Caspian Sea level based on GRACE-FO

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Abstract

The level of the Caspian Sea has decreased by about 13 cm in 2019. In this study, the Caspian Sea level has been studied based on GRACE-FO observations from 2018 to 2021. Its linear trend has been analyzed to examine it more closely. The linear trend is about -8 cm / year.

Keywords: GRACE-FO, Caspian Sea, Caspian Sea level changes, GRACE

Introduction

The level of the Caspian Sea has decreased by about 13 cm in 2019 [1]. This number seems small, but when we compare it with international standards, we realize the critical situation of this sea [2]. In the last 25 years, the level of the Caspian Sea has decreased by about 1.4 meters. Due to the sharp decline in the water level in recent years, the level of the Caspian Sea is even lower than the open waters. The most important reason for the decrease in the water level of the Caspian Sea is the decrease in the inflow of the Volga River and the effect of factors such as increasing temperature on the evaporation level of water is effective. According to statistics, on average, one meter of water in the Caspian Sea is lost annually due to evaporation, which is approximately equivalent to 380 billion cubic meters [3].

In this study, the Caspian Sea level has been studied based on GRACE-FO observations from 2018 to 2021.

Results

Figure 1 shows the changes in the Caspian Sea level based on GRACE-FO observations from 2018 to 2021, in which seasonal changes and a downward trend are observed. As the level of the Caspian Sea gradually decreases.
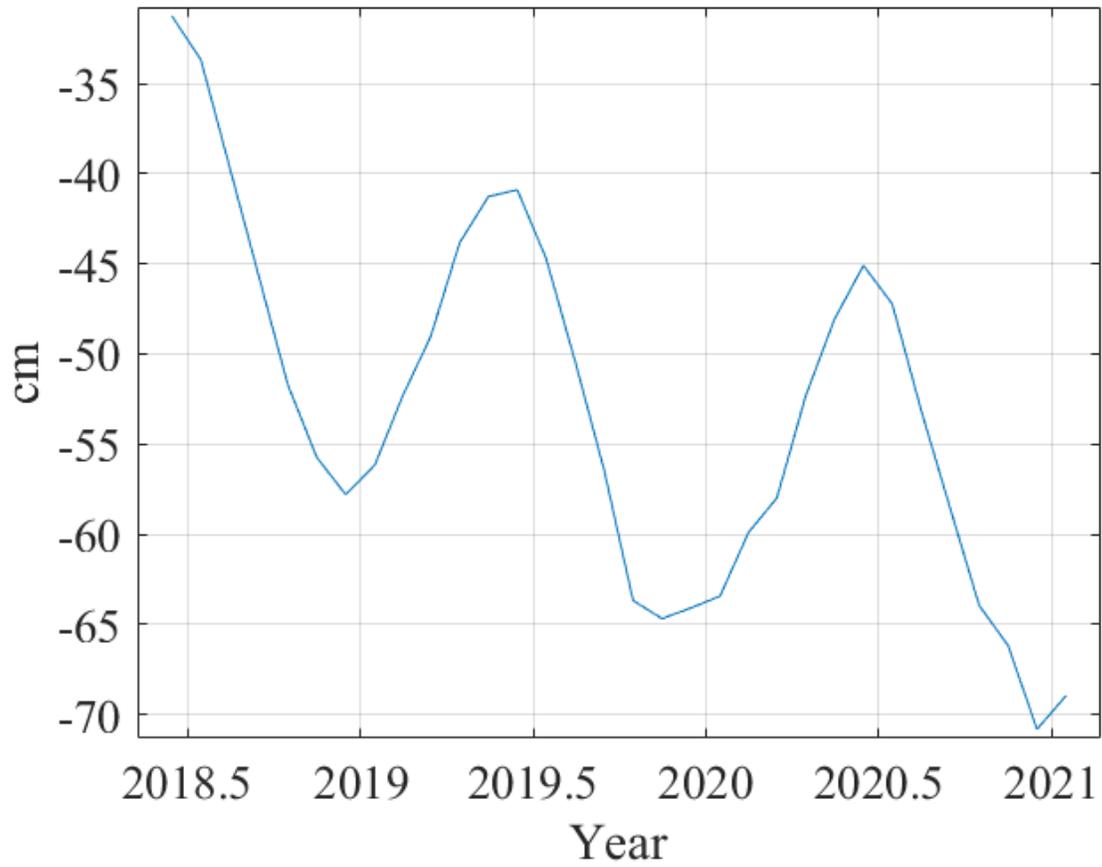
Figure 1 Caspian Sea level changes based on GRACE-FO observations from 2018 to 2021

To examine it more closely, its linear trend is analyzed in Figure 2. The linear trend is about -8 cm / year.
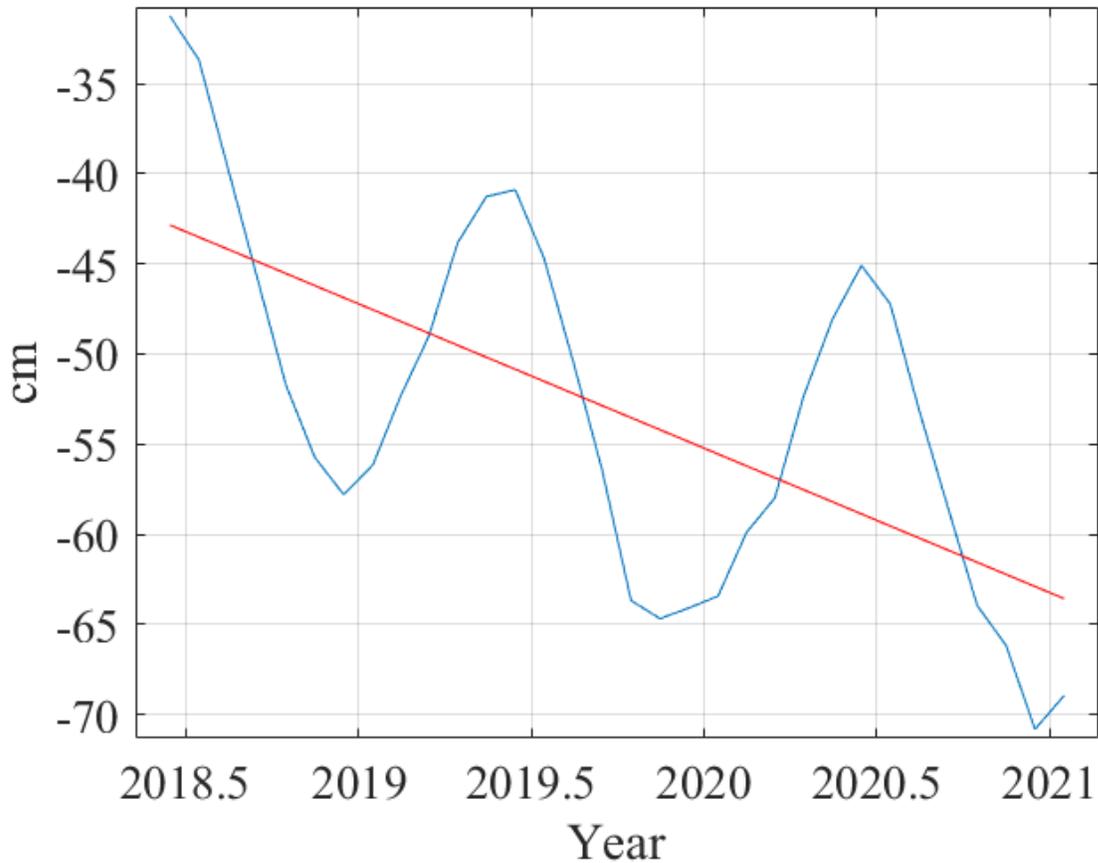
Figure 2 Caspian Sea level linear trend based on GRACE-FO observations from 2018 to 2021

Conclusion

In the Caspian water balance level equation, two factors of sea inputs and outputs must be considered. Currently, the irrigation of rivers and rainfall over the width of the Caspian Sea are the two input factors of this sea. As the statistics show, on average, about 200 mm of rain falls annually on the Caspian Sea, which is not a significant number and does not have much effect on the water balance of the Caspian Sea. What is remarkable about the Caspian Sea is the entrance to the rivers. Currently, 85% of the northern rivers flow into the Caspian Sea, the most important of which is the Volga. For the importance of this river, we should mention that the Volga is the largest catchment area in Europe, the entrance of which has a great impact on the water level of this sea and is responsible for about 80% of the Caspian water supply. Therefore, what happens in the Volga catchment directly affects the Caspian water level. The linear trend is about -8 cm / year, which is higher than the

annual decrease rates in past years. Deep learning can be useful in estimating the level of the Caspian Sea [4-11].

Competing interests:

The authors declare no competing interests.

<div align="center">References</div>

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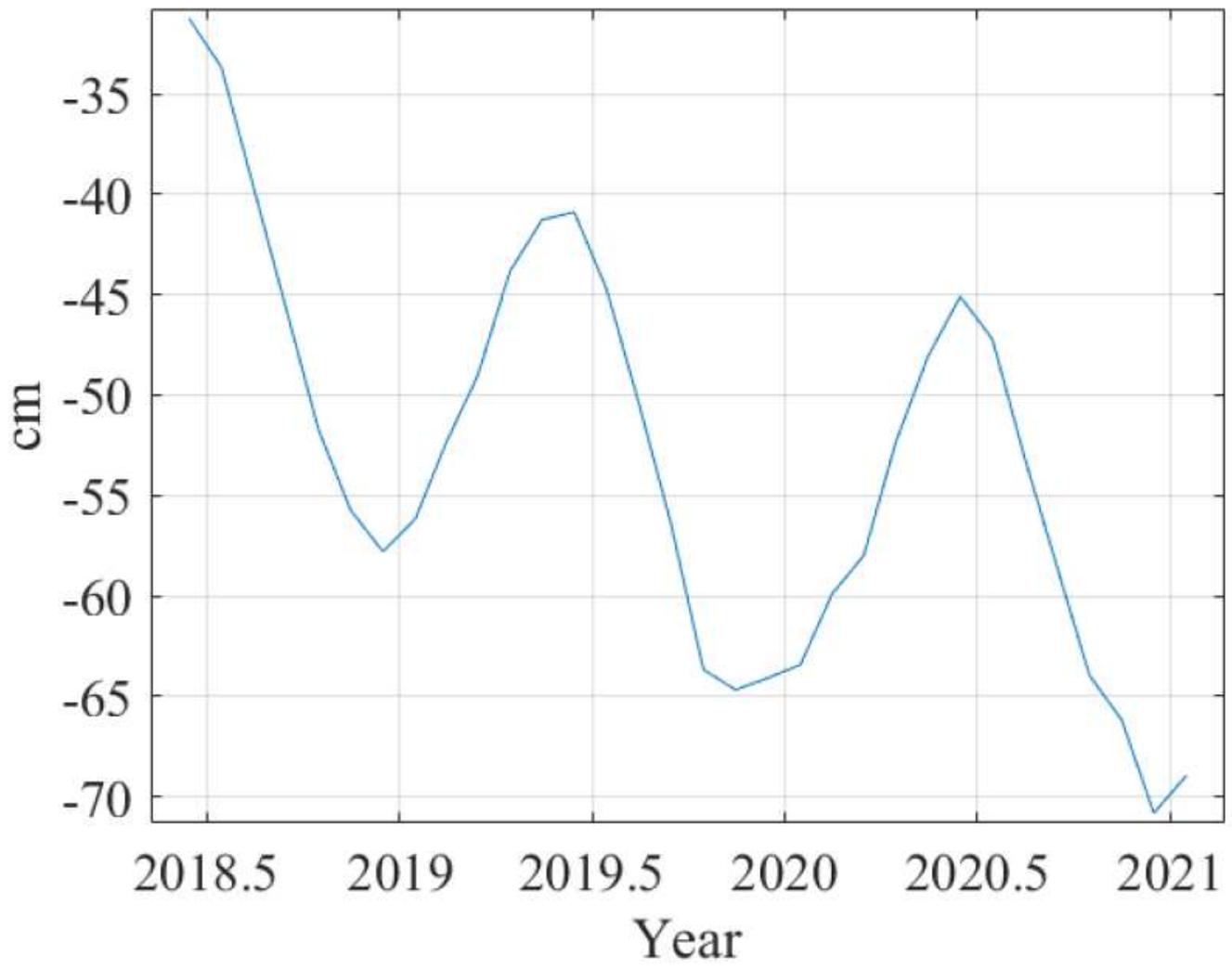
Figures

Figure 1

Caspian Sea level changes based on GRACE-FO observations from 2018 to 2021
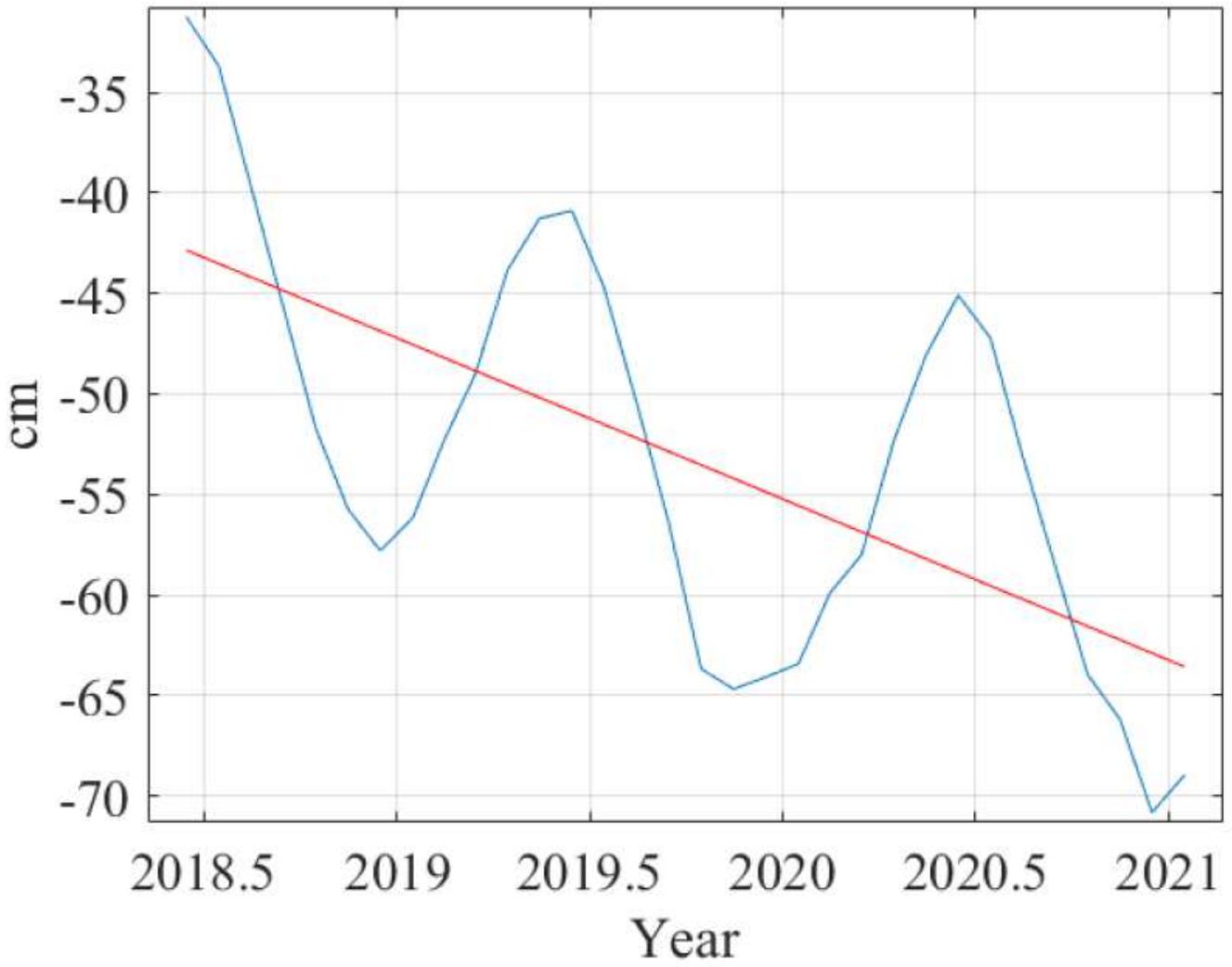
Figure 2

Caspian Sea level linear trend based on GRACE-FO observations from 2018 to 2021