

A person in a light blue shirt and dark pants stands in a lush green field, reaching up towards a large white balloon floating in a clear blue sky. The balloon is suspended by a thin line. A semi-transparent grey rectangle is overlaid on the left side of the image, containing the title text.

Reducing the Environmental Impact of Radiosonde Observations

Matti Lehmuskero

Product Line Manager, Soundings, Vaisala

January 31st, 2024

VAISALA



Agenda

- Introduction
- Vaisala BioCover™ and BioTwine™
- Disintegration and mechanical strength test results
- Comparison of sounding results for BioCover™ and BioTwine™
- Summary and further information



CLIMATE CHANGE

Increasing **knowledge and resilience** to extreme weather

Enhancing production process efficiency, **decreasing emissions**



RENEWABLE ENERGY

Optimizing production and utilization of **renewable energy sources**, such as wind, solar, and biogas



RESOURCE EFFICIENCY

Increasing **efficiency and productivity** in buildings and industrial processes

Enabling **safe, efficient, and sustainable transport** systems in road, rail, sea, and air traffic



WELL-BEING AND HEALTH

Providing data on environmental **indoor and outdoor conditions**

Monitoring development and manufacturing in **regulated industries like life science**



SUSTAINABLE SOLUTIONS

Vaisala sustainability in action

SUSTAINABLE BUSINESS PRACTICES



PEOPLE

Diversity, equity, and inclusion (DEI)

DEI index **4.2/5**

Targets to Increase gender balance in tech and management

Targets to increase multi-culturality



Well-being and development

Well-being index **4.0/5**

Learning index **3.9/5**

Occupational health and safety

Reducing work-related injuries and enhancing the safety culture

ENVIRONMENT

Energy and emissions

100% renewable electricity

Science-based targets to reduce Scope 1 and 3 emissions

Recognized **European climate leader** (Financial Times)



Sustainable product design

Energy efficient, easily maintainable and recyclable products

Long product life cycles of even **20 years**

Waste

Recycling rate **66%**



ETHICS AND COMPLIANCE

Code of conduct

Code of Conduct trainings for employees and partners



Human rights, anti-corruption, and information security & privacy

Mitigating risks in our own operations and partner network

Radiosondes Are Used Everywhere



Terminology should be unambiguous

Bio-based

- Refers to the source of the material only, bio-based is not interchangeable with biodegradable

Biodegradable

- Material degrades over a period of time in natural environment to the base substances such as water, carbon dioxide, methane, basic elements and biomass

Microplastic

- Plastic particles with the size less than 5 mm (0.20 in) in length, that remain in the nature after disintegration



RS41 E-models with Vaisala BioCover™

- Bio-based, compostable, and plastic-free materials (cover, insulation)
- Biodegradable mechanical parts (cover, insulation, fasteners, string pin)
- Reliable and accurate observations, performance verified in soundings



RS41-SGE vs standard RS41-SG

- Reduction of non-biodegradable plastic is 66%
- Weight increase from 80 g of standard RS41 to 90 g of RS41-SGE
- Negligible changes in dimensions
- The unwinder body and battery holder remain from conventional plastics



Introduction to Vaisala BioTwine™

- Biodegradable material
- No microplastics after the disintegration
- Made from cellulose-based fiber
- Closed manufacturing process where 99% of organic solvent can be recovered and reused

Four test environments for BioCover and BioTwine



Home compost

Freshwater

Grassy terrain

Baltic Sea

Predictions of complete disintegration times in different environments for BioCover

Environment	Cover	Insulation	Fasteners and unwinder pin
Home compost	8 months	4 months	15 months
Freshwater, temperature < 5 °C	50 months	8 months	19 months
Grassy terrain	27 months	3 months	5 years
Baltic Sea	17 months	< 1 month	

Results of twine comparisons

mechanical strength

Material	PP (kg)	Cotton (kg)	Biodegradable twine (kg)
Dry	11.54	11.63	8.48
Wet	9.24	13.74	7.03
Compost 5 months	6.87	-	1.26
Freshwater 5 months	5.77	-	2.12
Terrain 7 months	-	7.55	1.91
Baltic Sea 1 month	-	7.20	1.86
Baltic Sea 8 months	-	3.01	0.46



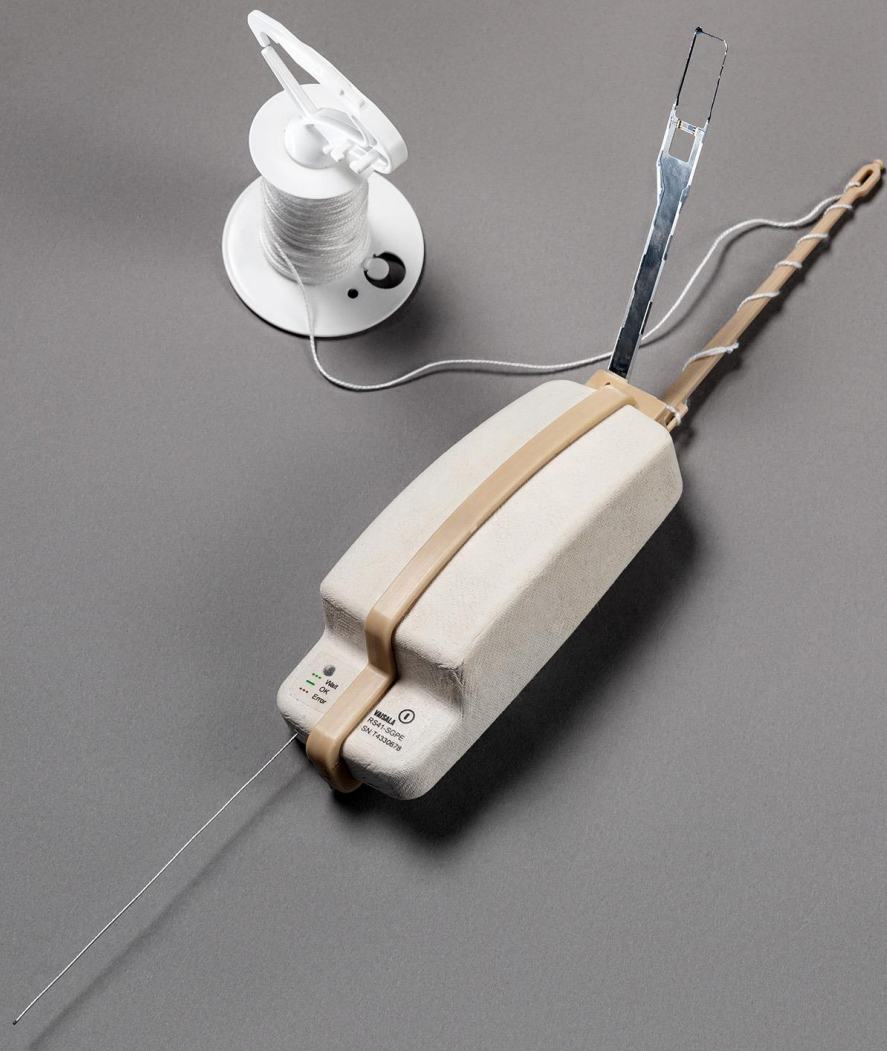
8 months in Baltic Sea

RS41 E-models Comparison Sounding Results

Carried tests

- RS41 E-model vs. standard RS41 with EPS covers
- Flight comparisons between unwinders with biodegradable twine (right) and polypropylene string (left)
- Based on comparison soundings the change to BioCover™ or BioTwine™ does not have any impact on the measurement performance of RS41
- Technical Paper available on the test results





Summary

- Reducing the environmental impact of soundings is important as radiosondes are used everywhere
- RS41 E-models with BioCover™ and BioTwine™ are an industry first in biodegradable materials
- Disintegration and mechanical strength have been tested in four different environments
- Based on comparison soundings the change to BioCover™ or BioTwine™ does not have any impact on the measurement performance of RS41

VAISALA