EnviroDIY Monitoring Station Winter Maintenance

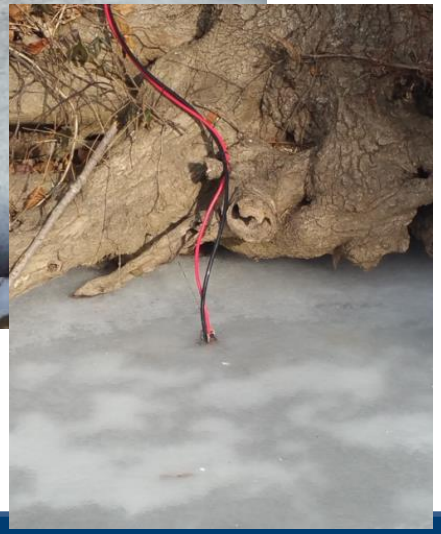



Primary winter risk: ice freezing on the CTD pressure transducer

White disc is the pressure transducer

It is ceramic and very thin – expanding ice can push on it and damage it

STROUD WATER RESEARCH CENTER



STROUD
WATER RESEARCH CENTER

STROUD
WATER RESEARCH CENTER

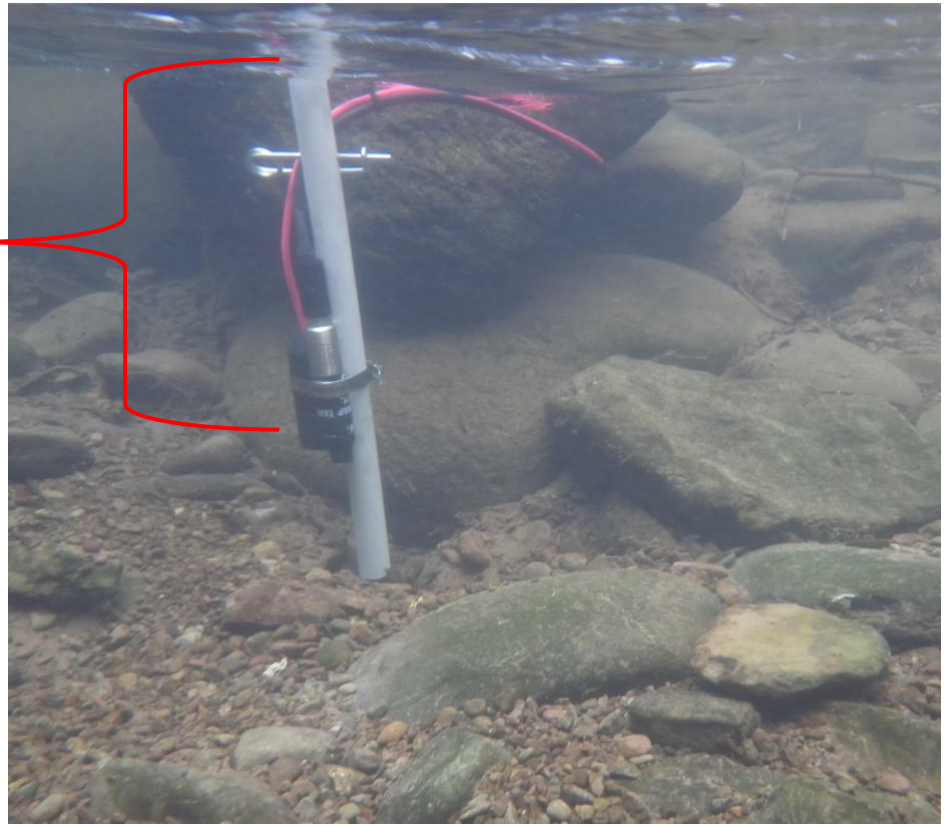
Primary winter risk: ice freezing on the CTD pressure transducer

- Conditions that are high risk for ice damage to CTD sensor
  - Shallow water – depth (as read by CTD sensor) at baseflow is less than 200mm
  - Slow water – ice forms quicker and deeper
  - Cold air temperatures – less than 32 degrees for several days or more
  - Water temp near 0degC

Deep water is low risk

In this case, for damage to occur ice would need freeze >10in deep

VERY LOW RISK



Stroud Water Research Center

Deep water is low risk

Because of proper choice of sensor location, most sensors are in water deep enough to avoid sensor freeze

Ice forms above but not around the CTD sensor

Shallow water is high risk

Small streams with sensors in shallow water (less than 200mm) are generally the highest risk

STROUD WATER RESEARCH CENTER

Options for handling high-risk situations (i.e., shallow slow moving water)

- Monitor conditions and data and clear ice as needed
- Remove the sensors for the winter
- Consider moving the sensors to deeper or faster moving water

What should I do if I need the data but my sensor is at risk?

- Pay attention to the physical conditions
  - The stream
  - The ice formation rate, depth, location
  - The sensor in relation to ice
- Pay attention to the data
  - To the weather and temperature (32degF, 0 degC) – use 10-day forecasts
  - To water depth (as measured by the CTD)
    - Less than 200mm is high risk
- **Then, as needed, clear ice before it builds up (continued on next slide)**

STROUD WATER RESEARCH CENTER

What should I do if I need the data but my sensor is at risk?

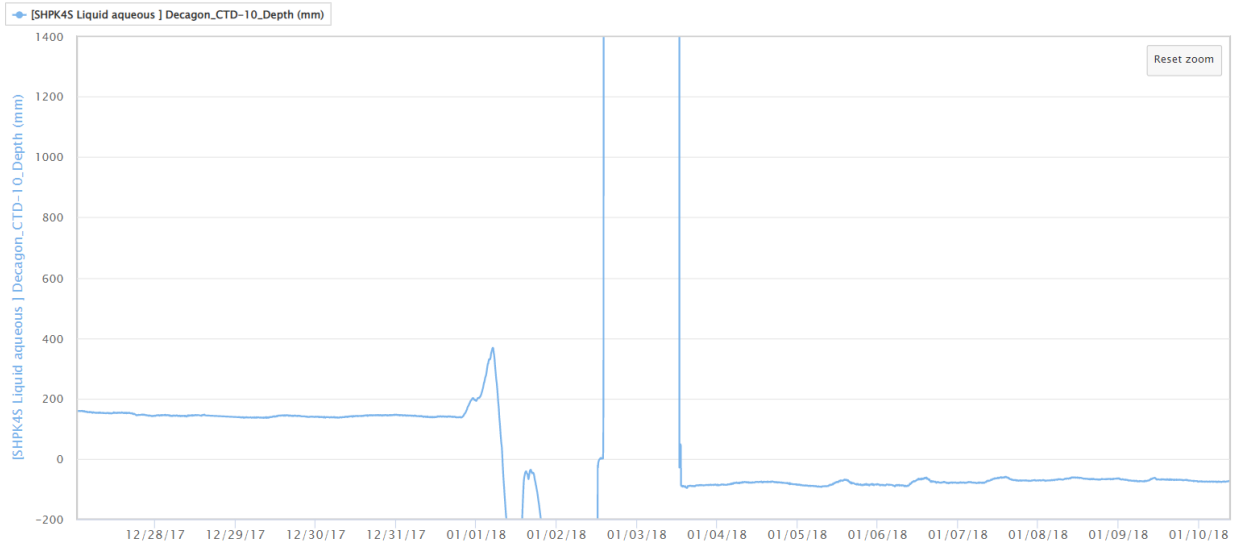
- Then, as needed, clear ice before it builds up in the area around the sensor
  - **Especially be sure to remove ice before it is able to attach to the sensor body**

STROUD WATER RESEARCH CENTER

What if ice does end up forming around my CTD sensor?

- Can I break the ice around the CTD sensor?
  - NO!!! Breaking ice that is attached to a CTD sensor adds risk to transducer damage
- Is there anything I can do once ice has formed around the CTD sensor?
  - Not really - note the conditions under which this happened and be prepared next time to clear ice away OR remove sensor during winter

Are there any data signals that are obvious red flags?



- If it's freezing temperatures and depth is currently 200mm or less this is HIGH RISK – ice may be close to the CTD
- Wacky depth and conductivity readings can indicate ice has formed on the CTD sensor

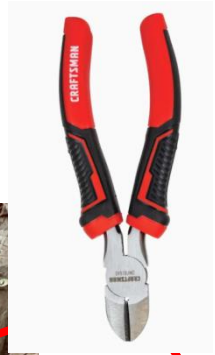
STROUD WATER RESEARCH CENTER

Are there any data signals that are obvious red flags?

- If it's freezing temperatures and depth is currently 200mm or less this is HIGH RISK – ice may be close to the CTD
- Wacky depth and conductivity readings can indicate ice has formed on the CTD sensor

STROUD WATER RESEARCH CENTER

If I want to remove the sensor bundle for the winter, how should I do this?

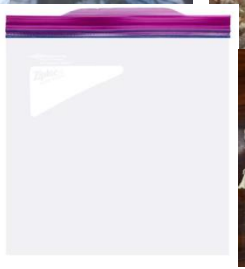


- Turn OFF the station
- Clip zip ties that are holding wires in place (on roots and on tent stakes)
- Pull up and keep tent stakes

(Cont'd next slide)

If I want to remove the sensor bundle for the winter, how should I do this?

(Cont'd from prev slide)



- Remove bundle pin and remove sensor bundle (re-insert pin into rebar)
- Organizing wires and sensors
  - Wind up extra wire and zip tie to logger pole
  - Dry sensor bundle and secure it along with sensor wire to the logger pole
  - Cover/seal sensor bundle with towel and then plastic bag and position so water cannot seep into bag

STROUD WATER RESEARCH CENTER

If I want to remove the sensor bundle for the winter, how should I do this?

(Cont'd from prev slide)

- Can also remove entire station from the site – follow previous steps and use hose clamp driver to remove logger box

Primary winter risk: freezing of the CTD pressure transducer

SUMMARY:

What should I definitely DO?

- Monitor the ice risk at specific sites:
  - Shallow water (less than 200mm)
  - Slow water (little movement)
  - Air temp under 32degF for multiple days
  - Water temp near 0decC
- Monitor the station
  - Pay close attention to the conditions on-site – **visit high-risk stations weekly**
  - Pay close attention to the data – **check online data daily**

(Cont'd next slide)

Primary winter risk: freezing of the CTD pressure transducer

SUMMARY

What should I definitely DO?

- If high risk, carefully consider your moves
  - **Are you willing to lose a sensor to get the data?**
- Consider lining someone up to track MonitorMW daily (this is good to do all the time)
- Consider lining up rugged people to do winter maintenance

- *Reach out to the EnviroDIY community and the Stroud Center with questions/concerns*

Primary winter risk: freezing of the CTD pressure transducer

SUMMARY

What should I definitely NOT DO?

- Break ice after it has attached to the CTD sensor
- Use a hammer, saw, or other tools to break ice around or on sensors
- Be gentle with all work – e.g., don't yank on frozen wires or wires buried in frozen soil

STROUD WATER RESEARCH CENTER

Other winter risks: snow cover on solar panel

Not a serious issue but can affect battery levels

Just clear it off with your hand, brush, or towel

Health/Safety Risks

- Cold hands, cold body, cold nose, cold toes, etc.
- Accidents – risk of accidents goes up when you're cold, stressed, or hasty
  - **Being cold/numb can exacerbate problems and increase accident risk**

Safety precautions

- Proper clothes
- Hand warmers
- **Towels**
- **Waterproof or neoprene gloves**

- *If you're alone, make sure someone knows you're out and when to expect you back
  - If you don't have reliable cell coverage consider a GPS emergency tracker

Questions?

- Contact:
  - Dave Bressler, dbressler@stroudcenter.org, 410-456-1071, 610-268-2153 ext 1312
  - Rachel Johnson, rjohnson@stroudcenter.org, 610-268-2153 ext 1239
  - Shannon Hicks, shicks@stroudcenter.org, 610-268-2153 ext 1267
  - Christa Reeves, christa@musconetcong.org, 727-520-5849

STROUD WATER RESEARCH CENTER