

## ***Interactive comment on “A global perspective on atmospheric blocking using GPS radio occultation – one decade of observations” by Lukas Brunner and Andrea K. Steiner***

### **Anonymous Referee #2**

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#### **General comments**

The paper "A global perspective on atmospheric blocking using GPS radio occultation – one decade of observations" by Brunner and Steiner analyses 10 years of blocking events as detected in GPS Radio Occultation (RO) data. Climatologies of blocking events as detected in RO data and in reanalysis data are studied: frequency as function of longitude and hemisphere, time evolution of blocking, and seasonal characteristics. The impacts of blocking on vertically resolved atmospheric temperature and specific humidity are investigated.

C1

This paper presents an interesting application that utilizes the high vertical resolution of RO measurements - which is a unique feature of RO amongst satellite observation techniques. Global statistical studies of blocking have up to now been using models or reanalyses. Here, it is quite convincingly shown by Brunner and Steiner that RO data can be used as a fully observation-based alternative to the models.

The study seems to be an extension of a previous study by Brunner et al. [Atmos. Chem. Phys., 2016] in which the fundamental blocking detection technique is developed. The new study provides a 10-year climatological view, based on the previously developed techniques.

It is a well-written, clear, and concise report of the work undertaken. It is an interesting example of RO data contributing within a rather mature field of meteorology and atmospheric sciences. And, as also pointed out in the paper, it is a field that recently gained renewed attention due to its coupling to extreme weather, heat waves, etc.

It also seems that the potential shortcomings of the RO method for this particular application (mostly due to a low horizontal resolution due to under-sampling) are pointed out and at least partly explained.

The paper is well suited for publication in AMT.

#### **Specific comments - only minor**

Abstract, line 11: "equator-ward" should be "equatorward". Search for these, there are several of them in the text. Also "pole-ward" which should be "poleward".

C2

Abstract, line 12: "anti-cyclonic" should be "anticyclonic". Search for this throughout the text.

Section 2.1: Which RO missions are included in the analysis? I don't find that information in this section. Perhaps it is found in one of the references.

Section 4.1: A specific day and grid cell is defined as either blocked (if certain conditions described in Section 3.1 are met) or not blocked. If I understand it right, Figure 1 shows the overall frequency of blocking (i.e,  $N_{\text{blocked}}/N_{\text{total}}$ ) for the whole 10-year period. What does "annual" blocking frequency mean in this context? I assume it means that data from all seasons are included, but to me "annual" indicates that data are separated into years.

Section 4.1, line 29: what does "one-dimensional" blocking frequency mean?

References, line 19, Brunner and Steiner: "amtospheric" should be "atmospheric"

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