

ANTARES MARINE ARCHITECTURE AND DEPLOYMENT METHODS LONG BASE INSTALLED PERMANENTLY AROUND THE SITE

Allows accurate deployments of detector components (10 years life / +- 2m accuracy)

ELECTRO OPTICAL MAIN CABLE

Cable laid with 420m fishing tail and 1 ton dead weight from offshore to shore with no slack on the first 5000m

Recovery of cable end by grappling the fishing tail under bottom navigation for installing or repairing the junction box

Segmented fishing tail and dead weight allows safe recovery (grapnel cannot slip outside segment end shackles)

Dredging cable and fishing tail spooled above on same capstan winch

Zero slack and long base navigation allows to reinstall the junction box at the same fix after repair (in catenary laying mode)

VLVNT WORKSHOP (AMSTERDAM / 6-8 OCTOBER 2003)



JUNCTION BOX

Junction box frame design with cable bending restrictor on the back and oscillating arm lifting point. Allows perfect equilibrium, alignment and landing under cable and fishing tail tension during deployment or recovery

OPTICAL MODULE LINES

450 m lines with 25 optical module floors tensioned between anchor and upper float / Release transponders for abandoning part of anchor and connector ready to be reused

Launched vertically step by step (2 minutes every floor) using two overboarding lifting points and automatic lock latch tools from bottom anchor to upper float

Connected through release transponder and dampening line segment to deepsea cable end / Deployed and positioned on bottom under tensiometer control and long base navigation

Recovered at surface after release of part of bottom anchor with only the float at surface / Recovered onboard step by step using automatic lock latch tools from upper float to bottom anchor

All line installed, tested and mobilized on specific deck support with rails and carriages

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INTERCONNECTING CABLES

Cables equipped with opto-electric wet mateable Ocean Design connectors

Cables length depends of the distance of the line anchor from junction box plus 20m slack

Cables are connected and deployed with submarine (Nautile or Victor ROV) using a specific turret send on the bottom and recovered empty at surface ready for next deployment

First cable is deployed straight towards instrumentation line / Used as a central guide line for following cable deployments

Tape marks used to indicate to the submarine route changes for following interconnections

All cables deployed from junction box to line anchors (no slack near junction box)

Slack laid around anchor and arranged with hook straight beyond anchor (minimizing foot print area for next deployments in case of line reparation)



ANTARES SEA OPERATION EXPERIENCE

All operations made in one day (except main cable laying) / No standby or technical problems delaying at sea any operation

Ability to dredge vertically and accurately fishing tail with grapnel (27m over length only) under tensiometer and bottom navigation control

Ability to recover and relay cable end for junction box installation and maintenance

Ability to install lines on the bottom within 2 m of accuracy under tensiometer and navigation control / Requires 50m ship displacement and one minute lift up for adjustment of final position waiting for sufficient number of good acoustic fixes

Ability of Antares and Castor team to perform all detector installation and maintenance operations



KM3 MARINE ARCHITECTURE BASED ON ANTARES EXPERIENCE

MARINE ARCHITECTURE

Minimize concentration of cables on junction boxes

Maximize redundancy (2 junction boxes and main cables)

Combine star and ring topology for transporting power and data clockwise and counter clockwise to the shore as necessary to bypass and isolate faults

Maximize space between lines for facilitating ROV intervention

Minimize number of pressure vessels and connectors in vertical lines

MARINE OPERATION

Be ready to operate for routine, recurrent and cost effective installation and maintenance operations with dedicated infrastructure and operation team

Marine base with dedicated ship and ROV mandatory

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