The Sky Distribution of VLT Observations

The sky is not all the same. Observers have favorite regions where most telescope time is spent while others are apparently ignored. To quantify this predilection we constructed an all-sky distribution of VLT pointings and found the existence of a well defined unpopular region, a ~20° band above and below the Galactic plane, where the VLT rarely spends any time.

João Alves and Marco Lombardi
VISAS, ESO

It comes as no surprise that observers have favorite target regions in the sky. A simple classification of observers as extragalactic, galactic, or solar system observers implies immediately a clear division of regions of interest. Even within each of these classes of observers one can expect preferences towards well known targets, or targets involving multi-observatory international projects. This can be clearly seen in Figure 1 where we present an all-sky map of VLT pointings for Service Mode runs during 2 years (Periods 68 to 71), in an Equatorial Aitoff equal-area projection. Greyscale intensity in this map is proportional to observing time and does not represent sky coverage, which is much less than at first suggested in this representation. As expected, the distribution is far from uniform. There are several interesting features in this map worth a more thorough analysis but perhaps the most striking of all is the well defined unpopular region, roughly characterized as a ~20° band above and below the Galactic plane, where the VLT rarely spends any time. A possible reason for this "void" is that extragalactic observers do not venture too close to the Galaxy (interstellar dust extinction fear comes to mind), while galactic observers prefer to stay close to the galactic plane (note in Figure 1 the string of observations along the Galactic plane, especially towards the inner Galaxy). We present in Figure 2 the same data as in Figure 1 but binned into Right Ascension bins of 2h (about a month per bin; October~0h bin, April~12h bin).

Opportunity

For the telescope scheduler, favorite sky regions mean higher demand for observation time at certain parts of the year, i.e., increased competition for specific Right Ascensions. For example, there is only a limited number of photometric dark nights in April (a particularly popular month) which is on average 10 times less than the total requested by observers. A direct consequence of this is that only the top OPC ranked programs can make it to the telescopes during April's dark time. On the other hand, the opposite is true for January and August. The time request for targets in these months is very low, allowing almost all programs applying for time at these RAs, and considered at least useful by the OPC, to be scheduled.

While an accurate knowledge of the distribution of favorite sky regions helps the observatory in optimizing short and long term scheduling of observations and engineering activities, this optimization can only go so far when the demand for time is as nonuniform as in Figure 2. As a consequence, a genuine scheduling opportunity exists for observers ready to find targets in the less visited areas of the sky. Observers: check your catalogs and you might be in for a treat.

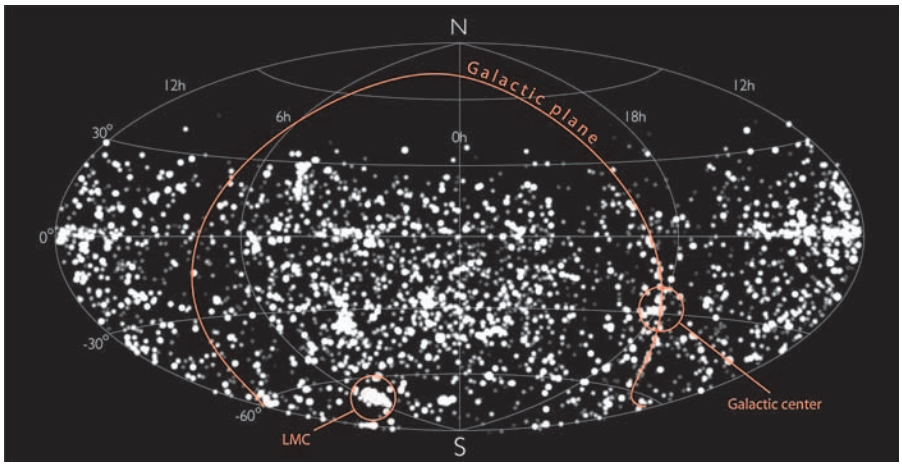

Figure 1: All-sky map of VLT pointings for Service Mode runs during 2 years (Periods 68 to 71) in an Equatorial Aitoff equal-area projection. Greyscale intensity is proportional to observing time. Sky coverage is much less than suggested in this representation. The Galactic plane and several popular targets are indicated. Note the unpopular voids above and below the Galactic plane.

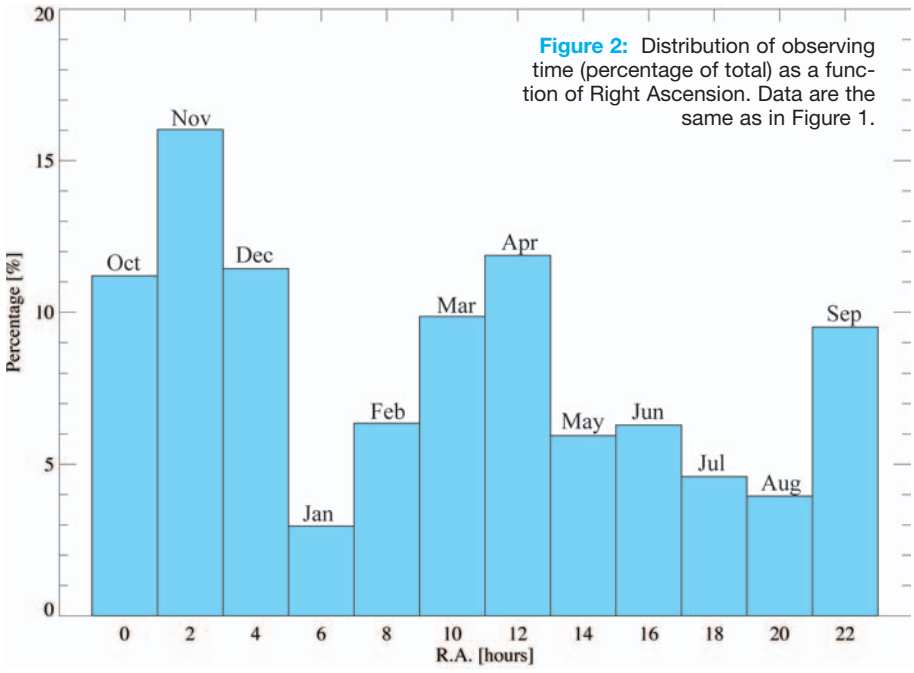

Figure 2: Distribution of observing time (percentage of total) as a function of Right Ascension. Data are the same as in Figure 1.