The importance of the new AWS network in the warning alert system in El Salvador, Central America

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Abstract

This paper describes the importance of the new AWS (automatic weather stations) network in the warning Alert System in El Salvador installed by Territorial Studies National Service SNET. The purpose of this network consisting of AWS's (42 stations) is monitoring the amount of rainfall and stream level in five basins rivers these are Lempa, Goascoran, Jiboa, Paz and San Miguel .Moreover consider the contribution of the Guatemala and Honduras rivers.

Part of these Stations are eqipped with   meteorologicals sensors as temperature, relative humidity, windspeed/direction, solar radiation and pressure and this information is useful for making meteorological forecast that are part of the material that is going to be employ in the warning alert system.The network works fully automatically or by including observer information.   Also monitoring and administration of the stations, data comunication, store data, alarm handling and process of the measurements are discussed, as the system is part of the national warning alert system a brief explanation of the inter institutional system is treated..

The paper presents station design, data flow, monitoring center operations and some products obtained.

Introduction and history

At the end of the 90's the Meteorological and Hidrological Service (SMHN) of El Salvador had an old technology to control the amoun t of rainfall and stream level , when we had bad weather conditions the observers were using conventional rain gage and stream gages as tools to read the atmospheric and rivers condition. Preparing for the effects of flooding, and particulary ordering evacuations of residents potentially in harms way due to the flooding was very often hindered by the lack of reliable and/or current information. Communications failed at critical time which made it more dificult to find out what was happening in the way of rainfall or stream levels upstream. Official were forced to operate in a mode where they were reacting to current flooding rather than being able to plan in advance their actions based on what is occurring far upstream.

In a way there wasn't a warning early system. Then if we had severe weather conditions the SMHN sent a messages by phone to COEN (Emergency National Committe) assembles in San Salvador consisting of cabinet level personnel, advising of the severity of the situation.

The committee ordered COEN to dispatch trucks and equipment to certain areas to assist in evacuation. COEN was also monitory rainfall from reporting stations in San Miguel, Acajutla, Ilopango, El Salvador International Airport, and La Union. This informations was available from the WMO Four Star Aviation Wheather Report.

Insummary we had few information to operate a warning alert system trying to avoid this situation USAID started after the MITCH hurricane (1998) a plan to design a flood warning system that will be describe later.

An import aspect in the warning alert system is the coordination among differents interinstitutional centers. Now SNET (SMHN before) is the monitoring center of the AWS network, Civil Protection (COEN before) it's the coordinator of the alert. If the SNET's staff identify a danger send several messages to different organizations. Army, red cross, first aiders, air force, etc. Mainly to Proteccion Civil who is going to coordinate the actions.

What is an Warning Alert System

Is a system that whose objective is to provide additional information and increase reaction time and will mean the people will be able to make informed decisions about the need for possible evacuations or other flood preparedness activities.

These systems consist of three components:

1-Monitoring of natural conditions linked to the threat.

2-Forecast of events

3-Warning
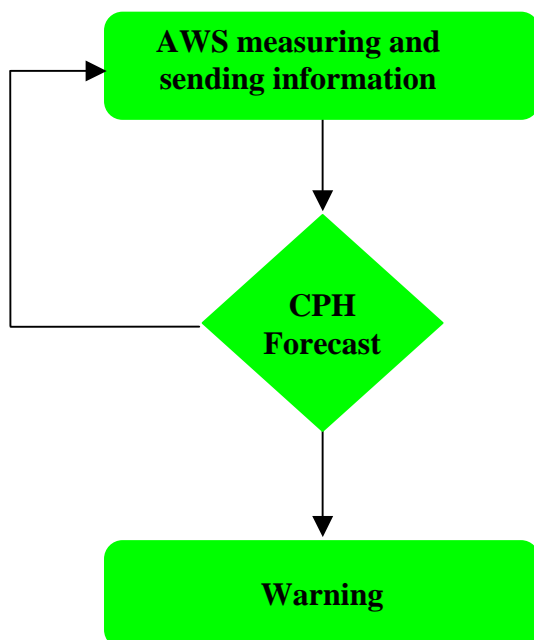
General Description of the systems

These are the most important functions:

-Acquisitions by the automatic weather station(Data collection platform-DCP) of the basic weather parameters measured by analog and digital sensors.

-Input of human observations (present weather,visibility,clouds) in some meteorological offices.

-Generation and transmission of normalized encoding messages by satellite.

-Data check, proccesing, storage, analysis,forecast and warning.

-Normalized data transfer.

The system consists in to have a network of rain gage and stream gages deployed in a basin upstream of the areas most affected by flooding connected to the DCP . These gages report rainfall accumulations and stream level changes in real time to the DCP and this one sends the information to the observer's office with computer base station via Los Radio or to NOAA GOES satellite. After these datas are being sending to Centro de pronostico Hidrologico (CPH) in SNET El Salvador where are received by phone or by satellital antenna and transferred to the data decoder system (DDRGS) and linked to the computer base station. The computer base station acquires, decodes and store the data receives and converts the data to user-friendly chart and graphics that show the user what is occurring and the possible impact the event may have to the flood prone areas.

The hydrologicals AWS stations(29) sends the information every three hours (Timed transmission)

And the Meteorological stations (13) sends the information every hour .The AWS network has programmed thresholds for example if it rains more than 25 mm in five minutes the AWS will send a random transmmission every five minutes (real time) this occurs several times in order to be sure the warning message was sent because this random channel is shared for several AWS's.

The computer base station in CPH   has a software called PCBASE2 but moreover has special application   software   where   you   can   see   the   data   stations   in   a   map http://mapas.snet.gob.sv/lempa/index.php this is the key for going to identify and analyzing the rivers or weather conditions. The SNET's staff can then more closely monitor the incoming data on the base station computer and determine to send by E mail ,fax or by phone the warning to several users the different codes of flood warnings.

This is done to allow the officials (Proteccion Civil) who are actually responsible for making flood impact decisions, wether it be flood preparedness activities or evacuations, etc. To have the data available in making decisions.

Prior to the instalation of the warning early system SNET and proteccion civil (with assistance from NOAA/CSC) determined the initial seasonal thresholds for the base station computer . These thresholds are being revised as time goes on based on historic data and information gained from

'Ph and CPM(forecast
CPH is monitoring the
observers meteorological
CPH and everybody is

CUENCA TRINACIONAL DEL RIO LEMPA

Hydrological and Meteorological stations in El Salvador

El Salvador is a small country (21000) square kilometers, the AWS network try to cover the five main basins in the future SNET is planning to add more AWS in order to control others tributaries rivers.

List of the Meteorological and Hidrological AWS installed in the country

Hidrological stations

Station	River	Location	
		Latitude	Longitude
La Hachadura	Paz	13°51´34.3´´	90°05´17.1´´
El Jobo	Paz	14º 01´01.7"	89º 54´26.2"
Puente Viejo	Jiboa	13°30´57.6´´	88°59´17.4´´
San Marcos	Lempa	13°25´24.7´´	88°41´49.0´´
El Zapotillo	Lempa	14°10´31.0´´	89°24´46.7´´
Citalá	Lempa	14°22´05.5´´	89°12´45.5´´
El Tamarindo	Lempa	14°02´45.3´´	89°15´09.1´´
San Gregorio	Lempa	13°55´54.2´´	88°30´27.8´´
Osicala	Torola	13°50´25.0´´	88°08´55.0´´
Las Flores	Sumpul	14°02´36.3´´	88°48´32.5´´
El Delirio	Gde. San Miguel	13°19´38.6´´	88°09´00.7´´
Villerías	Gde. San Miguel	13°31´02.0´´	88°10´27.4´´
La Ceiba	Goascorán	13°31´08.4´´	87°46´57.5´´
El Sauce	Goascorán	13°40´20.8.´´	87°47´52.7.´´
G. Oriente	Goascorán	13°47´49.5´´	87°42´36.4´´

In this table you can see the Differents rivers with AWS

Hidrologicals Stations		
Stations	Location	
	Latitude	Longitude
Vado Marin	13° 18´ 05.5"	88° 17´ 23.8"
Metapan	14° 21´ 34.1"	89° 32´ 41.8"
San Antonio	13° 27´ 12.8"	88° 49´ 10.8"
Santa Clara	13° 40´ 21.0"	89° 45´ 22.6"
Santa Beatriz	13° 35´ 32.3"	89° 44´ 11.2"
Tecoluca	13° 32´ 00.4"	88° 46´ 52.7"
Volcan San Miguel	13° 26´ 33.2"	88° 14´ 15.8"

Meteorological Stations

Stations	Location	
	Latitude	Longitude
Santa Ana-UNICO	13º 58´ 57.1"	89º 32' 55.6"
Acajutla-CEPA	13º 24´ 36.8"	89º 50´ 06.1"
La Unión-CPI CORSAIN	13º 19´ 00.3"	89º 49´ 47.1"
San Miguel-UNIVERSIDAD	13º 26´ 20.1"	88º 09´ 32.7"
Ilopango-AAC	13º 32´02.3"	89º 24´ 57.6"
Procafe	13º 41´ 03.6"	89º 17´ 11.8"
Boqueron	13º 44´ 02.2"	89º 16´ 02.9"
San Vicente	13º 35´ 45.0"	88º 50´ 22.2"
Las Pilas	14º 22´ 16.9"	89º 05´ 47.0"
San Fco. Gotera	13º 41´ 26.7"	88º 06´ 34.1"
Chapeltique	13º 38´ 32.7"	88º 19´ 24.0"
El Pacayal	13º 28´ 08.4"	88º 15´ 38.9"

System Overview

The majority of our AWS are Sutron (90%) for that reason we are going to describe this system

It is a common situation to have a observer stations communicating with the DCP through a radio link in the observer office we have a PC running a software that will dial up the local PC abd once connected will be able to perform the same controls and retrieve the same data as the local Pc.

The WMO Data Collection aplication (SINÓPTICA) displays current weather data from an a Automatic Weather station (s) (AWS) and aids the Observer in generating automated weather repors (Synop, METAR and SPECI). The following software packages and individual applications should be running on the Observer´s PC at all times.

Software

-PCBASE2- Sutron´s Data collection and communications software

-RTU Server

-Data Server

-Setup Server

-DDE BATCH

SYNOPTICA-WMO Data Collections Aplication

-Real Time Weather Data Display

-Observation Entry Window (will only open before new message is created)

PCBASE2: willl poll the 8210A data logger every 2 minutes for current data via a radio modem. This data will be displayed on the Real Time Weather Data Display. The displays includes Wind, Temperature, Pressure, Radiotion and Precipitation reading.

Every hour the Observation Entry Window will open to prompt the Observer to manually enter Observed data. This window will open at 34 minutes past the haur and will close 6 minutes later. (time are configurable) . The values will occur automatically regardless of Observer Input.

The Real Time Weather Data Display will always be displayed on the PC´s desktop and will be continually updated with laters sensor reading, usually every 2 minutes. The "last Update" field in the upper right –hand comer will display the time the 8210 was polled.

PCBASE2 Polling

The BCBASE2 – RTU Server application will poll the 8210 Data Logger for the laters measured values on a time interval defined in the PCBASE2 .INI file (Pollgroup:1) , normally every 2 minutes. This poll is accomplish via a 2.4 Ghz Radio link between the Observer´s PC (com1) and the 8210. The polled data is stored in binary data files which are managed by the PCBASE2- Data Server application for the use by the SYNOPICA software. This data automatically updates the various data fields of the Real Time Weather Data Display though the use of the DDE (Dynamic Data Exchange) protocol. SYNOPTICA will also use these new values to calculate additional weather parameters such as QNH and QFE as needed.

GOES Message Transfer

Data from the 8210´s a long is also sent via the GOES system to the NESDIS (national Envirnmental Satelite, Data, Information Service), facility at Wallops ISLAND , V.A. These messages are created and sent every 3 hours, as configured in the GOES setup section of the 8210. In an effort to keep the messages size small 8no more than 4000 to 4500 Bits) the GOES messages contain only 12 reading per sensor, one reading every 15 minutes for the 3 hours period. The messages received at the NESDIS facility are stored on their server for a period of 72 hours.

Message Formats (WMO)

Message formats are strictly define by the World Metereological Organization in Publications No. 49, Technnical Regulations and No. 306, Manual on Codes. These publications as a guide to developing messages which conform to WMO requirements.

System Setup

The WMO setup diskette several files:

1.MASTER. INI (To be installed on the Master Station PC)

2.PCBASE2.INI: (t to be installed on the remote MOS PC´s)

3.NETTXFR. EXE.:

4.COI2. DBT

5.XXXXX.SET

6.XXXXX.BAS

7.MOSSynop.EXE (The MOSSynop .EXE.is the WMO Data Collection software)

All files should be copied to the C:/PCBASE2 directory

The installer may need to make changes to the following configuration files in order to accommodate local requirements. To edit the following files use an editor like NOTEPAD or WORDPAD.

PCBASE2 INI files

In the PCBASE2 .INI. file the following parameters need to be verified with the local user:

Country   WMO Country Code

ZuluOffset   Offfset in hours from Greenwich Mean Time (GMT)

SYNOTIME Time when the SYNOP application will create messages. Default is 40 (minutes after the hour) Note: The Observation Entry Window will open 6 minutes before this time.

WMMOID   World Meteorelogical Organization ID

ICAOID   International Civil Aviation Organization ID

HMSL   HEIGHT above Mean Sea Level – For pressure calculations (in Meters)

Phone Number: Number to dial to connect to the MASTER station Computer

The installer should be of the following parameters in the SET file for the 8210 Data Logger. These are default values for the MOS system.

Measurement Interval	00:02:00
Sample Interval	00:00:01
Measurement Time	00:00:00
Sampling Time	23:59:59
# of Samples / Set	120
# of Measurements/ log	1
Basic Interval	00:00:00
Basic Time	00:00:05

XXXXX.bas

The Tiny Basic program should not require any modifications

HARDWARE

The data collection platform (DCP) is complete with the following components:

➢ 8210 Data Recorder

➢ Satlink GOES Transmitter

➢ Enclosure, NEMA-4 ,Fiberglass, 24" x 20" x 10"

➢ MS connectors, Pre- Wiring & configuration

➢ Mounting Hardware for DCP

➢ Power system including Solar Panel Regulator, Battery (12vdc, 24AH), and all necessary cabling

Typical Installation AWS

In addition, the station is equipped   and pre-wired for the following sensors:

➢ Rain Gauge Tipping, Stainless Steel (metric) and mounting hardware

➢ Temperature/Relative Humidity Sensor with Replaceable Module and Radiation Shield

➢ Wind Sensor, Prop Vane, With mounting hardware and necessary cabling

➢ Pyranometer , Second Class, with mounting hardware and necessary cabling

➢ Barometric Pressure Sensor

Data Collection Platform (DCP) WITH 8210 Data Recorder The functional foundation of the Meteorological Station is the Sutron 8210 data recorder. The 8210 is mounted inside a sealed enclosure. A NEMA4 fiberglass enclosure is supplied to ensure protection of equipment from environment. The enclosure also houses the battery, solar panel regulation, and surge arrestor.

Sensors connections to the DCP enclosure are easily identifiable and have unique connectors such that sensors cannot be connected in the position. All sensors may be connected or disconnected without opening the DCP or requiring additional tools. All connectors are military standard (MS) type which shield against humidity, rainfall, salinity an other external agents which may cause shorts and / or corrosion or damage to the connector pins.

The Sutron 8200 family of data collection products is specifically designed to meet the wide variety of data collection needs of the hydrologic and meteorologic communities. These needs may range from simple data recording to transmission via satellite or other telemetry links.

The overall 8200 design utilizes CMOS and low-power circuitry to achieve long-life battery operation and provide a rugged system for unattended field operation in extreme environments. For even more durability, each 8200 is tested to operate over the- 40° C to+60° C temperature extremes expected in remote environment Full EMI and transient protection are built into each input.

Featured in the 8210 include

- Dual communications now supported in one unit
- PCMCIA memory card slot for data or programming storage
- True industry standard RS-485 port
- 20 digital imput/output lines for SCADA or other control applications
- Internal auxiliary RS-232 port
- Dedicated SDI-12 port with tree wire terminal connection
- Solar panel battery regulator current increased to 1.25 amps to support larger solar panels
- Dedicated external RS-232 serial port for programming and data retrieval

Can accommodate optional telemetry modules

- Telephone modem,
- Telephone modem with speech synthesis
- GOES radio transmitter
- Radio modem with internal radio
- Radio modem for external radio
- METEOSAT radio transmitter
- INSAT radio transmitter

SatLink-Sutron´s Multi Satellite Transmitter

Relays data from even the most remote sensors and loggers to everywhere around the globe and works with virtually all dataloggers.

SatLink is programmable from any PC using software provided with the unit. The user enters configuration values for the transmission ID, transmission times, intervals satellite selection to completely control the types of transmission made.

- ➢ Operates at new GOES data rates- 100/300/1200 Baud
- ➢ Compatibility- User with most dataloggers
- ➢ Versatility- GOES/ ARGOS/ Other Weather Satellites
- ➢ Certified by NESDIS
- ➢ STD RS232 interface
- ➢ Dual transmission with dual 20KC Buffers
- ➢ Compatible with Sutron 8210 and 8400*Data Recorders and Sutron´s Xpert and Xlife Dataloggers
- ➢ Upgrade firmware via serial port
- ➢ Internal diagnostics
- ➢ Usar programmable via PC
- ➢ Automatic transmit inhibit if GPS satelites are not acquired (with exception of INSAT)
- ➢ The power system is comprised of a battery, solar panel and voltage regulator

Battery

The 5100-0040 is a 12- volt, 24 amp-hour, maintenance-free, rechargeable sealed lead-acid battery which features overcharge protection, leak-proof packaging, and long service life. The sealed construction allows trouble-free, safe operation in any position. There   is no need to add electrolyte, as gasses generated during the overcharge are recombined in a unique " oxygen cycle". The high- impact resistant battery case is made of non-conductive ABS plastic with   superior resistance to shock, vibration, chemicals, and heat.

Solar Panel

Sutron´s 20W Solar Panel, 5100-0410-1, is provide with u-bolt mounting hardware allowing a great variety of attachment methods and mounting surfaces options. The solar panel should be mounted on south sides of the tower with slight downward tilt to prevent water accumulation on panel surface.

Solar Regulator

The Solar Panel Regulator, is an integral part of a solar electric power system that includes photovoltaic (PV) solar array and a battery. It provides years of protection for batteries from over – charging. This device has a built-in LED that indicates when the battery is being charge by means of solar power.

Free Standing Tower

Sutron has provided a 9 Meter Free Standing Tower Kit. This Kit consists of one (1) Hinged base plate and one (1) tower top section, and two (2) middle sections. This an extremely rugged equilateral triangle tower with extra heavy-duty 1-1/4" steel tubing side rails and continuous steel solid bracing electrically welded throughout. Each piece is Hot Dip Galvanized inside and out after fabrication to protec all points of construction and welding against corrosion.

Sensors

The more importants in the warning alert system are rain gauge and shaft encoder

Rain Gauge

Stainless Steel Rain Gauge Tipping Bucket, 5600-0425, is a precision instrument with a sensitivity of 0.2 mm. Per trip. It is supplied with 10 meter (30 foot) of cable modified with MS connector compatible for enclosure connection. The gauge should be located on the prevailing wind side of any obstruction so not to disrupt rainfall measurement.

Rain entering through a funnel assembly with an 7.87-inch (200 mm) orifice passes through a debris filtering screen and is funneled into one side of the tipping bucket assembly inside the gage. The bucket tips when a given amount of water, determined by gage earlibration, has been collected. As the buckete tips it caused a magnet to pass by a ruggedized mercury switch, momentarily closing the switch,. The tipping of the bucket brings a second bucket into position under the funnel, ready for filling. After the rainwater is measured, it is directed into drain tubes that allow it to exit out in the base or the gage, screens to prevent insect entry cover these.

Typical Rain Gage

Measure the stage(level) of rivers,stream, reservoirs, and other bodies of water. The encoder is based on low power optical sensor circuitry.It resolves one rotation of the 5/6" inputs shaft into 100 increments.

For 0.01 foot resolution, input data is commonly provided by a float attached to a tape that drives a standard 1-foot circunference wheel.for different resolutions, different circunference wheels are used.the shaft rotation is translated into quadrature pulses.

There are others level sensors ultrasonic level sensors, submersible pressure transducer, Hydrological bubbler, and ultrasonic level sensor but in our country Shaft Encoder is commonly used.

Incremental Shaft Encoder

CONFIGURATION

The 8210 is pre-wired and ore-configured to continuously monitor all the sensors provided. Upon receipt, the 8210 is configured for a measurement interval on five minutes. The units of measure are determined by the sloped and offset of the sensor configuration in the 8210 and are discussed for each.

Wind Speed and Direction

For the wind speed (WSA) and wind direction (WDA) , a average will be computer and logged.

The wind speed input uses a slope of 0.1904 and offset of o.0 for units of knots. If units of meters per second were desired, a slope of 0.098 and offset of 0.0 would be used. If kilometers per hour were desired as the units od measure, a slope of 0.3528 and offset of 0.0 would be used. For the wind direction input, a slope of 72.0 and offset of 0.0 are used for degree (°) unit of measure.

These averages are calculated by the operating system according to the Sample Time, Sample Interval, and Sample to Average in the Measurement Schedule Setup. Upon receipt unit, is configured to sample the input every second and produces the average every two minutes. The average wind speed (WSA) AND DIRECTION (WDA) are also logged.

Air Temperature and Relative Humidity

The 8210 will measure and log instantaneous air temperature (AT) and relative humidity (RH)

The temperature is logged in degrees (°C) and relative humidity in percent (96). For the air temperature input, a slope of 100.0 and offset of- 40.0 is used for Celsius units. For the humidity input, a slope of 100.0 and offset of 0.0 is used for percentage units.

Solar Radiation

The instantaneous radiation (PSP) is a differential input, which is logged by the 8210 in units of watts per square meter (Watts/m2) . The slope is set to the inverse of the pyranometer´s. sensitivity.
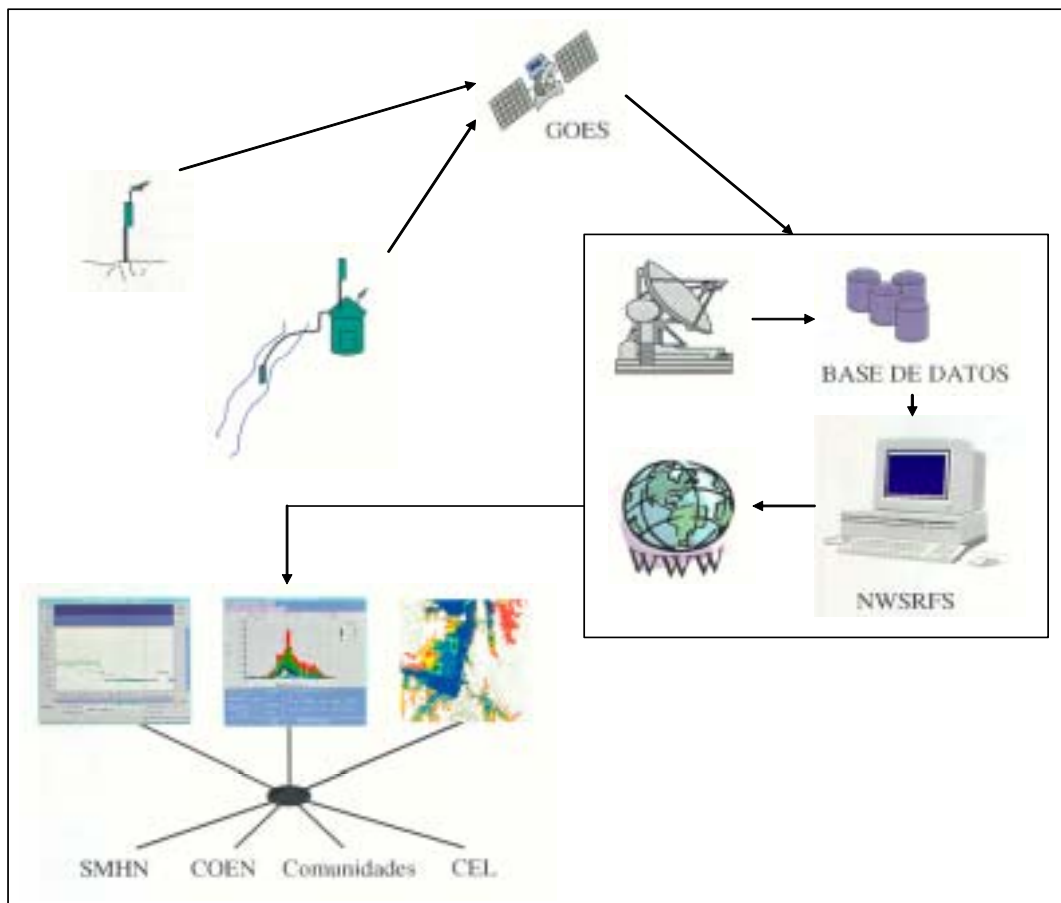
Barometric Pressure

The instantaneous barometric pressure (Baro) is an SSDI-12 input which is log by the 8210 in units of mbar or hPa. The slope is set to 1 and an offset of 0 is used.

Battery Voltage

Battery voltage (battery) is enabled for measurement and logging as well. Units of measure are volts. Slope for input es1.0 and offset is 0.0.

Data flow of the Data from AWS

How to analyse and make a warning

SNET has four years of experience with **AWS** network measuring the rainfall, intensity and stream level that are going to exceed the tresholds rivers. Considering this the CPH-SNET determine the need to communicate the warning for flood fighting activities or evacuations.

 The next figure shows the evaluation of thresholds in meters in differents stations(these information was obtained analyzing the **AWS** information). As can you see there are three differents codes or stages.

Code green-Stage 1   Monitor-previous notice

Significant rainfall occurring, no flooding expected, stand by for updates and potential upgrade in alert status.

Code Yellow-Stage 2   Warning

Flood watch, possible flooding.

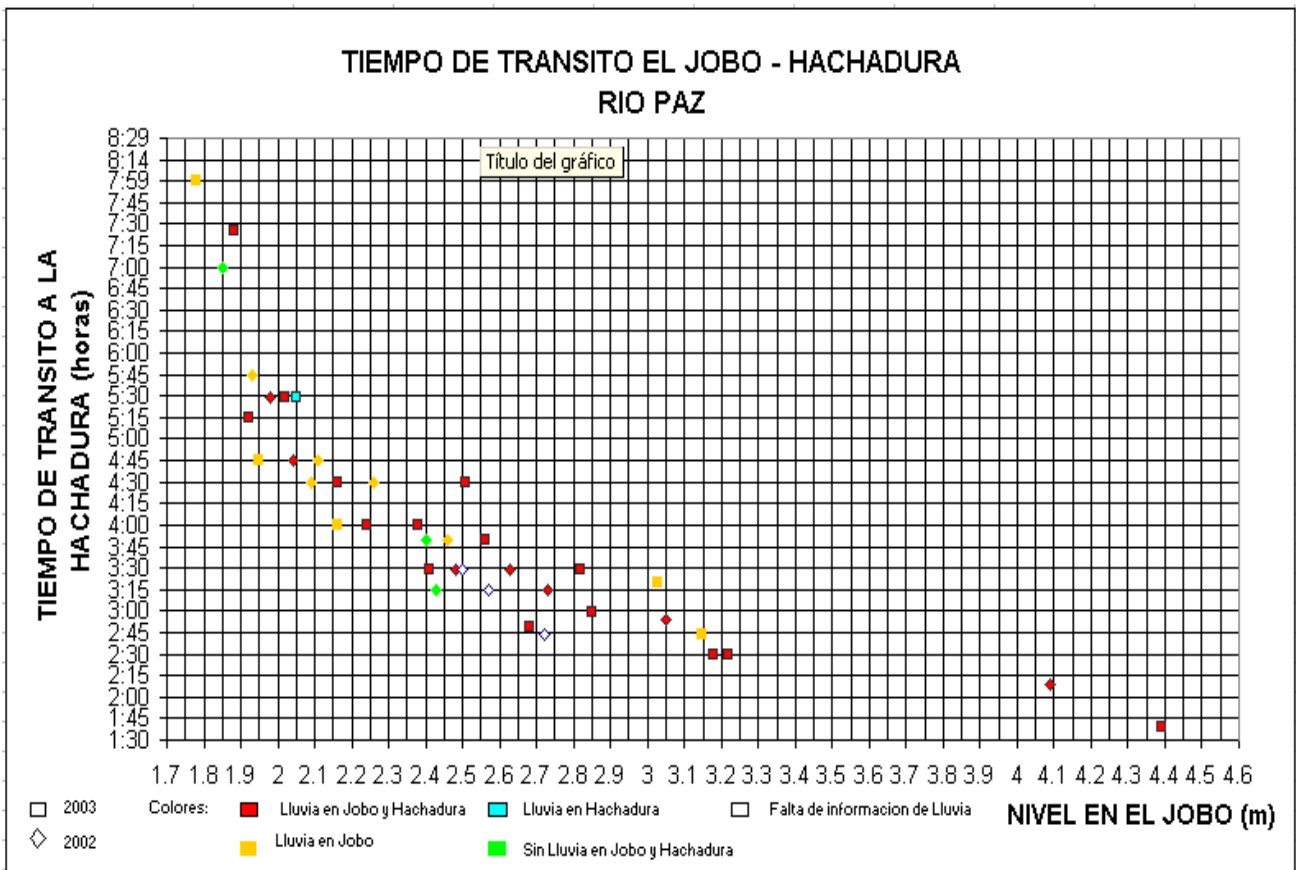Possible evacuation of low lying (most flood prone) areas.

Stand by for updates and potential upgrade in alert status.

Code Red-Stage 3   Alert and Emergency

Flood Warning, eminent flooding

Evacuation of all flood prone areas

Thresholds of Automatic Stations			
	STAGE 1	**STAGE 2**	**STAGE 3**
STATION	MONITOR - PREVIOUS NOTICE	WARNING	ALERT AND EMERGENCY
	0 - 75%	75% - 90%	90% - 100%
EL JOBO	0 - 3.72	3.72 - 4.46	4.46 - 4.96
LA HACHADURA	0 - 3.63	3.63 - 4.36	4.36 - 4.84
PUENTE VIEJO	0 - 3.38	3.38 - 4.05	4.05 - 4.50
CITALA	0 - 3.38	3.38 - 4.05	4.05 - 4.50
ZAPOTILLO	0 - 6.83	6.83 - 8.20	8.20 - 9.11
TAMARINDO	0 - 10.73	10.73 - 12.87	12.87 -
LAS FLORES	0 - 3.93	3.93 - 4.72	4.72 - 5.24
SAN GREGORIO	0 - 17.25	17.25 - 20.70	20.70 -
OSICALA	0 - 3.38	3.38 - 4.05	4.05 - 4.50
SAN MARCOS	0 - 4.50	4.50 - 5.40	5.40 - 6.00
VILLERIAS	0 - 5.25	5.25 - 6.30	6.30 - 7.00
EL DELIRIO	0 - 3.74	3.74 - 4.48	4.48 - 4.98
SAUCE	0 - 3.75	3.75 - 4.50	4.50 - 5.00
LA CEIBA	0 - 3.00	3.00 - 3.60	3.60 - 4.00

TIEMPO DE TRANSITO EL JOBO - HACHADURA
RIO PAZ

Título del gráfico

TIEMPO DE TRANSITO A LA HACHADURA (horas) vs **NIVEL EN EL JOBO (m)**

Legend:
- □ 2003
- ◇ 2002
- Colores:
  - ■ Lluvia en Jobo y Hachadura (red)
  - ■ Lluvia en Hachadura (cyan)
  - □ Falta de informacion de Lluvia
  - ■ Lluvia en Jobo (yellow)
  - ■ Sin Lluvia en Jobo y Hachadura (green)

SNET has also a statisc record of the rivers.With this information you can calulate for example the time that takes a flood to arrive to specific place. Look this correlation graphic.

### Speed of Flow between El Jobo and La Hachadura

Level of flow	Level in El Jobo	Time in transit (hours)	Speed of the water flow (m/s)
Low	Less than 2 meters	6:00	1.58
Mid	Between 2 and 3 meters	3:53	2.44
High	More than 3 meters	2:43	3.48
Average	2.38 meters	4.19	2.20

You can monitor the conditions in real time in CPH when you have bad meteorological conditions.

An important parameter is the rainfall.

The system update the conditions rainfall every hour ,if the thresholds are exceeded the **AWS** network sends the information in random transmission to CPH then you have access to the http://www.snet.gob.sv click in bulletin-Hidrologic and you will see the Warning Alert System Map (see below) here you can choose the basin and the station of interest. Give click again on the station and you may find many options to get the last data of rainfall, graphics, etc.

The symbols in the map are in accordance the table. For example if you see a red volcano in any hidrological **AWS .**It means the level of the river is increasing, you decide in that moment what kind of information you need and the system is going to give you this one.
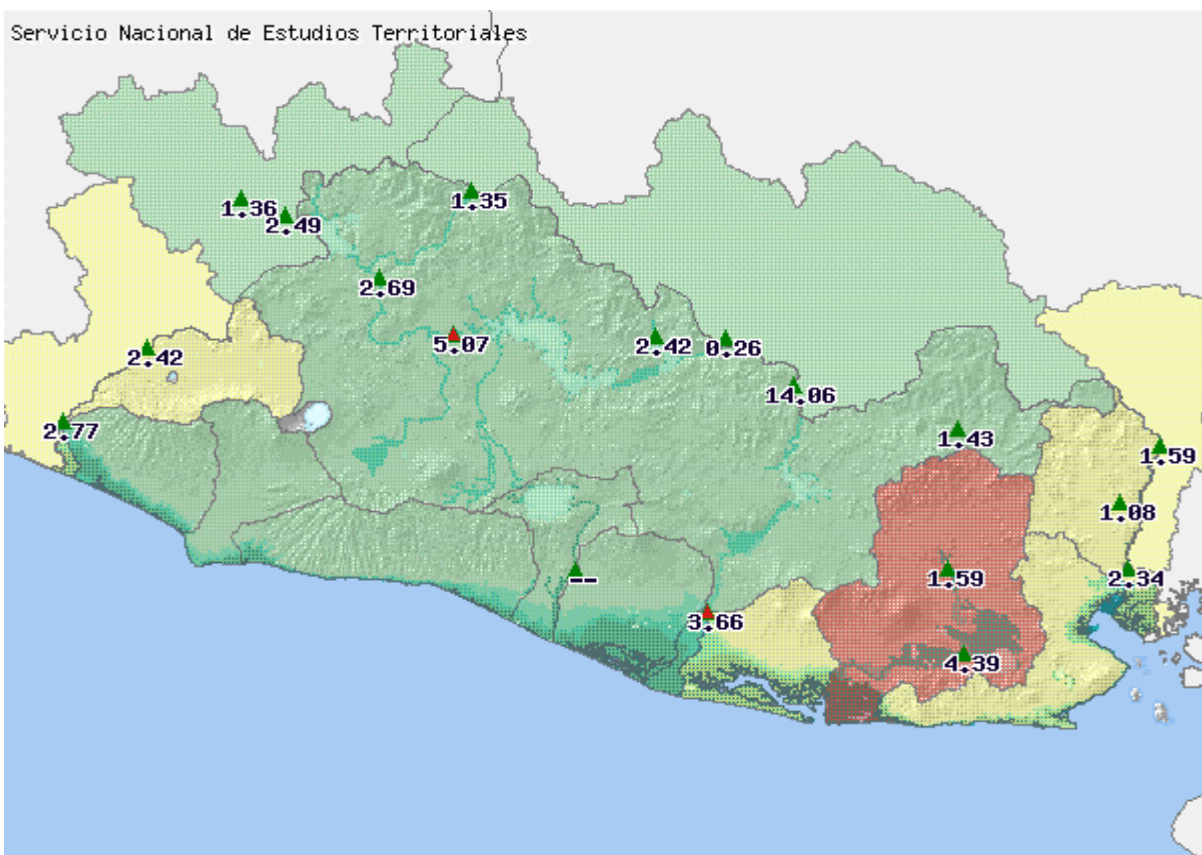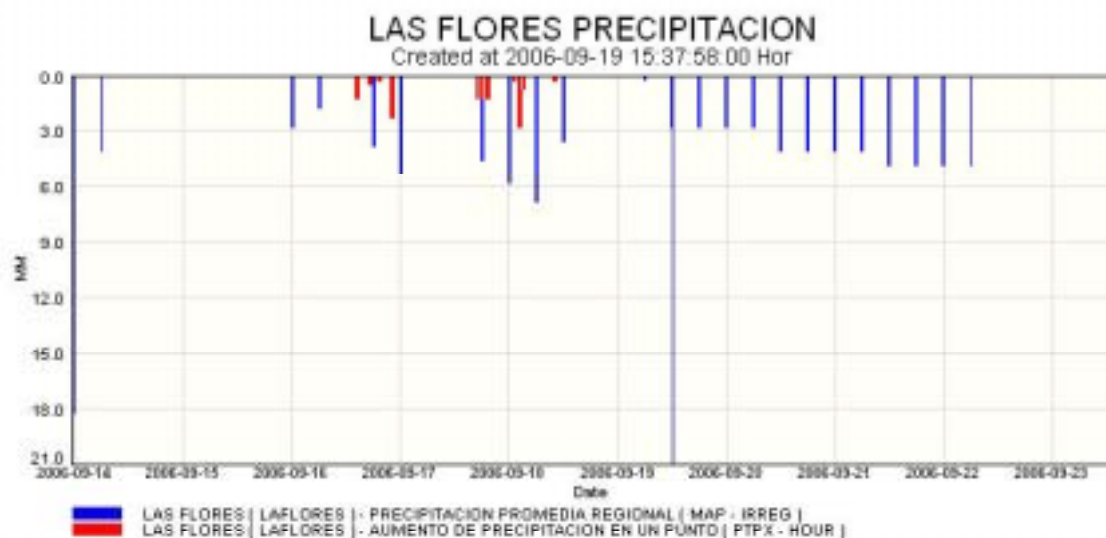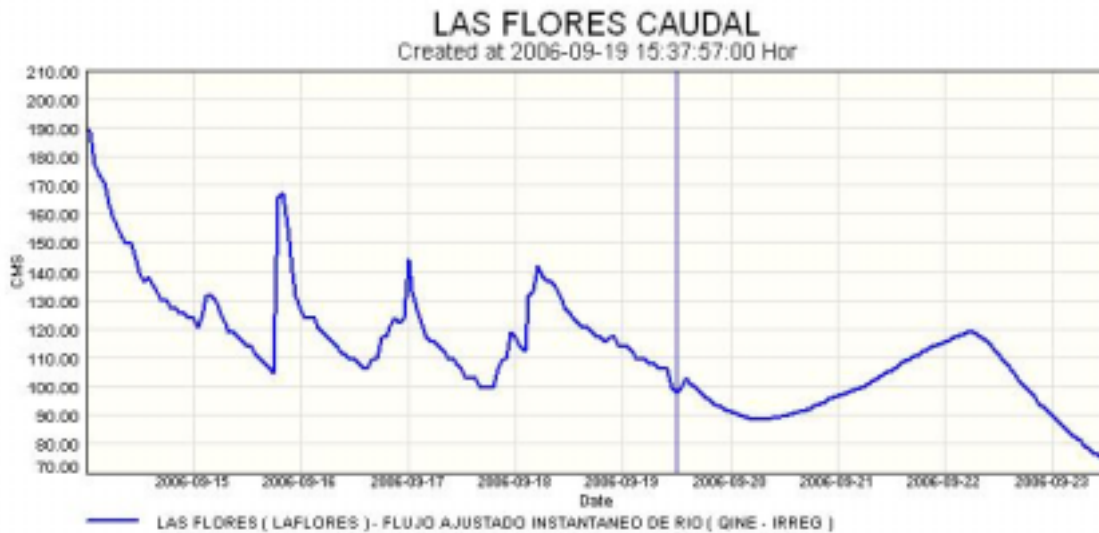

WARNING ALERT SYSTEM MAP

▲ Est. Tendencia: Subiendo
✦ Est. Tendencia: Normal
▦ Riesgo Desbordamiento: Bajo
▢ Riesgo Desbordamiento: Moderado
▦ Riesgo Desbordamiento: Alto
▢ Lagos y Lagunas
▬ Moderada Susc. a Inundaciones
▬ Alta Susc. a Inundaciones
▬ Muy Alta Susc. a Inundaciones

MAPA DE LA CUENCA INTERNACIONAL DEL RIO LEMPA

Si desea ver información de c/u de los sitios en el mapa la página le permite que al dar un clic sobre un sitio y obtendra la siguiente información:

LAS FLORES CAUDAL
Created at 2006-09-19 15:37:57:00 Hor

LAS FLORES NIVEL DE RIO
Created at 2006-09-19 15:37:58:00 Hor

The last three fig. Are the example of the information you can get in the system.

Conclusion:

The principal conclusion from this work is that the new AWS network is an excellent
Technology that permits a quantitative and cualitative improvement of the measurement
Of meteorological and hidrological parameters in El Salvador.
The introduction of this system is giving to SNET and Civil Protection more information
 In type and detail to be an effective tool in providing advance notice of potential flooding
So orderly evacuations can take place prior to the onset of flooding.Will require a strong
Effort to asure the long term sustainability of the system.