



## How do I determine the total observing time for my solar proposal?

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Please note first the limitations of ALMA observations:

1. The longest duration of one scheduling block (SB) is 2 hours.
2. Every SB includes a calibration session before starting scientific observation. The duration of the session is 25~30 minutes. Therefore, the maximum of on-source (solar observation) in a SB is about 1.5 hours.
3. Solar proposals are considered 'Regular Proposal' and total observing time is therefore less than 50 hours. When you determine the total observing time for your project

Subsequent to the above, the total observing time of a solar project must be determined from the scientific point of view. For example, if your target phenomenon is present always in the Sun, the total observing time might be based on the lifetime of the target phenomenon. On the other hand, if your target phenomenon is not always present, the total observing time might be determined based on the occurrence frequency of your target phenomenon.

As an example, we consider a hypothetical proposal to detect oscillations in the umbra with ALMA. Since umbra oscillations always exist in a sunspot, we consider the total observing time based on the period of the oscillation. Reznikova et al. (2012) reported that the frequency of the oscillation on the umbra observed with 17GHz was 6~7 mHz (~3 minutes). Here, we assume that we need to observe 100 periods of the oscillation for achieving our scientific goal. Hence, the required on-source time becomes 5 hours. As mention above, the duration of one SB is limited to 2 hours and the on-source time in one SB is 1.5 hours. Therefore, we need to carry out three 2-hours SBs and one 1-hour SB . Finally, the required total observing time for the proposal is estimated at 7 hours.