

Abstract

Satellites have become an essential part of our everyday modern life. Especially weather satellites as they provide a basis for weather forecasts from a unique perspective. The objectives of this study revolve around the UN's Global Goals for sustainable development and how to introduce more accessible and democratic ways of conducting water and climate research. This study, therefore, examines if it is possible, as an individual with low-cost equipment, to independently receive and conduct a scientific study with images directly from these weather satellites. The study analyses sea surface temperature (SST) in the Baltic Sea region and its development during the fall of 2020.

To examine the objectives, a complete ground station was constructed to receive APT-signals from the NOAA 15, 18 and 19 weather satellites. A new cheap horizontal V-dipole antenna was constructed and the received signals were then recorded with an SDR, demodulated and decoded automatically into images with various free software. Self-developed code were then used to analyse and compile the SST-data. The station recorded flyovers autonomously during nine weeks between the 28 September and 29 October which resulted in 283 observations. In order to validate and measure how these observations compared to *in situ*, reference data were also gathered from three SMHI sea buoys.

The analysis concludes that the weekly average sea surface temperature in the Baltic Sea region declined during the period of measurement by 2,07 degrees. The measured temperature was found to be systematically about 3,35 degrees lower and had a larger dispersion than the reference data but followed the overall pattern well. However, the study is foremost a proof of concept and the method proves that it is possible to harness the opportunities weather satellites provide. More research is required to determine the methods general applicability but the low cost and simple design enables possible applications in regions where weather forecasts are unavailable due to various reasons. Researchers, military and farmers in remote areas could utilize increased accessibility to satellite technology to help improve their lives and better understand our seas, weather and climate.

Keywords: NOAA-weather satellite, Sea Surface Temperature (SST), Software Defined Radio (SDR), Automatic Picture Transmission (APT), Baltic Sea