

塑造智慧变革



HEXAGON

海克斯康



北京
国家会议中心

2018年

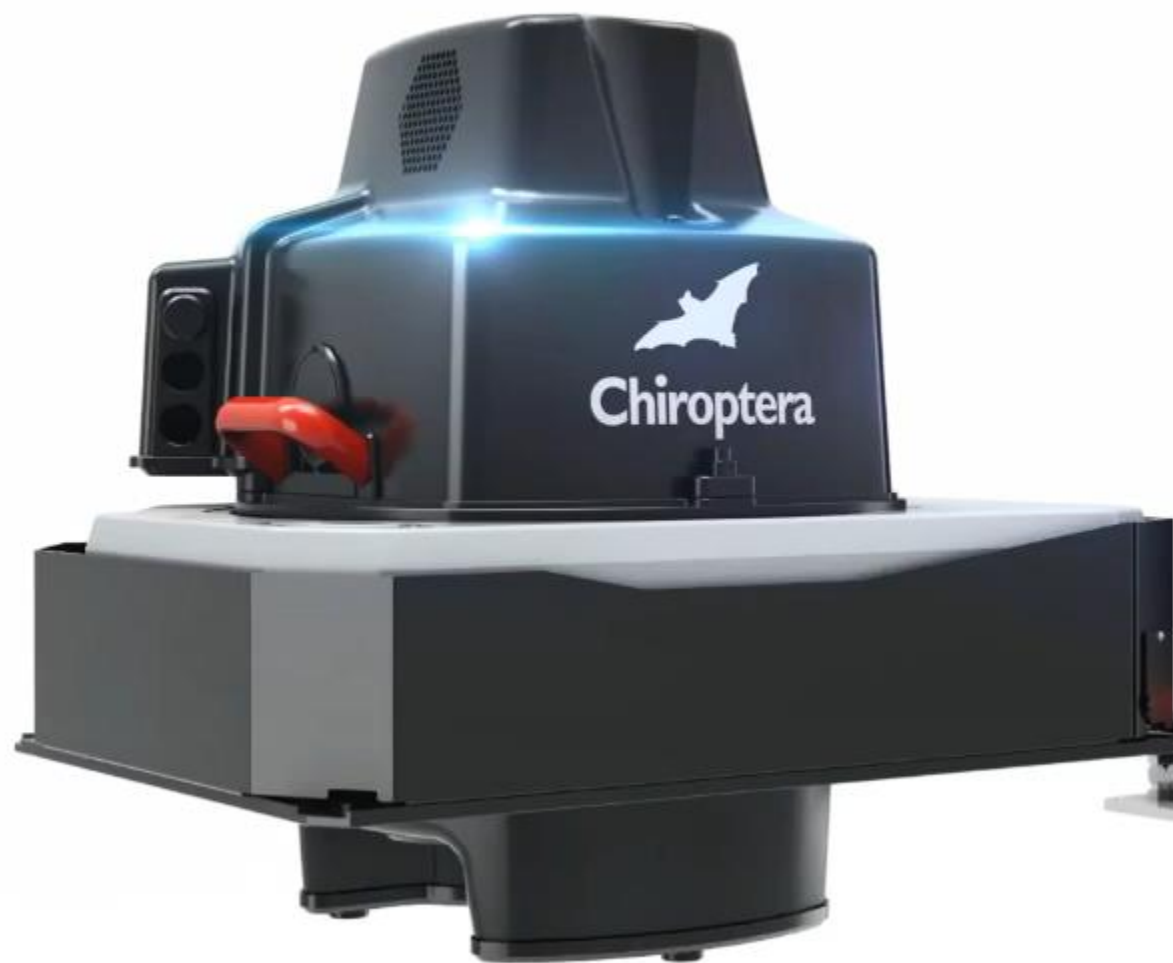
9月10-12日

2018.hexagonchina.com.cn

Experiences of Leica HawkEye and Chiroptera around the globe. 徠卡鹰眼&蝙蝠的全球应用

Anders Ekelund — VP, Bathy Lidar (副总裁)

11 September 2018



Agenda 日程

1. Topo / Bathy LiDAR general overview

- a) System principles
- b) Performance and accuracies
- c) Installation
- d) Typical end products

2. Application examples around the globe

- a) Coastal monitoring
- b) Sea-bed vegetation mapping
- c) Hydrographic charting
- d) River surveying
- e) Inland water surveys
- f) Islands survey
- g) Irrigation management

3. Summary and conclusions

1. 水陆激光雷达概述

- a) 系统原理
- b) 性能和精度
- c) 设备的安装
- d) 最终产品

2. 全球的应用案例

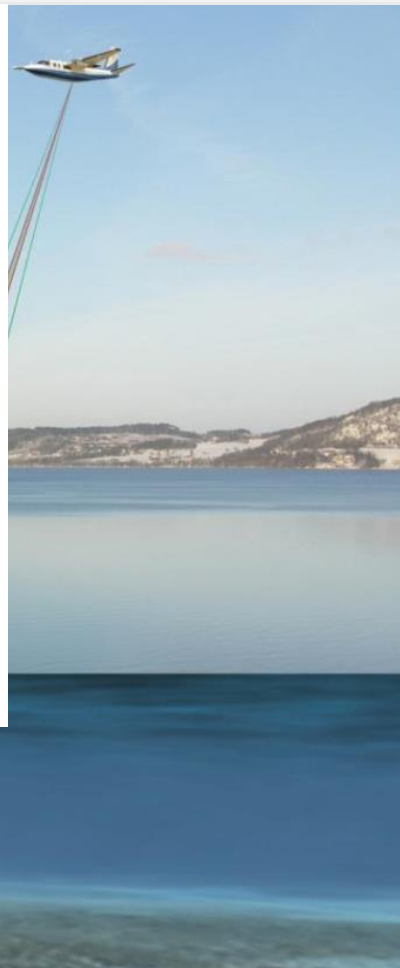
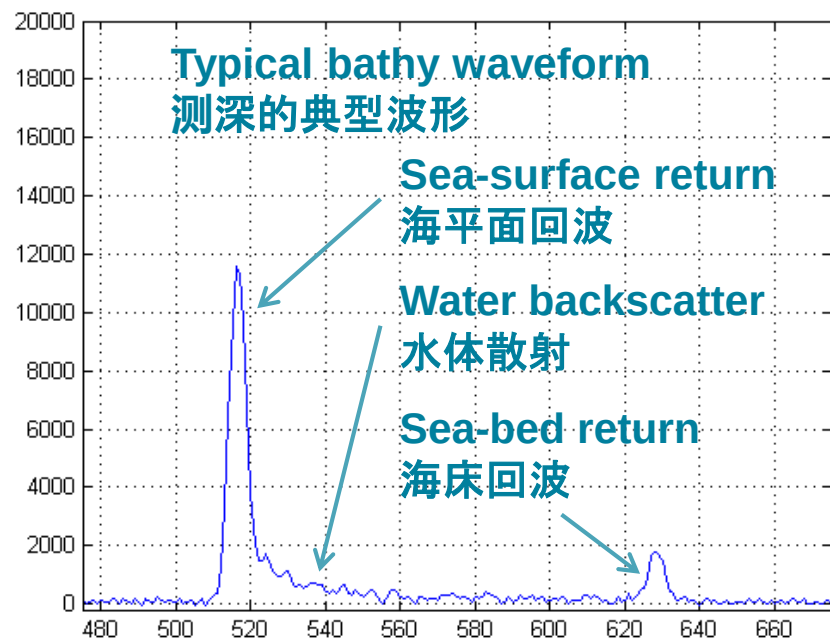
- a) 海洋监测
- b) 海床植被测绘
- c) 水系制图
- d) 河流测量
- e) 内陆水域测量
- f) 岛屿测量
- g) 灌溉管理

3. 摘要与结论

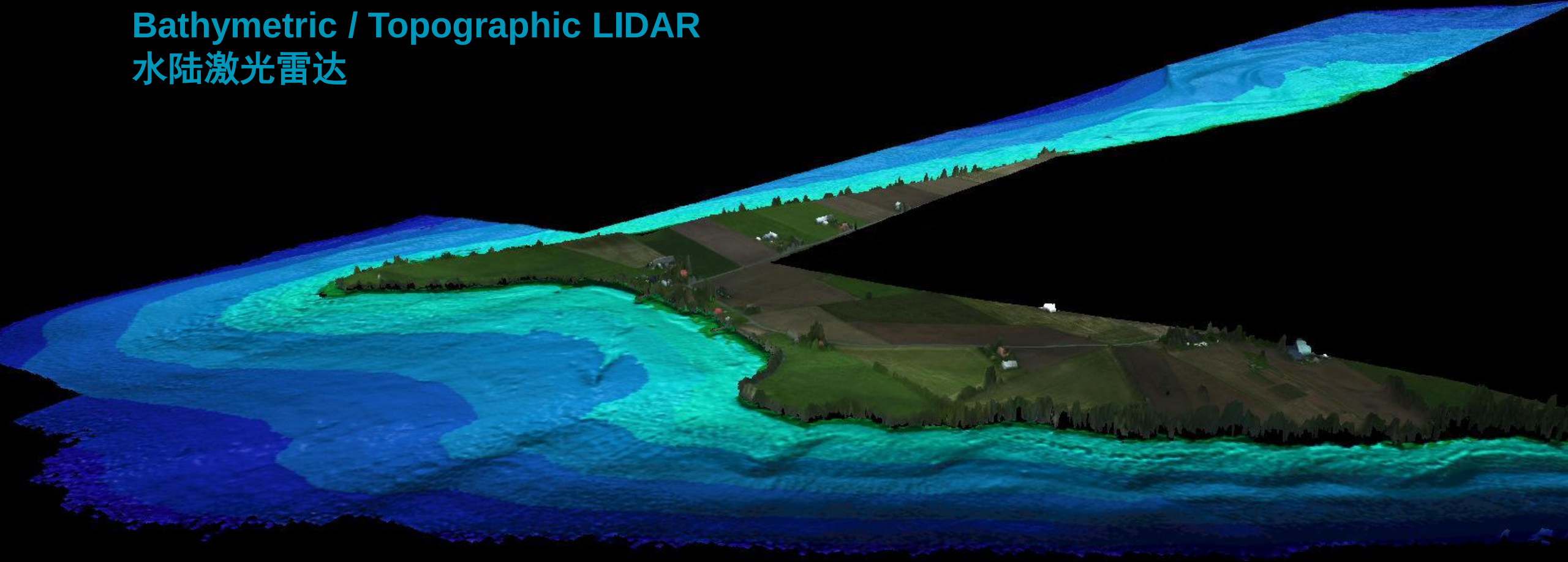


Topo / Bathy LiDAR systems: Overview

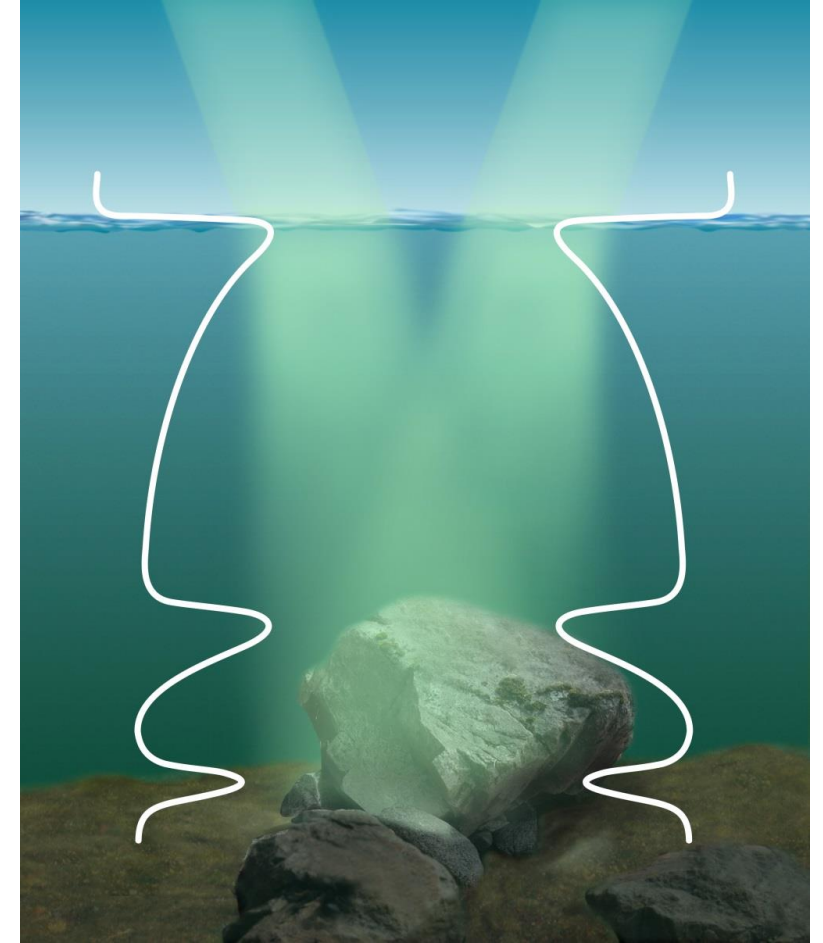
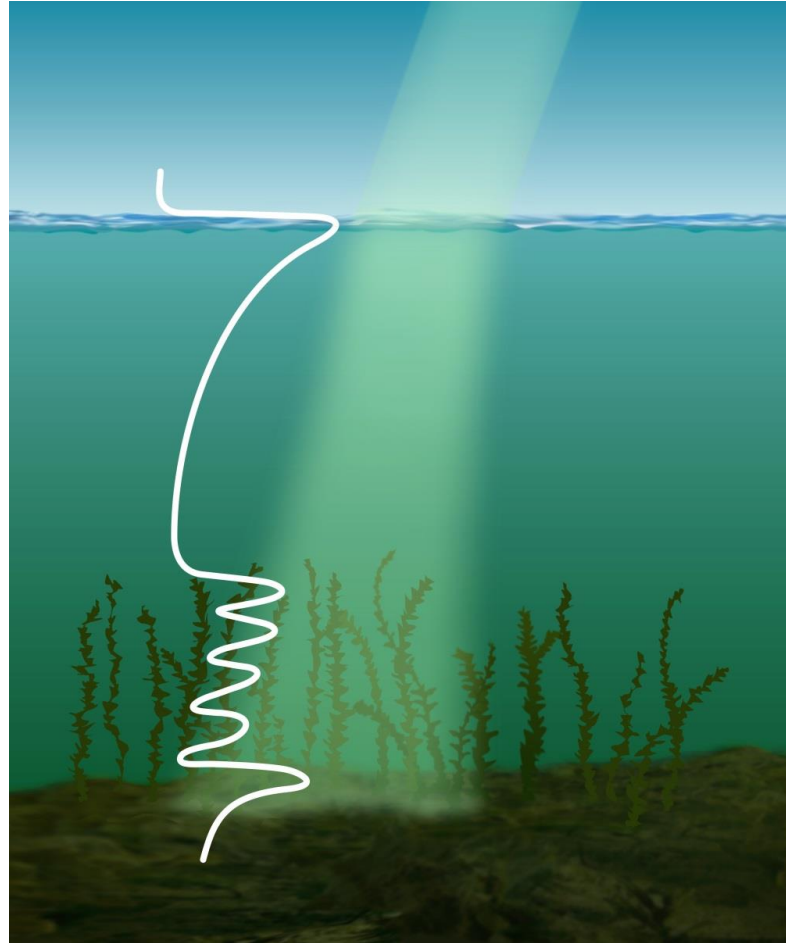
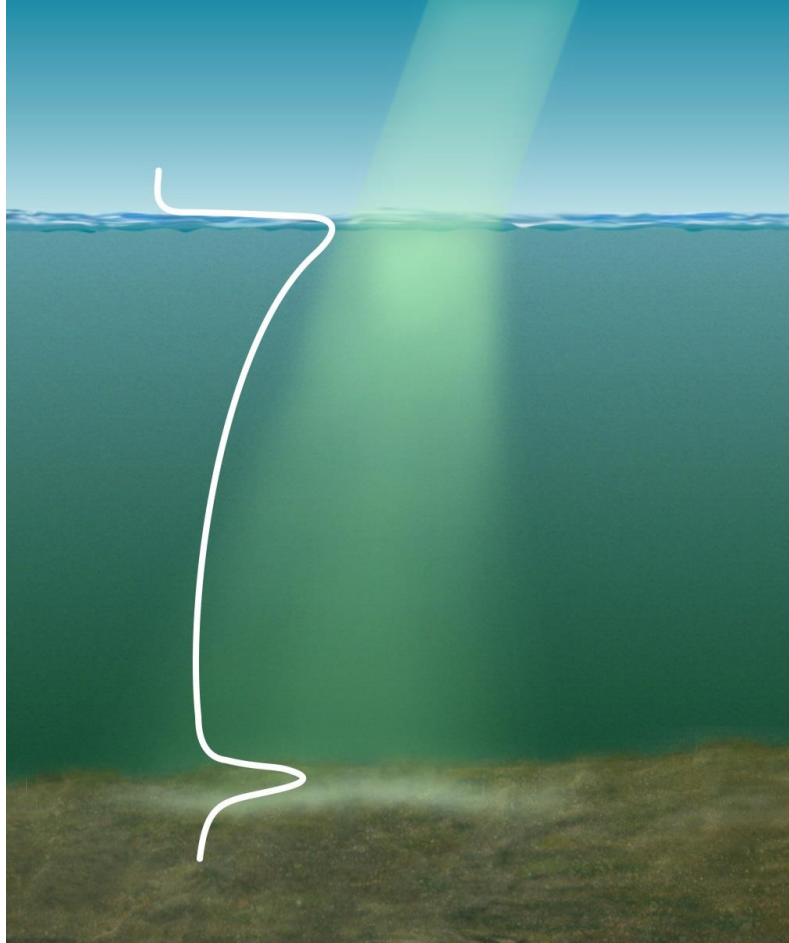
水陆激光雷达系统概述

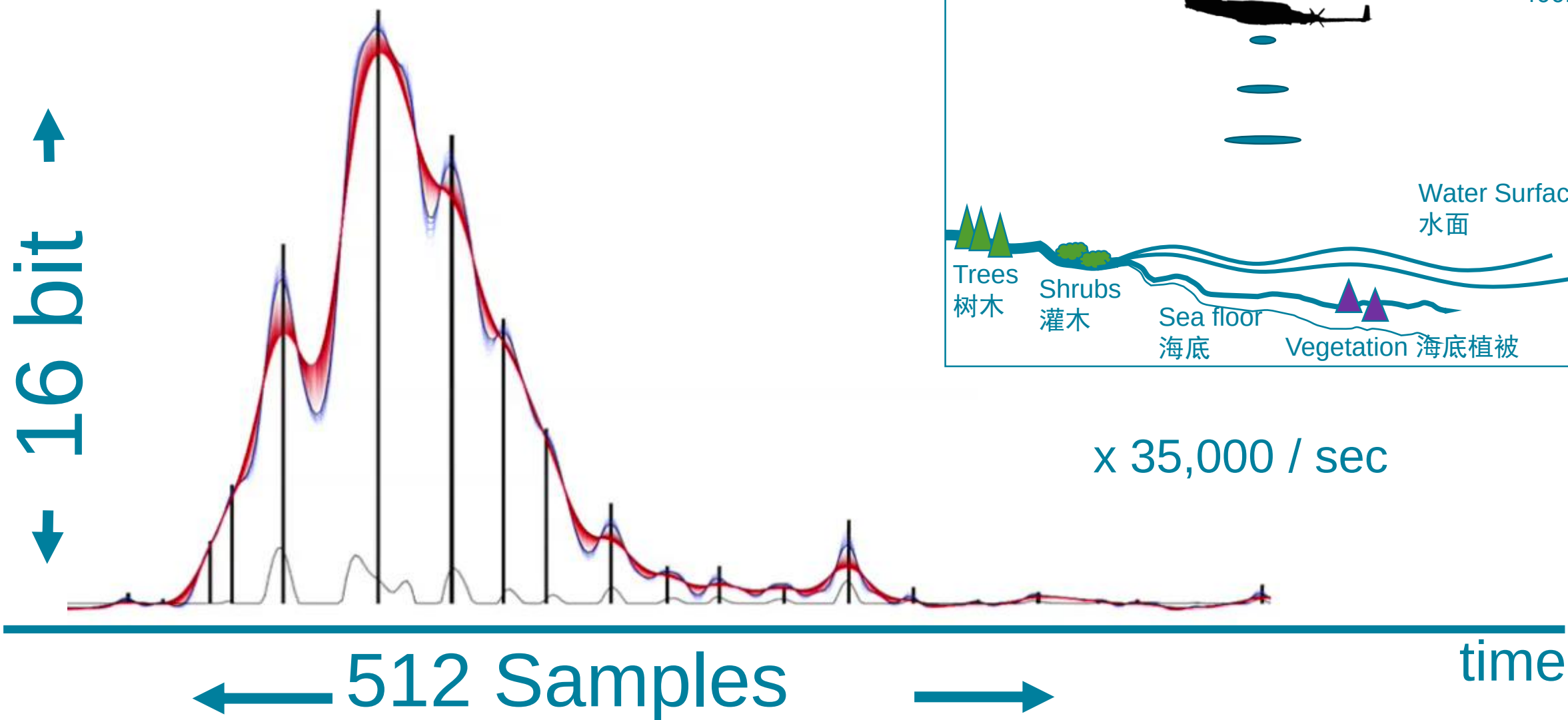


Bathymetric / Topographic LIDAR 水陆激光雷达

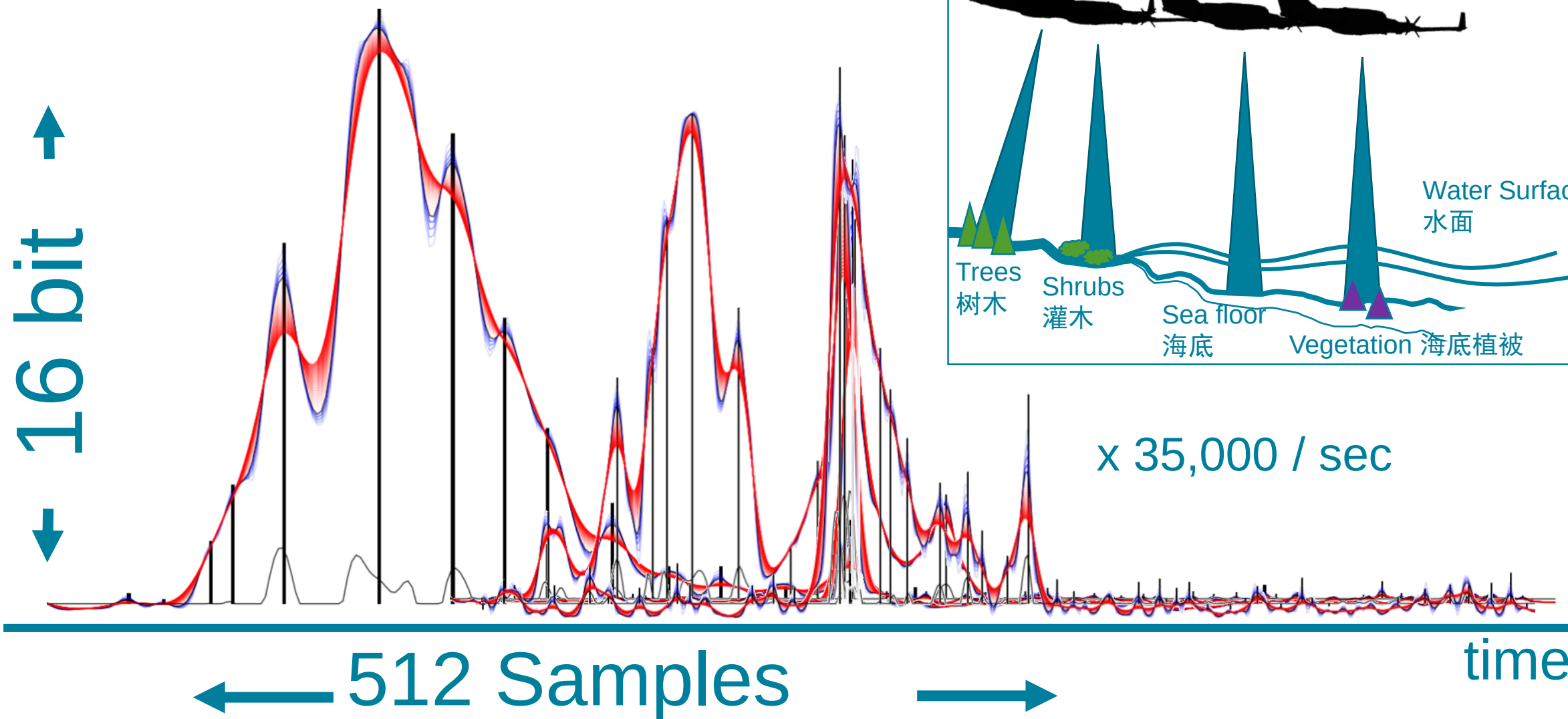


Waveform Sea-bed interaction 海床波形示意

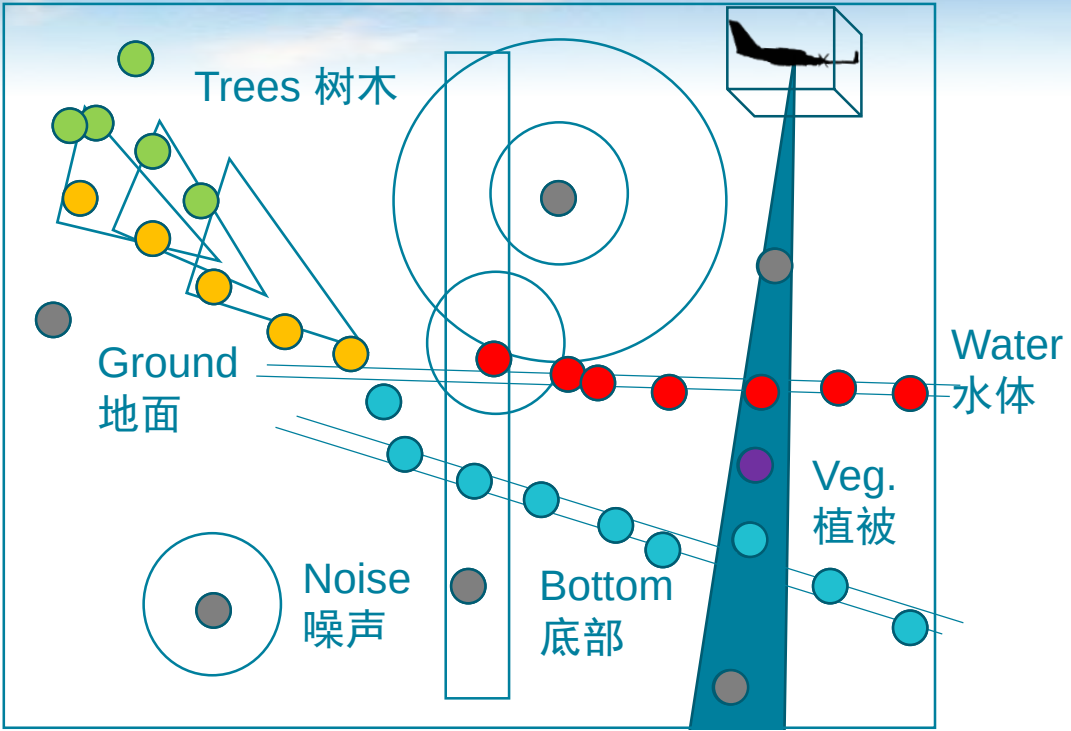




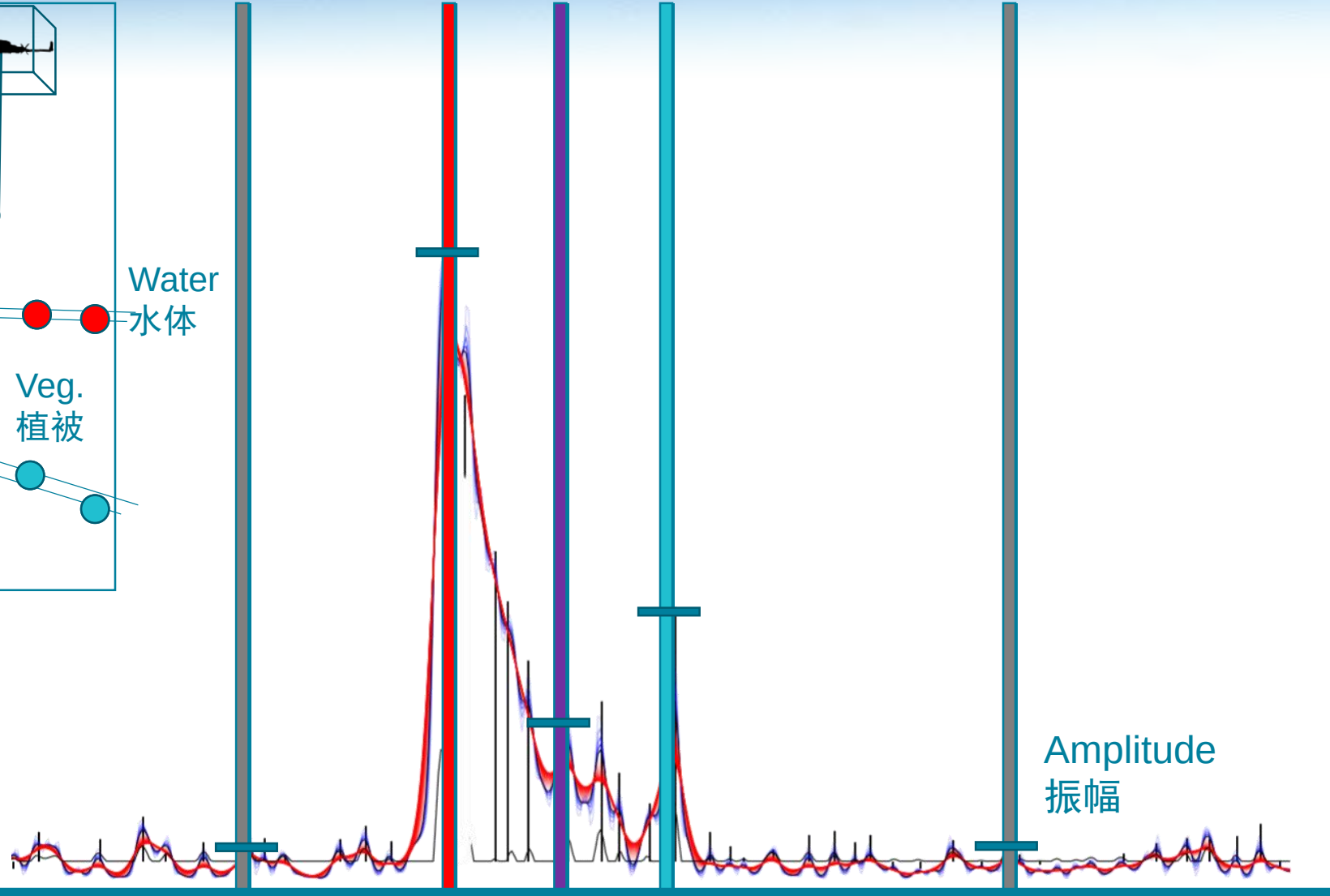
~165 gb / hour



~165 gb / hour

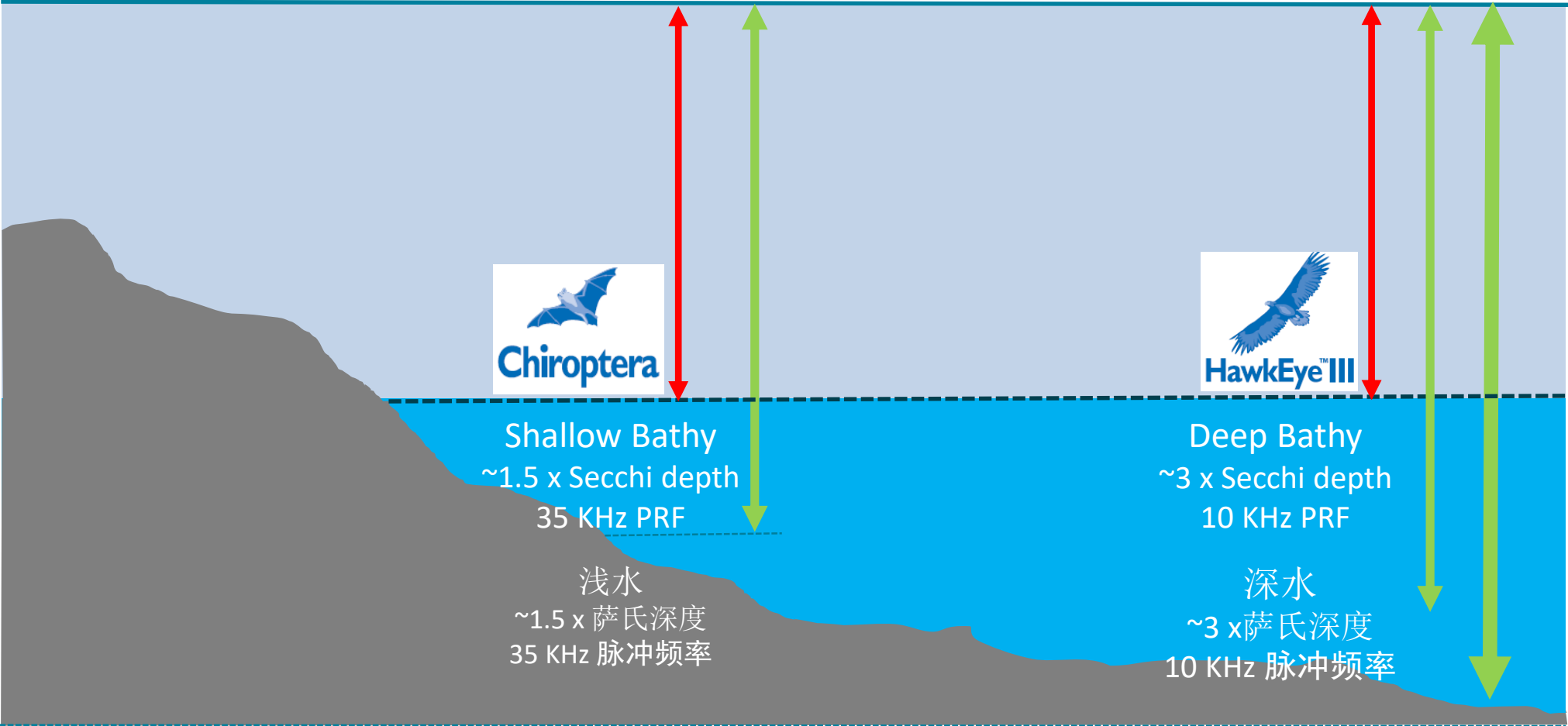


Cross-section
横截面



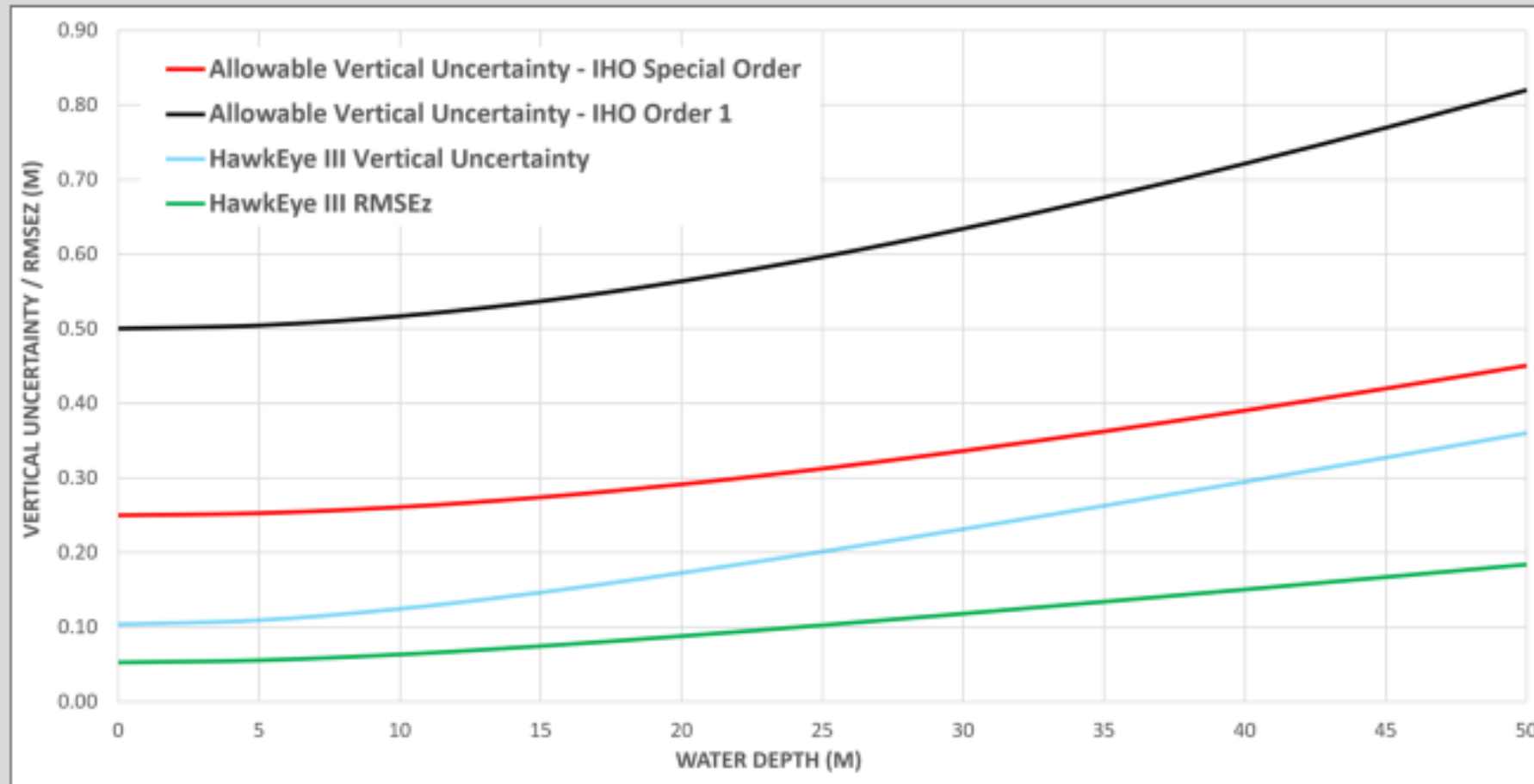
Leica Topo Bathy LiDAR portfolio

徠卡水陆激光雷达组合



REAL WORLD ACCURACY STATISTICS

Comparing Lidar and Acoustic Bathymetry Using TPU and the CUBE Algorithm, ILMF (2008) , C. Lockhart, D. Lockhart, J. Martinez



Aircraft installation 机上安装示意图

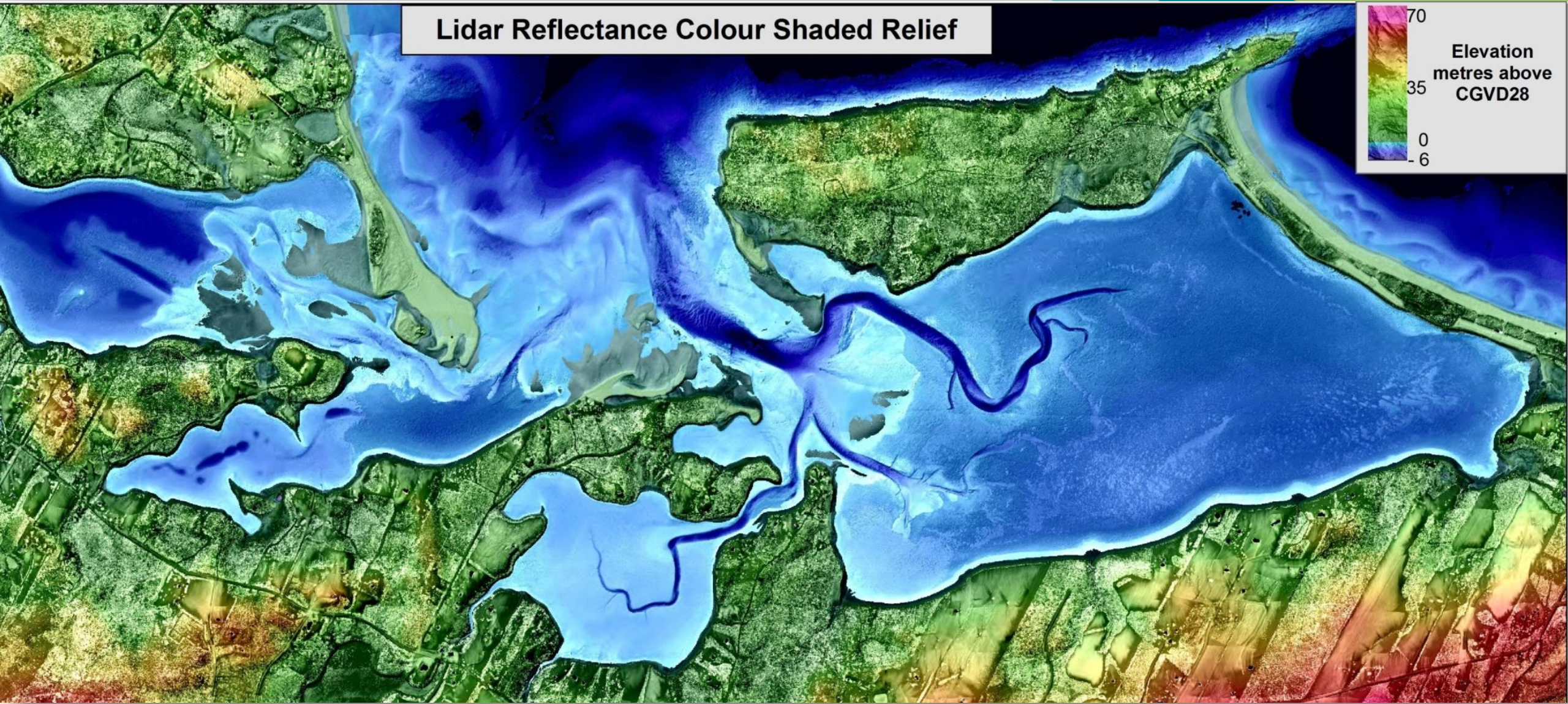


Chiroptera II installation
蝙蝠II 安装示意



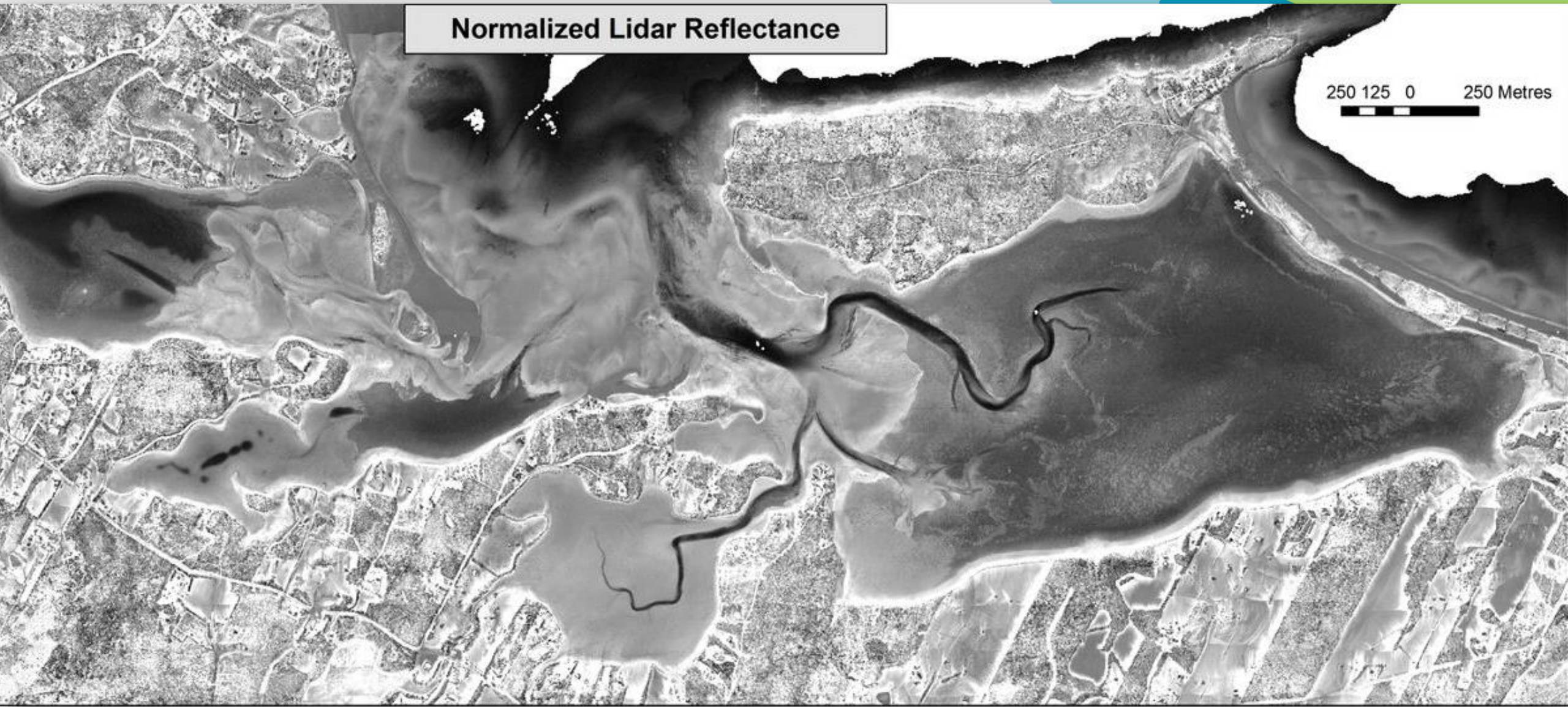
HawkEye III installation
鹰眼III 安装示意

Lidar Reflectance Colour Shaded Relief

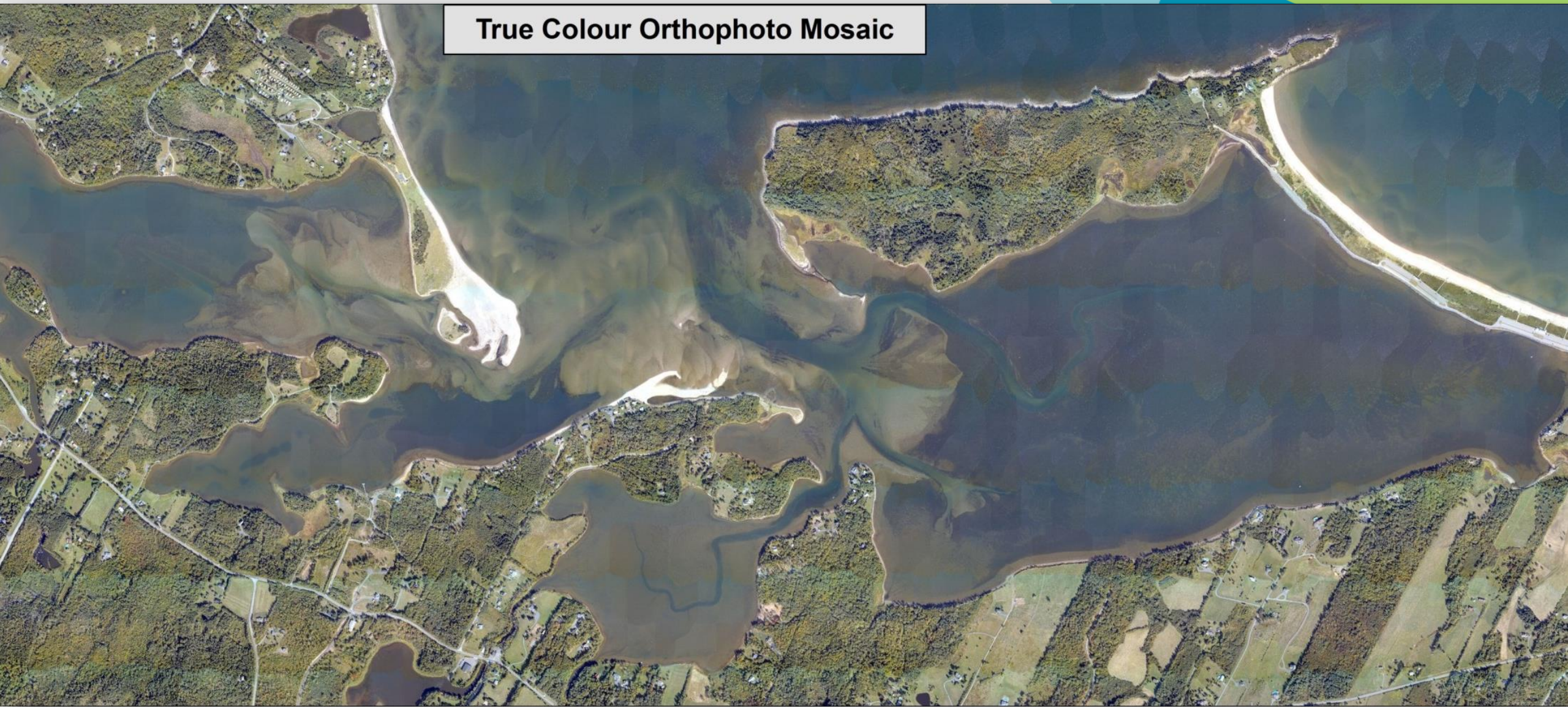


Normalized Lidar Reflectance

250 125 0 250 Metres

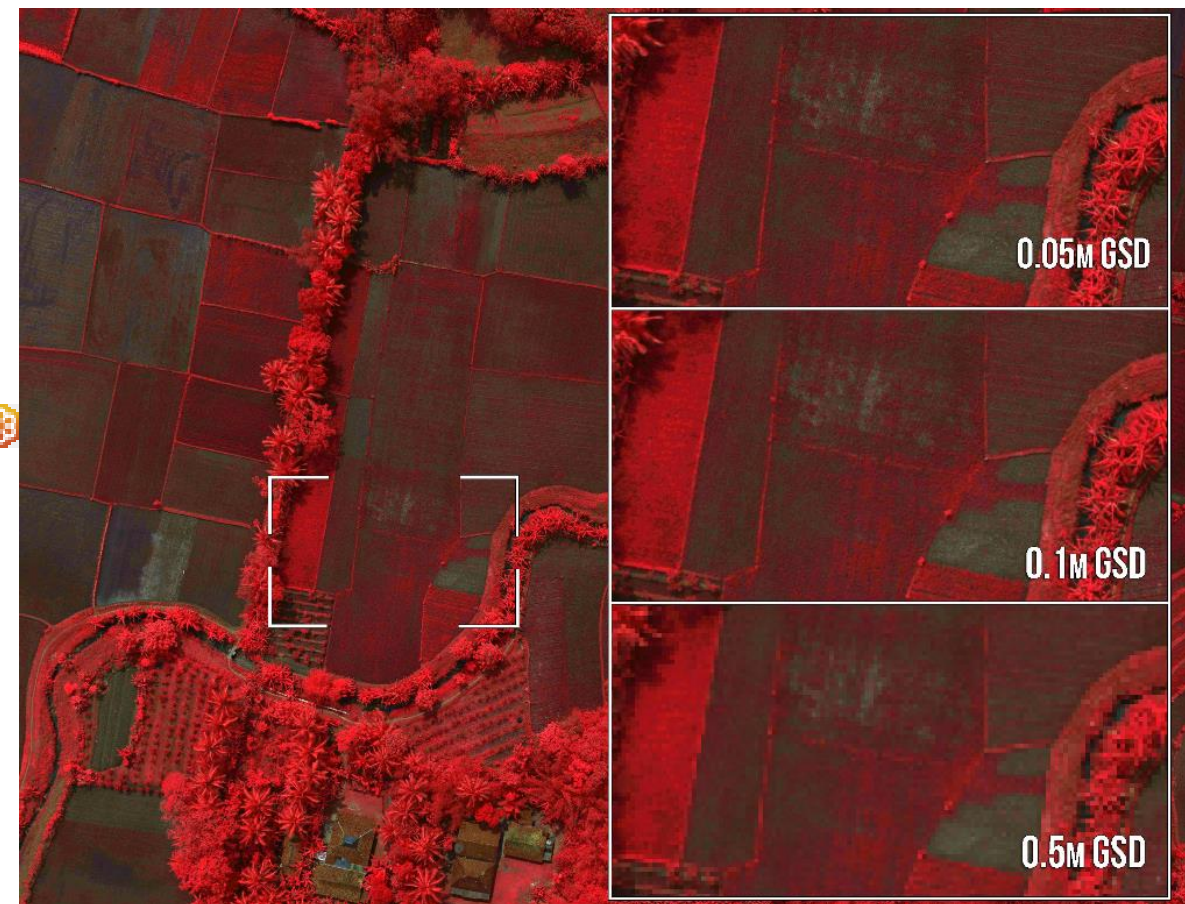


True Colour Orthophoto Mosaic



Ortho Mosaics (RGB and CIR)

正射镶嵌 (RGB、CIR)



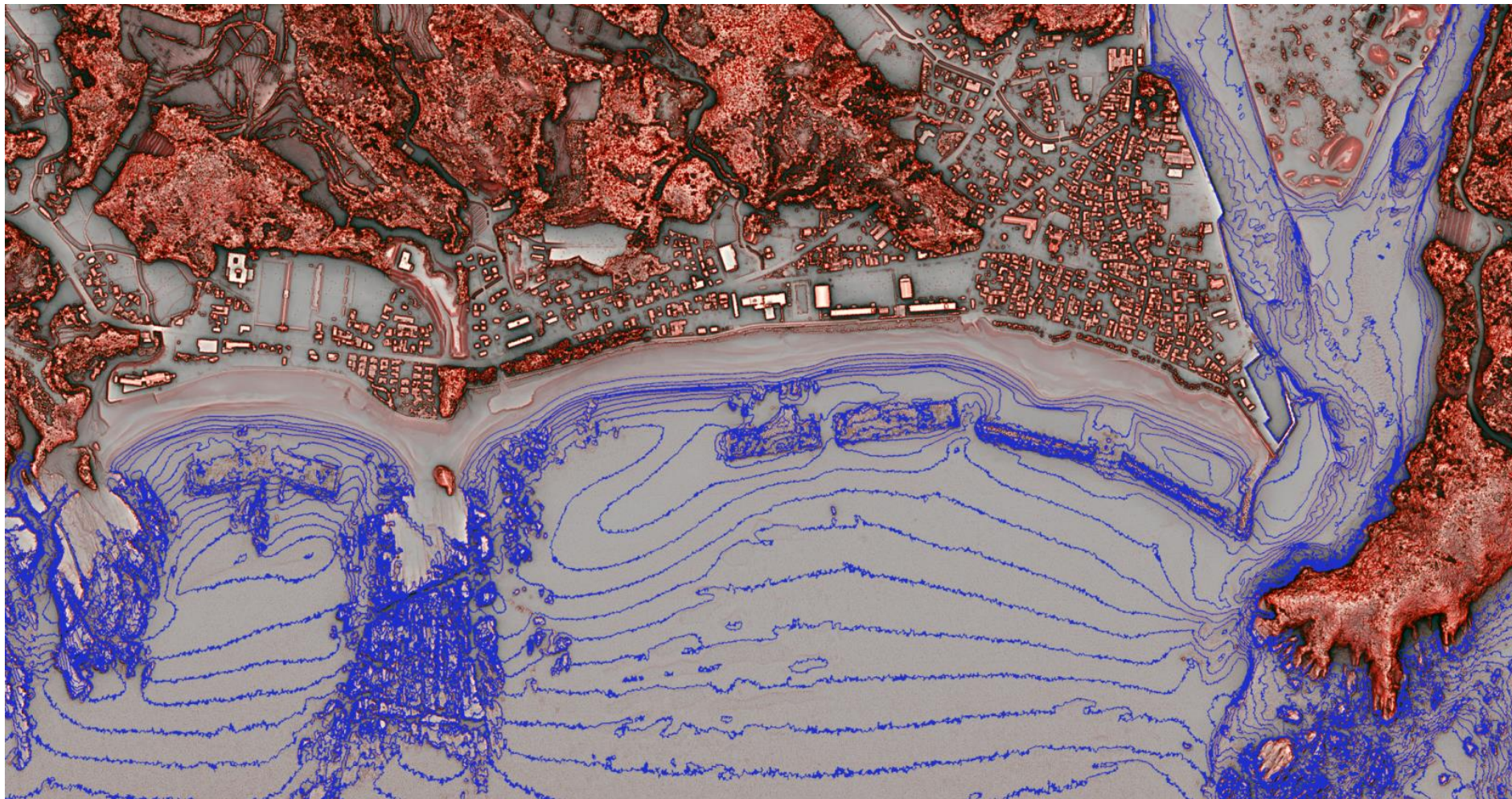
Coastal monitoring – Japan 沿海监测 – 日本



Coastal monitoring – Japan 沿海监测 – 日本



Coastal monitoring – Japan 沿海监测 – 日本



National Coastal Mapping Program – France

国家沿海测量计划 – 法国

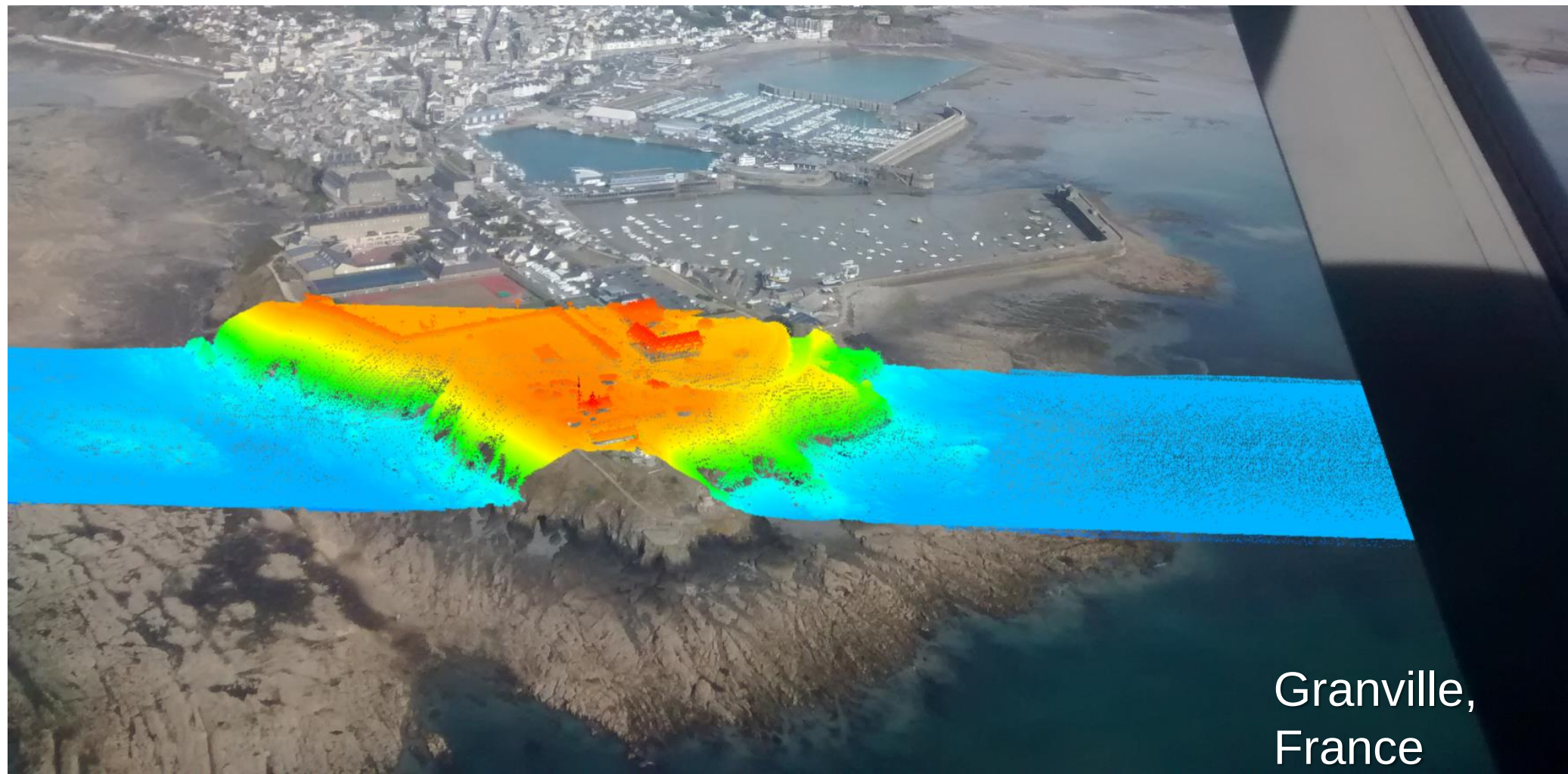
Litto3D®

SHOM

IGN

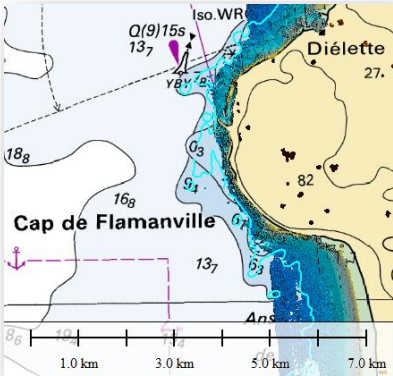
L'océan en référence

INSTITUT NATIONAL
DE L'INFORMATION
GÉOGRAPHIQUE
ET FORESTIÈRE



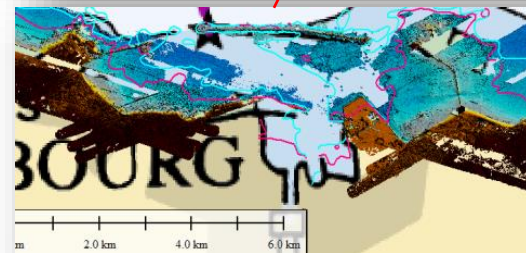
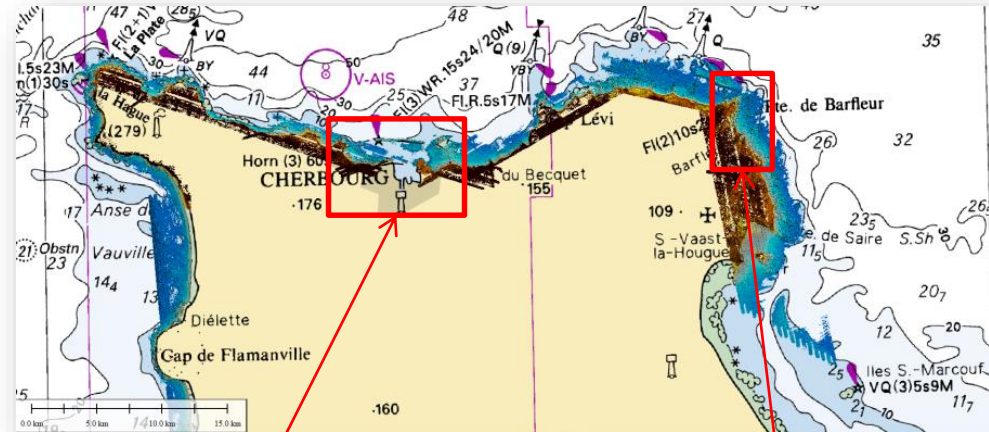
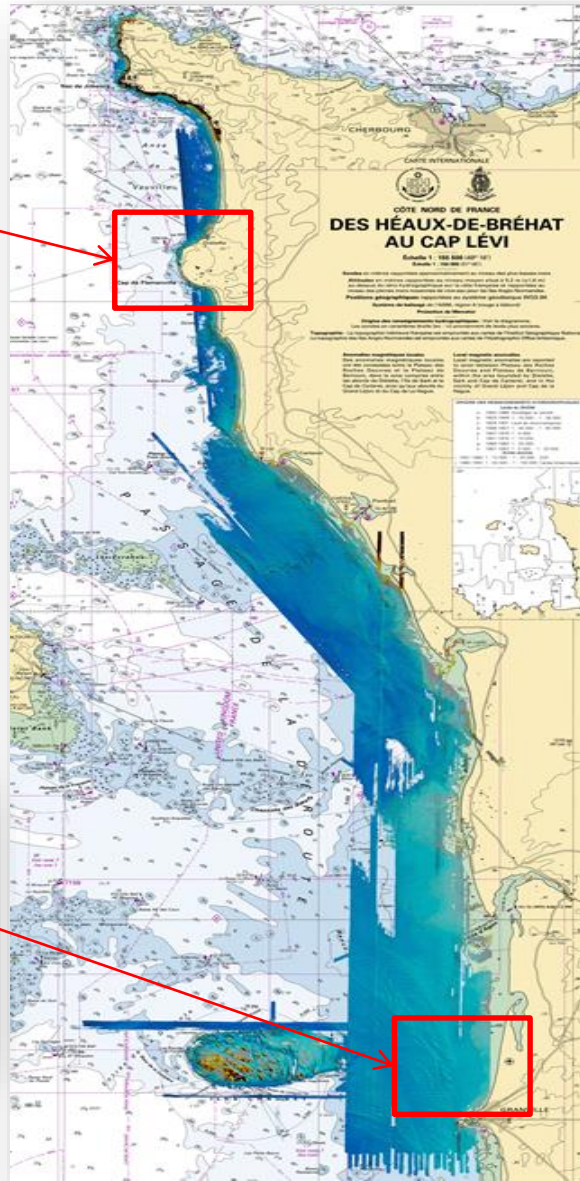
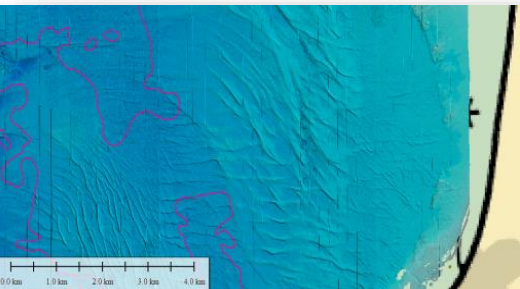
Results of the “Normandie & Hauts-de-France” survey

诺曼底&上塞纳省的测量结果



From Granville to Cap de la Hague, The 5m contour is generally achieved, except in steep cliff and kelp areas.

从格兰维尔到黑格海岬，除了陡峭的悬崖区域外，总体上都满足了5米的等高线。



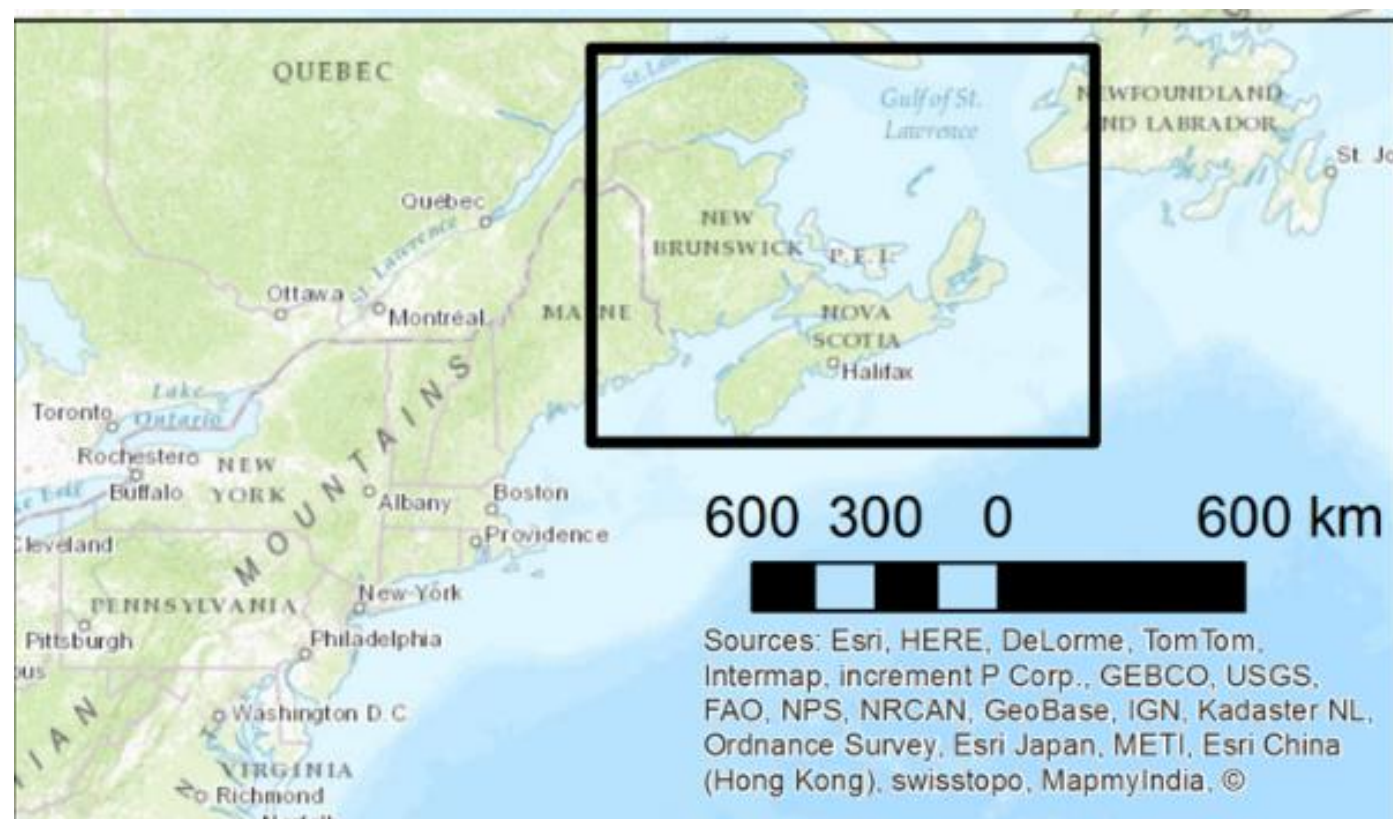
From Cap de la Hague to St Vaast La Hougue, some good coverage especially in the East part. Some poor coverage in the Cherbourg harbor.

从海牙角到圣瓦斯特拉胡格，都有很好的覆盖，尤其是在东部。瑟堡港的覆盖不佳。



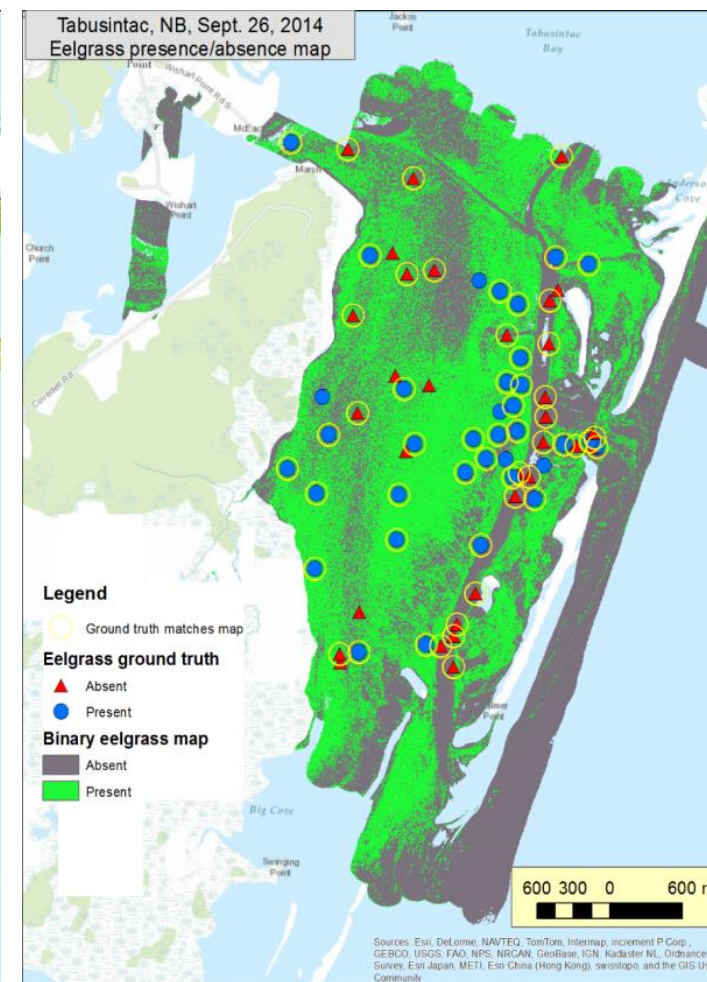
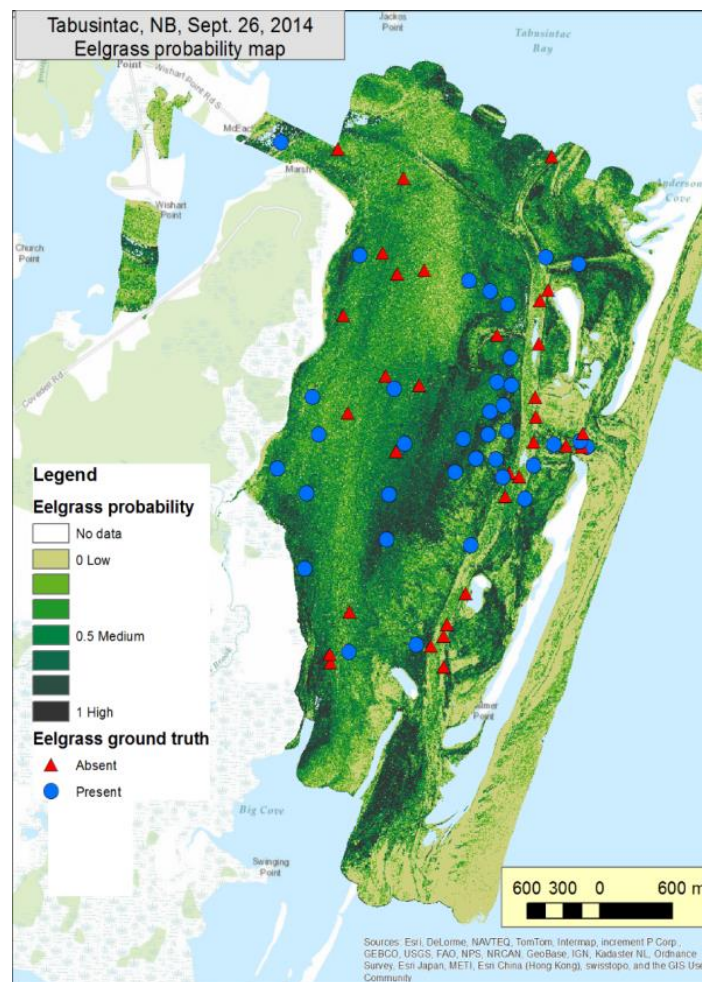
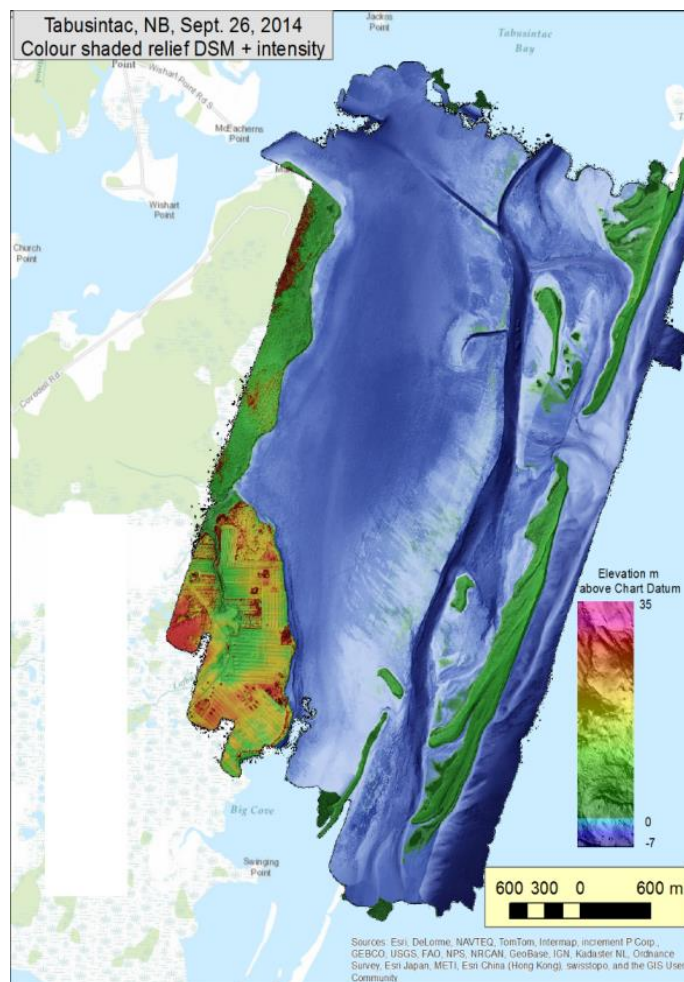
Eelgrass mapping – Tabustniac, Canada

大叶藻制图 – 加拿大



Eelgrass mapping – Tabusintac, Canada

大叶藻制图 – 加拿大

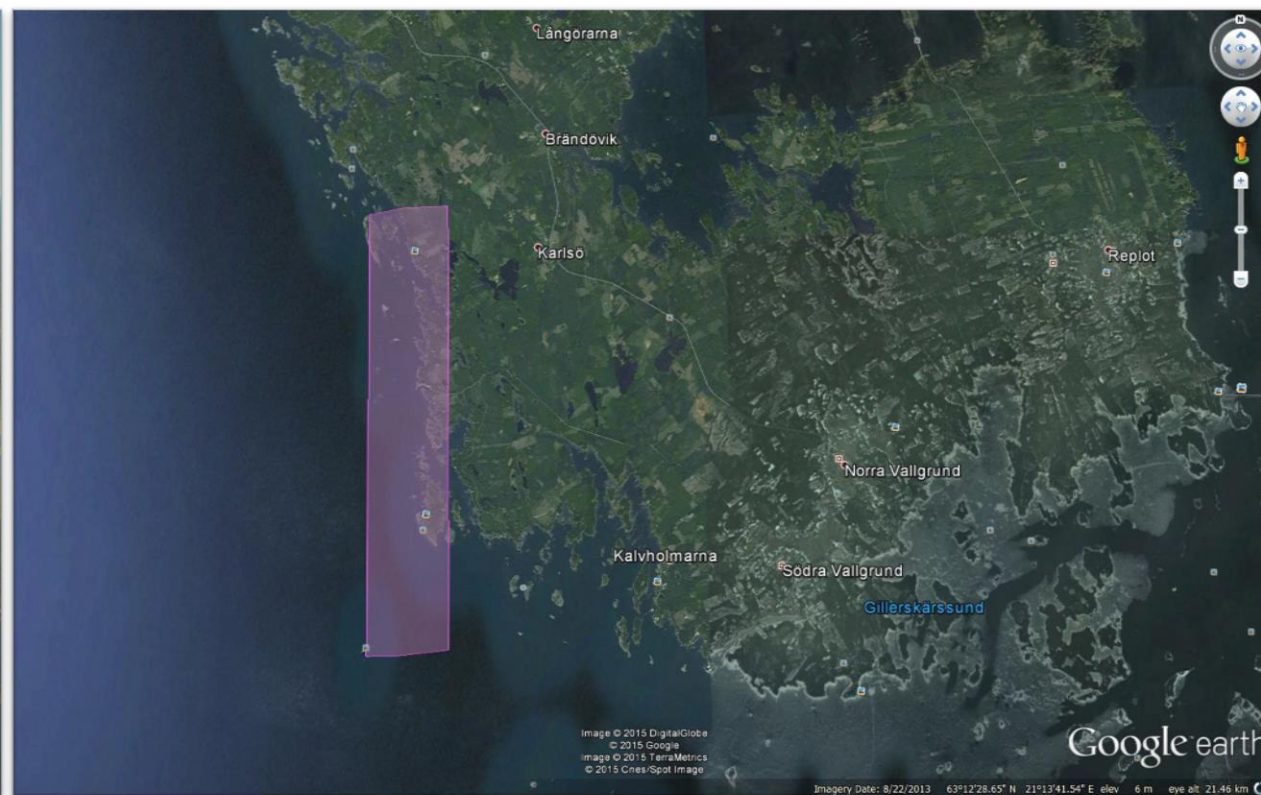


Complex Archipelago Charting – Vallgrund, Finland

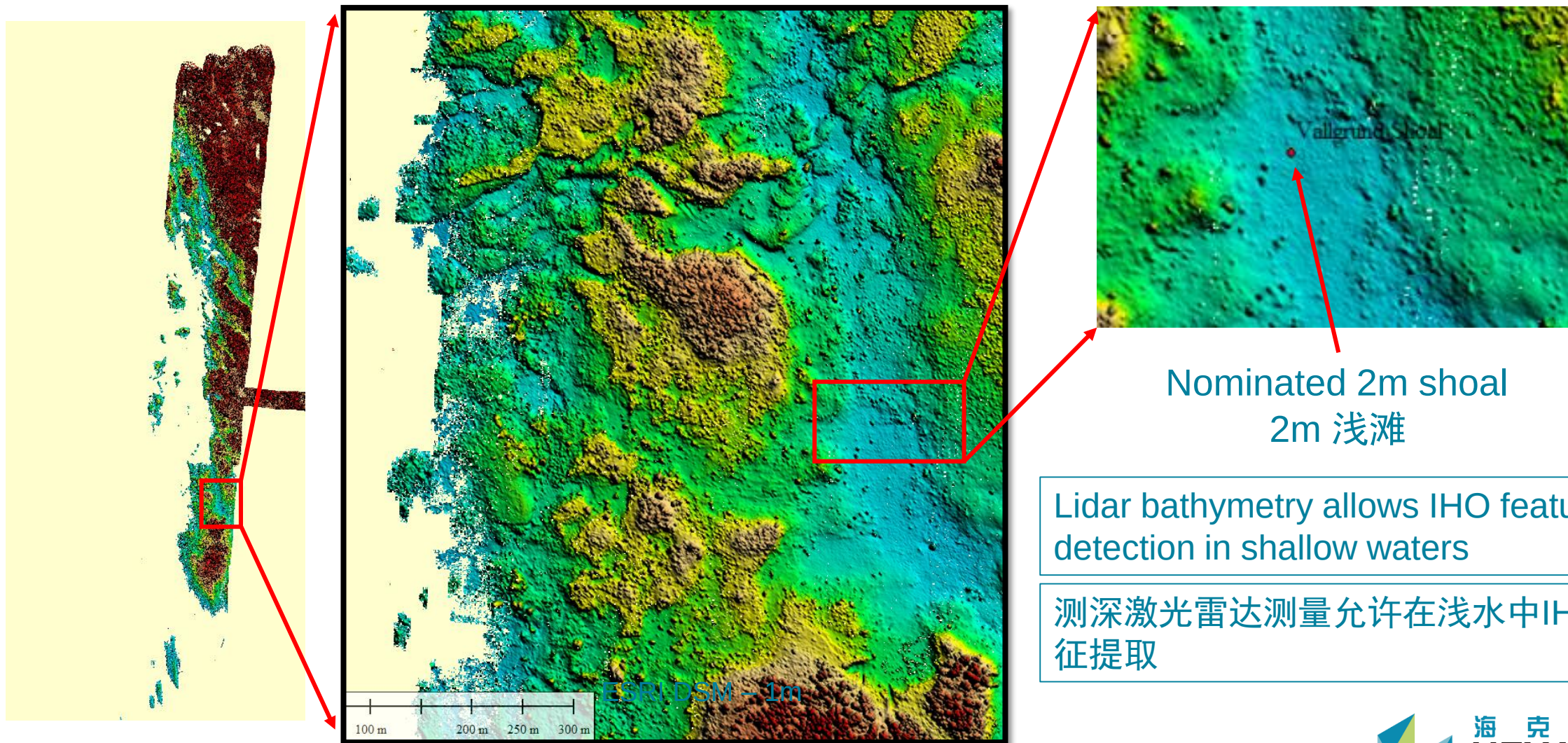
复杂群岛的制图 – 芬兰

End user: Finnish Transport Agency
Requirements: IHO order 1A
最终用户：芬兰运输机构需求：IHO标准
1A

Vallgrund Area – Finland
群岛区域 – 芬兰



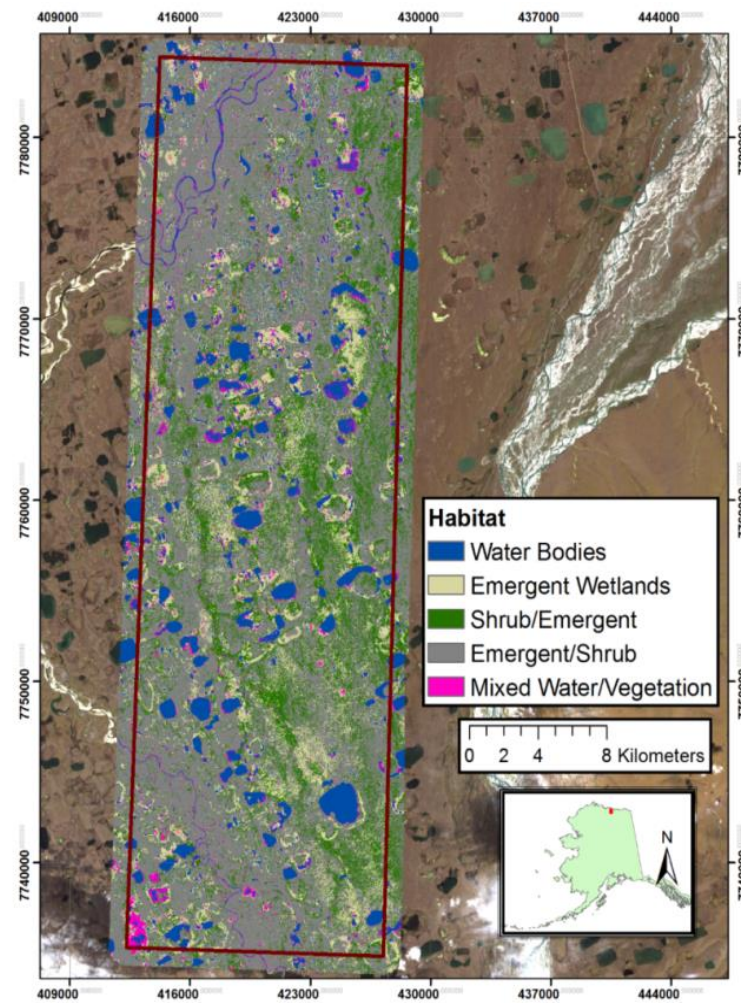
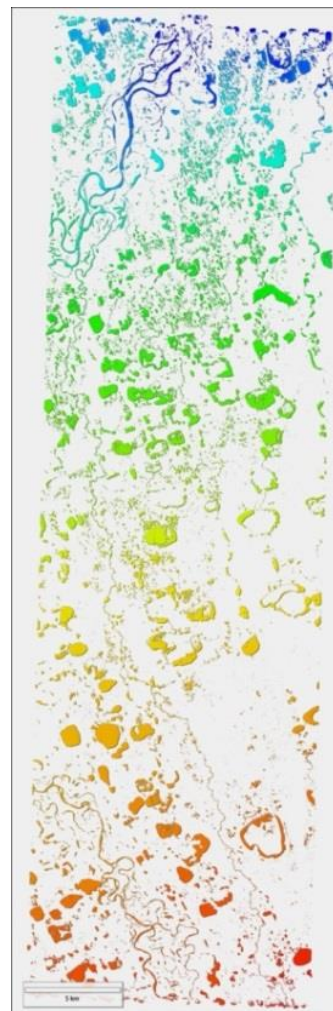
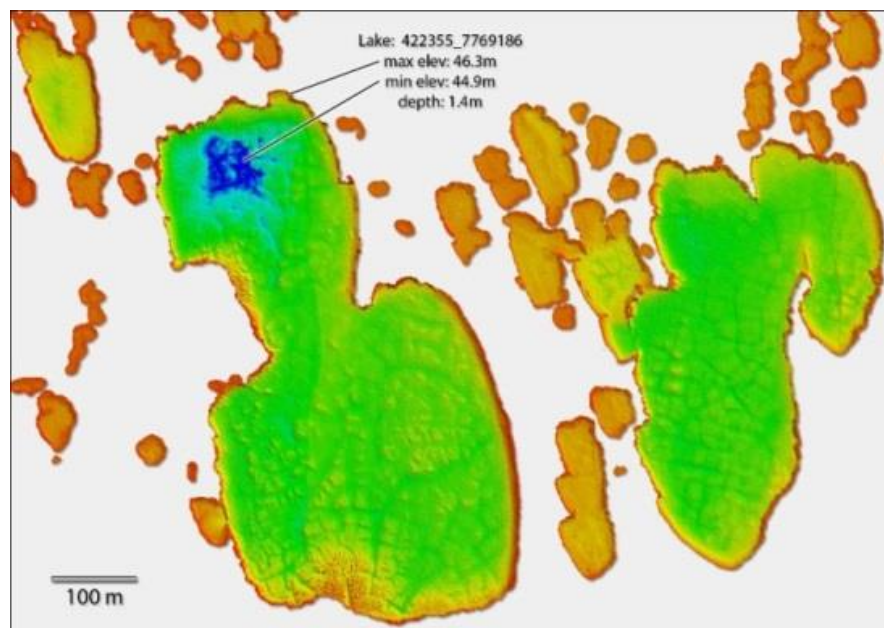
Complex Archipelago Charting – Vallgrund, Finland 复杂群岛的制图 – 芬兰



Complex inland waterbodies mapping – North Slope, Alaska

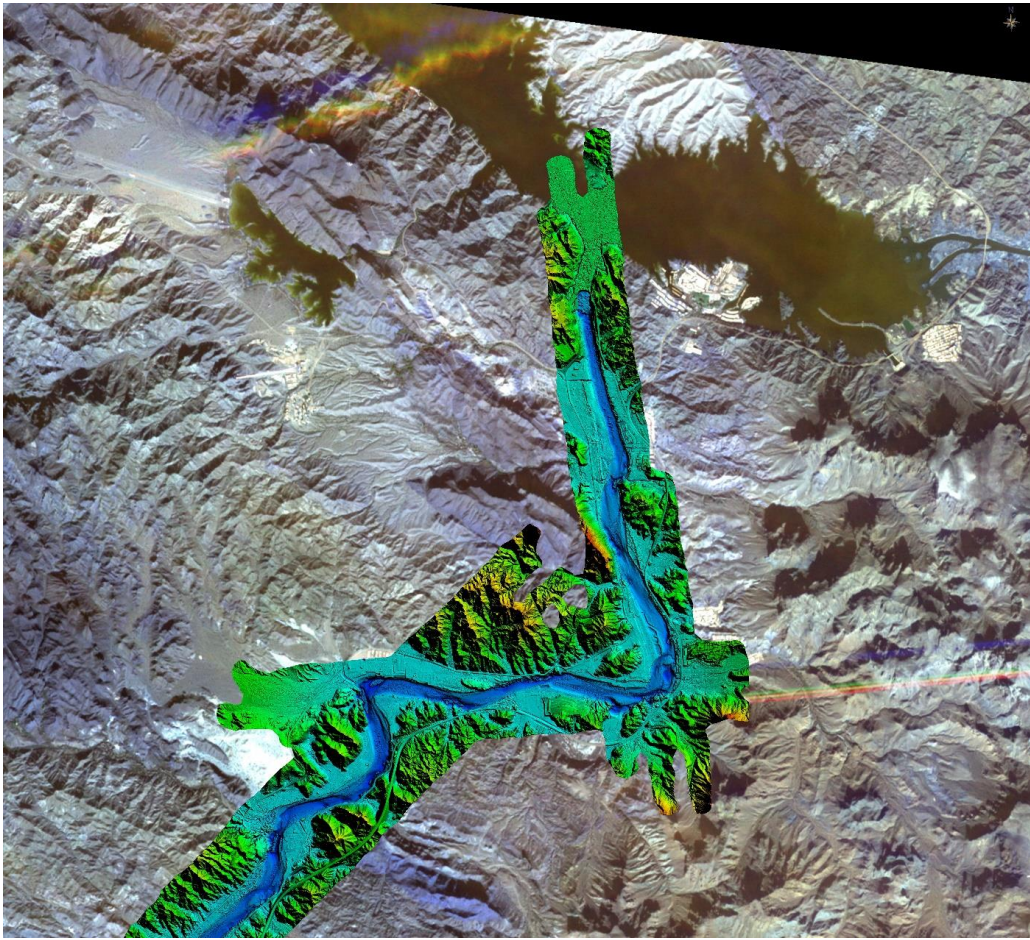
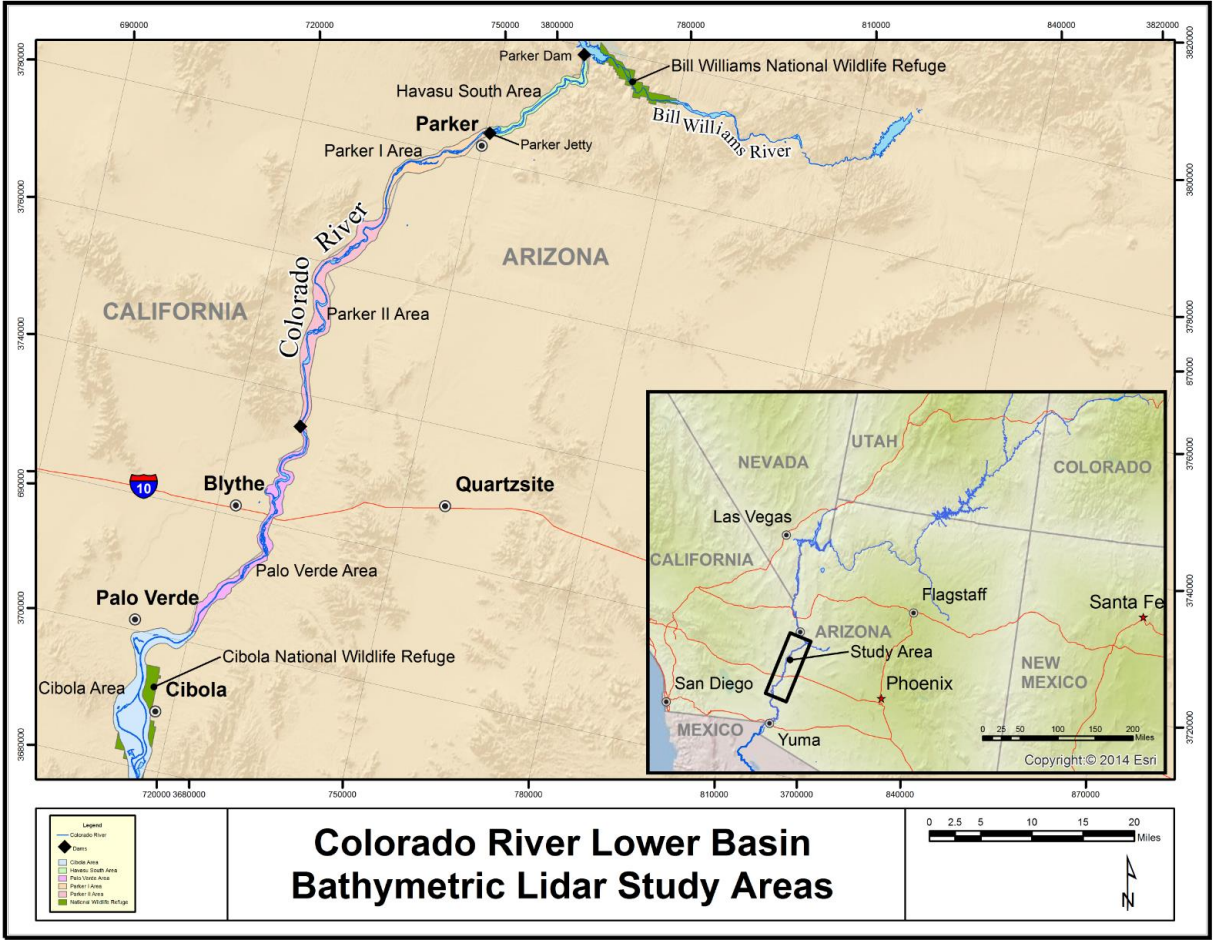
复杂的内陆水域测绘 - 阿拉斯加北坡

- 5545 water bodies were identified with no links to nearby or other water bodies in the area, whereof about 1000 with less than 10 cm depth
- 5545个水体被确认与附近或该地区其他水体没有联系，水深不足10厘米的水体约1000个

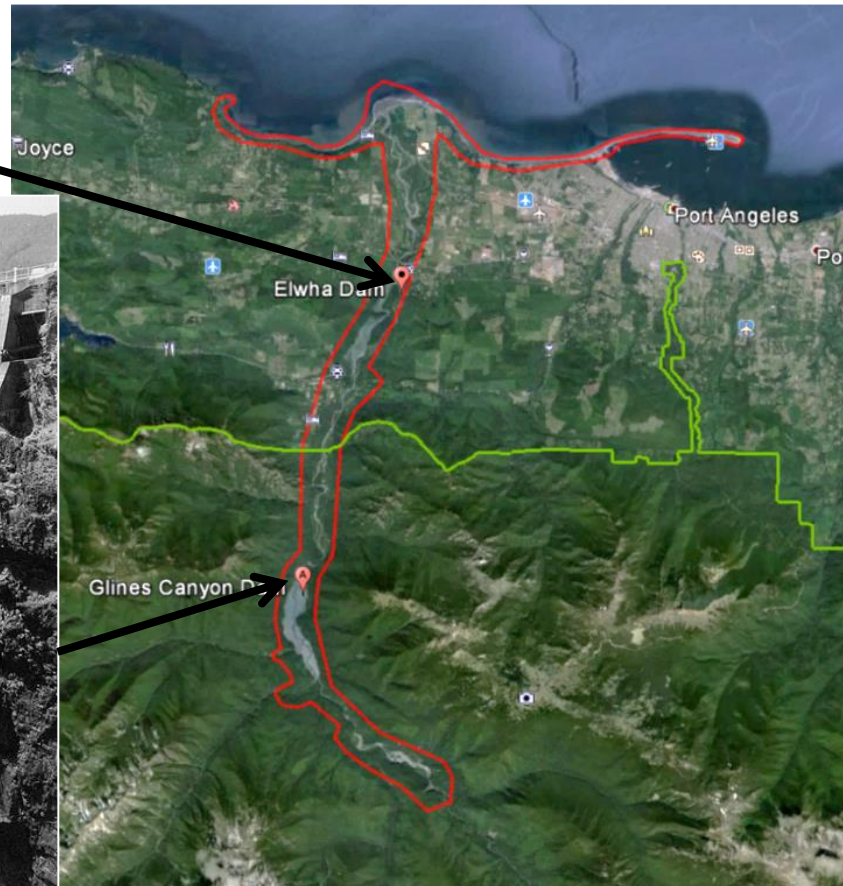
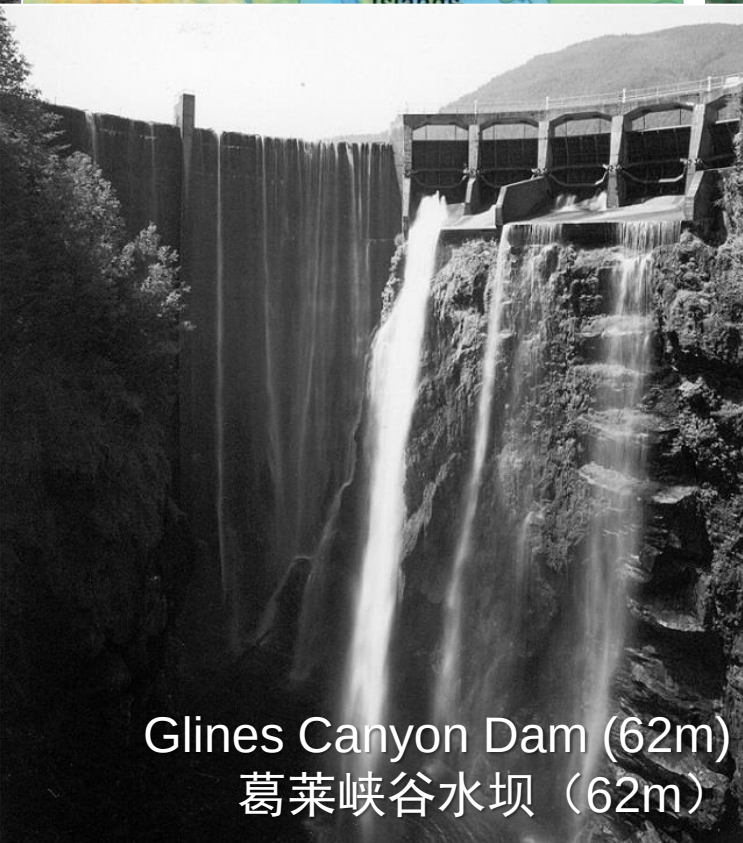
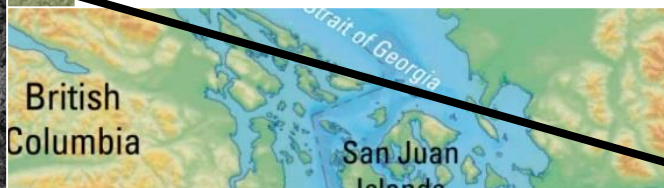


Lower Colorado River Basin

科罗拉多河低流域



Monitoring Elwha river and estuary 监测爱尔兰河及其河口湾

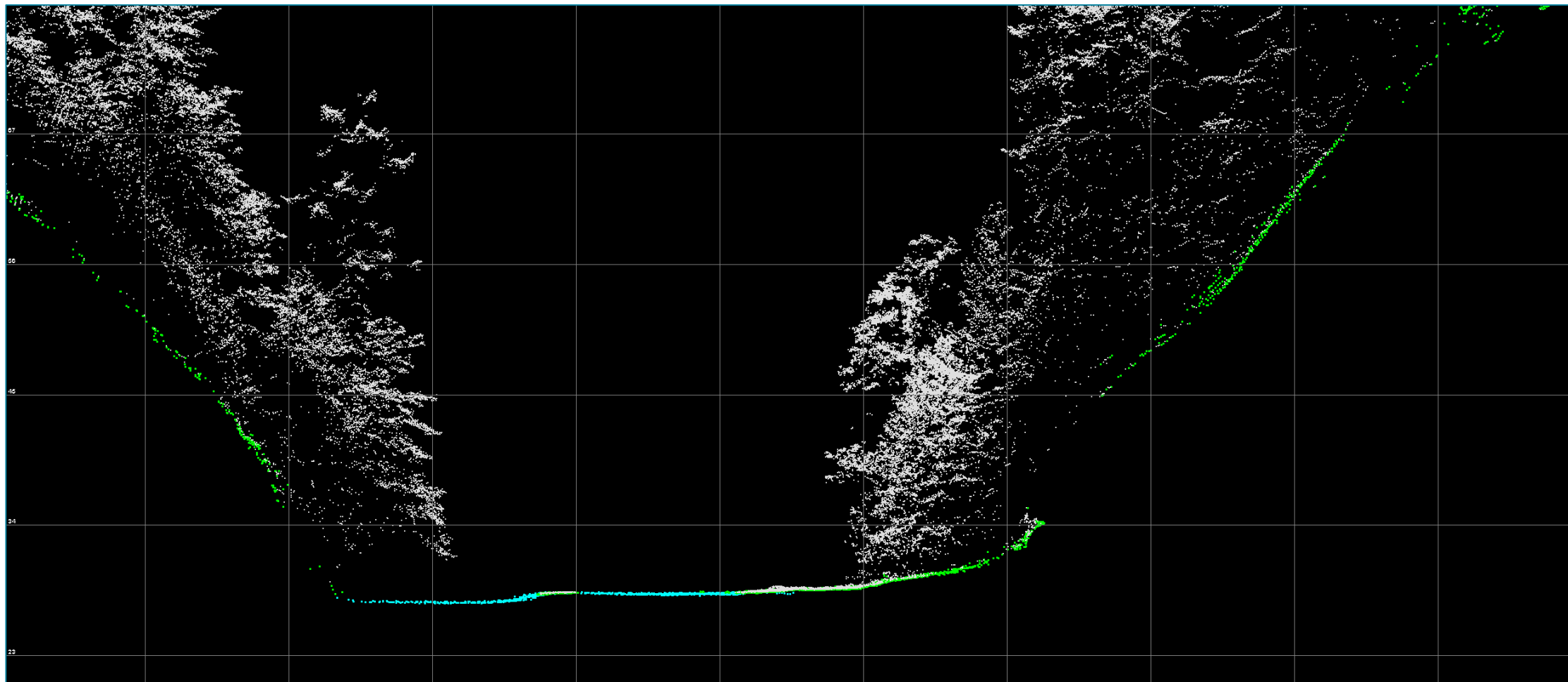




Elwha River Basin: Steep Slopes Well Defined; Seamless Topo-Bathy 爱尔兰河流域：斜坡陡峭，轮廓分明；水陆激光雷达无缝获取

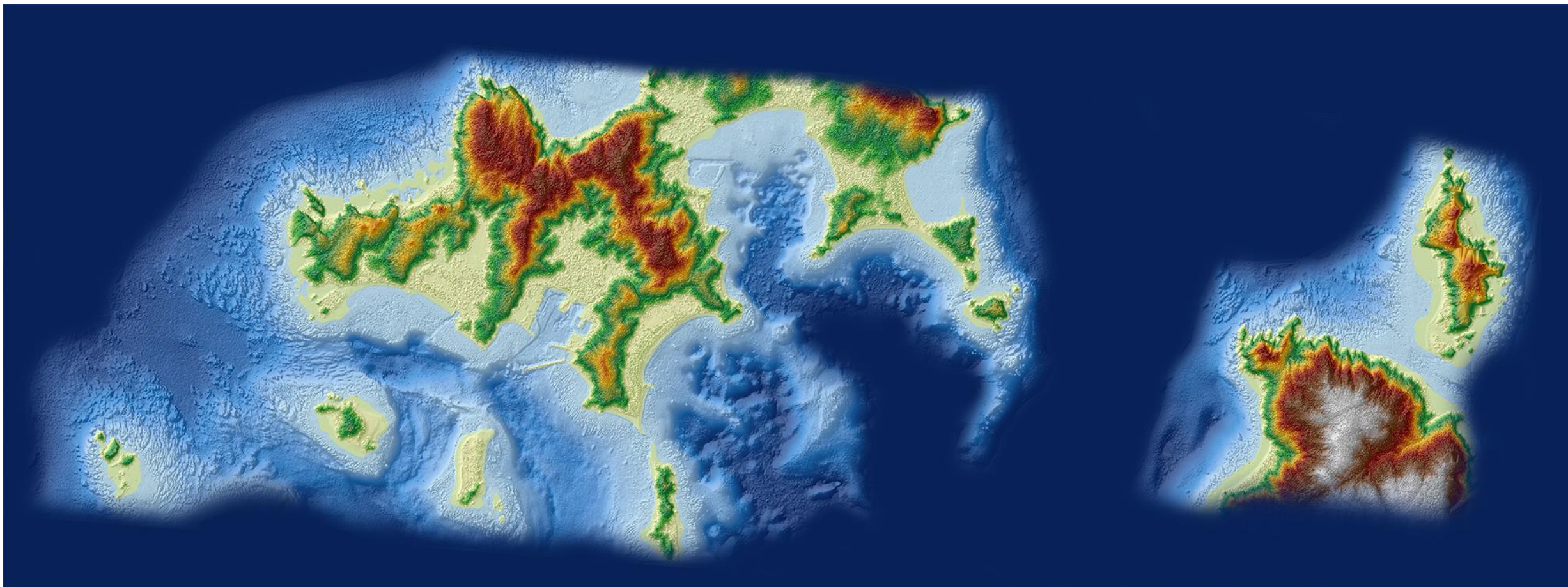


Elwha river: Elliptical Scan / Multiple Returns Allow Bathy Returns Under Vegetation 爱尔华河：植被下的椭圆扫描 / 多次回波



Island / Coral Reef Mapping – Japan

岛屿 / 珊瑚礁测绘 - 日本

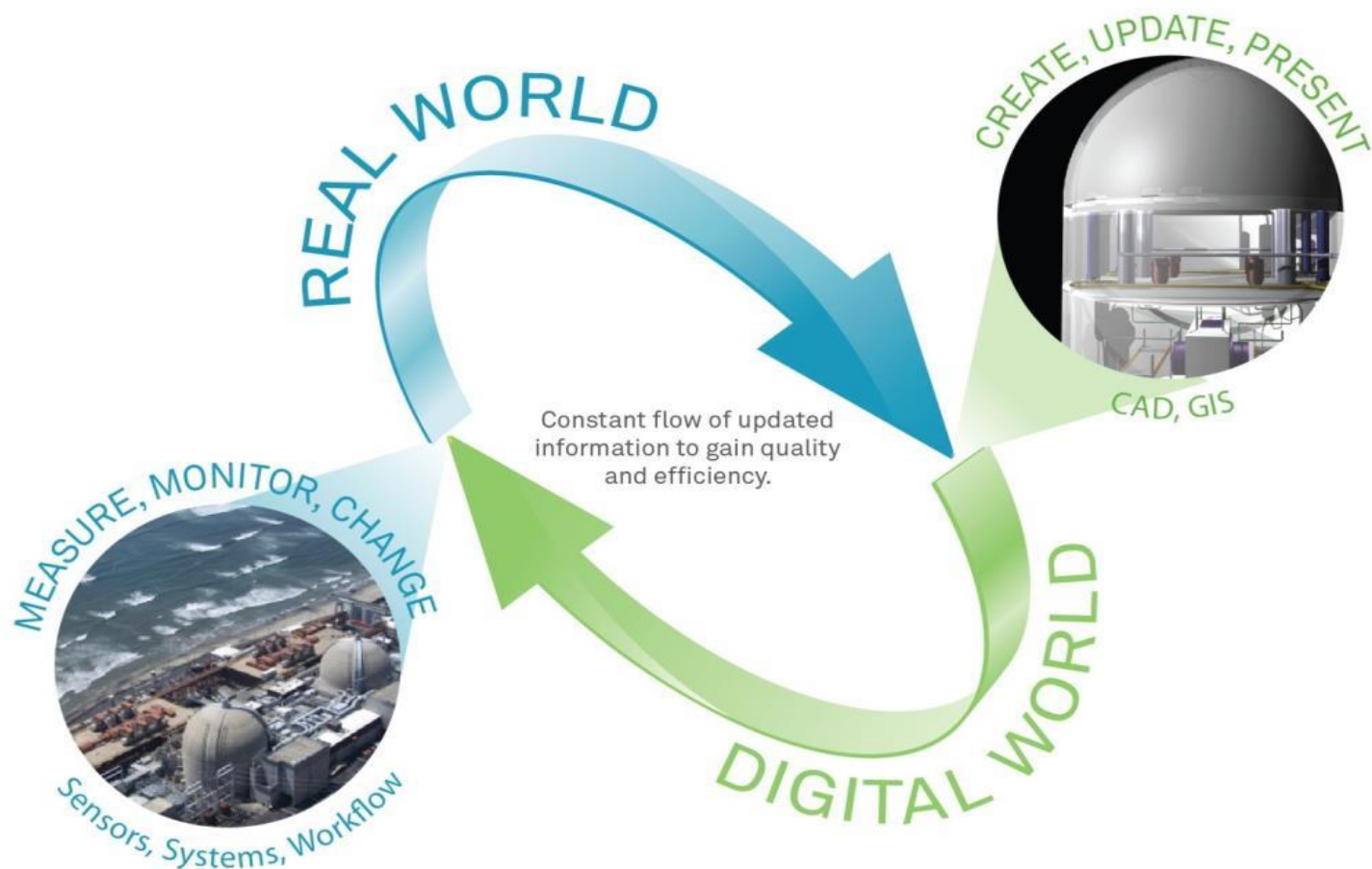


Summary

总结

- Bathymetric LiDAR have over the last years turned from a research tool, to a commodity used of various organisations all over the globe.
 - Bathy LiDAR are used for various applications, as coastal mapping, erosion monitoring, hydrographic charting, inland waters and river mapping.
 - Bathymetric LiDAR is the perfect complement to shipborne multibeam surveys, offering a strong efficiency improvement in the total sea-bed mapping solution.
 - The HawkEye and Chiroptera systems field proven solutions from a large number of countries, in a large number of different waters types around the world.
 - We do see a growth in the market for bathymetric LiDAR surveys, as further organisations and countries adapt to this technology.
- 在过去的几年里，测深激光雷达已经从一项研究变成了全球各组织使用的一种商品。
 - 测深激光雷达能适应于多种应用领域：沿海测绘、腐蚀监测、海道制图、内河测绘等。
 - 测深激光雷达是舰载多波束测量的完美补充，在海底测绘效率的提高中提供了强大的解决方案。
 - 鹰眼和蝙蝠系统是经过世界各国不同水域测试后的最佳解决方案。
 - 随着越来越多的组织和国家应用这种技术，测深激光雷达的市场也在增长。





Thanks!
非常感谢!



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