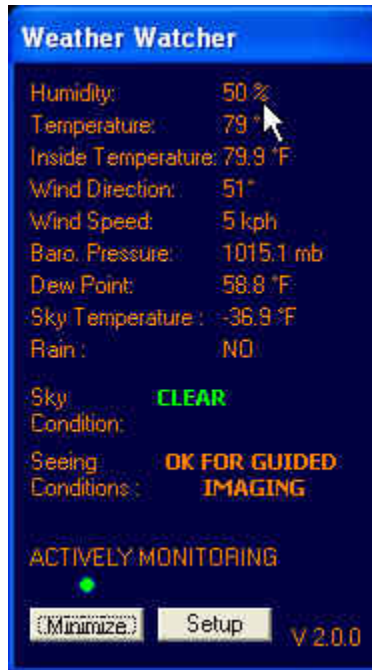


# WeatherWatcher ACP



## Minimum System Requirements

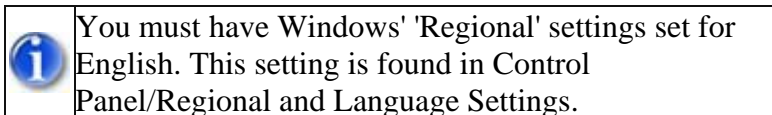
### Software

- ACP
- [Ambient Virtual Weather Station](#) (Pro or Internet editions), or [Weather Display](#)
- [ASCOM platform v4.1 or higher](#)

### Hardware

- Weather Station compatible with Ambient VWS or Weather Display software ([see a full list here](#))
- [Boltwood Cloud Sensor](#) I or II (**Clarity v 1.56 or higher required**)

WeatherWatcher will work without the Boltwood Sky Sensor but it is highly recommended.



## **Introduction to the Weather Aware Observatory**

**There will be times in our astronomy careers when want to do unattended imaging. With the choices of software packages these days it is very easy to do. Until a few years ago the only device to protect the observatory from rain events was a rain detector. Of course this means that it had to rain before the observatory was closed. Closing the observatory can be a very slow process and rain falls on the expensive observatory equipment before the dome can be closed.**

**This problem was solved with WeatherWatcher ACP, by using an off the shelf weather system such as the Davis Vantage Pro2 or similar weather station and the Boltwood Cloud Detector. WeatherWatcher ACP is able to collect vital weather and sky condition information then apply user programmable algorithms to create an automated, weather aware ‘brain’ for your observatory.**

**The weather stations provide basic information so the observatory user can set the following weather parameters for local weather conditions.**

**Humidity - At my location in the Pacific I know that when humidity reaches 85% a few things will be true. Seeing conditions will be poor, clouds will be present and there is a good possibility that it will rain.**

**Wind - If the wind exceeds the usable limit of the dome the dome will shut. In my case it is 30 MPH so I set 25MPH to 35MPH as my wind limits.**

**Temperature - We all know that on very hot nights the camera may not cool down well enough to get a clean image so we can set the temperature limit we think works best. The combination of high temperature and high humidity is another waste of imaging time.**

**The Boltwood Cloud Sensor measures the amount of cloud cover by comparing the temperature of the sky to the ambient ground level temperature. The sky temperature is determined by measuring the amount of radiation in the 8 to 14 micron infrared band. A large difference indicates clear skies, whereas a small difference indicates dense, low-level clouds. This allows the sensor to continuously monitor the clarity of the skies, and to trigger appropriate alerts on your computer. The user sets the parameters relative to his or her location by simply watching the sky to see at what temperature it is clear and what temperature it gets cloudy and of course very cloudy. The parameters are selectable in both the WeatherWatcher setup and on the Boltwood software interface.**

**Here are some recommendations for those who use WeatherWatcher: In many geographic locations you can anticipate weather such as cold fronts and other storms heading your way. If you know that only scattered clouds are heading your way you can use the check box in the WeatherWatcher program to ignore clouds only, but your observatory will still close for unanticipated wet conditions or many other user settable**

parameter. So, a few scattered clouds during the night will not cause a loss of an entire night of remote imaging.

In places where there is topography driven weather you must watch the forecast closer and leave the ‘Clouds Only – Safe’ checkbox unchecked. This is where the WeatherWatcher really excels. If it gets cloudy and the forecast calls for a chance of precipitation the observatory will simply close when any of the parameters are exceeded.

Some of you may wonder why both a weather station and the Boltwood systems are desired (but not necessary). To take full advantage of the power of WeatherWatcher the weather station senses rain and other parameters while the Boltwood has an early warning system sensing clouds and bad conditions before it rains. Moreover, the Boltwood’s rain sensor is very sensitive and will indicate wetness before most weather stations can.

## **Networking WeatherWatcher ACP**

We have built in the ability to setup the WeatherWatcher ACP on the observatory computer or use a networked “Weather Computer” to run several observatories. That means if you have more than one observatory on site you will only need one weather station and one Boltwood Sky Sensor to provide information to each WeatherWatcher ACP equipped observatory. This of course means that all of your computers are able to communicate over a local network.

To setup the networked data only a few steps are required (WeatherWatcher is looking for two paths):

To create the working file for the Boltwood Systems, click on the ‘Data’ button on the Boltwood program, this will take you to a directory where you create a file named “Claritylog.txt”( or any other allowable Windows convention with a ‘.txt’ extension). Once the file is created simply find the same path and file on the network Weather Computer.

## **Weather Display Setup Procedure**

**[Click Here for PDF Instructions](#)**

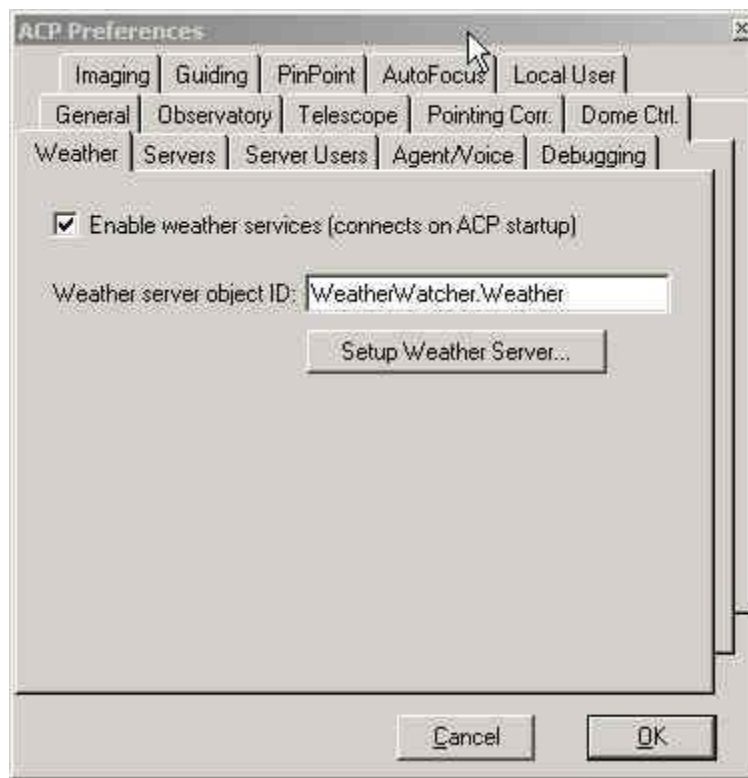
## ACP and WeatherWatcher Setup Procedure



If you put a script called **ACP-Weather.xxx** (xxx=vbs,js) in the same directory as ACP.exe, it will be automatically run when ACP detects that the weather has become unsafe. You can use this to (at a minimum) park your scope and close your dome or roof. If you have turned on "Automatically home and close dome AFTER scope is parked" (Dome tab of Preferences), then all your weather safety script needs to contain is:

```
Sub Main()  
    Telescope.Park  
End Sub
```

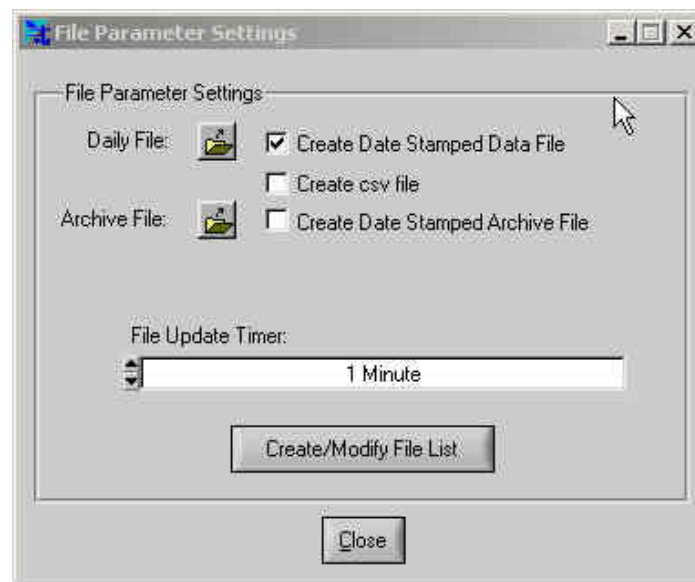
This will call the telescope's park method, and the auto-home/close logic will take care of your dome. The logic in Telescope.Park tries its very best to assure that your scope is parked before closing the shutter or roof.



Under the ACP Preferences/Weather tab rename the file in the 'Weather Server object ID' box to 'WeatherWatcher.Weather'. Then click the setup weather server button to select where your data files are located. If you are using the trial version, or you have not yet entered your unlock key, **DO NOT** use the 'Setup Weather Server' button, instead press 'OK' then connect WeatherWatcher via ACP's 'Weather' tab on the main screen. Click the 'Setup' button on Weather Watcher's main screen to access setup

## Setup for the Virtual Weather System Software

Select 'Settings' the 'File Settings' from VWS' main menu.



**"File Update Timer" should be set for a one minute interval or less to adequately update WeatherWatcher of weather changes.**

**You need to set up Virtual Weather Station (VWS) so the 'Settings/File Settings/Create/Modify File List' menu has the following values checked (only these as shown below):**

Wind direction  
Wind Speed  
Indoor Humidity  
Outdoor Humidity  
Indoor Temp  
Outdoor Temp  
Barometer  
Channel 1-3 Temp  
Channel 1-3 Humidity  
Dew point  
Rain Rate

**Parameter List**

Parameter	Value	Rate	Avg*	High	Low
Wind Direction	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wind Speed	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wind Gust	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Indoor Humidity	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outdoor Humidity	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Indoor Temp	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outdoor Temp	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Barometer	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total Rain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Channel 1 Temp	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Channel1 Humidity	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Channel 2 Temp	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Channel2 Humidity	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Channel 3 Temp	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Channel3 Humidity	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EvapoT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
UV Index	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Solar Radiation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wind Chill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Parameter	Value	Rate	Avg*	High	Low
Indoor Heat Index	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outdoor Heat Index	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dew Point	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SL Barometer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Parameter	Value				
Pressure Altitude	<input type="checkbox"/>	Deg Mon Cooling			<input type="checkbox"/>
Cloud Base Ht	<input type="checkbox"/>	Wind Run Month			<input type="checkbox"/>
Density Altitude	<input type="checkbox"/>	Deg Year Heating			<input type="checkbox"/>
Virtual Temp	<input type="checkbox"/>	Deg Year Cooling			<input type="checkbox"/>
Vapor Pressure	<input type="checkbox"/>	Wind Run Year			<input type="checkbox"/>
Daily Rain	<input type="checkbox"/>				
Hourly Rain	<input type="checkbox"/>				
24 Hr Rain	<input type="checkbox"/>				
Rain Rate	<input checked="" type="checkbox"/>				
Daily Wind Run	<input type="checkbox"/>				
Deg Day Heating	<input type="checkbox"/>				
Deg Day Cooling	<input type="checkbox"/>				
Moon Phase Day	<input type="checkbox"/>				
Rain Month	<input type="checkbox"/>				
Deg Mon Heating	<input type="checkbox"/>				

Average Preferences

[More Parameters](#)

[Close](#)

## Setup

### Hardware Present

- ☒ Weather Station
- ☒ Boltwood Sky Sensor
- ☐ Boltwood Sky II
- ☐ Roll off Roof

### Sky Temperatures

Guided :  To   
Unguided :  To

### Weather Parameters

Humidity (%) :   
Temperature:    
Wind Speed:

### Data Updating

Update results every:  Seconds  
☐ Clarity Installed Locally  
☐ Convert Clarity Data to F

### Wind Units

- ☒ MPH
- ☐ KPH
- ☐ KNTS

### Baro. Units

- ☒ Millibars
- ☐ In.Hg
- ☐ hPA

### Misc

- ☐ Clouds Only = SAFE
- ☒ Log Errors
- ☐ White Text

### File Locations

(double click the text input areas to open a file chooser box)

Get Sky Temperature from :

☒

Get Weather Station Data from:

☒

### Temp Sensors

- ☒ Default
- ☐ Channel 1
- ☐ Channel 2
- ☐ Channel 3
- ☐ Use In Temp

### Humidity Sensors


- ☒ Use Outside
- ☐ Channel 1
- ☐ Channel 2
- ☐ Channel 3

### Data File

Interval in Seconds:

OK

Default

	<p>To select the location of the weather data files uncheck the checkboxes next to the file boxes in the 'File Location' frame. Double click inside the field then navigate to the files. Once completed recheck the boxes as needed for the hardware present.</p>
	<p>Wind speed limits offer 2 inputs. The lower limit is set for winds that enter directly in to a dome slot; the upper limit is the wind speed maximum for blowing from opposite the dome slot. WeatherWatcher will then automatically compute excessive wind speeds for different directions in relation to the dome's current slot position.</p> <p>Roll-off roof observatories should enter the same value for both the upper and lower limits.</p>

### **Hardware Present:**

Check the appropriate hardware you have present. You should now be able to access the weather data.

### **Sky Temperature:**

Set the upper and lower limits for the sky temperatures that suite your guiding needs.

### **Weather Parameters:**

Set these to match your local conditions to trigger the seeing condition determinations that are displayed on the main screen.

### **Data Uploading:**

The interval is in seconds, of how often weather data is retrieved. Check the "Clarity is Installed Locally" if WeatherWatcher ACP is running on the same machine as the Boltwood Clarity software.

### **MISC.:**

The 'Clouds Only = SAFE' check box will allow you to override the unsafe safe trigger if no rain is present. So, with this box checked no actions to close the dome/roof or park the telescope will occur based on cloudy conditions only.



**Temp Sensors:**


Select the channel that you your have selected in VWS to monitor temperature.

**Humidity Sensors:**

Select the channel that you your have selected in VWS to monitor humidity.

**Data File:**

When the Boltwood Cloud sensor is not installed on the same local machine as WeatherWatcher you need to check to make sure that the data file is current and does not contain data that is too old to reflect accurate reading. It is recommended that you an interval of 5 to 300 seconds be selected. This interval will depend upon the type of connection, e.g. faster interval for LAN connections and longer interval for FTP transfers. Entering an interval of '0' will disable checking for old data.

	The 'Limit Parameters' and 'Sky Temperature' fields must be inputted in the same units (Metric, US) as your weather station is set to report its data.
--	--