

Report on the Joint US-Germany Space Weather Summer Camp 2011

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The Joint Space Weather Summer Camp of UA Huntsville, the German Aerospace Center, the University of Rostock, and the University of Greifswald finished successfully at the University of Alabama Huntsville on 13 August 2011. Over the course of four weeks, from 17th July to 13th August 2011, ten UA Huntsville and ten German undergraduate and graduate students lived together in a non-stationary Summer Camp to get an introduction to mostly all aspects of space weather at various Space Weather monitoring and research facilities in Germany and US.

The Space weather Summer Camp started in DLR Neustrelitz with introductions to the physics background of space weather. The lessons covered solar and magnetospheric physics and thermosphere and ionosphere as well. After learning background science, application oriented topics were discussed such as geomagnetic induced currents, direct space weather impact on satellite payloads and propagation of radio waves used in telecommunication, Global Navigation Satellite Systems (GNSS) and remote sensing radars have been discussed. They were introduced into the principles and techniques of the Space Weather Application Center – Ionosphere (SWACI). This data center provides ionospheric information and data to users to mitigate the ionospheric propagation delays and other refraction effects (cf. <http://swaciweb.dlr.de>).



Figure 1: The Summer Camp group in front of a X band antenna at the DLR site Neustrelitz

During a one day stay at the Leibniz-Institut für Atmosphärenphysik e.V. at the University of Rostock (IAP) in Kuehlungsborn, the students got insight into relationships between the solar radiation and the atmospheric behaviour as considered in the international CAWSES programme. In the 2nd week the students moved to Germany's only ionosonde station operated by the IAP on the island Ruegen in Juliusruh. Here the students learned more details about ionospheric sounding and radar techniques, modelling and ionospheric impact on GNSS networks operated in Germany.



Figure 2: During a lecture at IAP Juliusruh on the island of Ruegen

Lectures given at the Ernst-Moritz Arndt University in Greifswald focused on the physics and monitoring of galactic cosmic rays and energetic solar radiation and their effects on human beings. Finally, before leaving to US, the students became aware of the fact that space weather research, monitoring and forecasting requires close international collaboration. They got an interesting overview on international space weather activities, on the role of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), in particular on the International Space weather Initiative (ISWI).



Figure 3: Last station in Germany at the University of Greifswald

Besides the scientific program the students visited the old hanseatic cities Rostock, Stralsund and Greifswald. A highlight was the visit of the Historical-Technical Museum in Peenemuende where the first launch of a missile into space took place here in October 1942.

After leaving Germany, students then spent two weeks primarily at UAHuntsville from where also an excursion to the Space Weather Prediction Center (SWPC – <http://www.swpc.noaa.gov/>) and NOAA in Boulder was organized.



Figure 4: At NOAA Space Weather Prediction Center, Boulder CO

At the Center for Space Plasma and Aeronomic Research (CSPAR) at the UAHuntsville students received lectures primarily on the theoretical background to space weather physics. They got the unique opportunity to apply this knowledge to practical projects and exercises. Thus, one group built a VLF antenna for detecting lightnings via receiving their radio emissions.



Figure 5: One of the student groups presenting their final work and their self-built VLF antenna at UAHuntsville

Results of the five group projects were successfully presented at the end of the Summer Camp.

The feedback of the participants was overwhelmingly positive, encouraging the organizers to think about regular continuation of such a joint summer school.