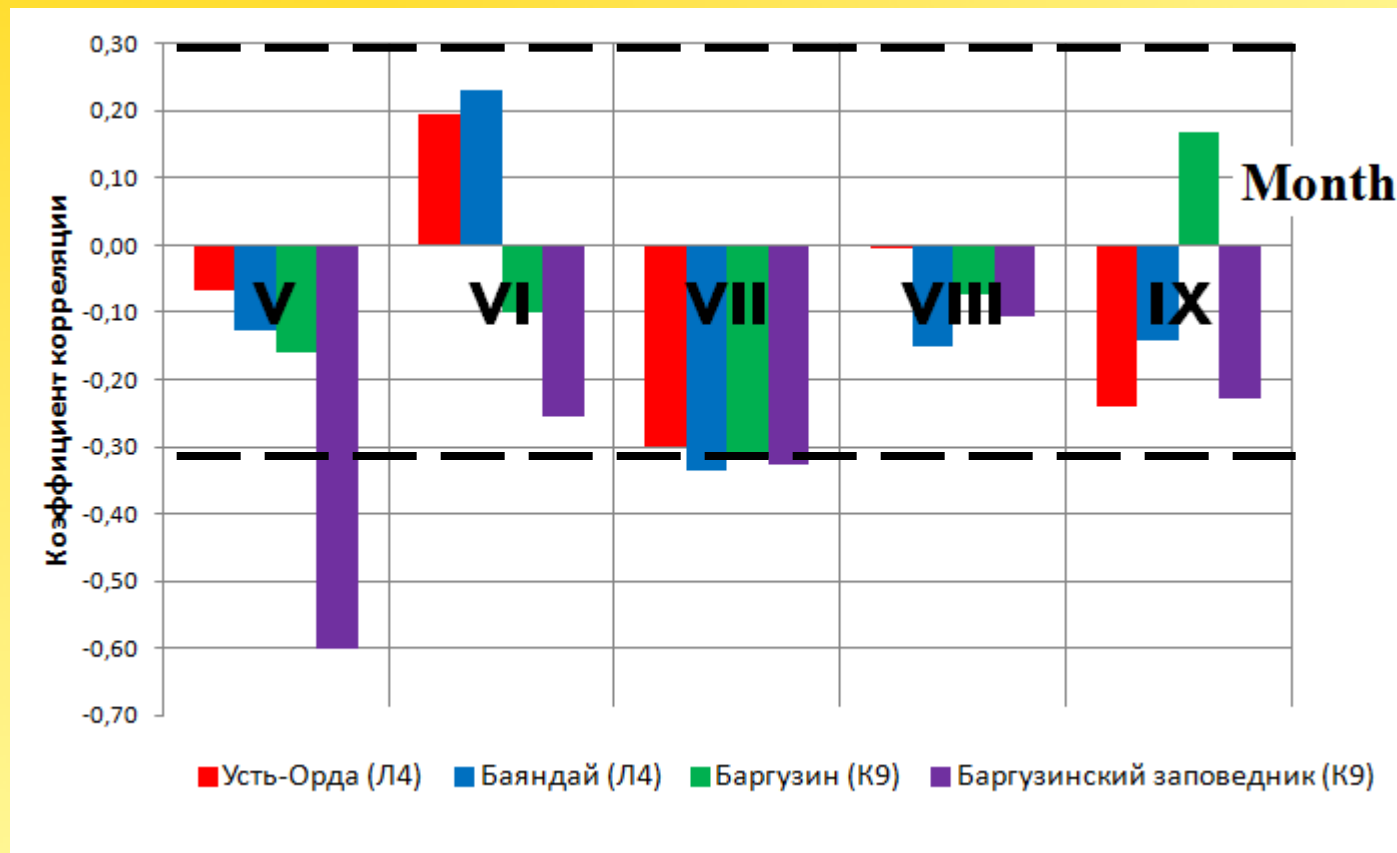
Continuous drought periods at the Baikal Nature Area

Year	Number of stations	Duration (months)	Month
1979	5 11	3 2	V-VII VI-VII
1986	12 3	3 2	VII-IX VIII-IX
1993	3 15	3 2	V-VII VI-VII
2002	13 4 6 2 2	5 4 3 2 2	V-IX VI-IX VII-IX V-VI VIII-IX
2003	11	3	V-VII
2005	5	3	VII-IX
2007	24 3	3 2	VII-IX VII-VIII

Continuous excessive moisture periods at the Baikal Nature Area

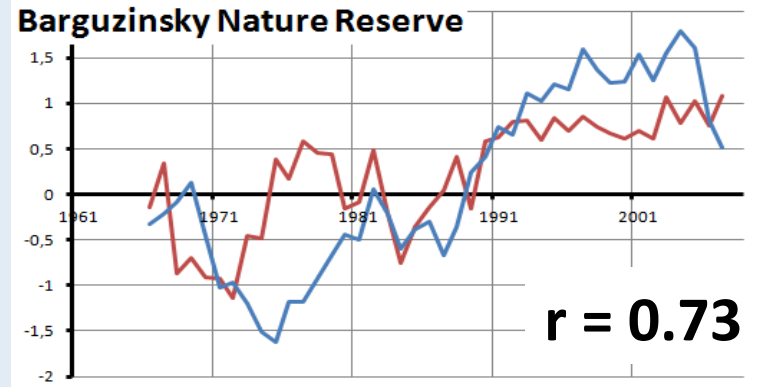
Year	Number of stations	Duration (months)	Month
1971	5 12	2 2	VII, VIII VI, VII
1973	10 4	2 3	VII, VIII VI-VIII
1983	4 14	2 2	V, VI VI, VII
1988	10 6	2 3	VI, VII V-VII
1990	10 6 7	2 3 4	VIII, IX VI-VIII VII-IX

Correlation coefficient of drought index and tree ring width

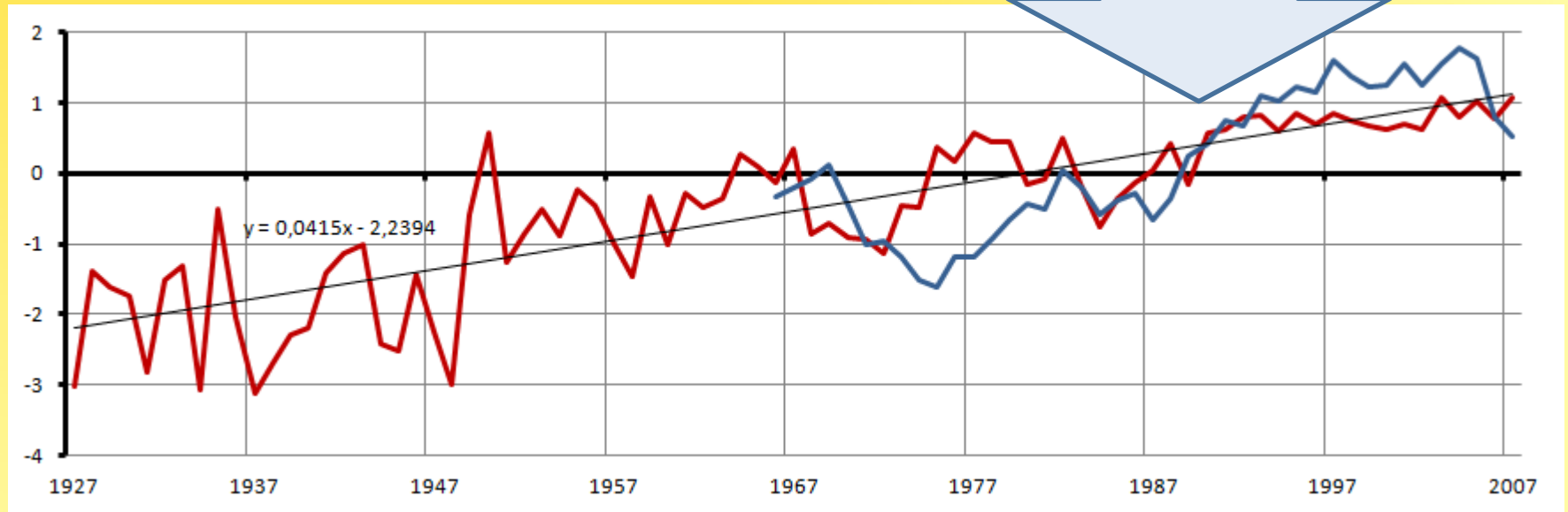


— — — Significant level of correlation

Reconstruction of drought index for 1927 – 2007 using dendrocronological data.



Model calibration 1961-2007



- 1 – 5-year averaging index S_i for May
- 2 – Reconstructed index S_i for May

Conclusion

The monitoring and assessment of drought events and identifying their trends over time and space has a scientific and practical interest.

Identification of the drought begin date using specific criteria and the drought coverage promotes the adoption of appropriate management and business solutions aimed at decrease of the damage caused by this natural phenomena and its reduction to a minimum.

Спасибо за внимание!