

RESEARCH LOG - WEEK 1

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1. ORIENTATION AND INTRODUCTION

My time this week has, for the main part, been exhausted on filing tax forms, ensuring I observe with US visa regulations and generally finding my feet in this beautiful town 4400 miles from home. Exhaustion is, no doubt a suitable word, as the seven hours time difference exerted its toll for the first few days. However, now only the peculiarity of days that clash so wildly with those across the Atlantic serves as a reminder that I am so far separated from the United Kingdom.

Monday was certainly a day of little work as we toured the campus, picked up keys for the Physics department and spent the afternoon attempting to connect to the Helios Unix machine. Teething issues inevitably ensued and this initial connection was only finally established two hours later. This was followed by the first of five IDL introductory tutorials in which we learnt how to interact with the Unix machines, analyse and plot solar data and not least, create this website. Despite the enormous quantity of commands available in IDL, most of the basic commands we will encounter this summer were described in the first few IDL sessions. The rest of the week was spent learning how to utilise LaTeX. Whilst IDL is rather seldom employed outside the field of solar physics, LaTeX is far more prevalent and I'm sure getting used to its application now will prove to be extremely useful in the future.

During the course of the week, the REU students attended lectures on observing the sun, the solar cycle and the sun as a star delivered by Dr McKenzie, Dr Munoz-Jaramillo and Dr Longcope, respectively. Despite the module in Solar Theory that I attended in St Andrews, each of these lectures covered topics of which I have no previous experience and were all very informative and interesting. As part of the Physics department here, my initial impression is that there is a different research focus than back in St Andrews. My limited experience in solar physics to date has mainly involved the manipulation of the Magnetohydrodynamics equations and it has been interesting to view the sun as a physical object rather than just considering the evolution of models of idealised solar structures. We also attended a seminar delivered by Dr Chaowei Jiang, a visiting scientist from the University of Alabama in Huntsville. This was certainly less accessible than the lectures aimed at the REU

participants, but it was nice to recognise some aspects of the talk such as the force-free approximation of the equation of motion.

2. THE PROJECT

Early in the week, a meeting was scheduled with my advisors for the summer, Dr Dana Longcope and Dr Jiong Qiu, for an initial discussion concerning the project that I will be working on. Ultimately, it was decided that an analysis of a solar flare observed on 26th December 2011 (I find myself being especially careful to make my dates unambiguous) will be conducted. To date, the task has involved identifying loops of plasma that develop during the flare process. This involves tracing loops that appear on a series of some 1000 snapshots taken of the developing flare. A minor modification to the IDL program was made as it could only sporadically identify the required file location. This probably was a fault of the author for attempting to run the program from the wrong directory. However, this could not be rectified and so instead it was found to be simpler to modify the file name in the code. Whilst this is only a very minor change, if it is ultimately necessary to rerun the code on other files, this alteration must be considered. The process of tracing plasma loops was found to be exceptionally fiddly and as the solar loops become more prevalent, it becomes increasingly difficult to distinguish one loop from another. In this sense, it is hard to believe that repeating the process would yield exactly the same results.