

MEMORANDUM

To: Dan Fabricant

From: Warren Brown

Date: 23 May 2002

Subject: Binospec Thermal Analysis I: MMT & 48in Dome Temperatures

1. INTRODUCTION

This is the first of a series of memos describing a detailed thermal analysis of Binospec I performed with David Boyd and Dan Fabricant. This memo presents dome temperatures measured at the MMT and the FLWO 48 inch telescopes. The telescope dome temperatures are used as the boundary conditions for the Binospec thermal models.

1.1. Online Data

The MMT and 48 inch dome temperature data is available as a tab-separated ASCII table in instrument database document **#395**, titled “MMT Dome Temperatures.” The date columns are in units of days. The temperature columns are in units of degrees Celcius. The original telescope data had 5 minute time resolution; the online data is averaged to an hour timescale for practical use.

2. MMT DOME TEMPERATURES

The MMT dome temperatures were recorded in May 2001 and provided by Steve West. The “dome temperature” is the average of four ambient air temperatures measured by thermocouples around the MMT mirror cell periphery. The MMT dome temperatures are plotted in Figure 1.

The MMT dome temperatures are discontinuous because the MMT temperature logger only runs when the cell electronics are on. The cell electronics are on during observing at night, and only occasionally are turned on in the day for engineering. I approximate day time temperatures in the Binospec thermal models by linearly interpolating morning and evening temperatures.

“Typical” MMT dome temperature variations are $\pm 3^{\circ}\text{C}$ over 24 hours. “Extreme” temperature variations are $\pm 10^{\circ}\text{C}$ over 8 hours (see Figure 1).

3. FLWO 48 INCH DOME TEMPERATURES

The FLWO 48 inch dome temperatures were recorded in October 2000 and provided by Emilio Falco. The “dome temperature” is the ambient dome air temperature measured by a thermocouple hanging off of the 48 inch secondary. The 48 inch dome temperatures are plotted in Figure 2.

In contrast to the MMT data, the 48 inch dome temperatures are continuous for a month. Note the more extreme 10 - 15° C variations experienced in the 48 inch dome every 12 hours (see Figure 2).

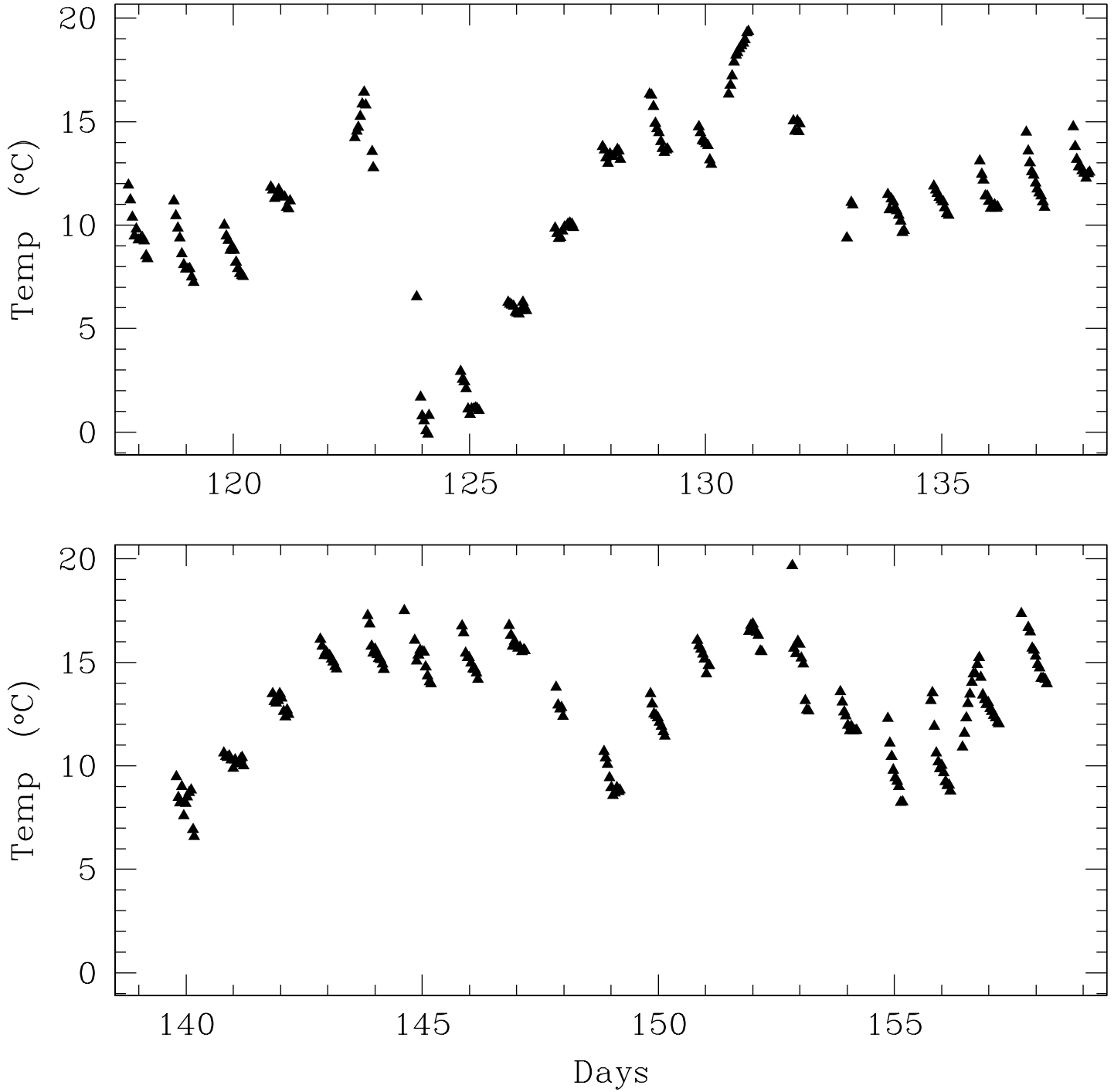


Fig. 1.— MMT dome temperatures for the period April 27 - June 6, 2001.

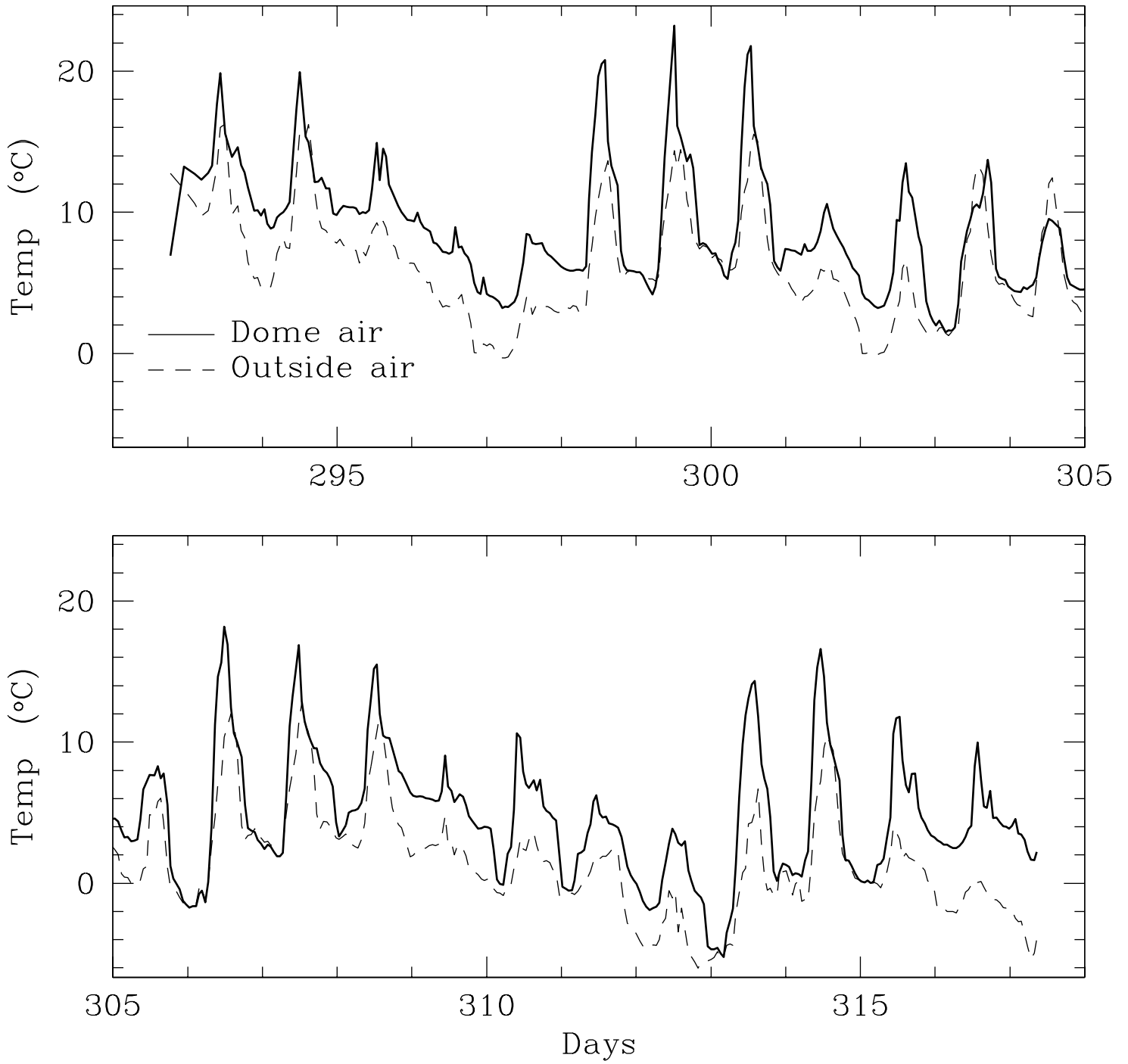


Fig. 2.— 48 inch dome temperatures for the period October 18 - November 12, 2000.