A Stationary Oceanographic and Meteorological Data Collection System With Redundant Communication Links

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Abstract

The University of South Florida’s College of Marine Science operates a Coastal Ocean Monitoring and Prediction System (COMPS) for the West Florida Shelf. The COMPS network consists of oceanographic-meteorological data collection systems on buoys and stationary platforms, computer base stations, and simulation models. COMPS products are presented to the public via the Internet at http://comps.marine.usf.edu (Figure 1).

The Ocean Modeling and Prediction Laboratory (OMPL) at the University of South Florida’s College of Marine Science has secured funding to improve specific components and data communication capabilities of existing COMPS near shore stations (Figure 2). Equipment from this upgraded system will replace instrumentation at eight COMPS coastal stations and at least three COMPS base stations. The working prototype consists of a fixed remote data collection platform with sensor array, bi-directional line of sight radio, asynchronous satellite transmitter, and a base station with a controlled data acquisition system and satellite downlink (Figure 3).

Data Collection

This functioning deployed system collects water level, wind, precipitation, air temperature, relative humidity, barometric pressure, water temperature, and sea surface conductivity data (Figure 5). Data collection intervals at the remote station range from one second to six minutes. Sensors transmit readings to the data collection platform serially via SDI12 and RS232 protocols and by frequency or analog signals. Processed station data are relayed to the OMPL base station by two communications systems. Real time data acquisition is accomplished by a 1-watt line of sight radio with data acquisition controlled by proprietary software at the base station. The throughput rate for the line of sight communication system is currently set at 115 Kilo baud with data being retrieved at six-minute intervals. Data are also transmitted via the Geostationary Operational Environmental Satellite (GOES) system. The transmission rate for this system is 1200 baud with one hour between transmissions. All transmitted records are stored at the stationary platform in a Compact Flash card.

<table>
<thead>
<tr>
<th>Component</th>
<th>Manufacturer and Model Number</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Collection Platform (DCP)</td>
<td>Campbell Scientific CR1000</td>
<td>DCP has 4 MB of SRAM and 64 MB card reader</td>
</tr>
<tr>
<td>Satellite (GOES) Transmitter</td>
<td>Campbell Scientific TX312</td>
<td>1200 baud ASCII transmission</td>
</tr>
<tr>
<td>Satellite Transmitter Antenna</td>
<td>Stevens V2TH</td>
<td>Enclosed antenna array</td>
</tr>
<tr>
<td>Line of Sight Radio System</td>
<td>Freewaves Technologies FGR 115RC</td>
<td>115 kilo baud communication rate with DCP</td>
</tr>
<tr>
<td>Line of Sight Data Acquisition Software</td>
<td>Campbell Scientific Loggerget</td>
<td>Retrieves logged data at 6-minute intervals</td>
</tr>
<tr>
<td>Water Level Sensor</td>
<td>Aquatrak 4110 System</td>
<td>Follows NOS sampling protocols</td>
</tr>
<tr>
<td>Wind Sensor A</td>
<td>RMYoung 5103</td>
<td>Has marine grade bearings and seals</td>
</tr>
<tr>
<td>Wind Sensor B</td>
<td>Vaisala W4825</td>
<td>Down configuration, data in RS232 ASCII string</td>
</tr>
<tr>
<td>Barometer</td>
<td>RM Young 61202 V</td>
<td>Uses Gill Pressure Port</td>
</tr>
<tr>
<td>Air Temperature &amp; Relative Humidity Sensors</td>
<td>RM Young 41572 VC</td>
<td>Mounted in multi-port radiation shield</td>
</tr>
<tr>
<td>Rain Gage</td>
<td>Stevens TR1</td>
<td>Tipping bucket with 1 mm tips</td>
</tr>
<tr>
<td>Water Temperature &amp; Conductivity Sensors</td>
<td>Stevens EC 250</td>
<td>Has delrin housing and 0-60,000 ms range</td>
</tr>
<tr>
<td>Tower</td>
<td>Rohn 25G</td>
<td>39 feet of tower height</td>
</tr>
</tbody>
</table>

Planned Future Applications

• Decode, log and relay real-time wave gage data strings from RDI & SeaBird Systems
• Trigger, record and relay JPEG picture images
• Acquisition, processing, logging and relay of high frequency data sets
• Quality control of sensor data sets at logger
• Placement of system in hardened enclosure system for offshore payload

Table 1. Main components of upgraded station at Egmont Key