The work deals with the calibration of meteorological web cameras, which can be then used for training of neural networks for the creation of realistic lighting and the generation of realistic clouds in the sky into 3D scenes. A method of calibration using the sun position, a method using the sky appearance and a simple analytical sky model and a method based on neural networks are compared. The first two methods are implemented in Python. A more sophisticated sky model is incorporated into the sky appearance calibration method and compared to the original sky model and the sun position calibration. Sun position calibration is the most successful, calibration with the original sky model a little less. The more sophisticated sky model doesn't improve the calibration the way it is used and further improvements are suggested.