# OFEG-TECH
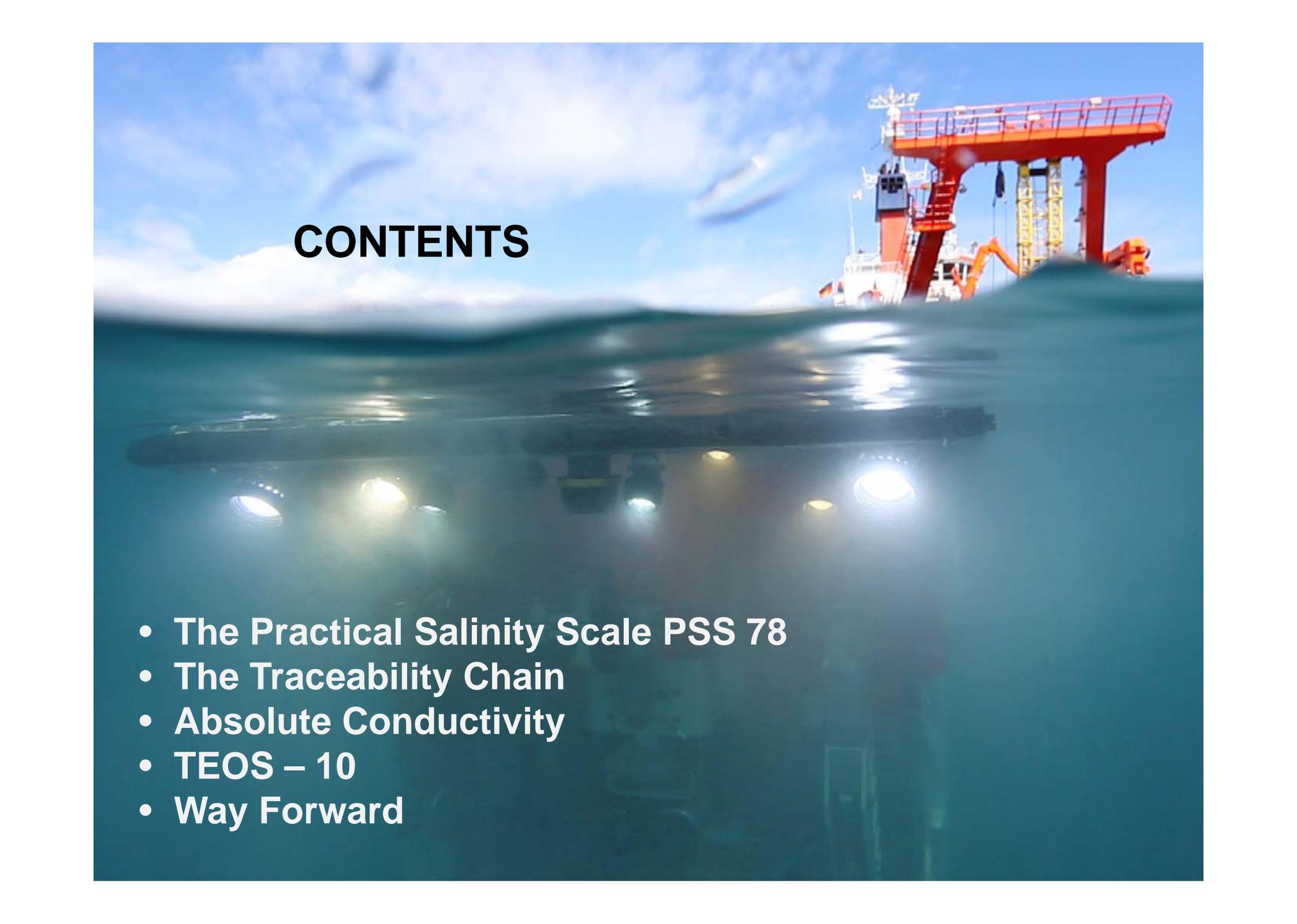
## Improving uncertainty of CTD measurements by making them traceable to SI units

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# CONTENTS

**Practical Salinity (PSS78)**

A seawater of practical salinity 35 has a conductivity ratio of unity at 15°C with a KCl solution containing a mass of 32.4356g KCl in a mass of 1 kg of solution

IAPSO Standard Seawater is available in sealed glass bottles, each containing ca.200ml of natural seawater.
The bottle label carries information on its conductivity ratio (K15) and salinity according to the Practical Salinity Scale 1978 (PSS78)

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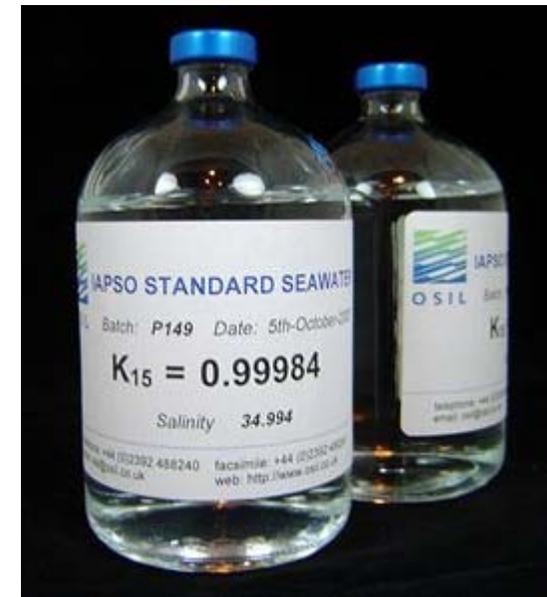
# The Practical Salinity Scale

- Practical Salinity is calculated from this scale which is based on a series of laboratory controlled determinations

- It has no units or dimension. The algorithms in PSS78 were adjusted to eliminate....

  **ppt, parts per thousand, $^0/_{00}$, p.s.u.**

- IAPSO Standard Seawater is the only internationally accepted transfer standard

- Chlorinity is an independent chemical parameter not linked with salinity

**PRACTICAL SALINITY IS NOT TRACEABLE TO SI UNITS!**

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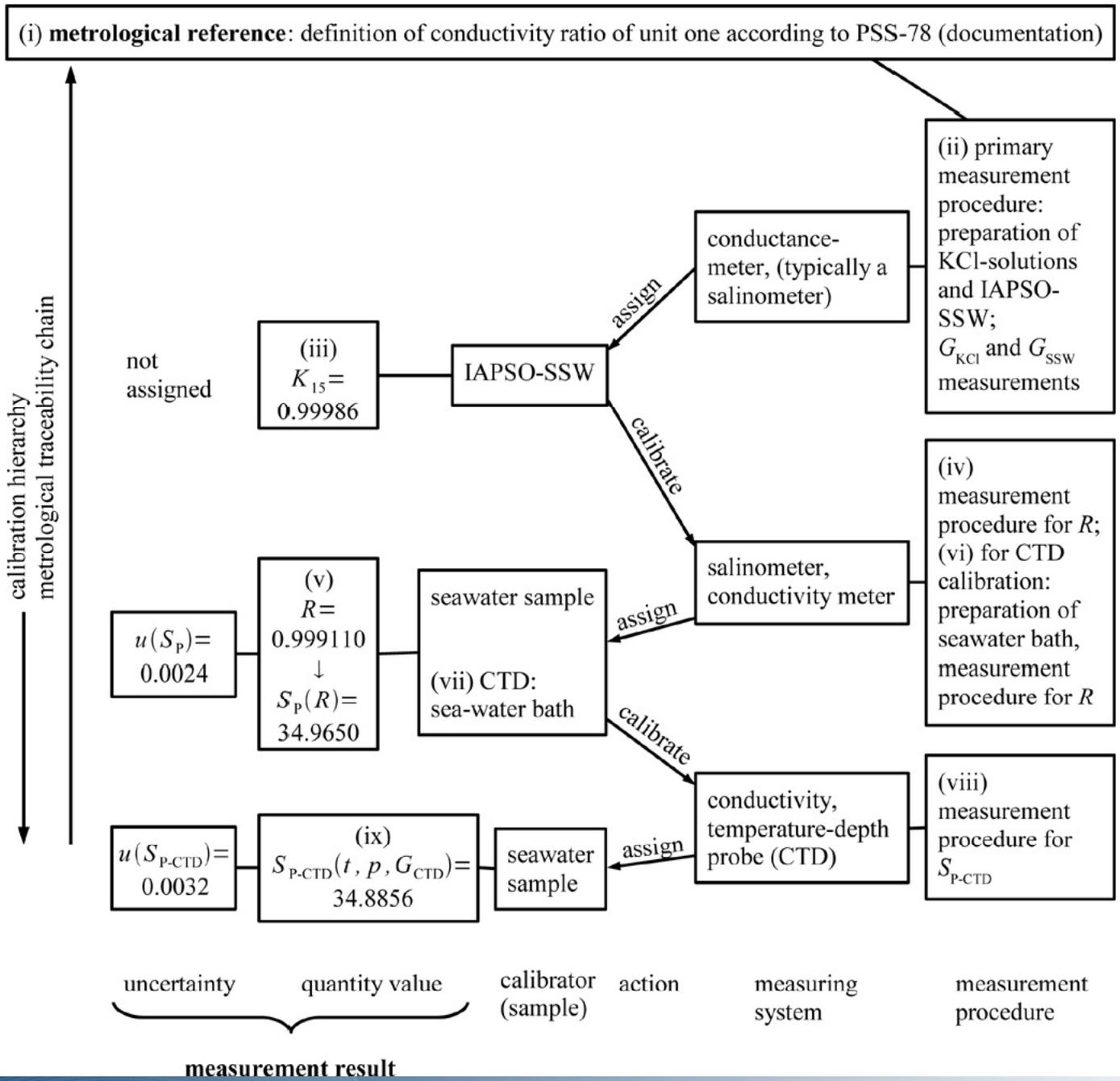
# EMRP
## European Metrology Research Programme
▶ Programme of EURAMET

## Metrology of Ocean Salinity and Acidity
### JRP 07e    Ocean Metrology

EURAMET
European Association of National Metrology Institutes

**Limitation of the current state-of-the-art**

**Practical Salinity**
Not SI traceable

Long-term data comparability not guaranteed

**Scientific work packages**

**WP1** Traceability of Practical Salinity based on density standards
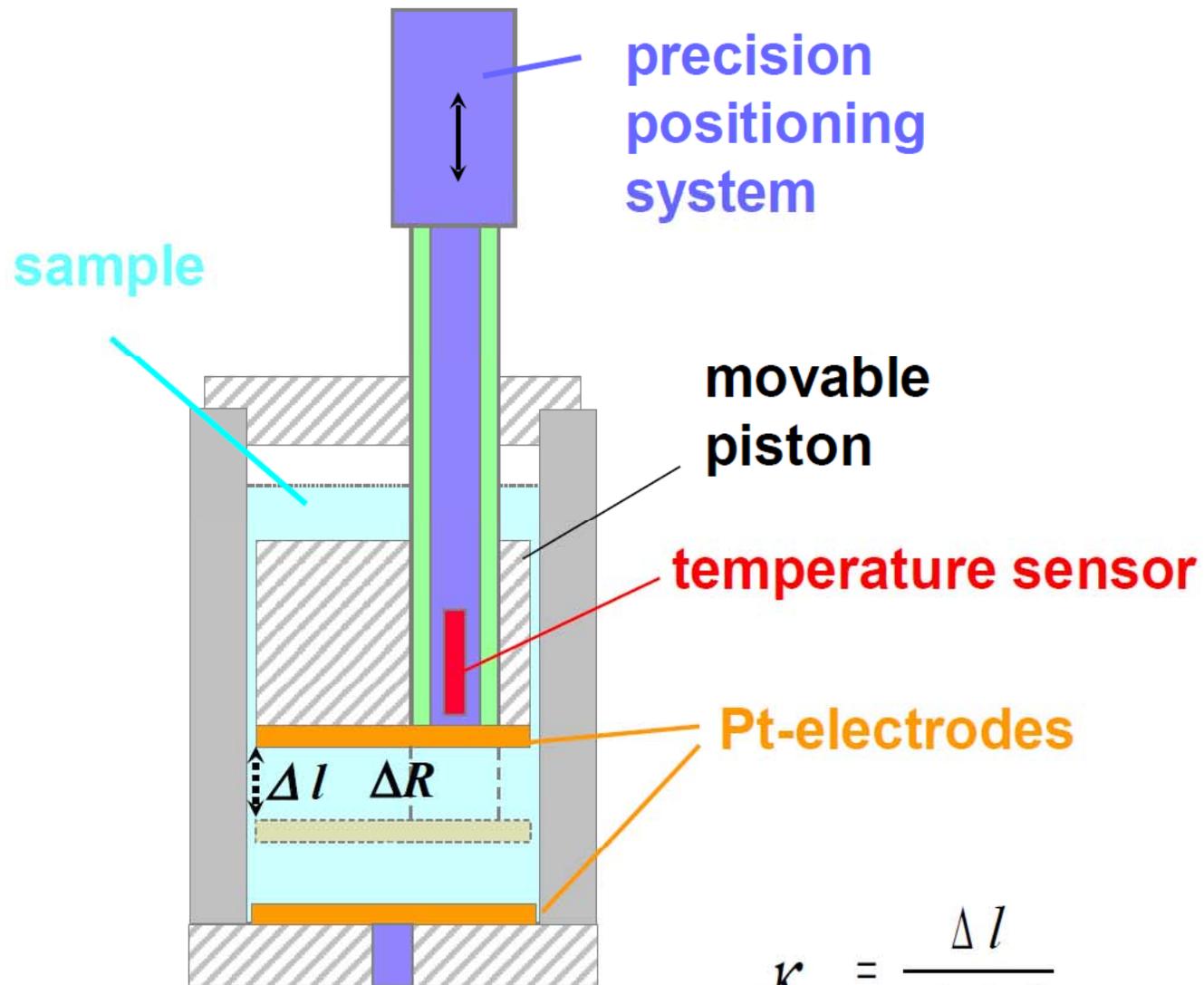
Up to high pressure (100 MPa)

89 PM

**Impact**

SI traceability for Standard Seawater

Transfer standard for CTD sensor calibration

precision positioning system

sample

movable piston

temperature sensor

Pt-electrodes

$\Delta l$   $\Delta R$

$$\kappa = \frac{\Delta l}{A \cdot \Delta R}$$

# TEOS-10

- Salinity is connected to thermodynamic properties

- A reference composition for salinity measurements have to be defined

- Difference in compositions in different parts of the world's ocean is accounted for by correction tables

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# Way Forward

- Absolute Conductivity Method has to be established (still work in progress)

- Alternatives have to be found like speed of sound and refracrive index

- The relation between the measurement proxies and salinity/density will always stay ambigiuous

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