Regional Climate Change in the Black, Azov and Caspian Seas

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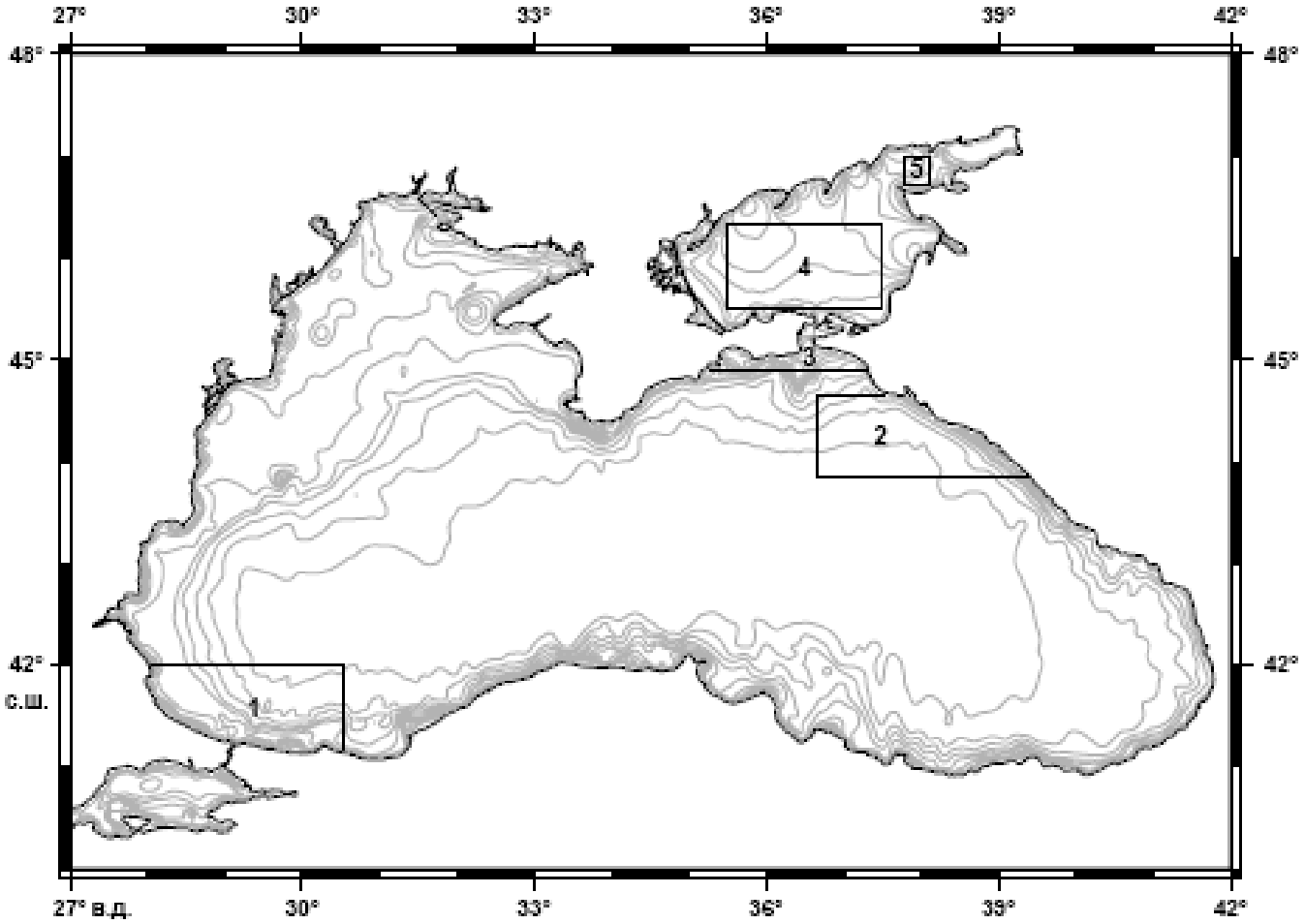
27°
30°
33°
36°
39°
42°
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45°
42°
с.ш.
27° в.д.
1
2
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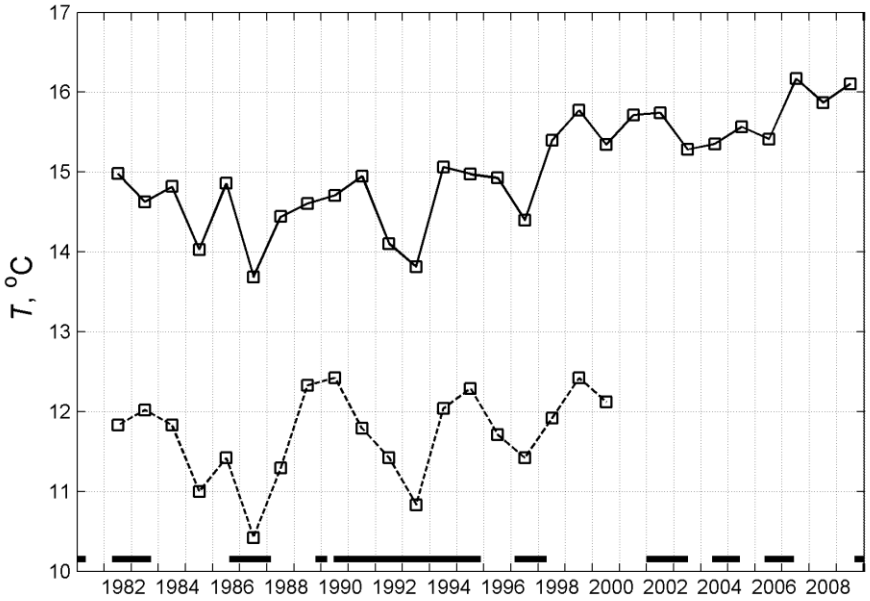
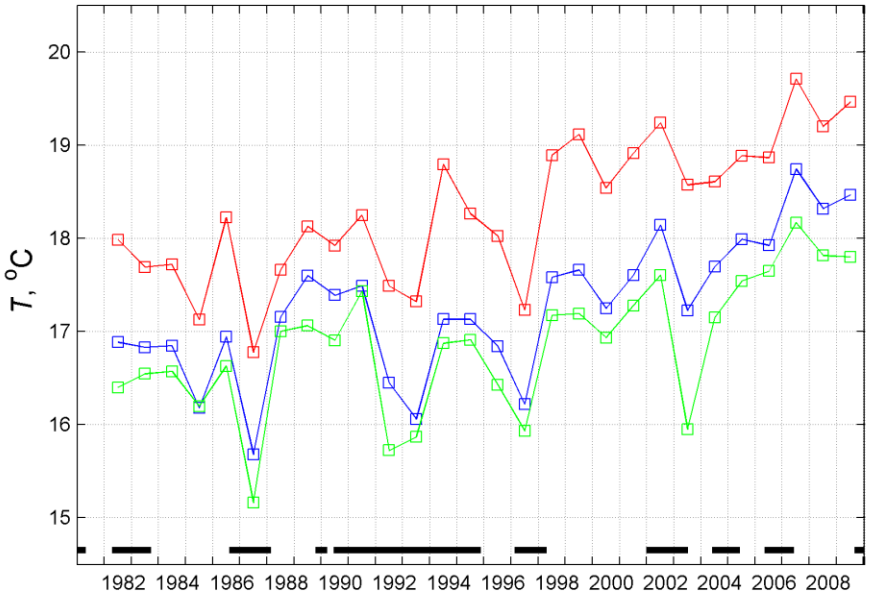
5



Среднегодовые ТПМ в Черном море в целом (верхняя кривая) и в Азовском море (нижняя)

Mean annual SST in the Black Sea (upper line) and in the Sea of Azov (lower line) for 1982-2009



Средние за апрель-ноябрь ТПМ в Черном море в целом (красная кривая), в центре Азовского моря (синяя) и в Таганрогском заливе (зеленая)

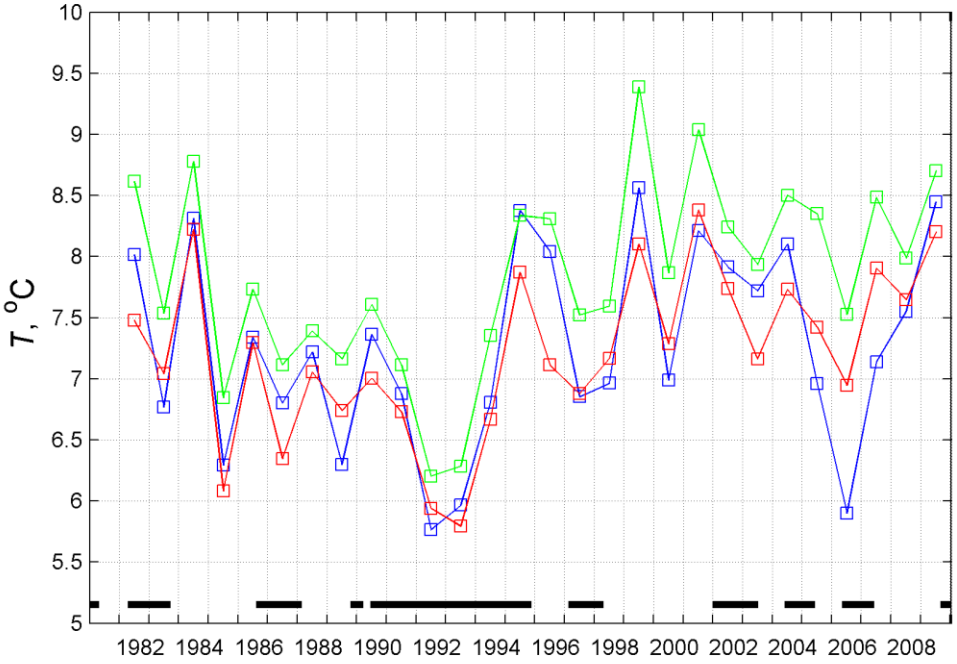
Mean SST for April-November in the Black Sea (red line), in the center of the Sea of Azov (blue line) and in the Taganrog Bay (green line)

Положительный тренды в период 1982-2009 гг. (линейная регрессия):

среднегодовой ТПМ в Черном море в целом – 0.06 ºС/год, в его прибосфорском, северо-восточном и прикерченском регионах – 0.05, 0.06 и 0.08 ºС/год соответственно (потепление – во все сезоны);
в теплый период (апрель-ноябрь): 0.07 ºС/год в Черном море в целом и 0.06-0.08 ºС/год в его регионах, 0.06 ºС/год в центральной части Азовского моря и 0.05 ºС/год в Таганрогском заливе.

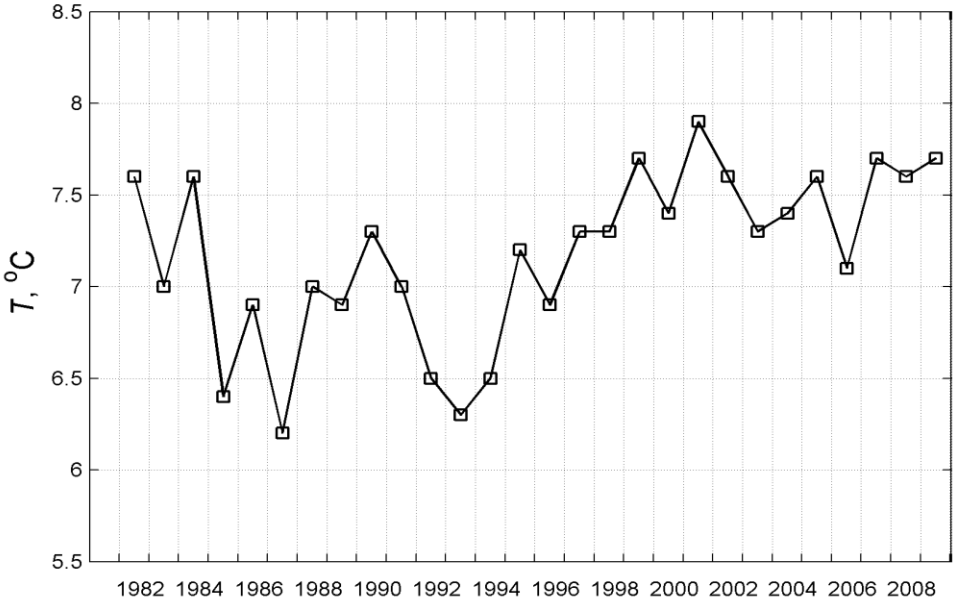
Positive SST trends for 1982-2009 (linear regression):
+0.06 C in the Black Sea
+0.05 C in the near Bosporus region
+0.06 C in the north-eastern part of the Black Sea
+0.08 C in the near Kerch Strait region

In the “warm” period of year (April-November):
+0.07 C in the Black Sea
+0.06 C in the near Bosporus region
+0.07 C in the north-eastern part of the Black Sea
+0.08 C in the near Kerch Strait region



Средние за февраль-март ТПМ в Черном море в целом (красная линия), в его СВ (зеленая) и прикерченском (синяя) регионах

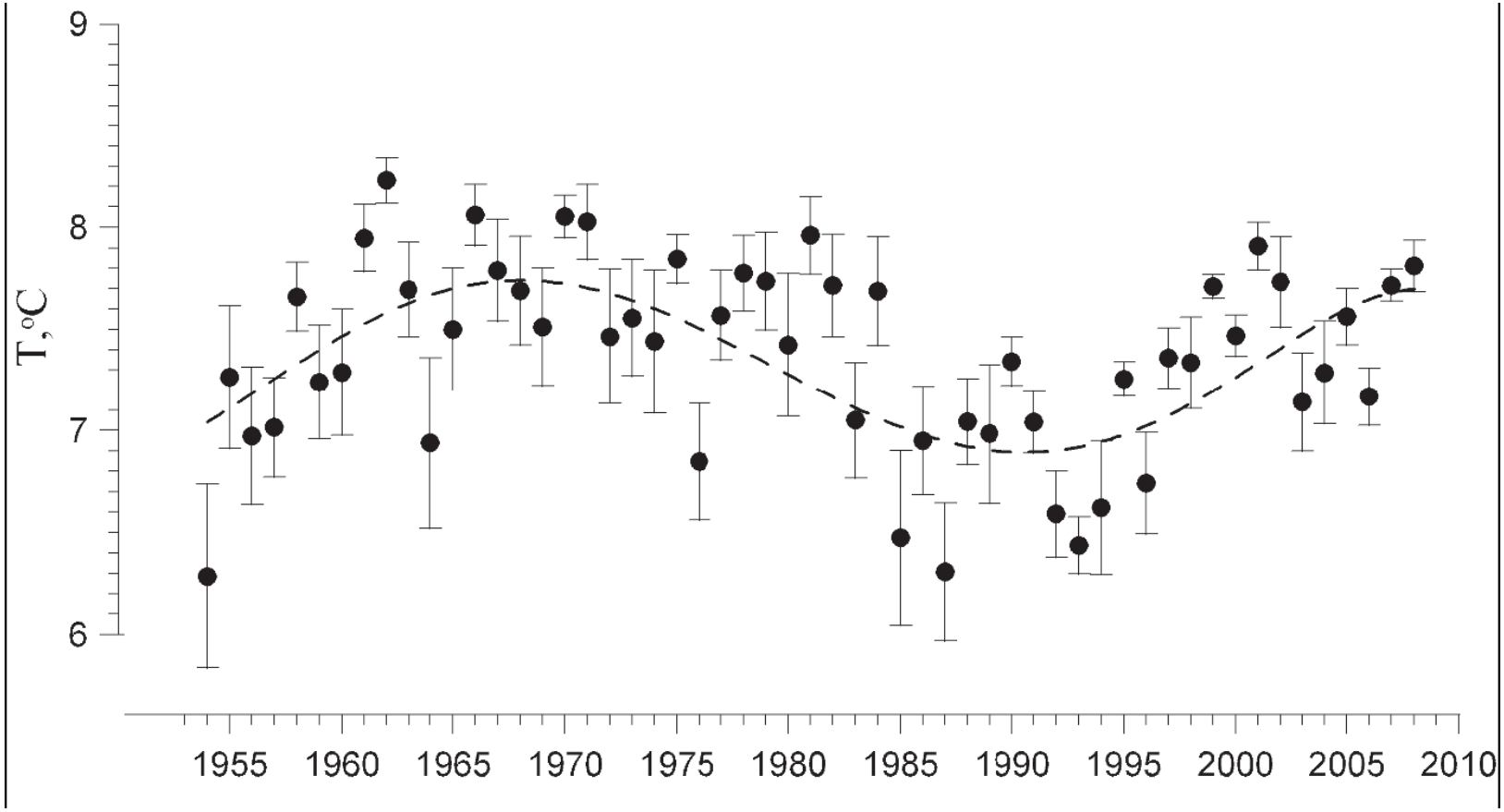
Mean SST for February-March in the Black Sea (red line), in the North-eastern part (green line) and in the near Kerch Strait region (blue line)

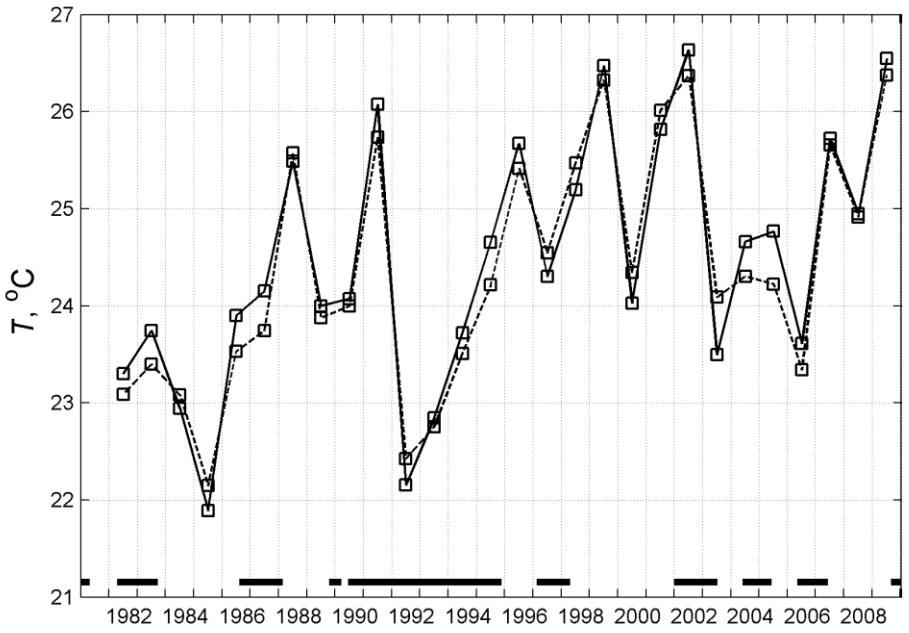


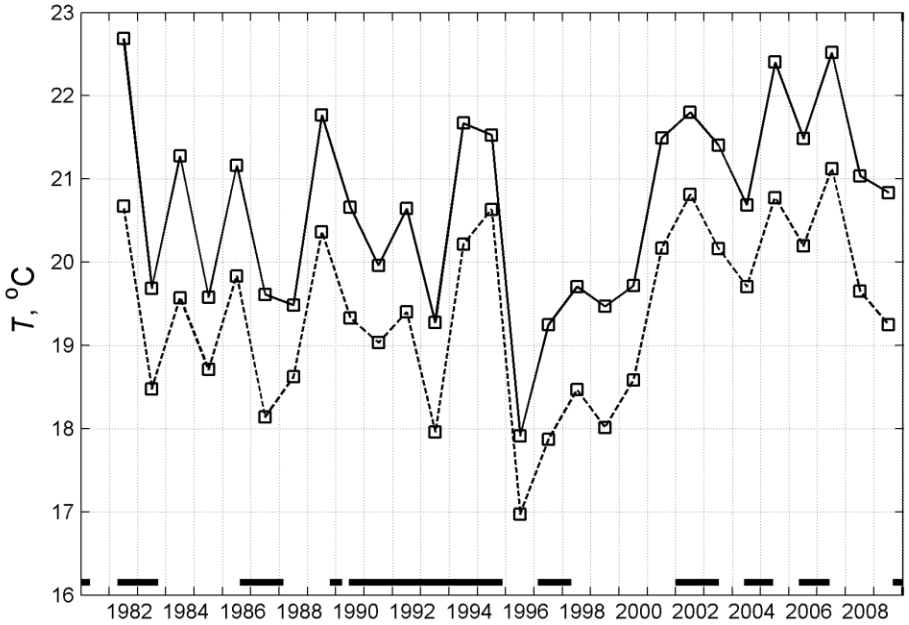
Температура ХПС по натурным Измерениям

Temperature of Cold Intermediate Layer in the Black Sea

Температура ХПС (1954-2008) по натурным измерениям
(Белокопытов В.Н., 2010)
In-situ temperature in CIL (Belokopytov, 2010)





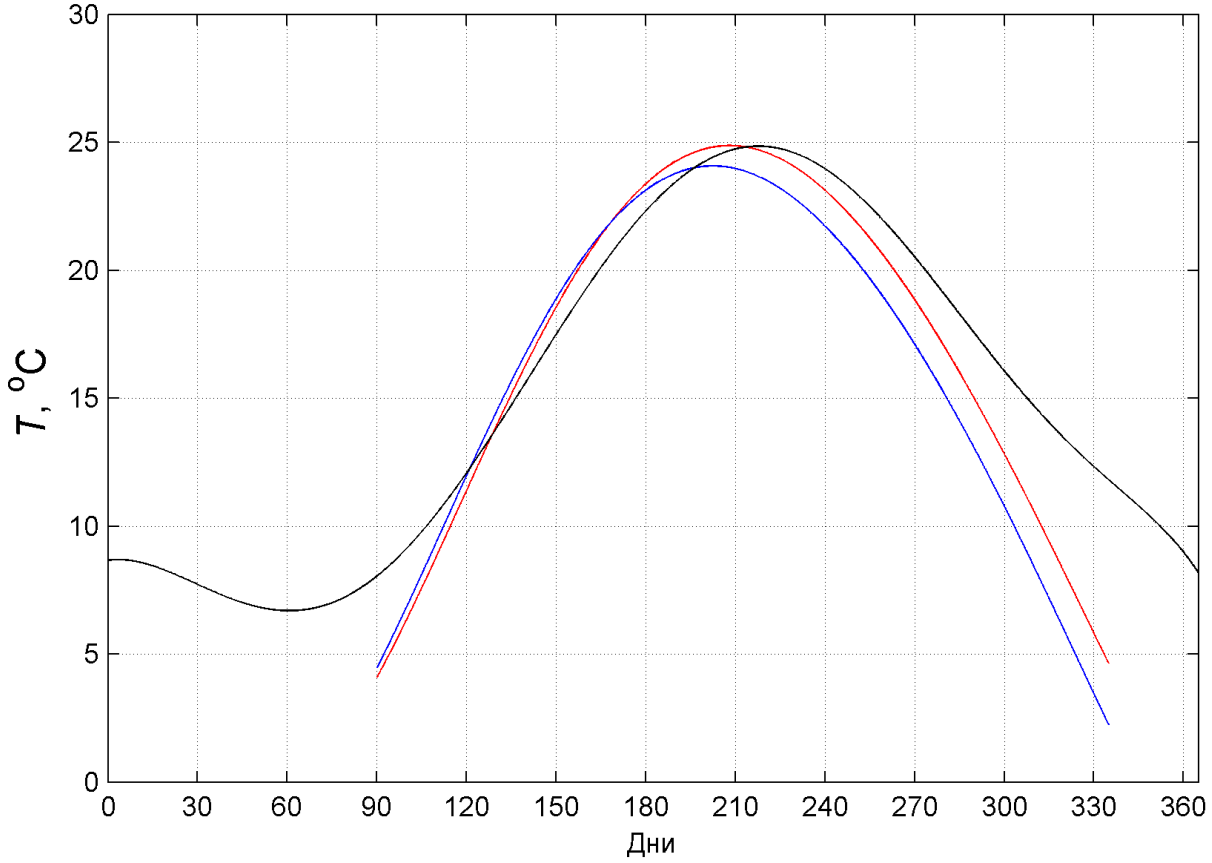


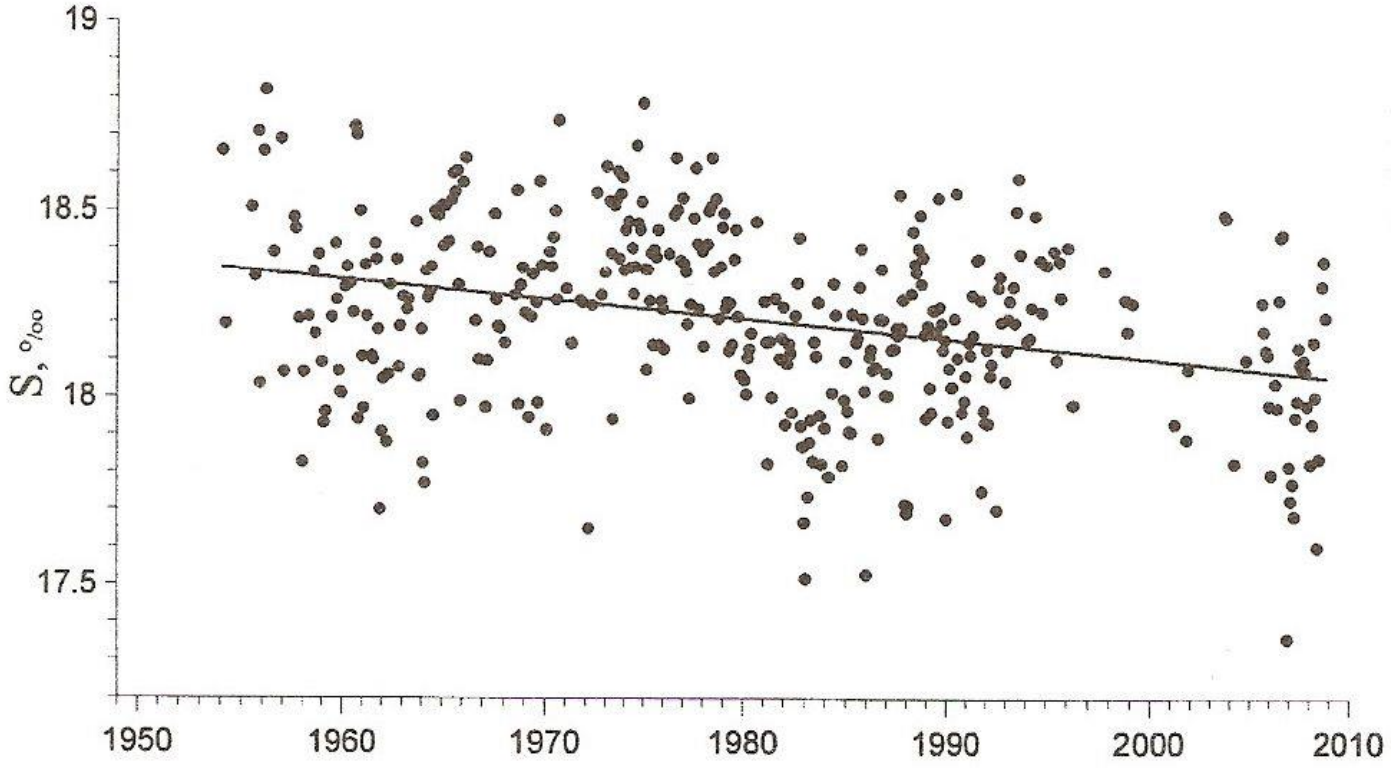
Средние за июль (верх) и сентябрь (низ) ТПМ в центре Азовского моря (сплошная линия) и в Таганрогском заливе (пунктир)

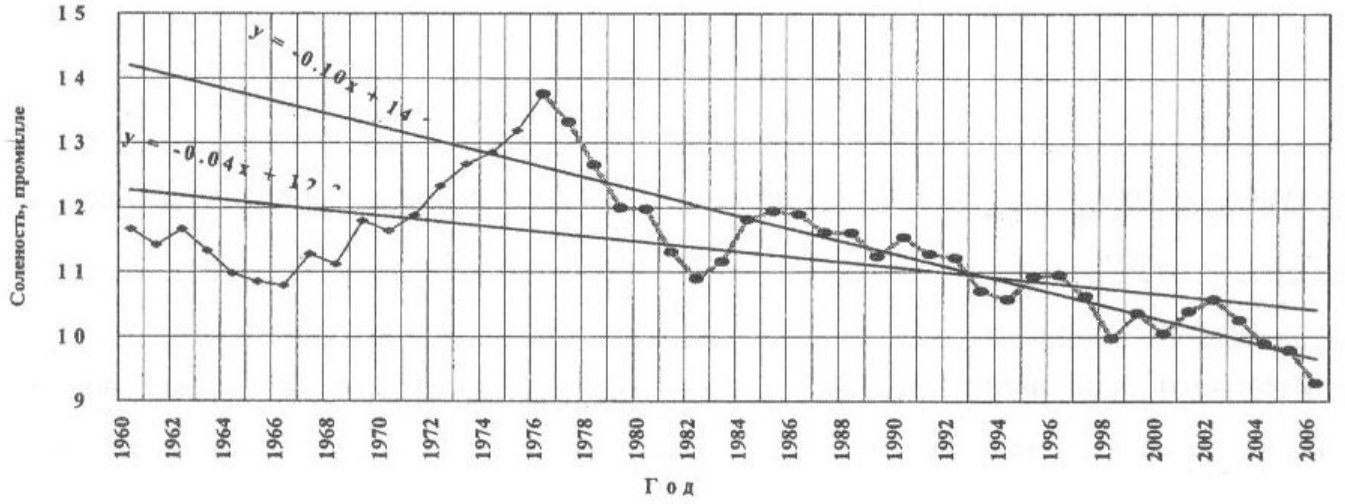
Mean SST for July (upper) and September (lower) in the center of the Sea of Azov (solid line) and in the Taganrog Bay (dashed line)

Сезонные циклы ТПМ Черного моря в целом (черная линия), центра Азовского моря (красная) и Таганрогского залива (синяя)

SST seasonal cycles in the Black Sea (black line), center of the Sea of Azov (red line) and in the Taganrog Bay (blue line)



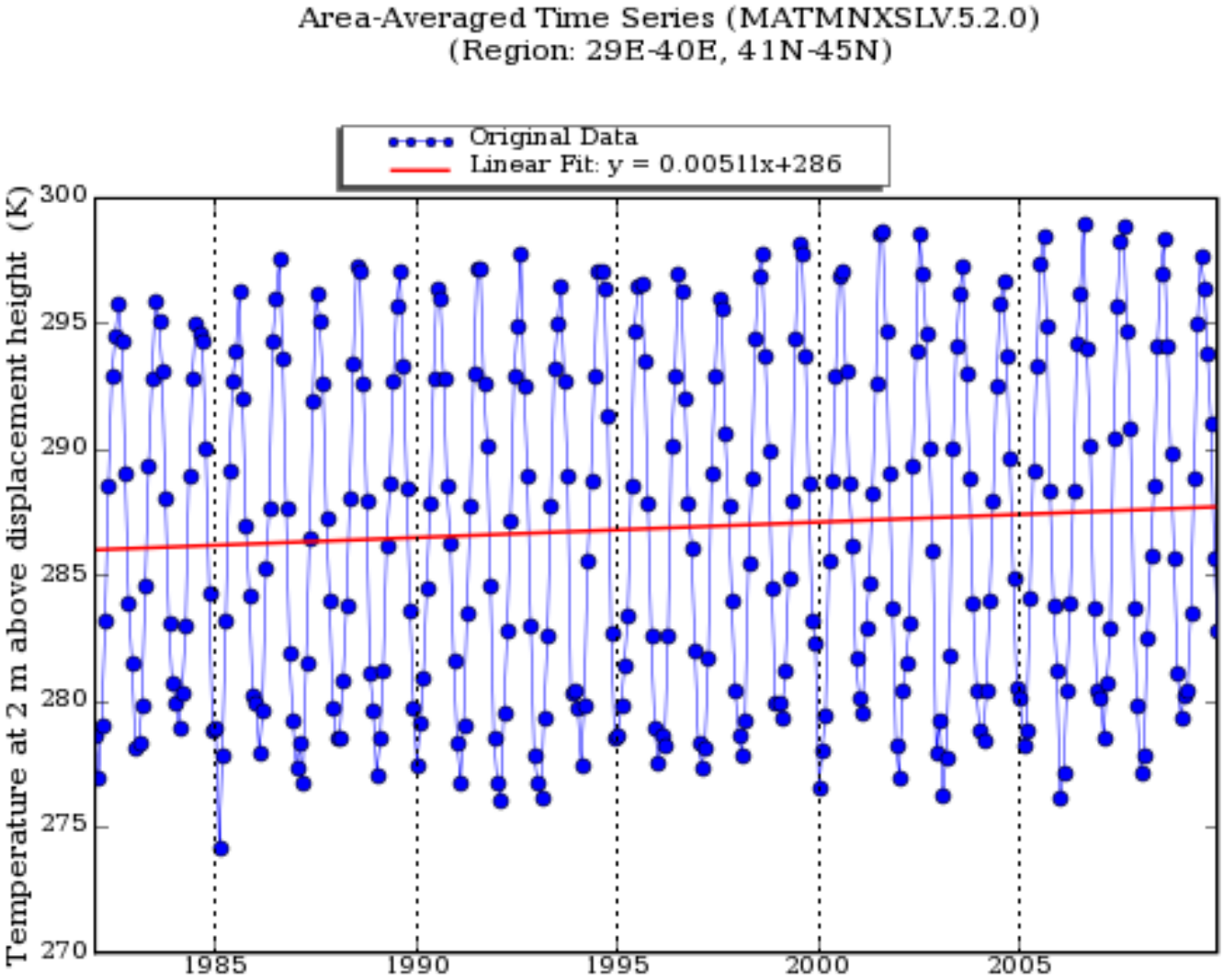




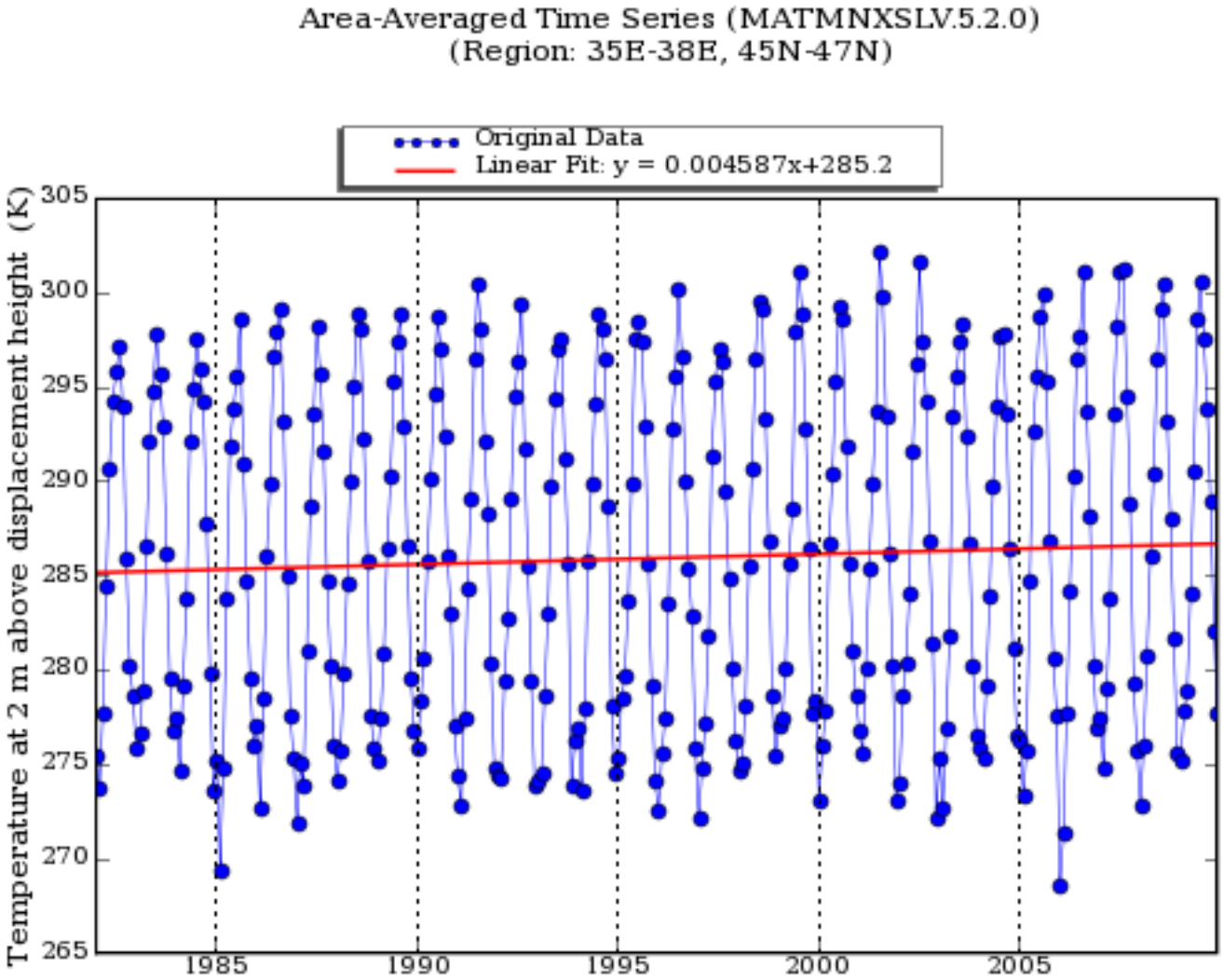
Соленость
Черного (верх) и
Азовского (низ)
Морей

Salinity in the
Black Sea (upper)
and
Sea of Azov (lower)

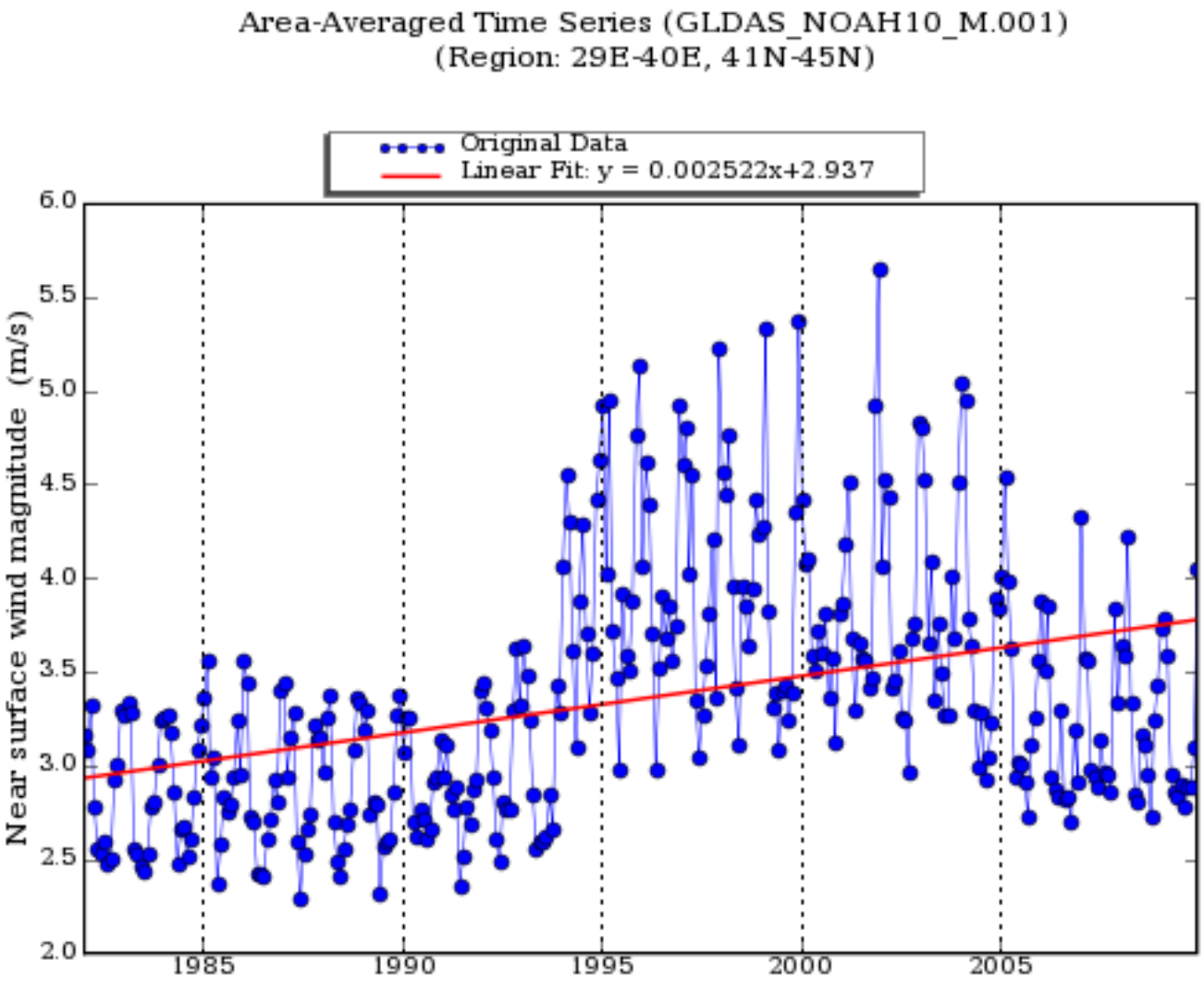
Температура воздуха над Черным морем
Air temperature over the Black Sea



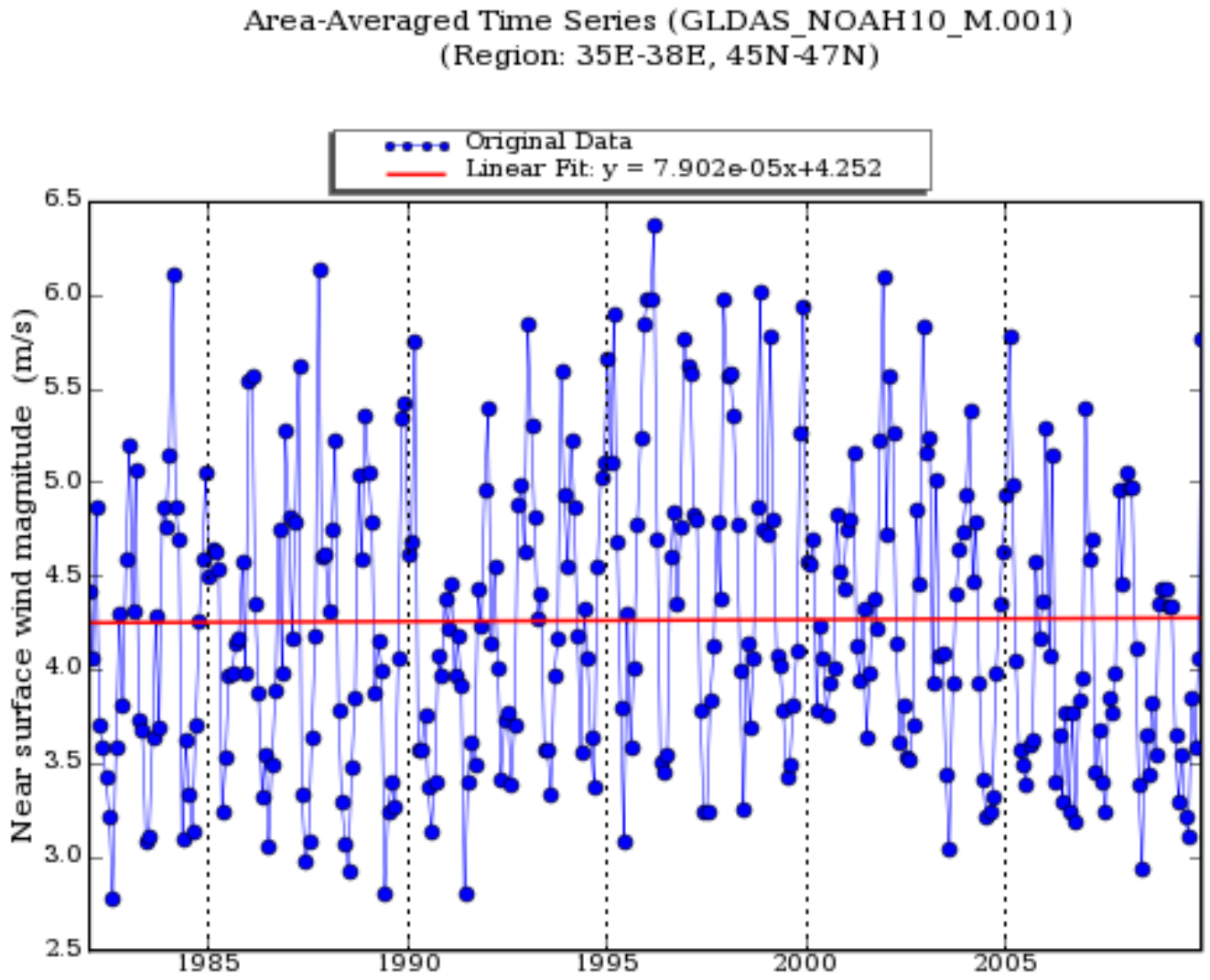
Температура воздуха над Азовским морем
Air temperature over the Sea of Azov



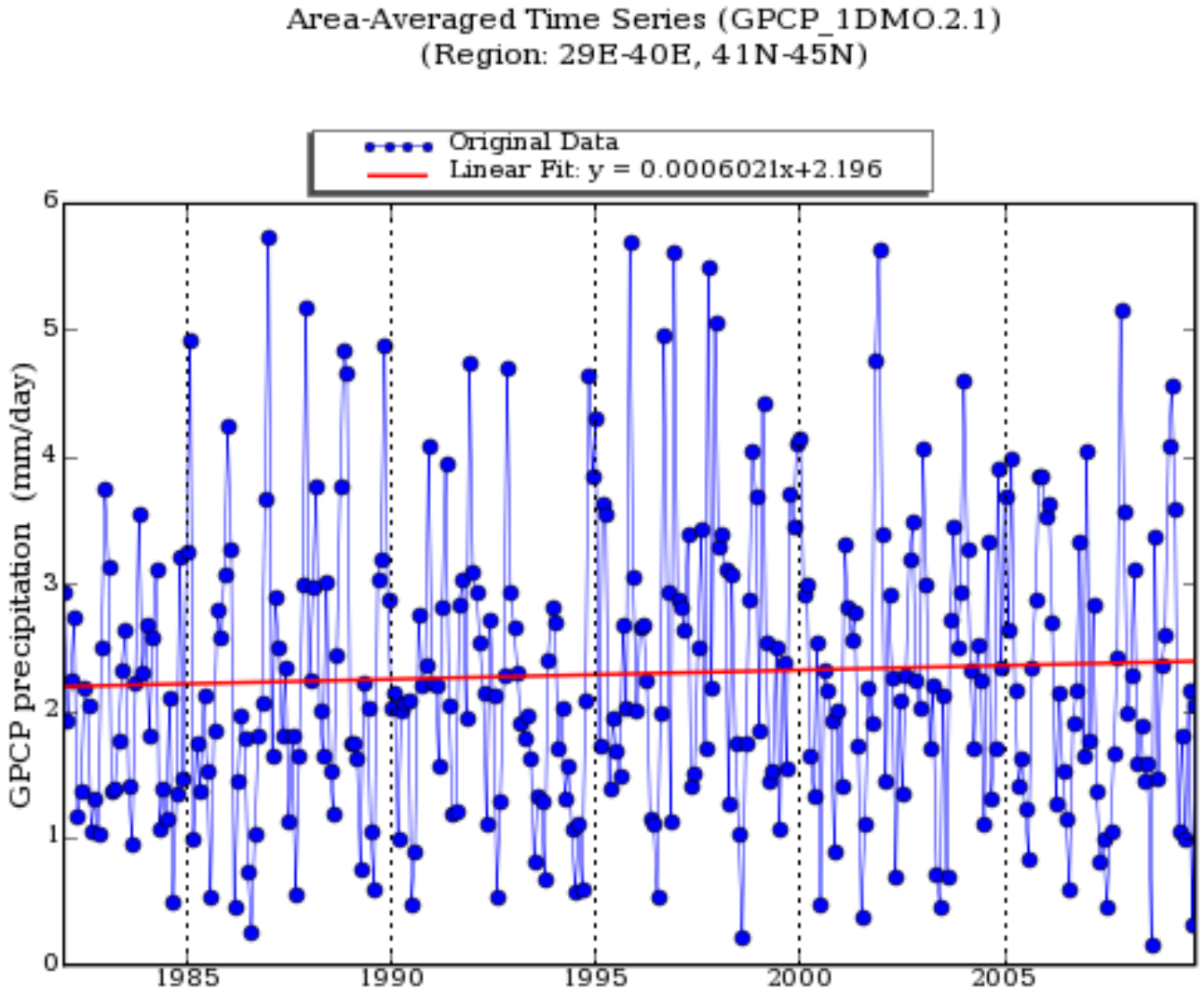
Ветер над Черным морем
Wind speed over the Black Sea



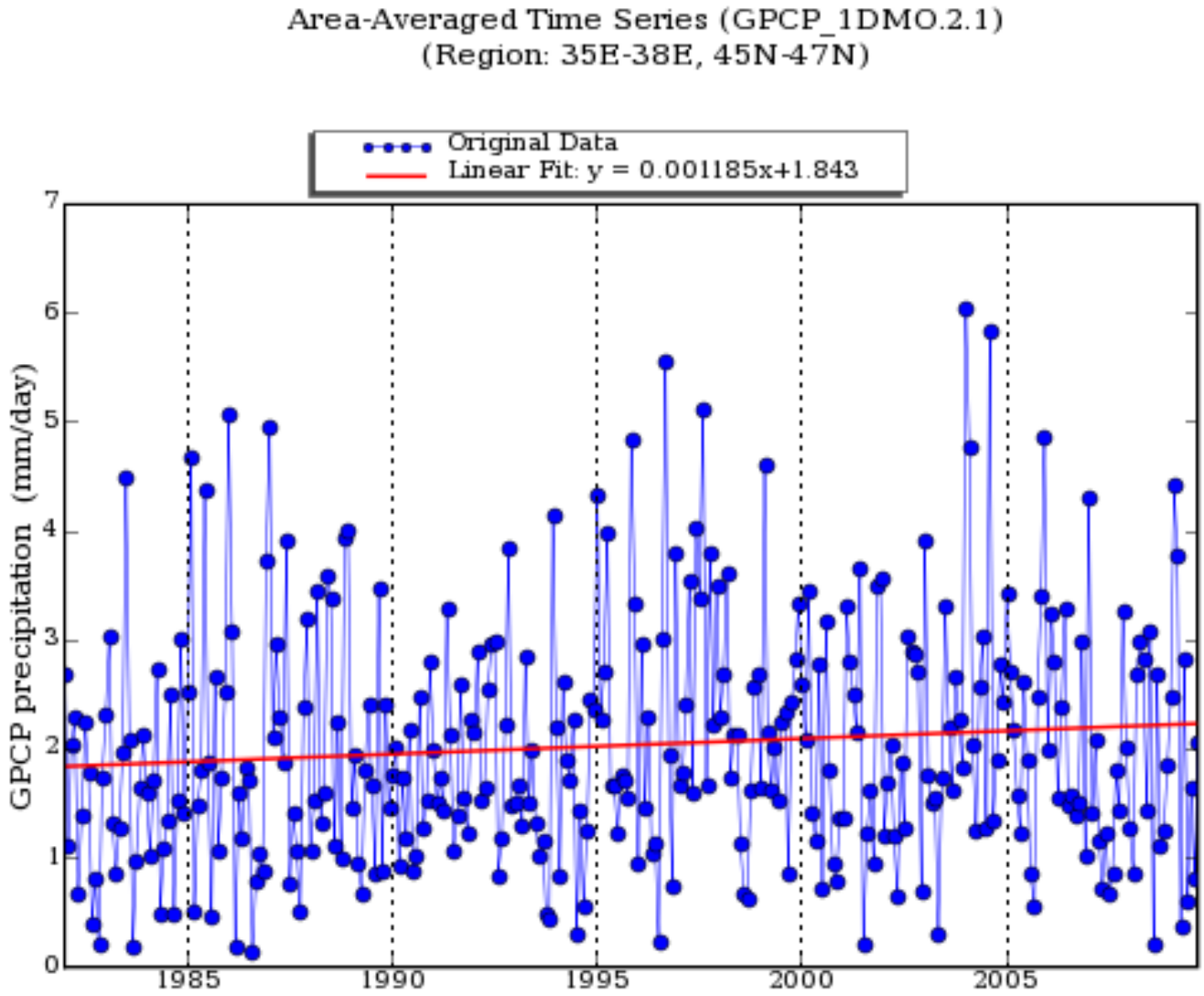
Ветер над Азовским морем
Wind speed over the Sea of Azov

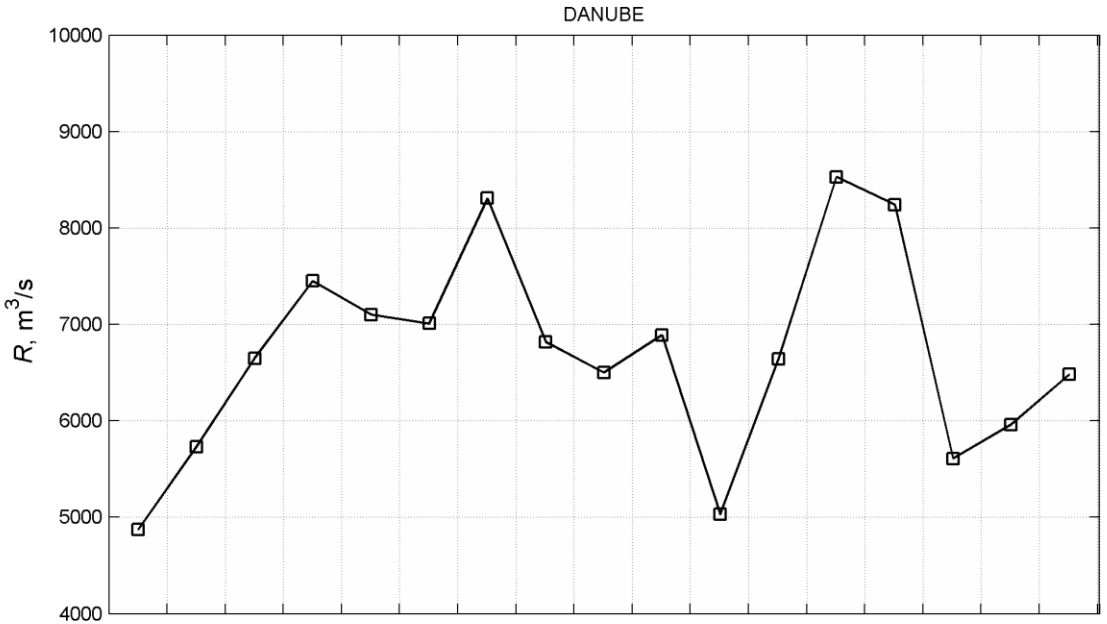


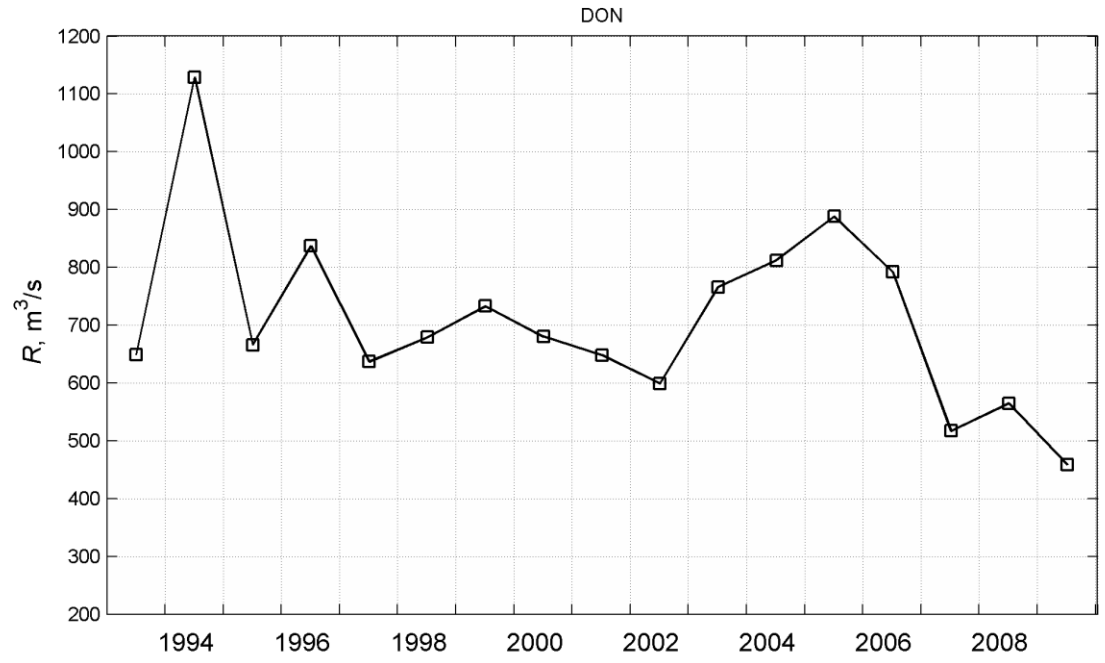
Атмосферные осадки над Черным морем
Atmospheric precipitation over the Black Sea



Атмосферные осадки над Азовским морем
Atmospheric precipitation over the Sea of Azov



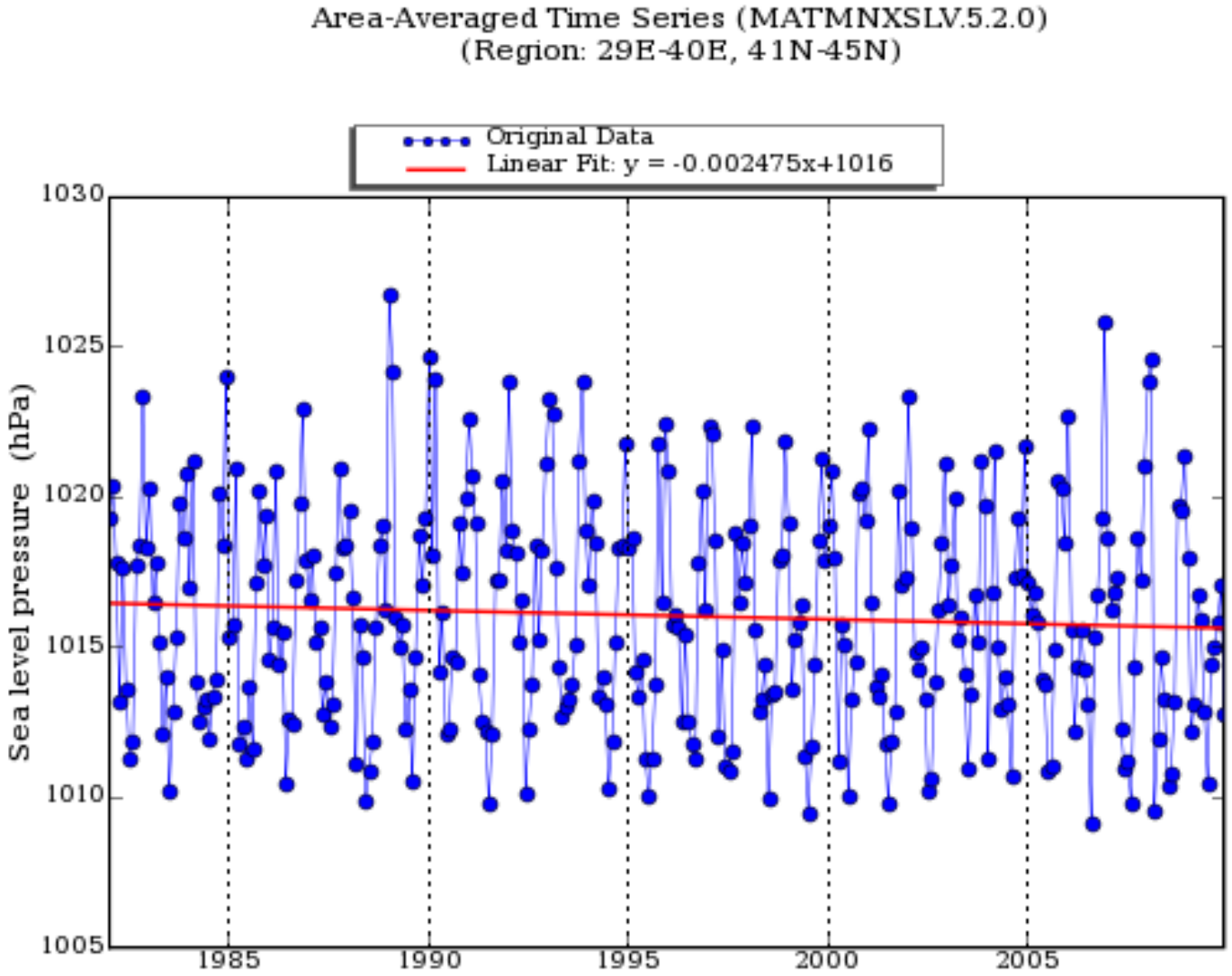




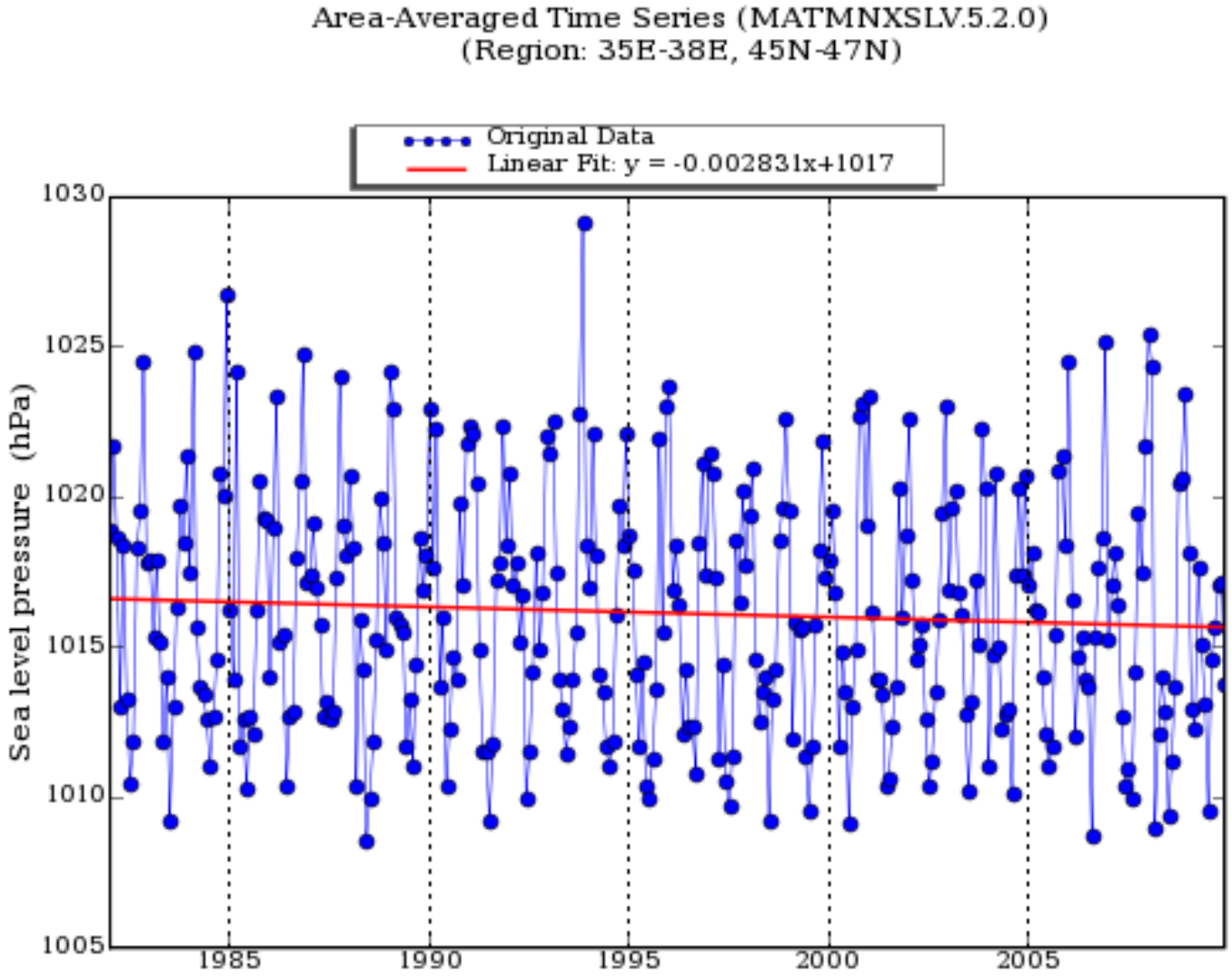
Межгодовая изменчивость расхода рек Дунай и Дон

Interannual Variability of the Danube and Don runoff

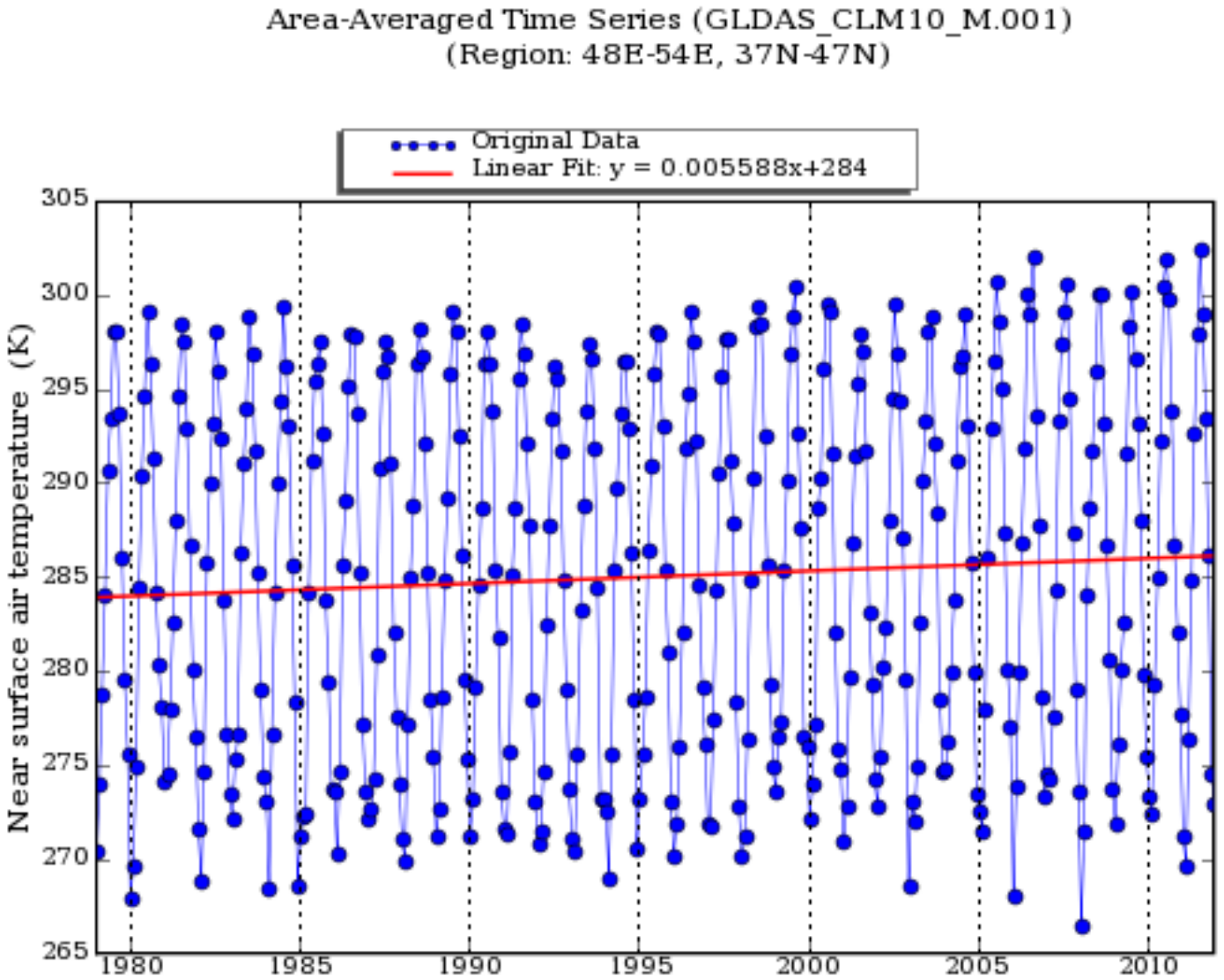
Атмосферное давление над Черным морем
Atmospheric pressure over the Black Sea



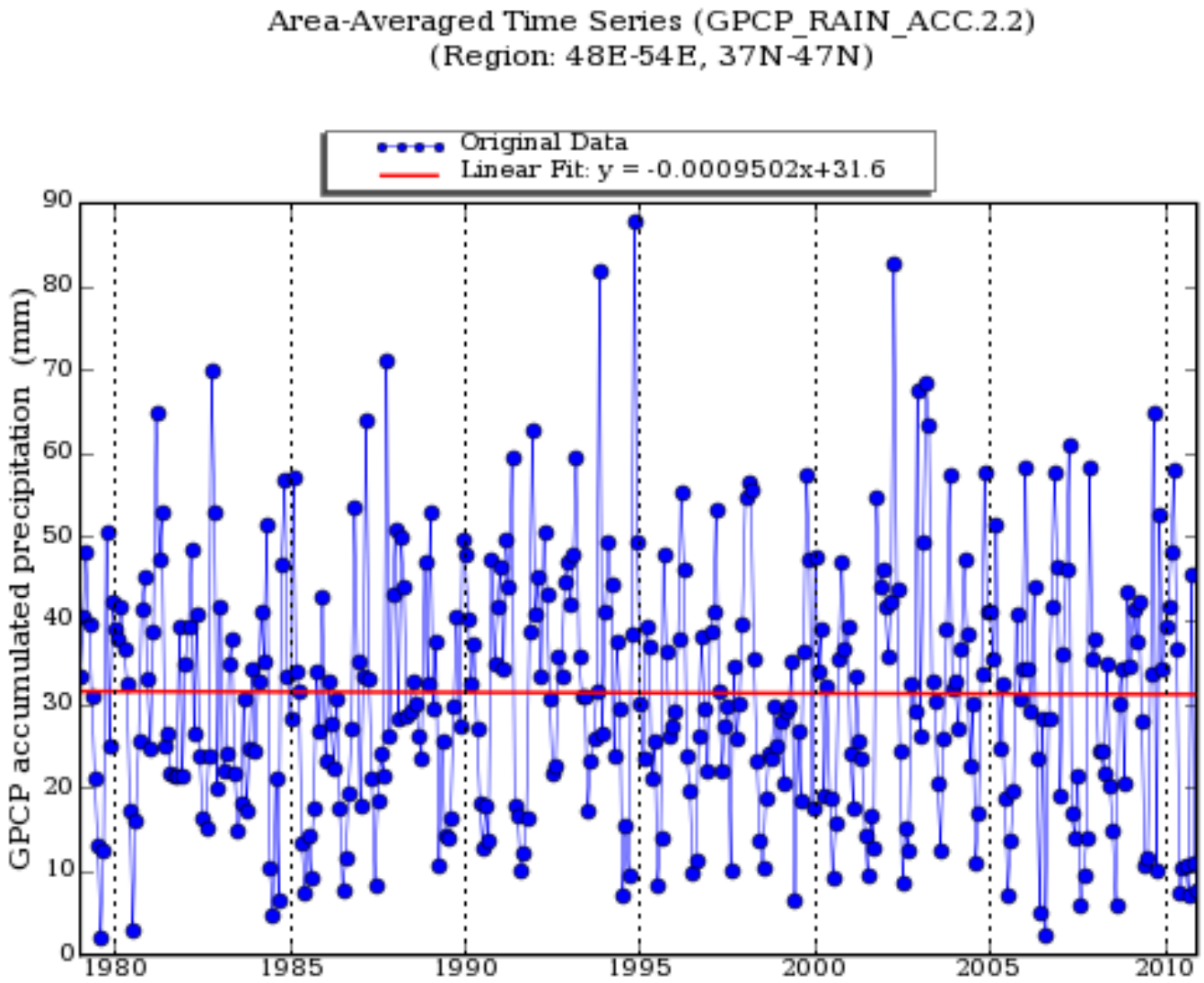
Атмосферное давление над Азовским морем
Atmospheric pressure over the Sea of Azov



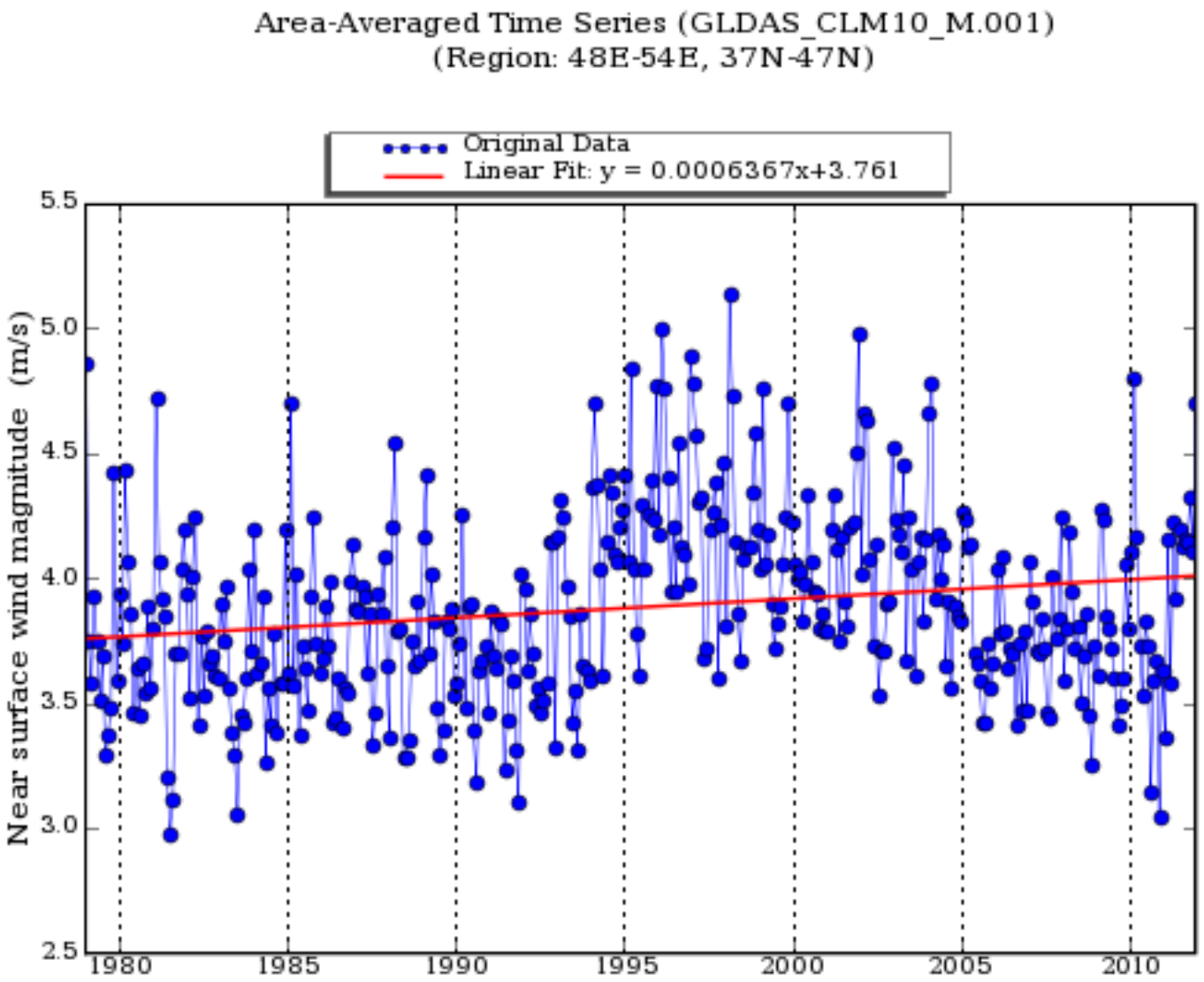
The Caspian Sea Climate Change
Изменчивость климата Каспийского моря
Температура воздуха Air Temperature



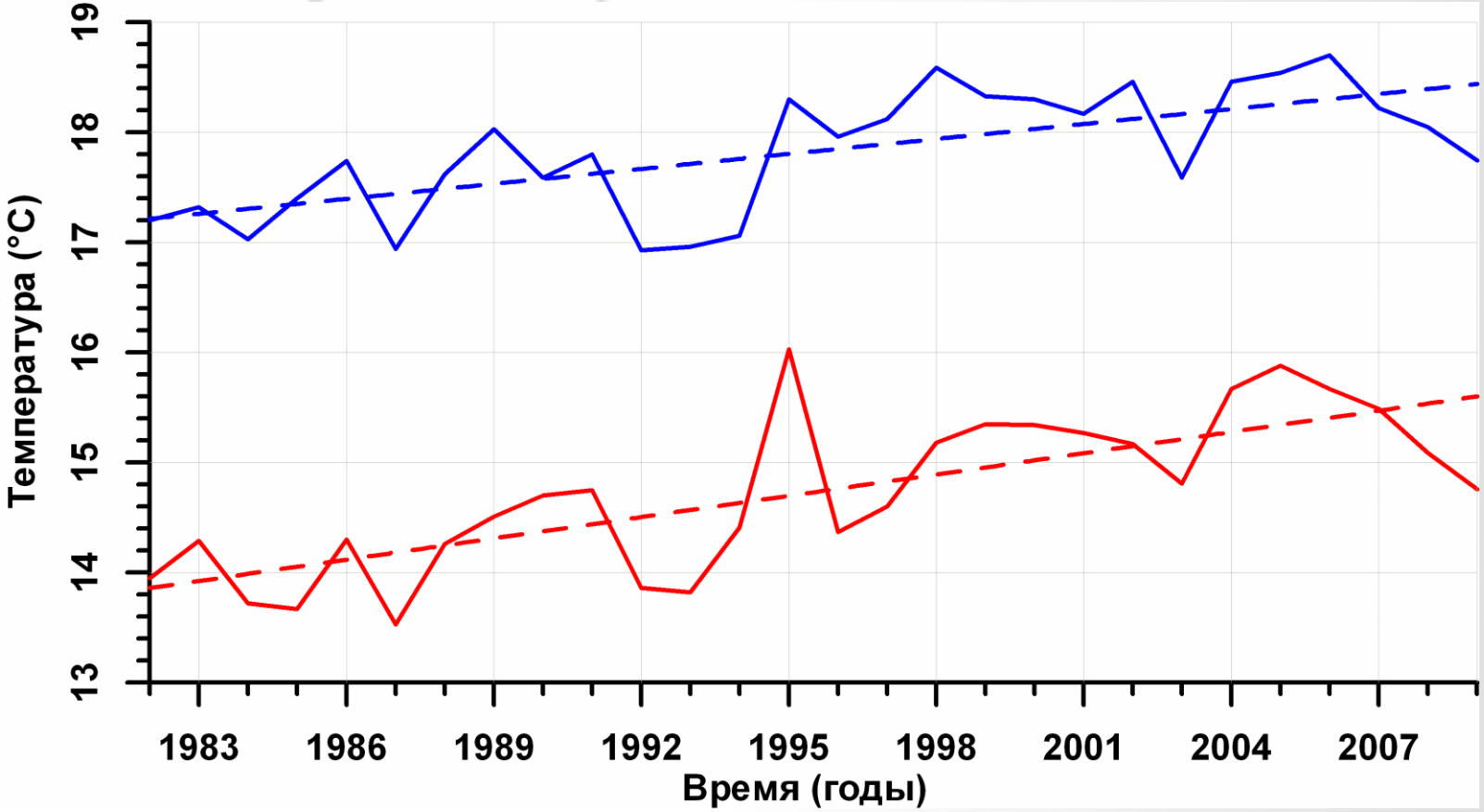
The Caspian Sea Climate Change
Изменчивость климата Каспийского моря
Атмосферные осадки Atm Precipitation



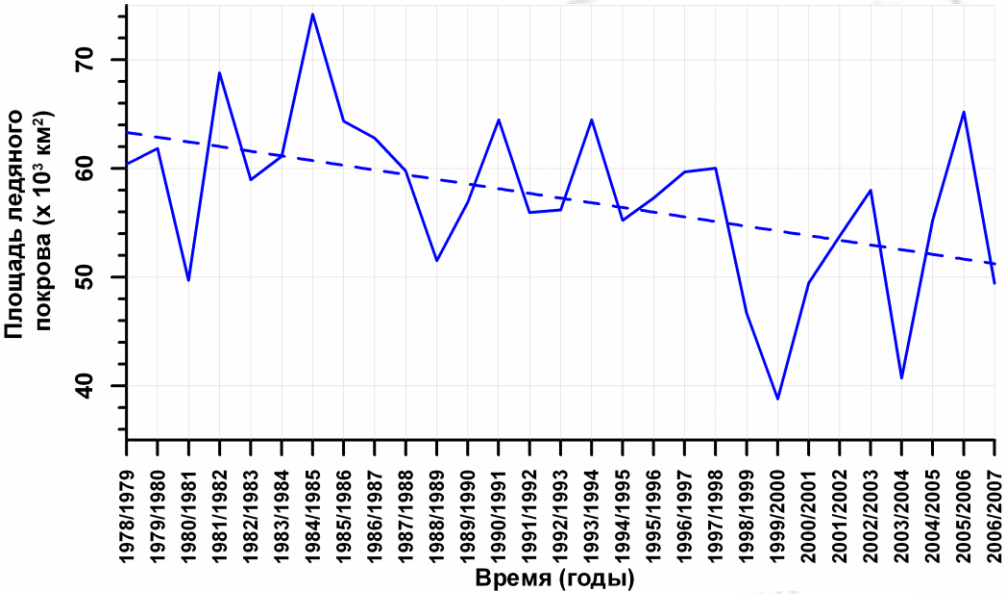
The Caspian Sea Climate Change
Изменчивость климата Каспийского моря
Скорость ветра Wind speed

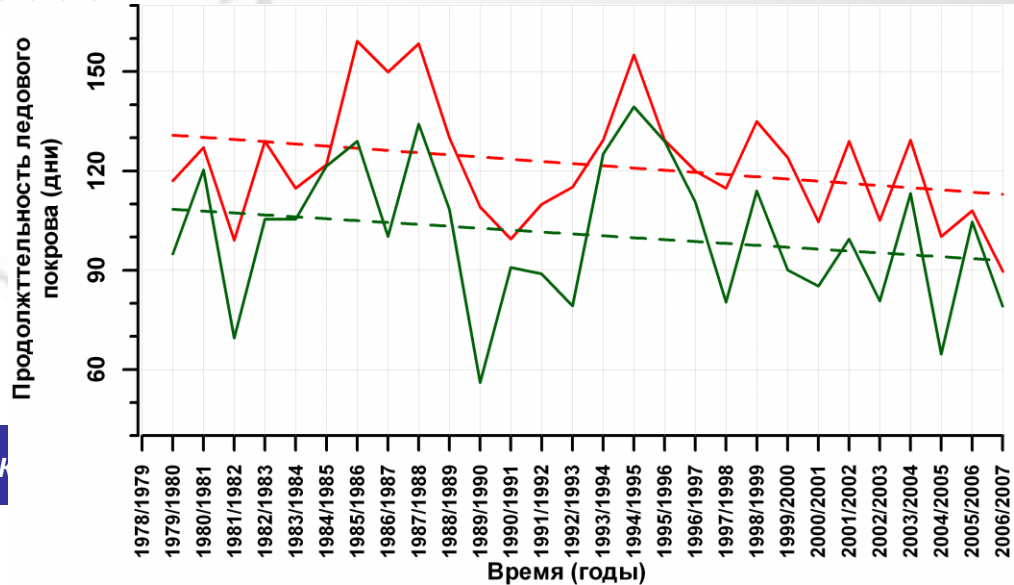


The Caspian Sea Climate Change
Изменчивость климата Каспийского моря
Температура поверхности моря SST
Blue – Southern Caspian
Red – Middle Caspian

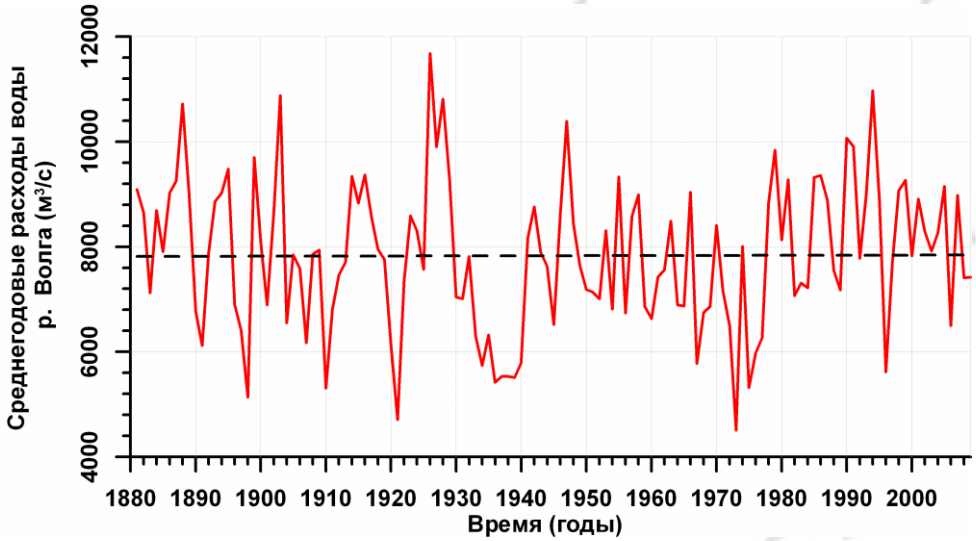


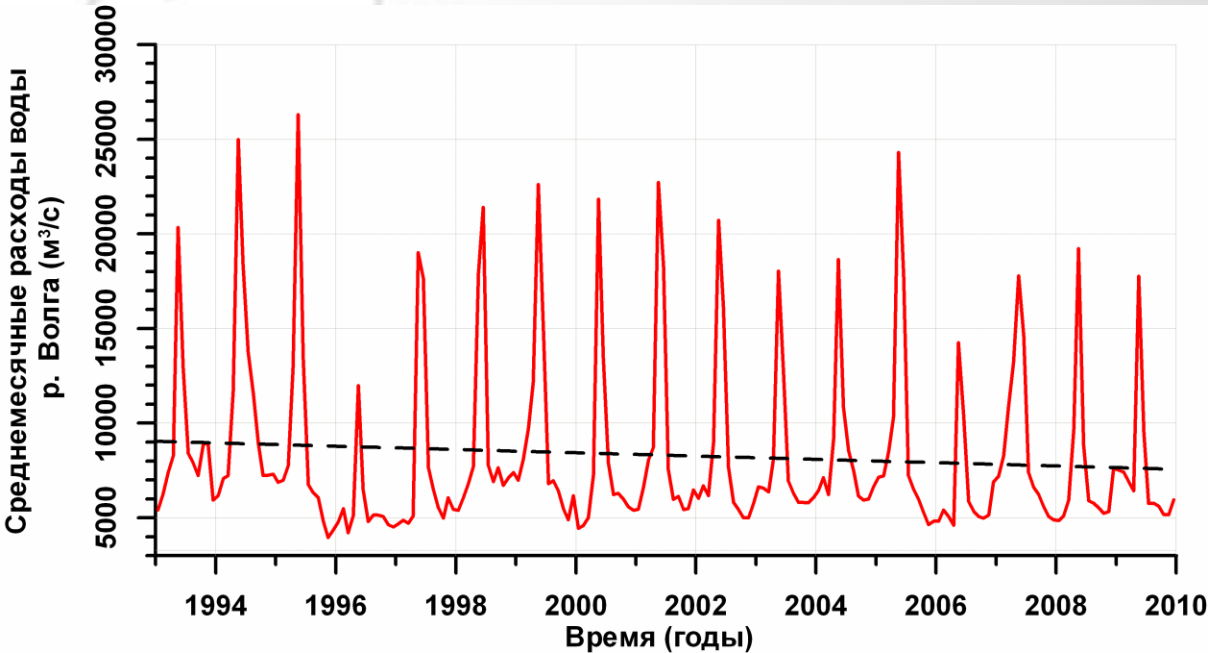
The Caspian Sea Climate Change
Изменчивость климата Каспийского моря
Sea ice cover and ice cover period (1979-2007)



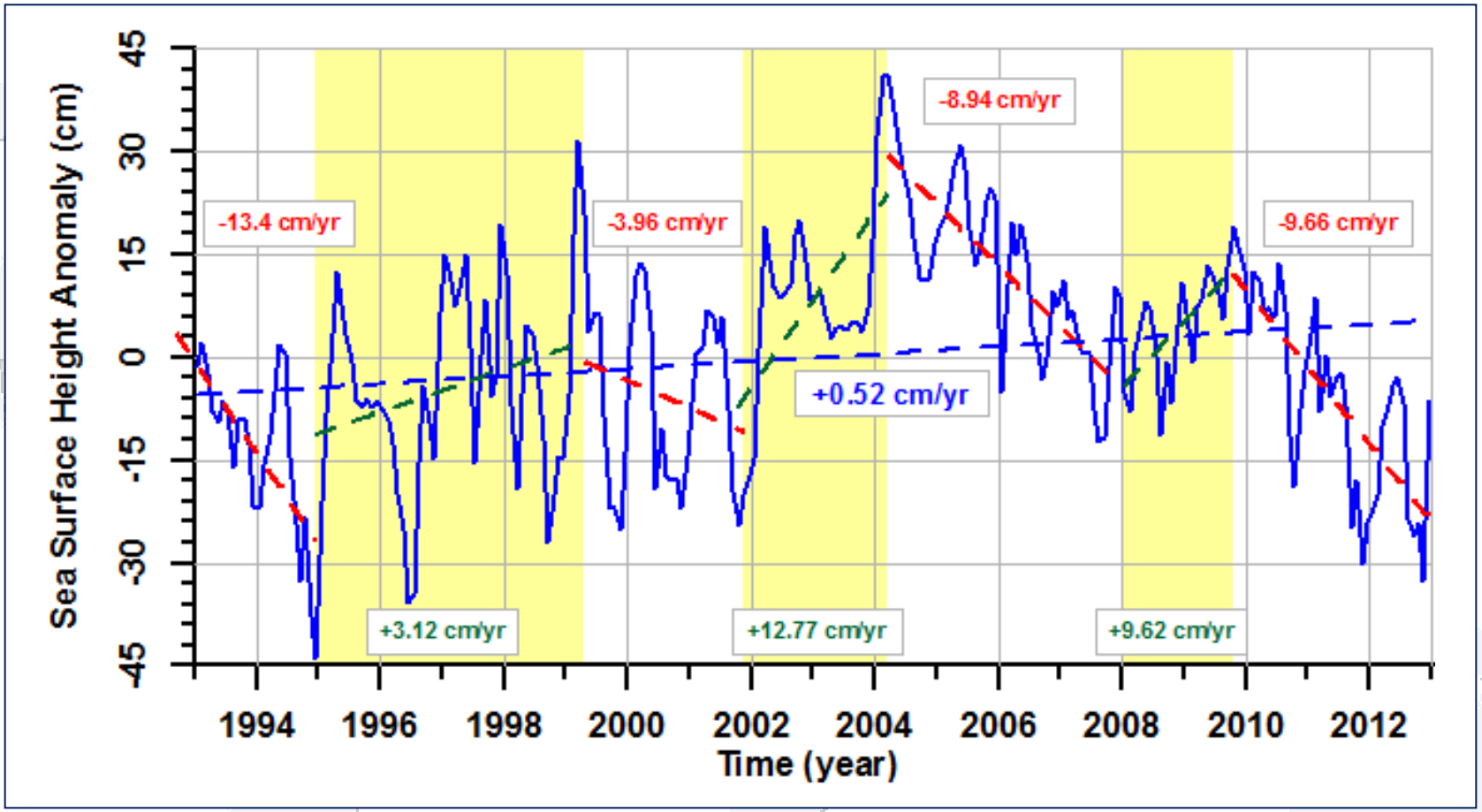


The Caspian Sea Climate Change
Изменчивость климата Каспийского моря
Volga River Runoff 1880-2009 and 1993-2009



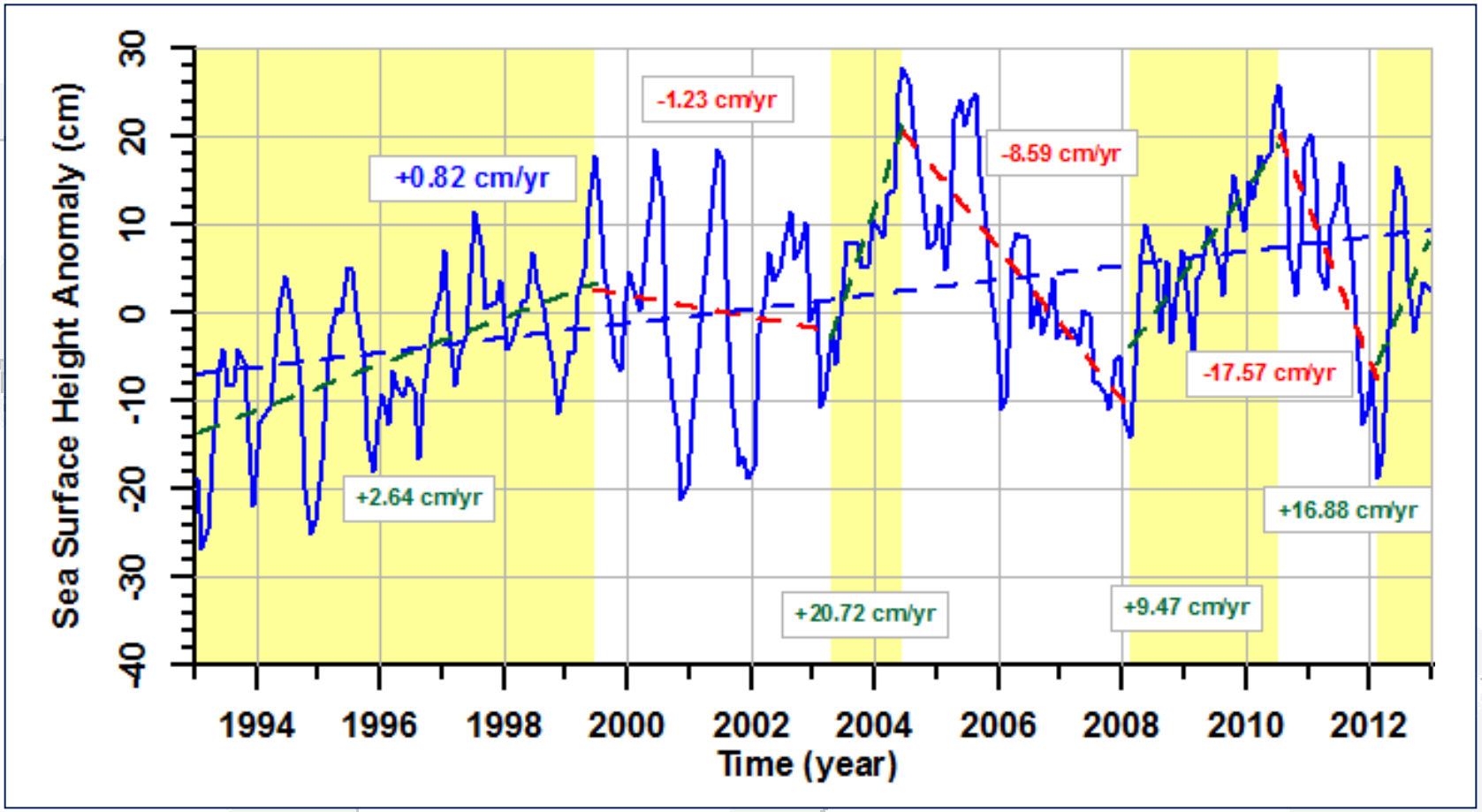


Temporal Variability of the Azov Sea Level



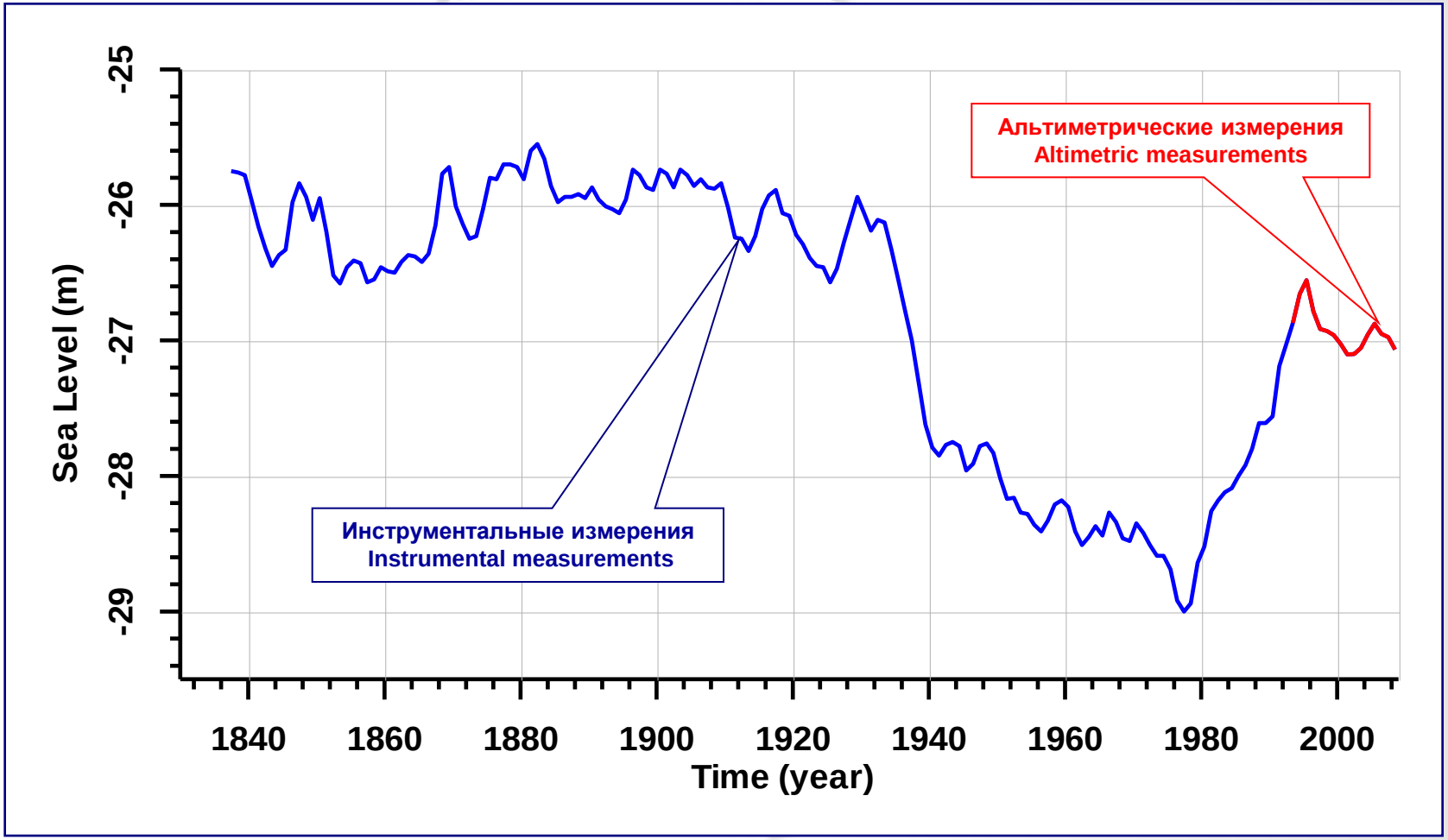
Temporal variability of the Azov Sea surface height anomalies from January 1993 to December 2012 based on the T/P and J1/2 satellite altimetry data (blue line). Interannual linear trends are shown by dotted lines. Periods of raising are shown by yellow color areas.

Temporal Variability of the Black Sea Level

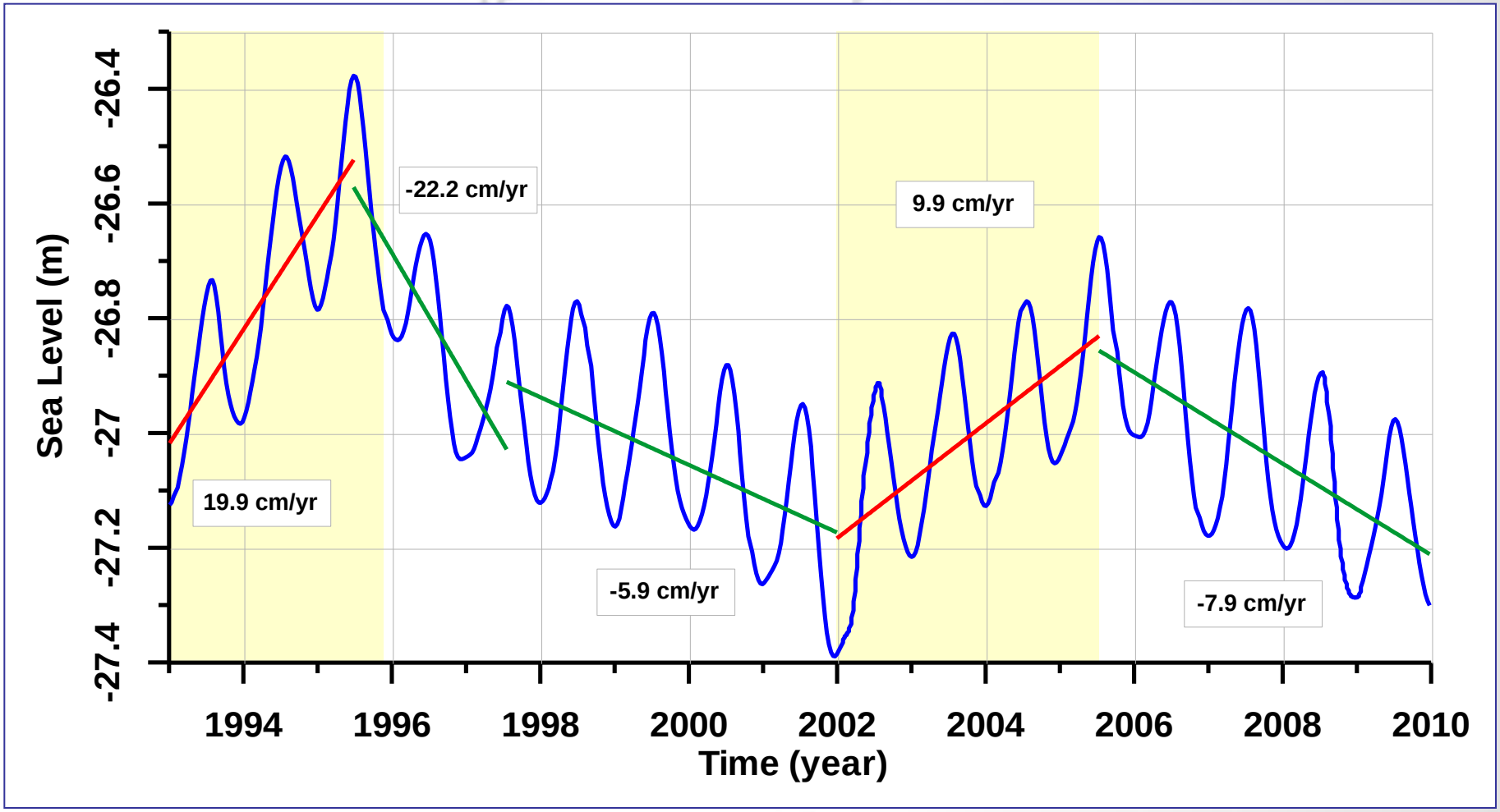
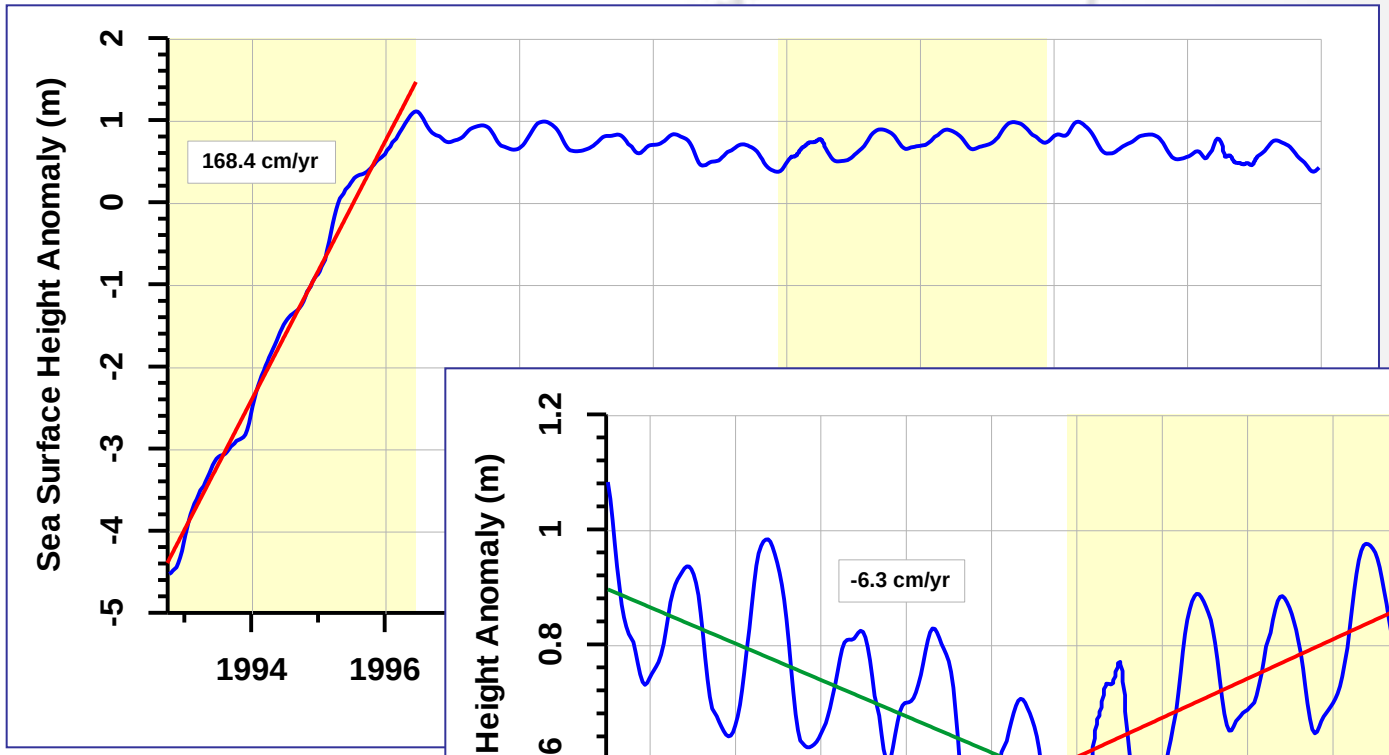
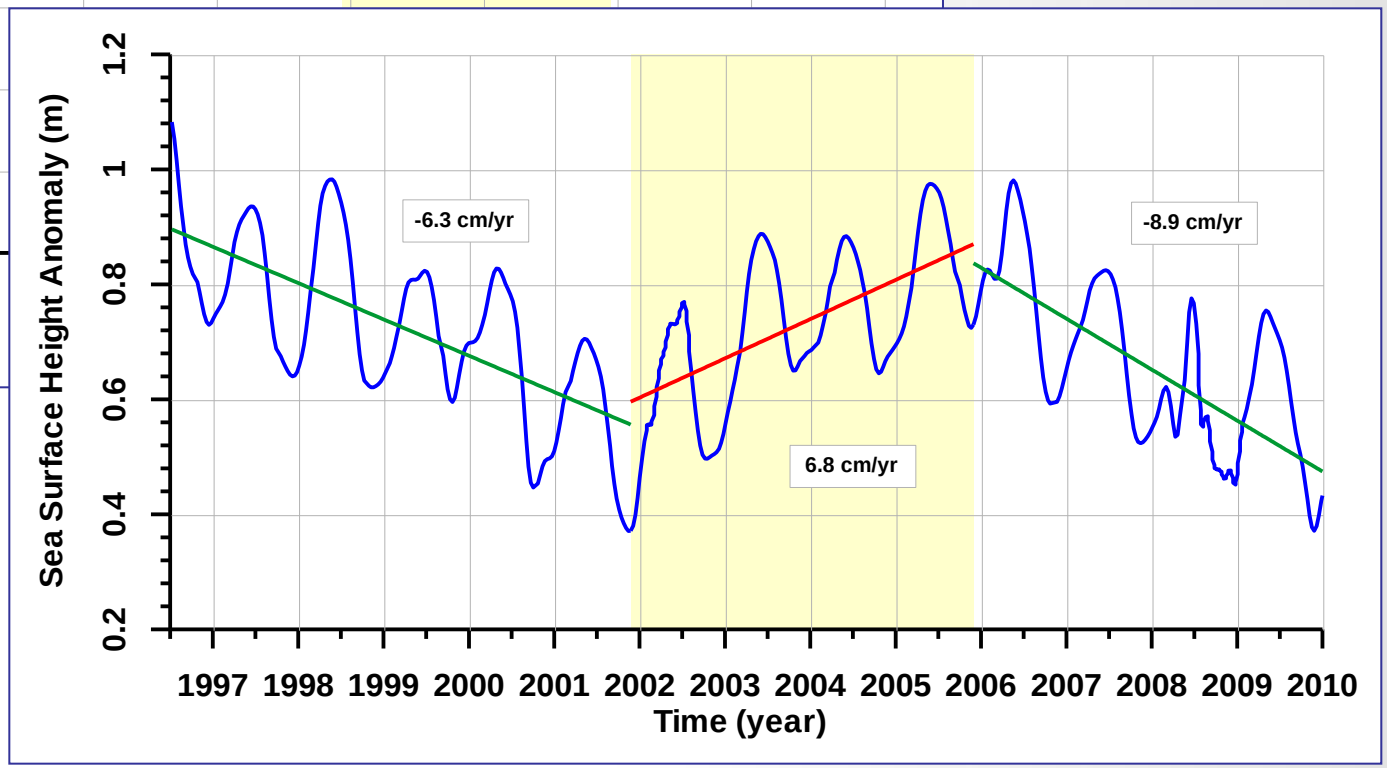


Temporal variability of the Black Sea surface height anomalies from January 1993 to December 2012 based on the T/P and J1/2 satellite altimetry data (blue line). Interannual linear trends are shown by dotted lines. Periods of raising are shown by yellow color areas.

The Caspian Sea Level Variation
Изменчивость уровня Каспийского моря



The Caspian Sea Level Variation
Изменчивость уровня Каспийского моря



Залив Кара-Богаз-Гол • Kara-Bogaz-Gol Bay