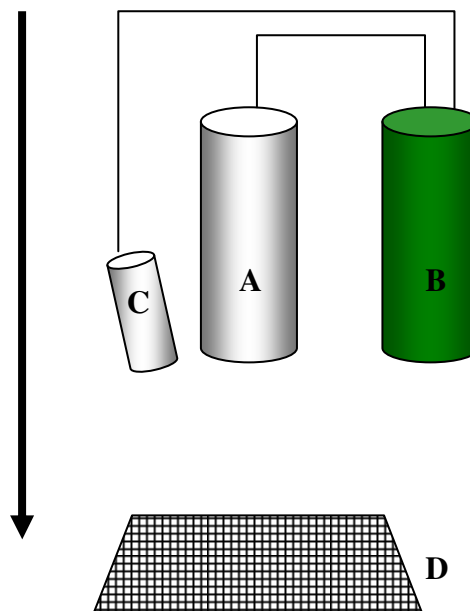


## Vertical Profiles of Pelagic Bioluminescence in the Mediterranean Sea.

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Ninety-seven percent of planktonic organisms in the pelagic zone have the ability to produce bioluminescence for a variety of ecological reasons. These animals, often transparent and extremely fragile, have proven difficult to study with conventional sampling. Mechanically stimulating bioluminescence during a CTD cast produces a marker for each individual, therefore vertical profiles of bioluminescence can be used as a proxy for pelagic community structure.

To induce these bioluminescent events, an ultra low-light camera (ISIT camera) is positioned on the CTD probe looking down on a black mesh screen. As the CTD is lowered through the water, organisms impacting or passing through the screen will produce bioluminescence by mechanical stimulation. The video profiles and data is pre-programmed, controlled, powered and stored autonomously inside a custom-built control unit on the CTD frame.



### FIGURE 1; Bioluminescence profiling technique.

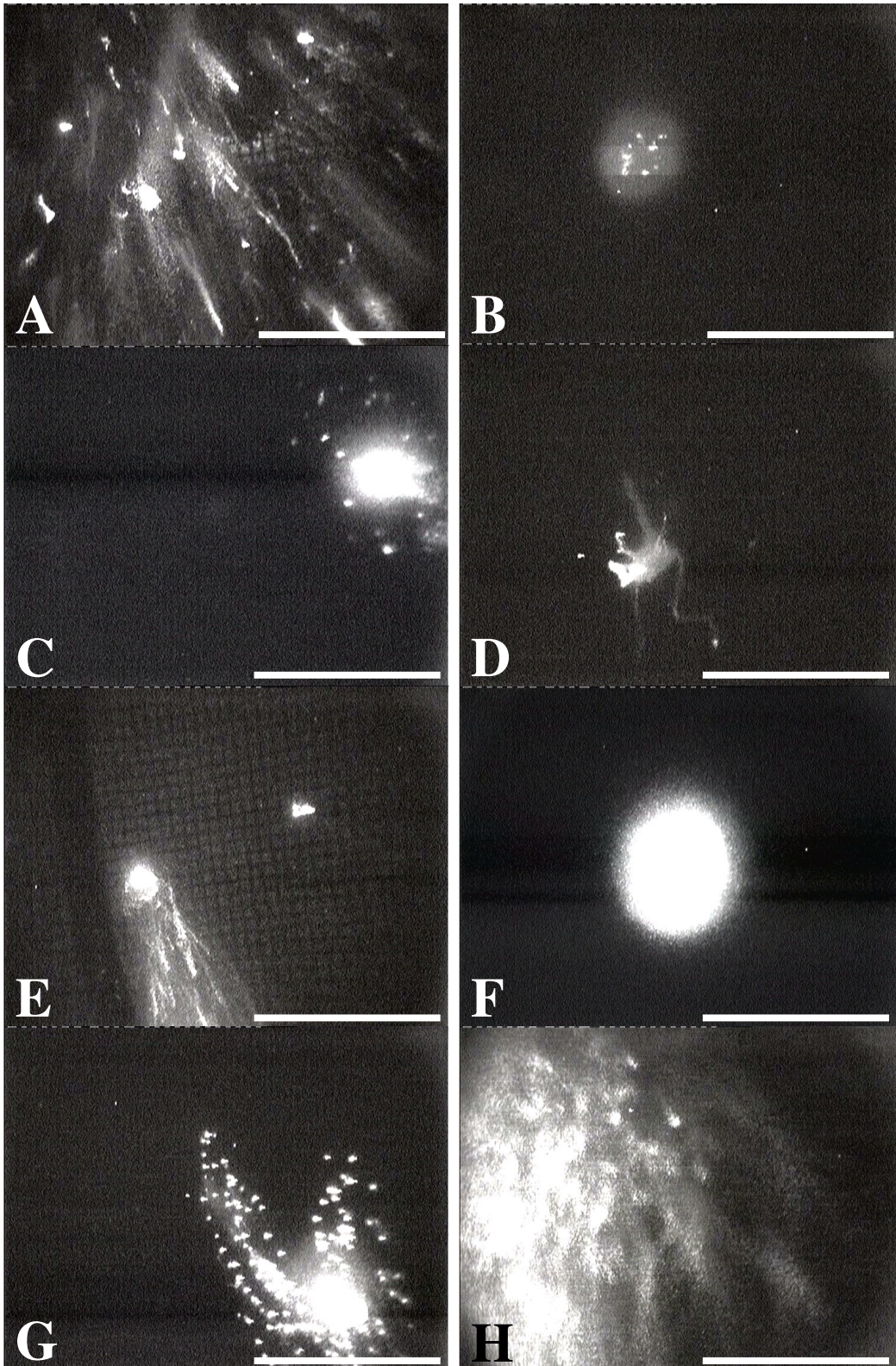
The ISIT camera (A), control/power unit (B) lamp (C) and mesh screen, 50cm x 375cm (D). The arrow indicates direction of travel during filming.

The objectives of bioluminescence profiling on M70-1 is to contribute to two EU funded projects. The first, HERMES, coordinated by NOCS (UK) is to survey the pelagic community in the vicinity of extreme seafloor topographical features such as troughs, seamounts and canyons, whilst also surveying control sites away from these features. Features such as seamounts have been shown to generate pelagic hotspots in the Atlantic due to upwelling of nutrient rich waters. Our contribution to the second project, KM3NeT coordinated by Universität Erlangen-Nürnberg (Germany), involves surveying the Mediterranean sea for background bioluminescent activity prior to the installation of a neutrino telescope array spanning one cubic kilometre.

### Summary of bioluminescence profiles.

<b>Dep#</b>	<b>St#</b>	<b>Location</b>	<b>Depth</b>	<b>Profile</b>	<b>Night/day</b>
1	653-1	Malta Trough	565m	100-484m	Night
2	653-2	Malta Trough	584m	100-512m	Night
3	655	Malta Trough	1000m	250-993m	Day
4	662	Malta Trough	711m	100-628m	Night
5	663	Malta Trough	660m	100-640m	Night
6	664	Malta Trough	444m	100-250m	Night
8	666	Linosa Trough	916m	250-900m	Day
9	674	Linosa Trough	1498m	100-1390m	Night
10	675	Malta Trough	1694m	100-1659m	Night
11	681	Aceste Seamount (off)	1210m	250-1178m	Day
12	686	Enarete Seamount (off)	2720m	250-2525m	Day
13	690	Enarete Seamount (on)	1510m	100-1450m	Night
14	692	Palinuro Seamount (off)	3278m	100-3016m	Night
15	696	Palinuro Seamount (on)	1189m	100-1151m	Night
16	697	Madonna dello Ionia (off)	1795m	100-1753m	Night
17	701	Madonna dello Ionia (on)	1661m	250-1637m	Day
18	705	Santa Maria Di Leuca	1006m	250-1003m	Day
19	709	Santa Maria Di Leuca	875m	250-873m	Day
20	722	Santa Maria Di Leuca	2450m	100-2350m	Night
21	723	Santa Maria Di Leuca	1195m	100-1170m	Night
22	724	Santa Maria Di Leuca	781m	100-750m	Night
23	725	Santa Maria Di Leuca	626m	100-600m	Night
24	726	Santa Maria Di Leuca	624m	100-600m	Night
25	733	Bari Canyon	792m	250-786m	Day
26	736	Dauro Seamount (south)	1074m	100-1030m	Night
27	737	Dauro Seamount (north)	1164m	100-1028m	Night
28	740	Dauro Seamount (north)	1164m	250-1146m	Day
29	749	Bari Canyon	629m	100-600m	Night
30	750	Bari Canyon	873m	100-850m	Night
31	753	KMD	4966m	100-4957m	Night

NOTE: No CTD data for DEP1 and DEP2 (CTD fail) and no DEP7 (ISIT fail)



**FIGURE 2; Examples of bioluminescent events from Meteor M70-1.**

A – Dense, small flashes typical of the surface layers. B – Single low intensity. C – Medium intensity, slow disintegration. D – Fragile clusters breaking into smaller events. E – Single intense point source flaring smaller streaks. F – Large intense event. G – Multiple sources from one organism. H – Large fragile colony flaring with rapid disintegration. (White Scale bar = 20cm)