Chromospheric Structure and Dynamics

Sunspot, New Mexico, USA, August 31 – September 4, 2009

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Saku Tsuneta *(National Astronomical Observatory of Japan, Japan)*

Organizers

Alexandra Tritschler *(National Solar Observatory, USA)*
Kevin Reardon *(Arcetri Observatory, National Institute for Astrophysics, Italy)*
Han Uitenbroek *(National Solar Observatory, USA)*

FOREWORD

This volume collects the proceedings of the workshop entitled "Chromospheric Structure and Dynamics – From old wisdom to new insights" held on August 31 – September 4, 2009 hosted by the National Solar Observatory at Sacramento Peak.

The goal of the meeting was to review our current understanding of the detailed behavior of the solar chromosphere. The moment for such a gathering was ripe, given the recent convergence of observational and theoretical advances, the key to untangling the complex physics at work in this region of the solar atmosphere. The wide availability of adaptive optics, high-spatial-resolution spectroscopic observations, and space–based imaging have highlighted in great detail the dynamic and structured nature of the chromosphere. At the same time, advances in three-dimensional MHD simulations have provided spatially and temporally resolved models with a realistic description of the essential physical processes in the upper layers of the solar atmosphere.

These developments have underscored how the chromosphere is a crucial domain in the solar atmosphere, the region where the magnetic field becomes the dominant agent in structuring the solar plasma, and with an important role in modulating the upward transport of energy that is eventually dissipated in the corona.

In some sense, the basic nature and importance of the chromosphere has long been known, given the long history of chromospheric studies spanning many decades. It was appropriate to hold this meeting at Sac Peak, where many important chromospheric discoveries such as the three-minute oscillations, umbral flashes above sunspots, and the characteristics of solar spicules were made. And indeed this meeting was held 25 years after another Sac Peak workshop with a very similar theme, "Chromospheric Diagnostics and Modelling", with an introduction to those proceedings by Bruce Lites that could have been largely duplicated for this meeting as well.

But if these topics have often been discussed in the past, the appearance is that the new tools at our disposal, both instrumental and computational, provide great promise that much of the inner workings of stellar chromospheres will be clarified in the coming years. The presentations at the meeting outlined many of these advances but also laid out the progress expected in the coming years. A similar meeting held in 10 years will undoubtedly include discussions of polarimetric measurements of the chromospheric magnetic field, UV spectroscopy with the IRIS satellite, and the first exciting results from the Advanced Technology Solar Telescope (ATST). These new observations will certainly also raise new questions about the physics of the chromosphere. Time will be the judge, but it appears that the coming years will be an exciting time for studies of this complex and enchanting region of the solar atmosphere.

This meeting was the 25^{th} of the venerable Sac Peak Summer Workshop series. It was also one of the largest, with over 70 attendees from 15 countries in attendance. Financial support for the meeting provided by the National Science Foundation's Division of Astronomical Sciences, NASA's Heliospheric Physics Division, and the European Space Agency (ESA) was used to provided support for 15 young doctoral student or post-docs to attend the meeting. The continued success of these meetings is due in large part to the generous efforts of the local staff in organizing and running the meeting. Many people at Sunspot helped to arrange meals, transportation, lodging, and computer access for the attendees, but special thanks are due to Donell Long, Rebecca Coleman, Jackie Diehl, Ramona Elrod, and Lou Ann Gregory.

The organizers,

A. Tritschler, K. Reardon and H. Uitenbroek