

# SADC – HYCOS PHASE 2

## INSTRUMENTATION INFORMATION FOR HYDROLOGICAL DATA COLLECTION

### PROJECT STEERING COMMITTEE MEETING

SWAKOPMUND 15 TO 17 NOVEMBER 2007

BY : PROJECT REGIONAL CENTRE

# CONTENTS

- 1. PURPOSE OF PRESENTATION*
- 2. WATER LEVEL MEASUREMENT*
- 3. WATER QUALITY MEASUREMENT*
- 4. FLOW MEASUREMENT*
- 5. HYDROMETEOROLOGICAL PARAMETERS*
- 6. DATA TRANSMISSION*

# PURPOSE OF THIS PRESENTATION

- *TO FAMILIARISE EVERYONE WITH THE VARIOUS TYPES OF INSTRUMENTATION AVAILABLE FOR THE COLLECTION OF HYDROLOGICAL DATA*
- *TO ASSIST IN DETERMINING WHAT TYPE OF INSTRUMENTATION SHOULD/CAN BE USED ACCORDING TO THE SITE CONDITIONS*

# CONTENTS

*1. PURPOSE OF PRESENTATION*

*2. WATER LEVEL MEASUREMENT*



# FLOAT - COUNTERWEIGHT

- *CHART RECORDER*
- *CHART RECORDER WITH SHAFT ENCODER/DATA LOGGER*
- *SHAFT ENCODER WITH INTEGRATED DATA LOGGER*
- *SHAFT ENCODER WITH EXTERNAL DATA LOGGER*

## PHYSICAL REQUIREMENTS

- *RECORDER TOWER WITH STILLING WELL, INLET PIPE & SHELTER*
- *RELATIVELY SILT FREE WATER*

## ADVANTAGES

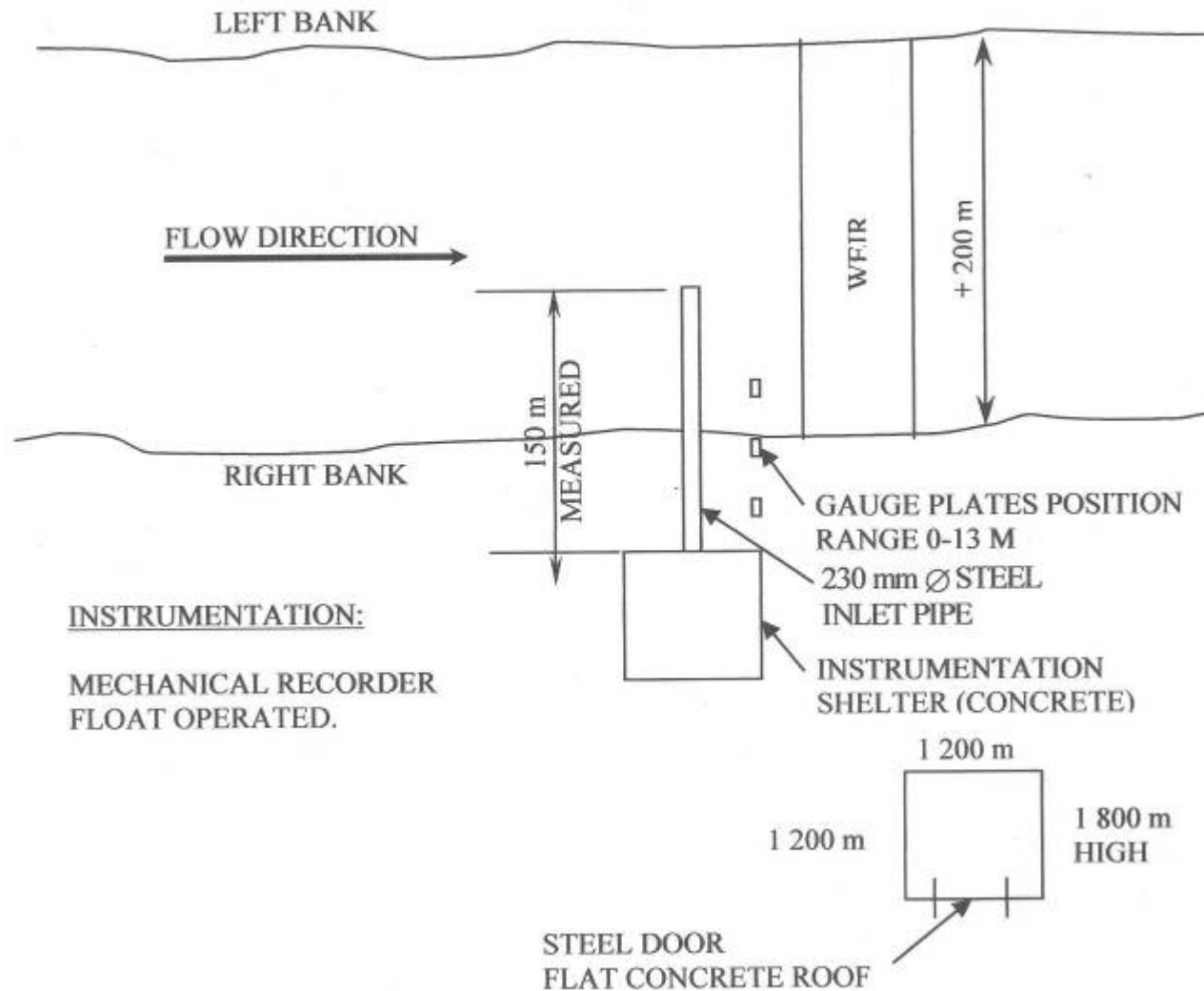
- *IF EXISTING TOWER – INEXPENSIVE*
- *SIMPLE OPERATION*
- *CHART BACK-UP*
- *LOW RISK OF LIGHTNING DAMAGE*
- *SUITABLE FOR PERENNIAL & NON PERENNIAL RIVERS*

## DISADVANTAGES

- *IF NEW TOWER TO BE CONSTRUCTED – EXPENSIVE*
- *TOWER & INLET VULNERABLE IN FLOOD CONDITIONS*
- *RESPONSE TIME SLOW*

# TYPICAL INSTALLATION FOR FLOAT COUNTERWEIGHT

## WEIR: PLAN

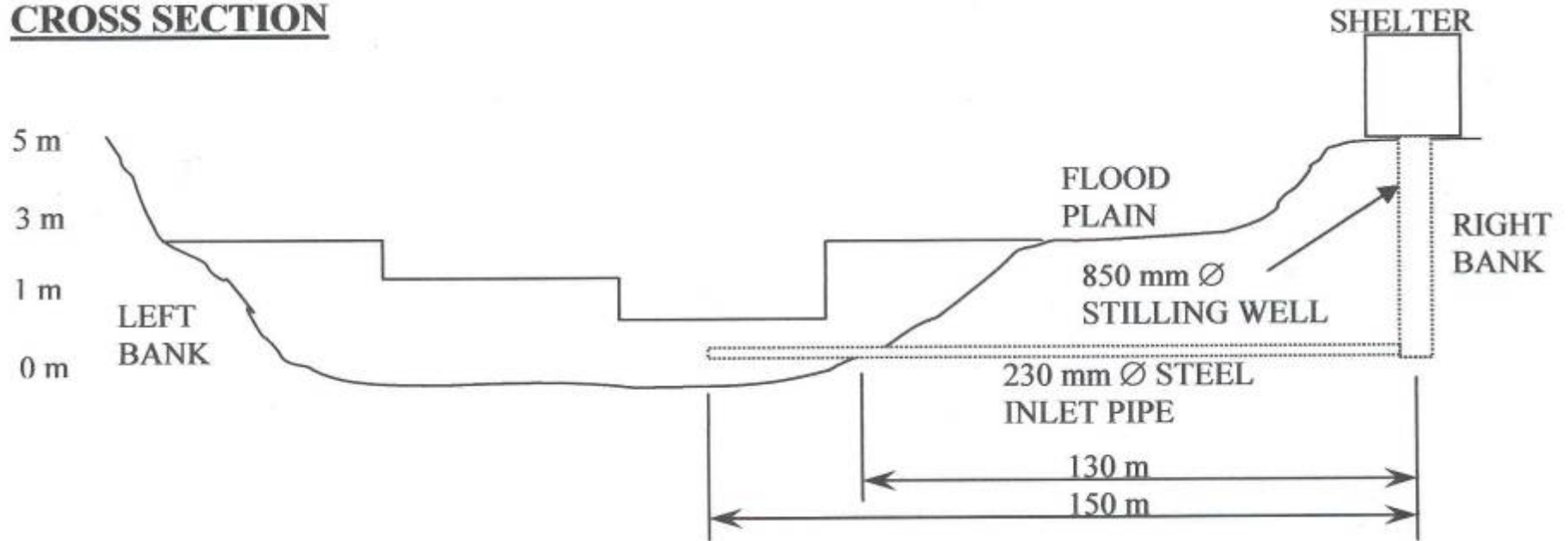


# TYPICAL INSTALLATION FOR FLOAT-COUNTERWEIGHT

230 mm Ø STEEL  
INLET PIPE

230 mm Ø STEEL  
INLET PIPE

## CROSS SECTION

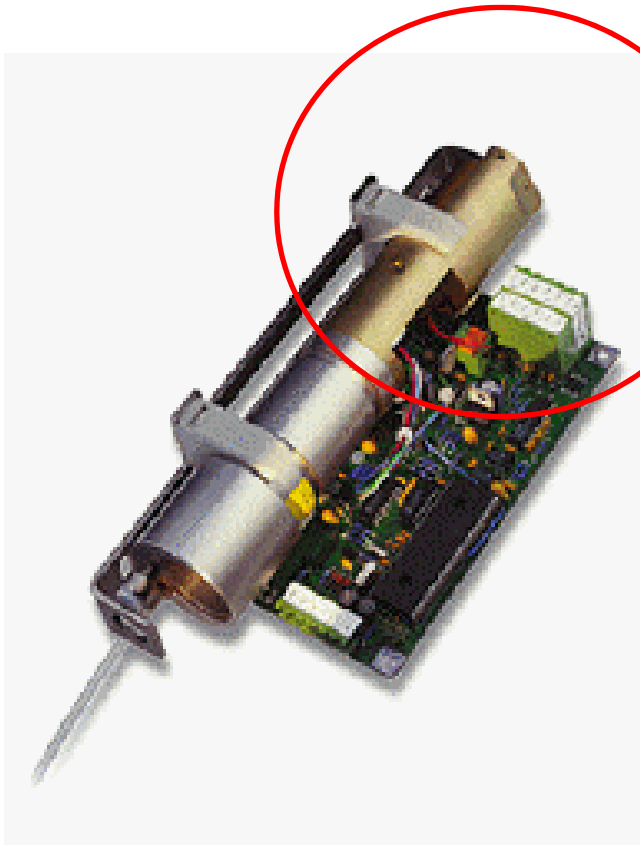


# SHAFT ENCODER WITH INTEGRATED DATA LOGGER



# BUBBLER

## TYPICAL INSTALLATION

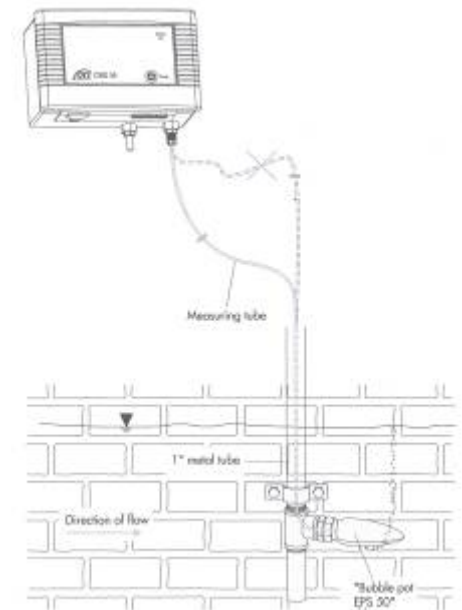


## ADVANTAGES :

- No tower
- No electrical contact with water (lightning safe)
- Tube inexpensive
- Suitable for perennial & non perennial rivers

## DISADVANTAGES

- Moving parts
- Tubing must be protected from rodents



# PRESSURE TRANSDUCER



## ADVANTAGES :

- NO TOWER REQUIRED
- RANGE SELECTABLE FOR OPTIMUM RESOLUTION
- HIGH ACCURACY
- NO MOVING PARTS

## DISADVANTAGES :

- LIGHTNING DAMAGE
- MOISTURE
- SEAL DEGRADATION IN PROLONGED DRY CONDITIONS

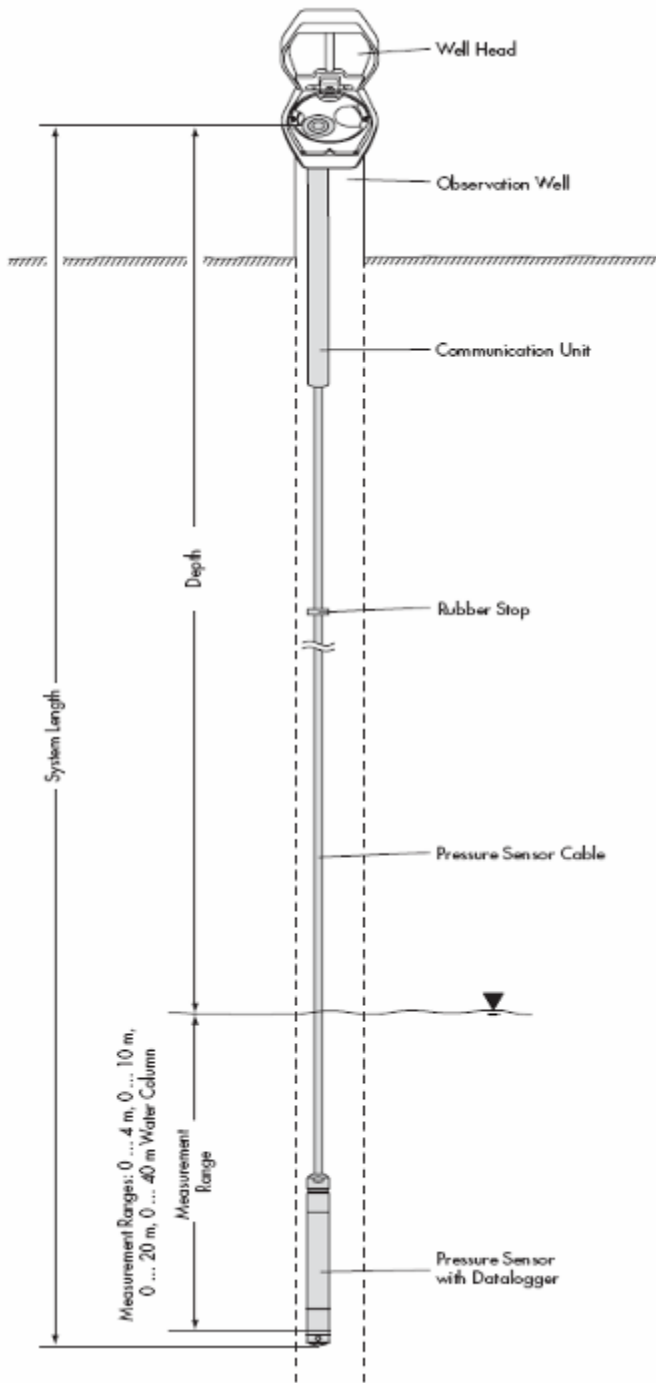
# TYPICAL PRESSURE SENSOR



- *Water level sensor*
- *High performance piezo resistive pressure sensor or ceramic cell*
- *For measuring water level and temperature*



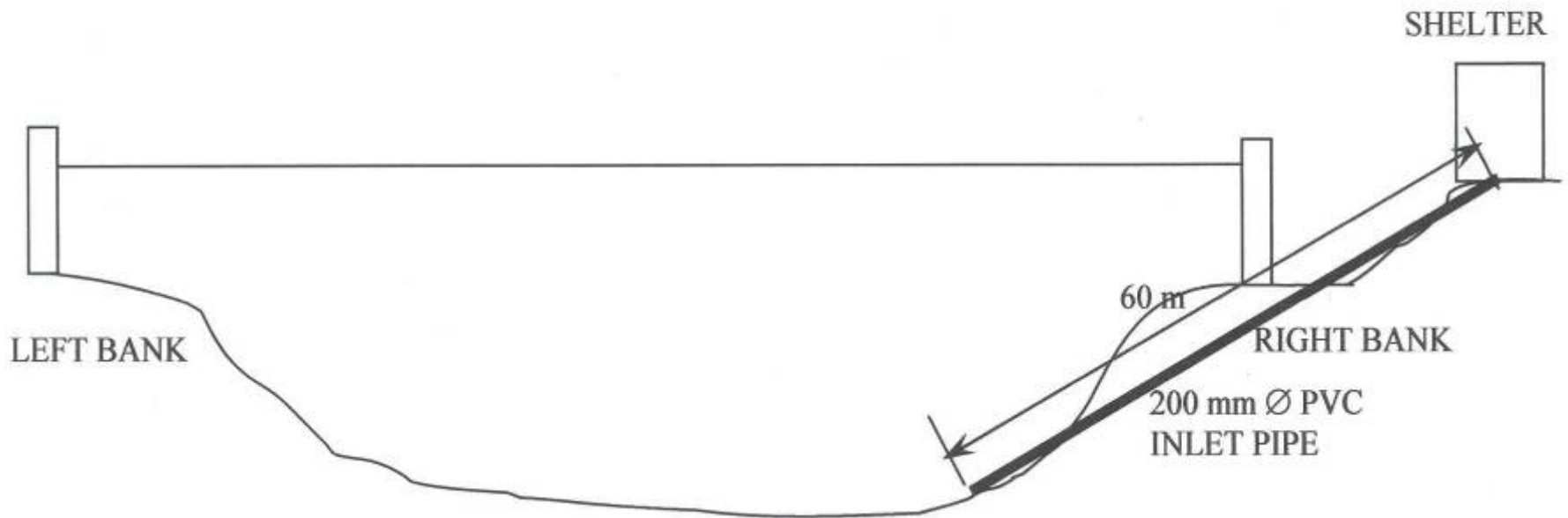
# GROUND WATER LEVEL MEASUREMENT



- **PRESSURE TRANSDUCER**
- **VENTED CABLE**
- **RESOLUTION DEPENDS ON RANGE**

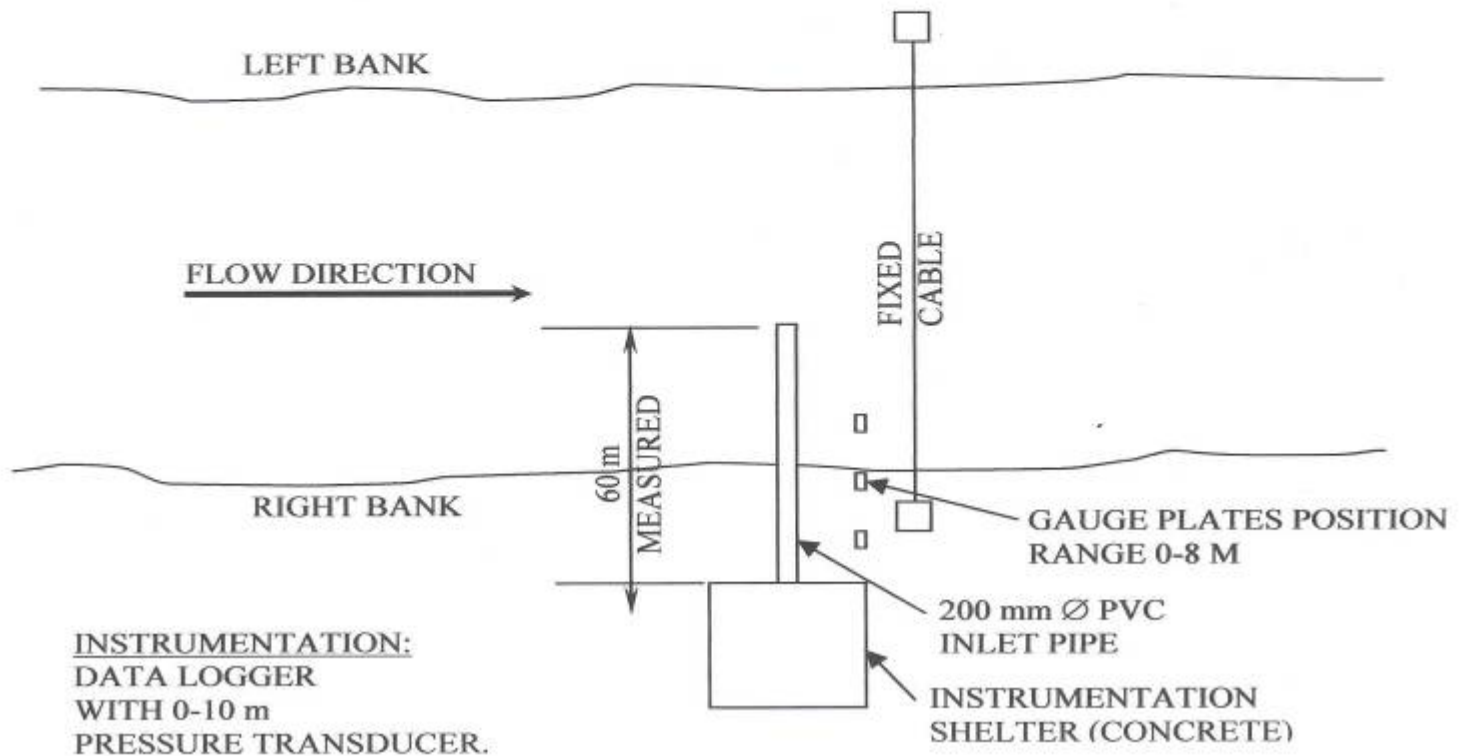
# TYPICAL INSTALLATION FOR PRESSURE AND BUBBLE SENSORS

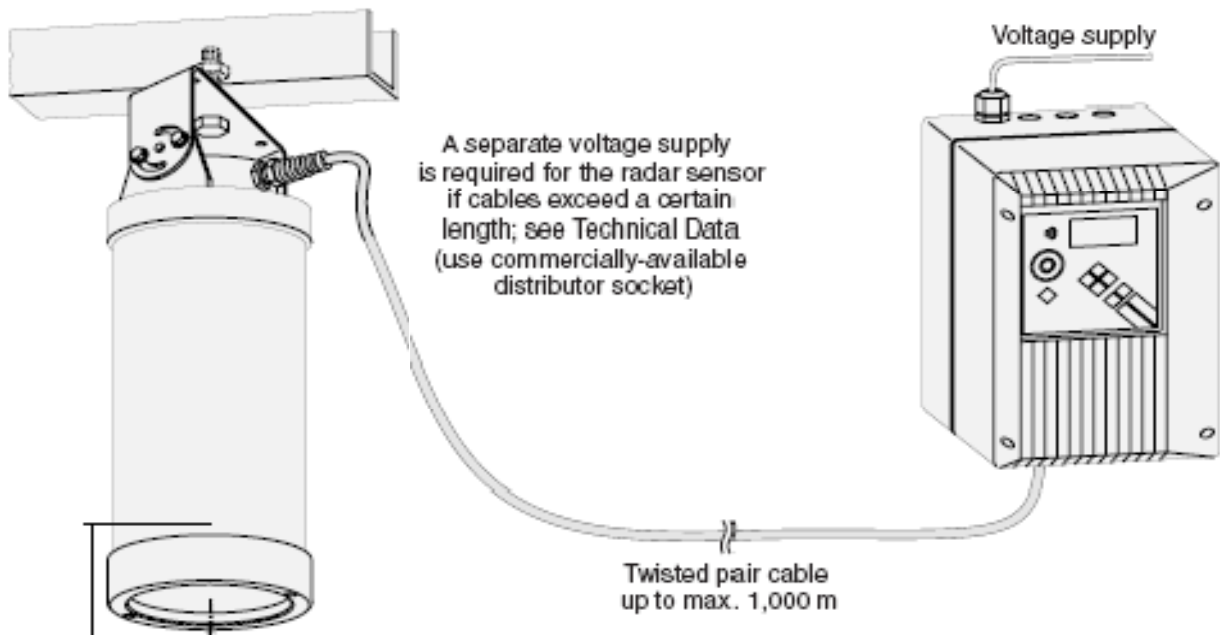
## CROSS SECTION



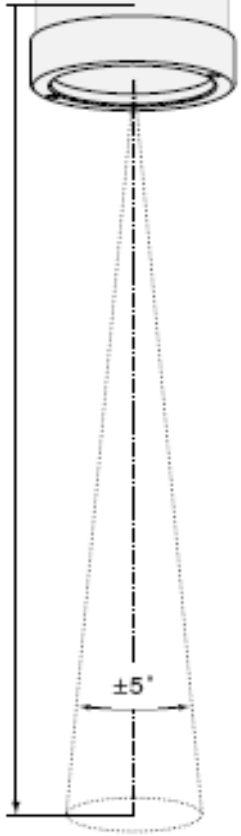
# TYPICAL INSTALLATION FOR PRESSURE AND BUBBLE SENSORS

## OPEN SECTION PLAN





# RADAR



# RADAR



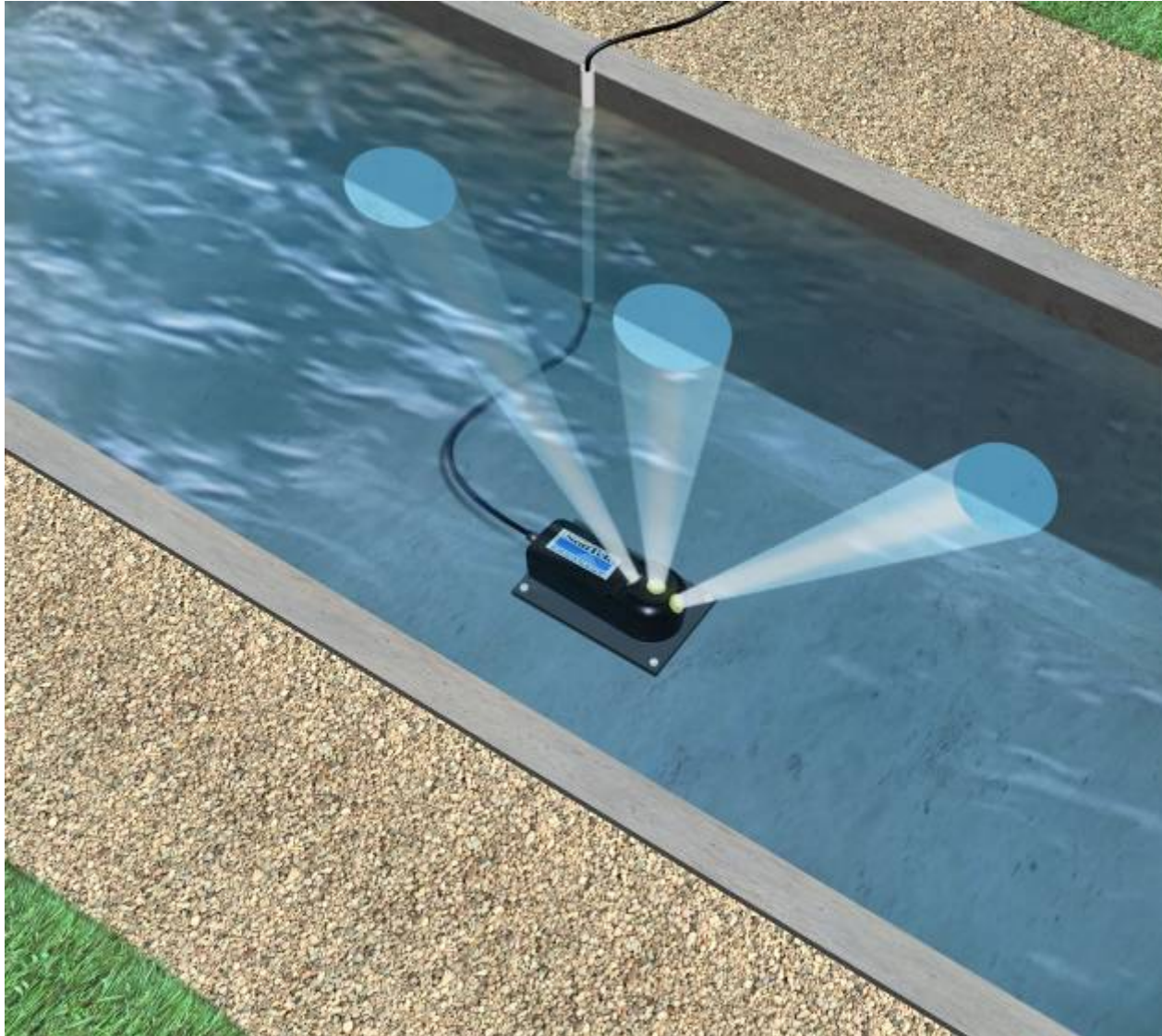
## ADVANTAGES :

- NO TOWER REQUIRED
- NOT IN CONTACT WITH WATER
- MEASURING RANGE 30m
- STABLE UNDER ADVERSE WEATHER CONDITIONS
- SUITABLE FOR PERENNIAL & NON PERENNIAL RIVERS

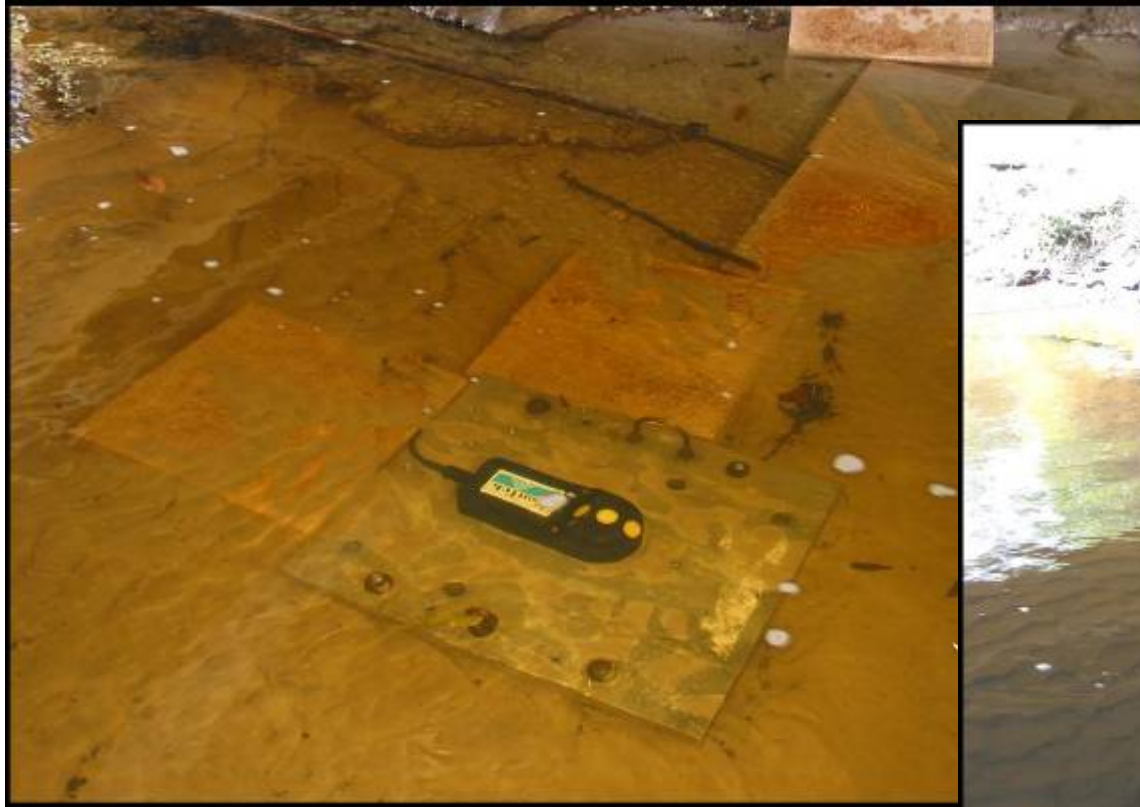
## DISADVANTAGES :

- RELATIVELY EXPENSIVE
- INSTALLATION CAN BE PROBLEMATIC IN REMOTE AREAS

# SHALLOW WATER ACOUSTIC DOPPLER WATER LEVEL & FLOW MEASUREMENT



# SHALLOW WATER ACOUSTIC DOPPLER WATER LEVEL & FLOW MEASUREMENT



2 D WATER VELOCITY MEASUREMENT &  
WATER LEVEL VIA VERTICAL BEAM

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# WATER QUALITY MEASUREMENT

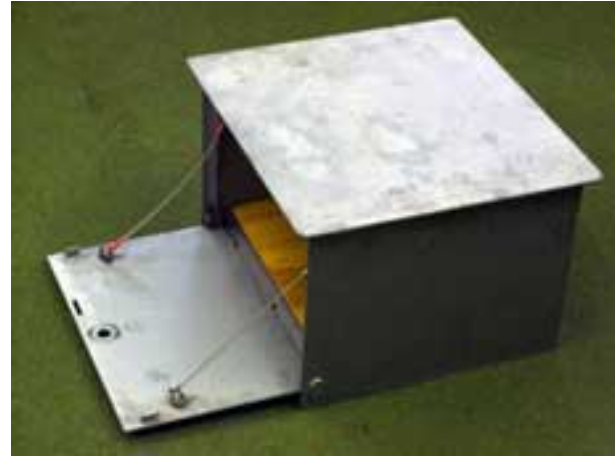


**MEASURING WATER QUALITY  
PARAMETERS UTILISING PERMANENTLY  
INSTALLED SENSORS :**

- **RUNNING WATER**
  - **VULNERABILITY**
  - **CALIBRATION**
  - **SERVICING & MAINTENANCE**
- **SOLUTION?**

**PORTABLE HAND HELD MULTI  
PARAMETER MEASURING UNIT**

# EQUIPMENT SHELTERS



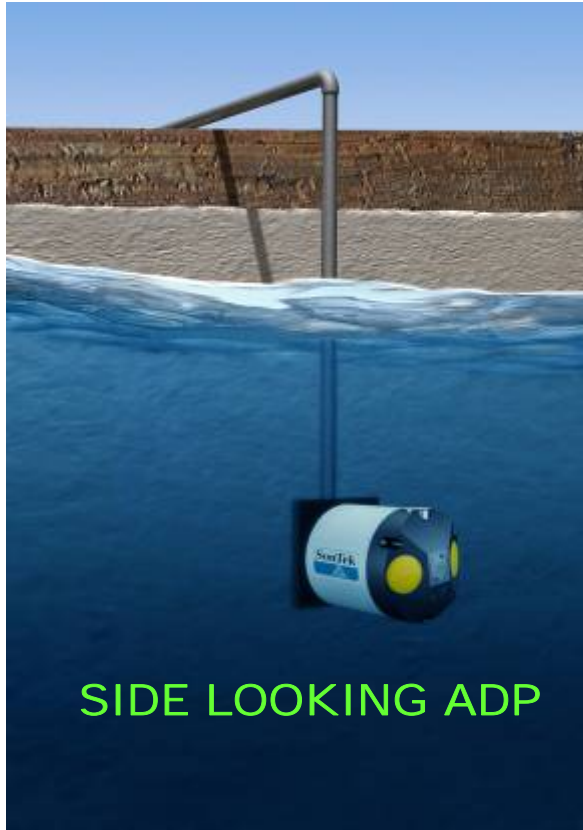


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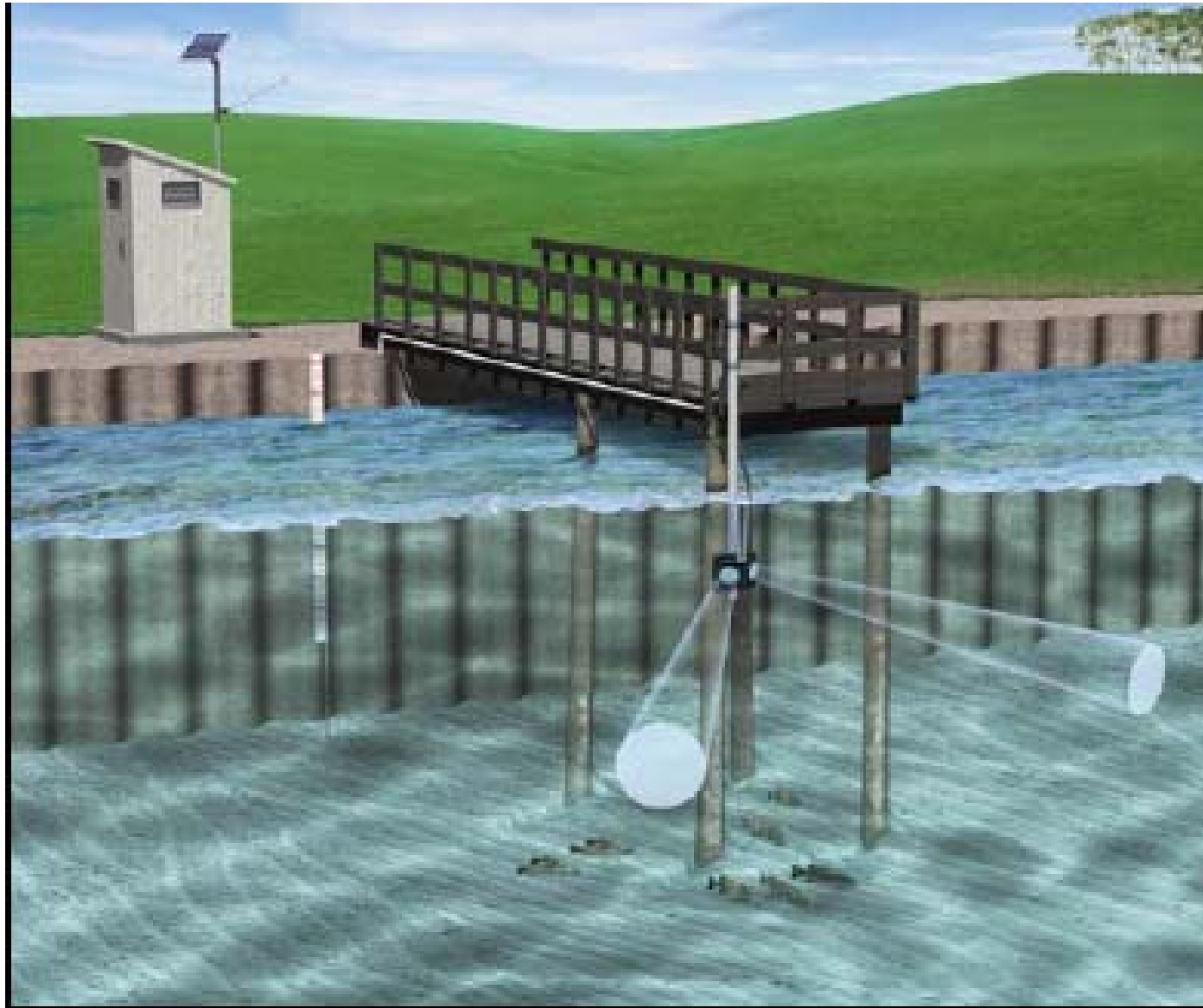
# FLOW MEASUREMENT



*CONVENTIONAL CURRENT GAUGING  
METHOD*

*ACOUSTIC DOPPLER PROFILING*

# Side Looking (SL) ADV



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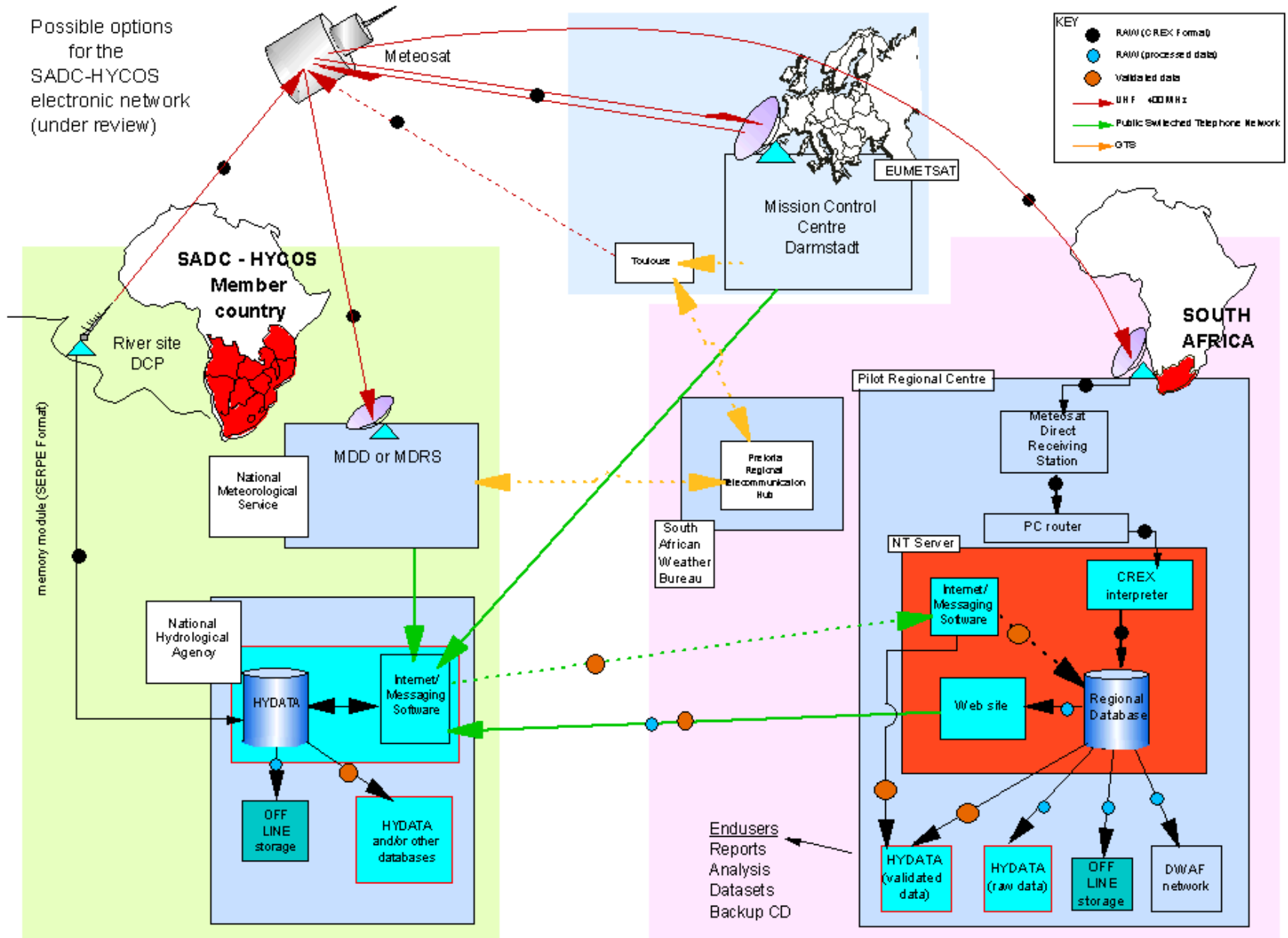
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Possible options  
for the  
SADC-HYCOS  
electronic network  
(under review)



# BEAUTIFUL NAMIBIA

*THANK YOU*

*THE END*

