

Km3NeT Italia – Seafloor Network

VLVNT2015

Roma – 15 sept 2015



Outline of talk

- Km³NeT Italia
- The layout of the seafloor network
- The Junction Box
- The interlink cable
- The CTF
- The sea operations

Km3NeT ITALIA

Project funded by PON (Piano Operativo Nazionale) 2007-2013 (EU funds)

Scope of the project: Construction of the first step of the Capo Passero KM3NeT Building Block

32 Detection Unit (8 tower + 24 strings)
seafloor network (including the connector for the EMSO node)

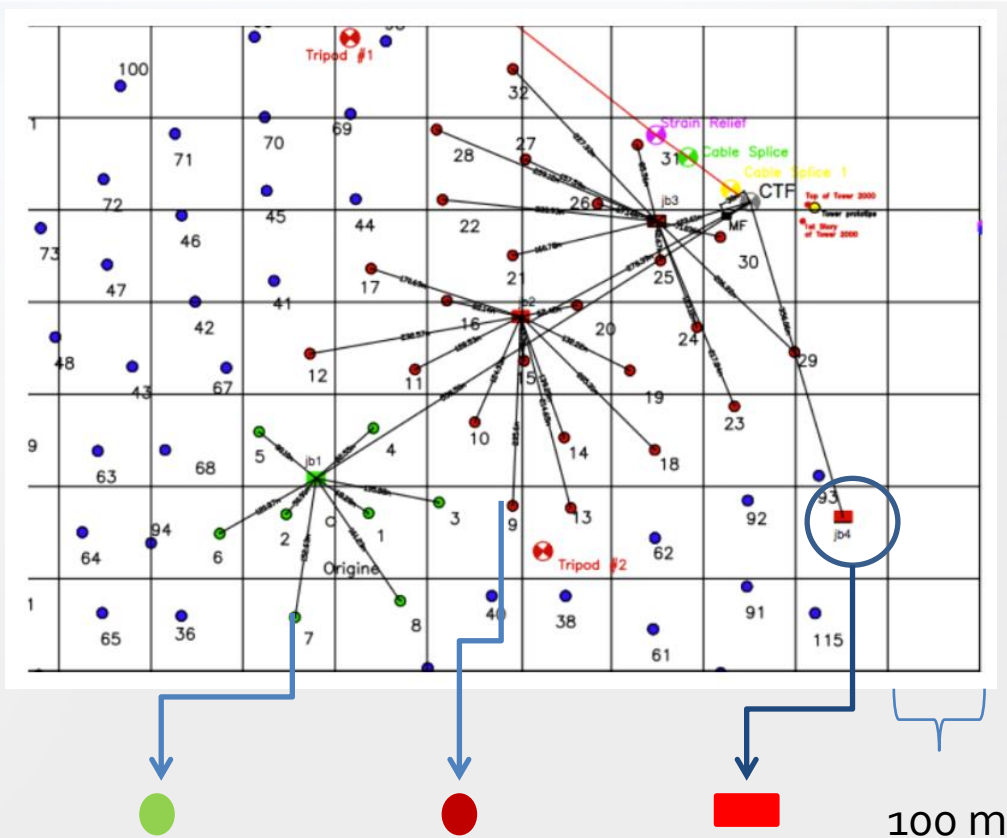
Budget 20.800.000 euro

Timeline

Started	jan 2012
Closed	dec 2014

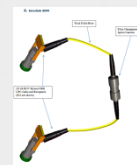
Km3NeT ITALIA

Seafloor network



3 JB

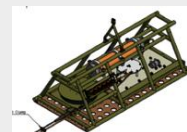
1 for towers
2 for strings



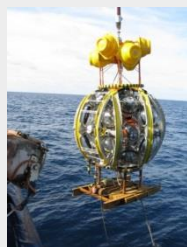
Interlink cable system

DU – JB

CTF – JB



New Termination Frame



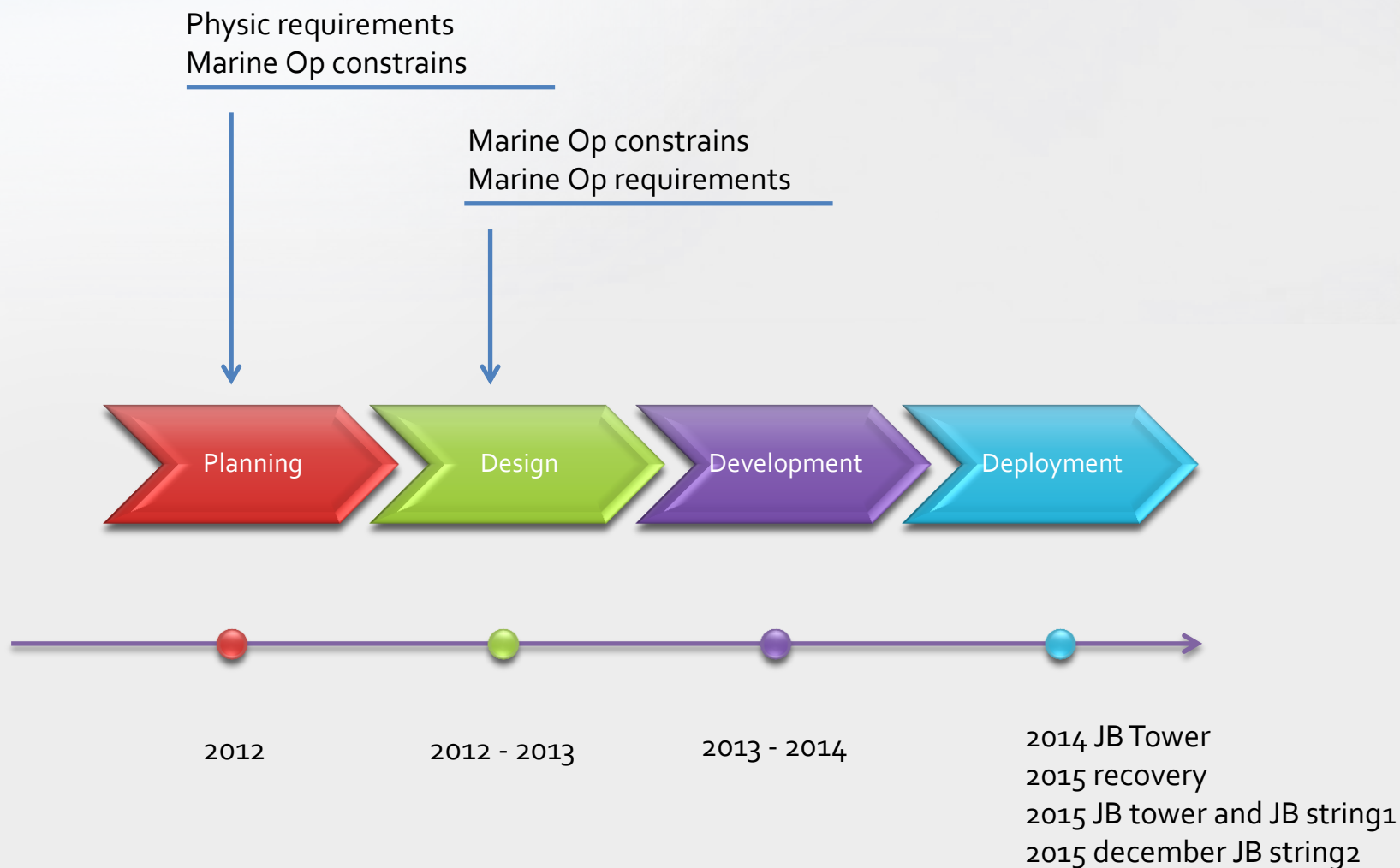
JB EMSO Node

Site characteristics

3.500 m depth

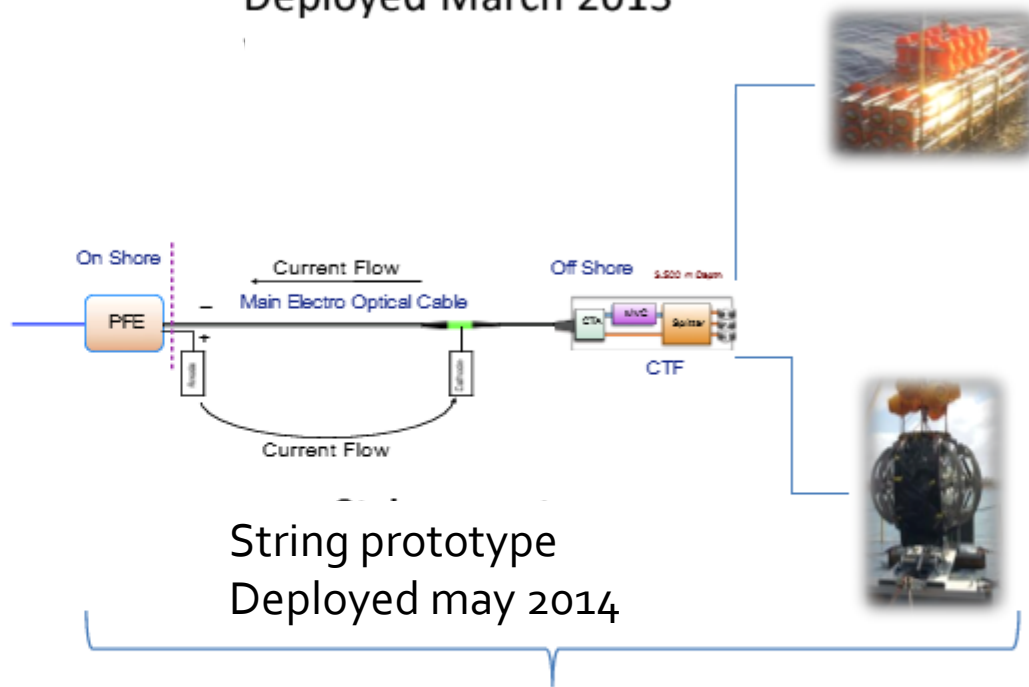
80 km far from the coast

Life cycle of the project



.... before Km3NeT Italia

Tower prototype
Deployed March 2013



String prototype
Deployed may 2014

Sea Operations



Junction Box characteristics

Item	JB Tower	JB String
Input (from CTF)	1 375V	1 375V
Output (to Dus)	8 (towers) 375 V , 5A	12 (strings) 375V , 5A
Size (mechanical Frame)	2.4 x 2.4 x 2.7 m	2.4 x 2.4 x 2.7 m
Material (mechanical frame)	Al Alloy 5083	Al Alloy 5083
PODs (Protective Ocean Device)	3	3
Material PODs	Al Alloy 6082 Hard Anodized	Al Alloy 6082 Hard Anodized

Note: one of the objectives was to standardize the layout of the JBs, the only difference is the optical POD (type of electronics, #connection, POD size)

Junction Box structure

Each JB is composed by

#1 **Manifold** for the splitting of electrical wires and optical fibres from and to the DUs

#1 **Electronic POD** for the management of the JB (power ON, link connection, slow control,....

#1 **Optic POD** for the Data Transmission Management

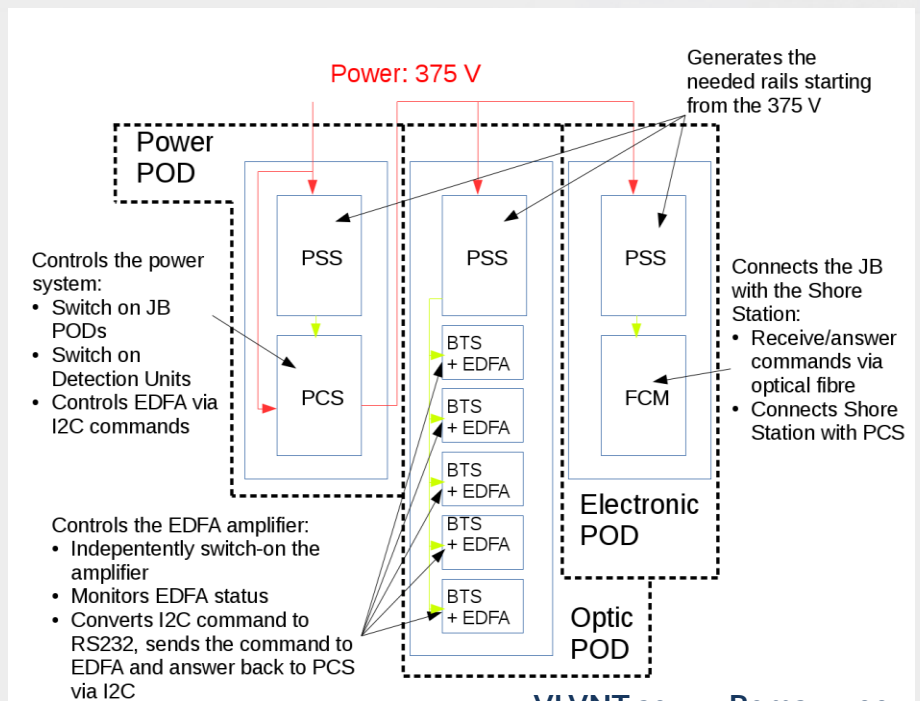
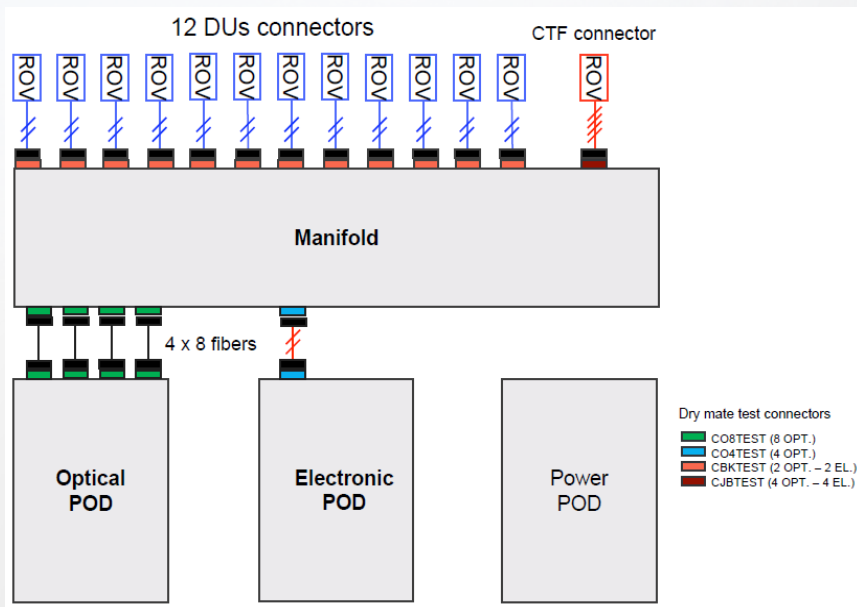
#1 **Power POD** for the power management of the OUTs (375V) and the JB

#1 **ODI NRH Bulkhead** connector for the connection JB – CTF

#8 or 12 **ODI NRH Bulkhead** connector for the connection JB – Dus

#1 **BEACON** for the LBL of the telescope

Junction Box structure



The first Junction Box (JB2) for strings ...

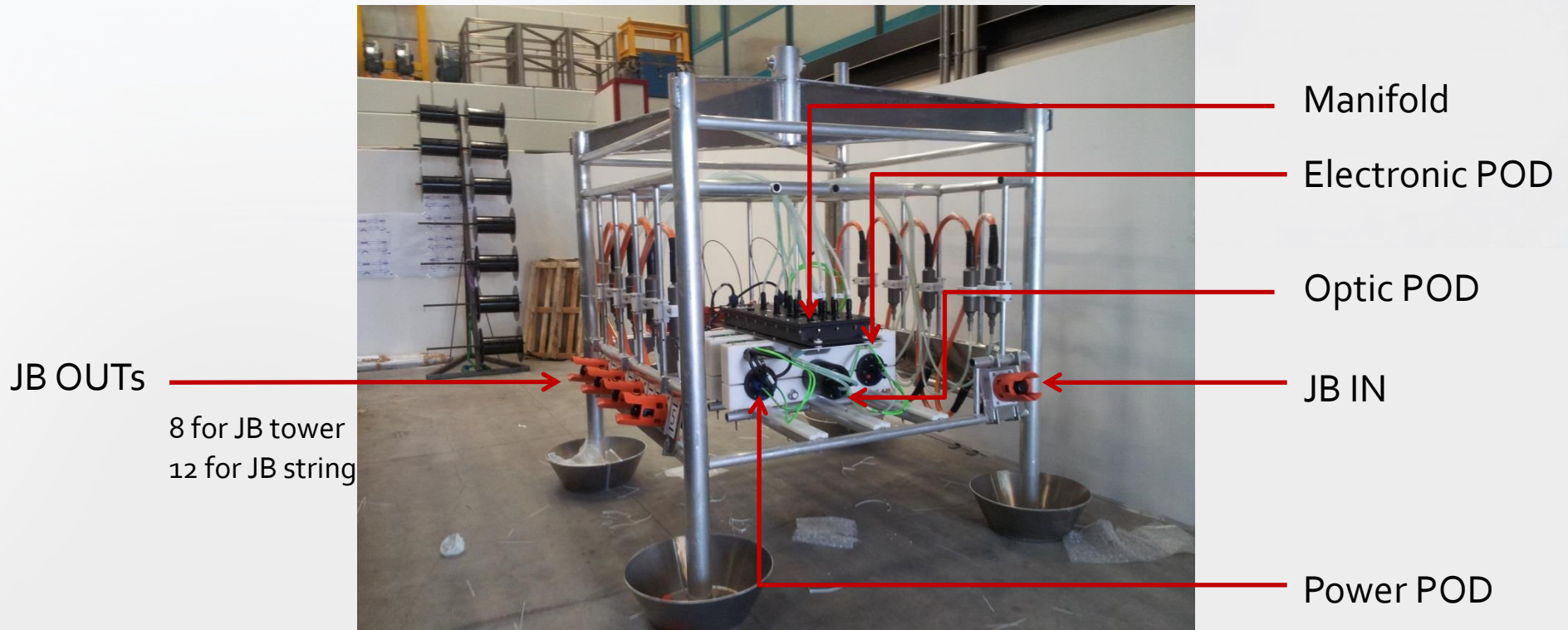


...during test



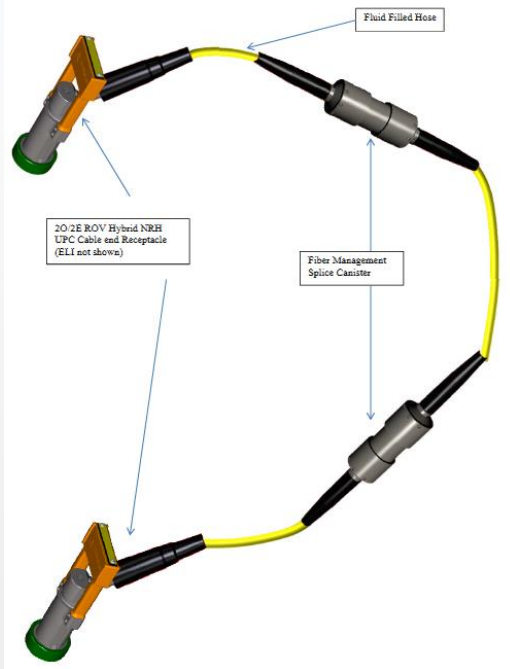
..and assembled

Junction Box assembled

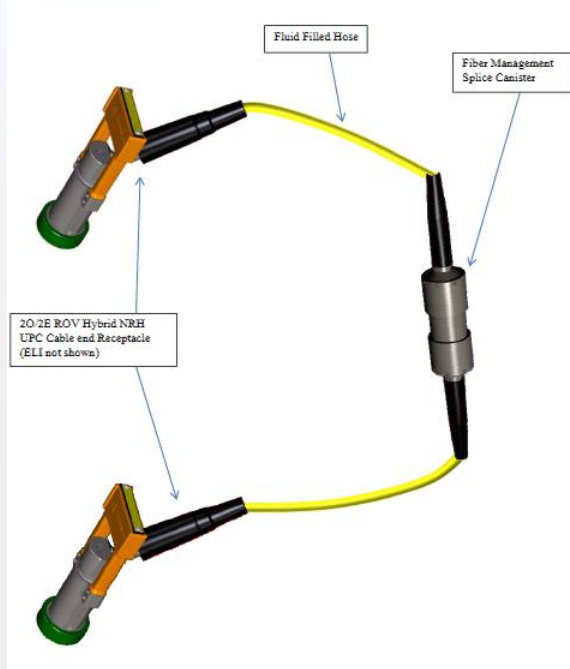


Interlink cable system (JBs – DUs) design

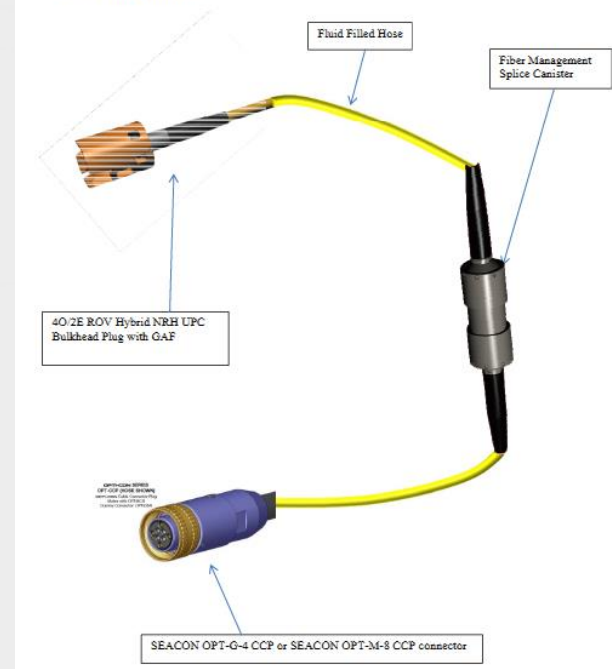
1. Interlink 310m; 280m; 250m; 200m; 150m; 100m and 90m

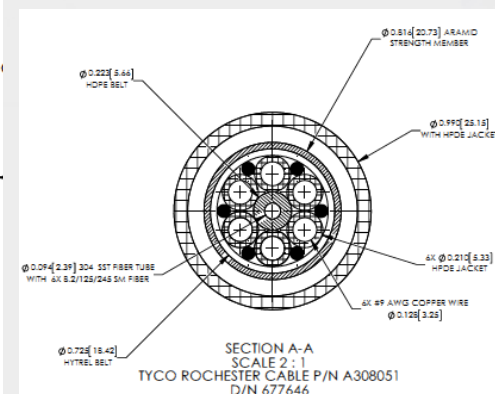


2. Interlink 90m



3. JB & DU Jumpers



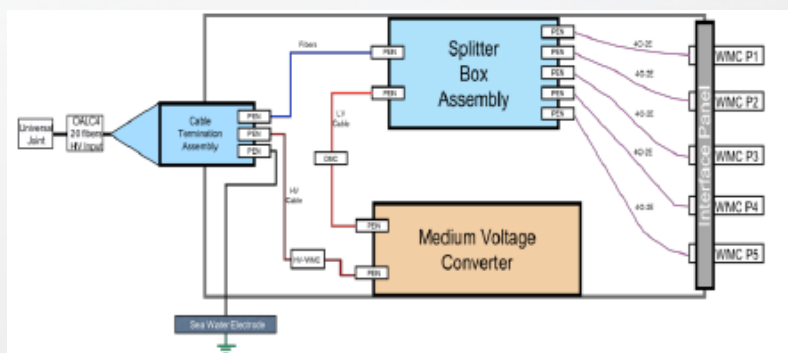
[illegible]

New Cable Termination Frame

Able to manage all the 20 fibres with 5 OUTs

OUTs 1,2,3,4 for the connection of KM₃NeT JB

OUT 5 for the connection of the EMSO Node JB

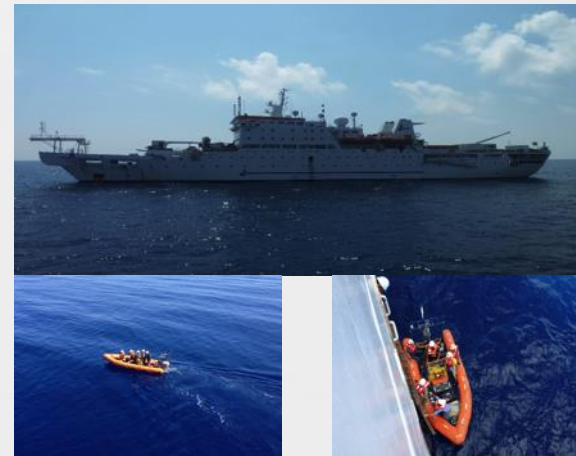


MVC Alcatel
10 kW
375V output

New cable termination frame delivered in mid-April
(acceptance tests successful at MacArtney –tests at LNS ok)

The Sea Operations

Tools for the sea operations



- Multi Service Vessel ATide
- 30 t hydraulic A-Frame with 4500m lift lines
- Heavy work class ROV rated up to 4500 mwd (125 hp)
- DP2
- Cable Repair/Lay Ship Antonio Meucci (MECMA)
- Fully equipped for cable jointing activities and cable deployment (drum and drum engine)
- ADP 701

Recovery of old CTF

ROV Mateable Connectors

Mechanical parameters:

- Max. pressure: 690 bar
- Mating force: 534 N
- Material: Titanium

Optical parameters:

- Circuits: up to 4
- Attenuation: < 0.5 dB @ 1310/1550 nm
- Return Loss: < -30 dB @ 1310/1550 nm

Electrical parameters:

- Pin numbers: 2 electrical, 4 optical
- Max current: 30 A per circuit
- Max voltage: 3.3 kV dc

375 VDC + 3 optical fibers
375 VDC + 3 optical fibers
375 VDC + 2 optical fibers

Old CTF and ROV

PPM-DU

Tower 2000

Meucci

ATide

Deployment of new CTF

MEOC

CTA

MVC

Splitter

5 X 375 V_{DC} + 3 optical fibers

MVC

CTA

MEOC

Sea Earth

ROV Mateable connectors

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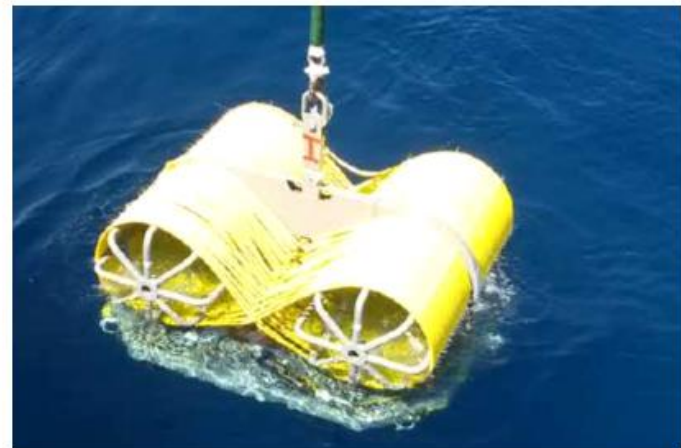
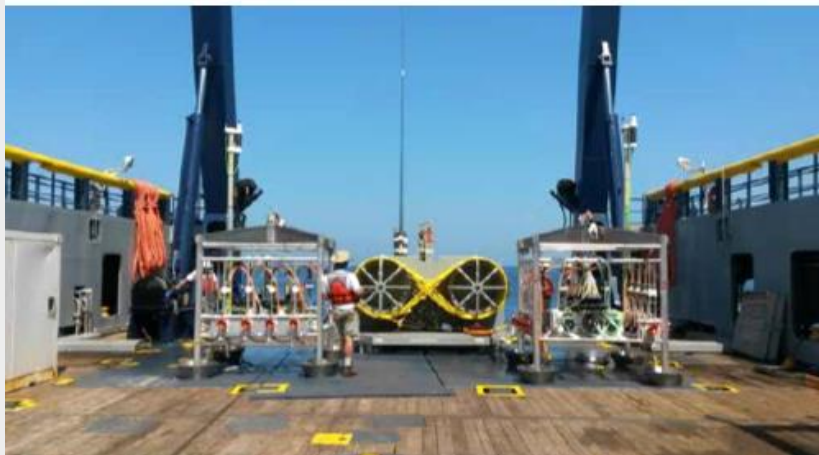
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JB Deployment

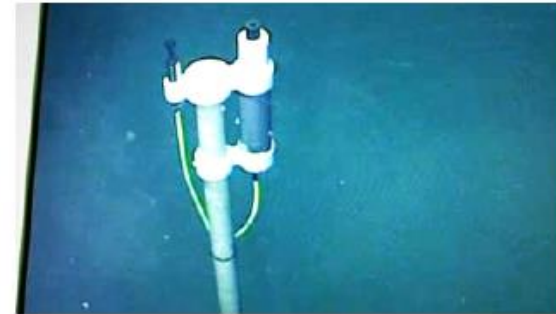
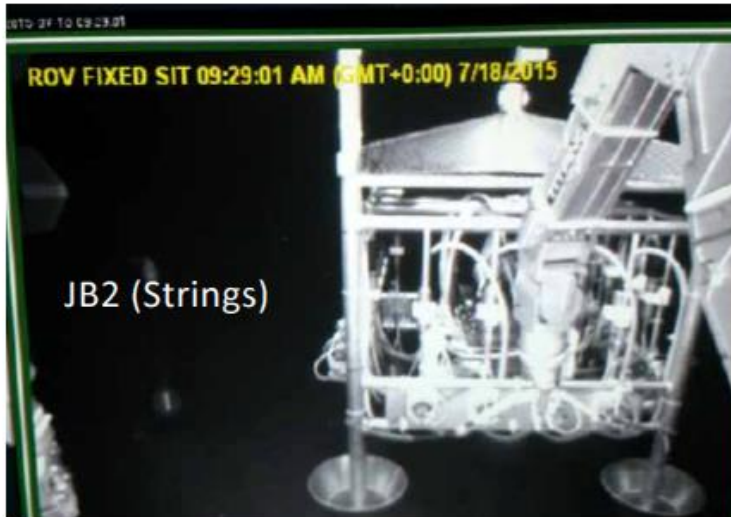
- **Operation July 2015**

Deployment of JB1, JB2 and cables, T2001-T2007 cabling

- Before and after the CTF activities the AT performed extensive field works.
- 585m cable between CTF and JB1 and 310m cable between CTF and JB2 were deployed using a purpose designed Cable Tray (designed in Genova)
- JB1 and JB2 were deployed and connected to the new CTF. JB preparation pre deployment and design requires some adjustment to improve future activities (see lessons learned document)
- Afterwards the remaining 7 cables to the the Tower DUs to JB1 were deployed and connectors parked in a safe position. Deployment of interlink cable T2001 to 2007 went smooth using Cable Tray. The cable tray will be upgraded to also be used as a 'basket transporter' in the future to improve field works.



JB Deployment



....Next

Sea operation – Dec 2015

- 1 string

- 1 or 2 towers

- 1 JB (last JB for the string)

Lesson learned from the KM3NeT Italia Project
to improve the design of the next JBs (to complete the
building block)

Funding request to complete the building block (DUs and
seafloor network)

- ERDF & RIS3

- PON 2014 -2020

Thank for your kind attention