Objective

The main objective of the expedition to the Faroe Islands is the observation of the Total Solar Eclipse that will occur on March 20, 2015 for two purposes:
1) Live broadcast of the event and 2) Promote educational activities.

Phenomenon

Total Solar Eclipse

After more than a year without Total Solar Eclipses (the last one occurred on November 3, 2013), the one occurring on March 20, 2015 will see the shadow of the Moon touching the surface of our planet. However it will be one of the most complicated eclipses in recent times because the totality will be visible only from within a narrow strip in the North Atlantic (see Figure 1). In fact it will touch the land only in two Arctic archipelagos: Faroe and Svalbard. From continental Europe and the UK, only a partial eclipse can be observed, with the peak of solar disk occultation occurring in Iceland, Ireland, Scotland and Norway. In Spain the solar disk coverage will reach more than 50%, peaking in the Galician Community (see Annex 1).
Pearls and Diamonds

There are many spectacular visible effects that can be observed during a Total Solar Eclipse. If the observer is located in a high place with a good view of the distant landscape, the Moon’s shadow can be seen approaching, at supersonic speed, from the western horizon. The beginning of the total eclipse phase is heralded by the appearance of Baily’s beads (Figure 2). These are bright points of light surrounding the dark lunar disk that are caused by sunlight grazing the undulating terrain of the lunar surface. Suddenly, once the solar disk is completely covered, the solar corona appears and safe naked-eye viewing of the total eclipse can begin (Figure 3). Until then it had been dazzled by the brilliance of the Sun’s photosphere, which is a million times more luminous. During the first few seconds, part of the chromosphere may also be seen as a thin arc of intense red colour with some bright extensions (Figure 2). These typically disappear as the lunar disk advances, unless they are very extended. The corona, which is an intense pearly white, shows structures that reflect the magnetic field of the Sun. The shape and brightness of the corona depends on where the Sun is in its solar activity cycle.

During the brief moments of totality, the planets and the brightest stars appear in the sky (Figure 3).
with the naked-eye, creating an artificial “night” although the lighting conditions are more reminiscent of advanced twilight rather than deep night. Around the full circle of the horizon the colours are similar to the colours of sunset because for those distant locations the eclipse is not total.

Figure 2. Baily's Beads and solar chromosphere at second contact of the eclipse of November 13\textsuperscript{th}, 2012 observed in Cairns, Australia (credits J.C. Casado, gloria-project.eu).

Figure 3. Solar Coronal and stellar background in the Eclipse of August 1\textsuperscript{st}, 2008 observed from Russia (credits J.C. Casado, tierrayestrellas.com).
Expedition Location

Shelios-GLORIA has chosen as final destination for the Eclipse watching the Faroe Islands (Denmark) located in the heart of the "Gulf Stream" in the North Atlantic (62° N) northwest of Scotland, halfway between Norway and Iceland. Less than 50,000 inhabitants are spread across 18 islands. Maritime climate, the Gulf Stream softens the atmosphere and hardly temperatures drop to 3-4 degrees in winter. From rugged terrain, the highest point stands at 882 metres, but the average height is 300 meters above sea level.

The observation of the eclipse will take place from the building of the Centre for Maritime Studies (University of the Faroe Islands) located in the archipelago's capital, Torshavn.

The Shelios Association (shelios.org) will provide logistic and practical organization of the expedition. Shelios - Faroe 2015 will be coordinated and directed by Dr. Miquel Serra-Ricart (Astronomer at Astrophysics Institute of the Canary Islands and Administrator of the Observatorio del Teide).

Broadcast

From the Faroe Islands, the Total Eclipse duration will be 2h 14m (13:13 - 15:27 UT) and retransmission will have a total duration of 15 minutes coinciding with maximum of partiality in Europe and the second (C2) and third (C3) contact (see time table in Annex 1). Astronomers from the Faroe Islands (Serra-Ricart & Cox) will provide explanations and commentary in Spanish and English. Two connections will be done:

**Connection 1: Maximum in Europe** (5 minutes)
March 20, from 8:45 to 8:50 UT (9:45 - 9:50 CET, 8:45 - 8:50 local).

**Connection 2: 2nd and 3rd Contact** (10 minutes)

Note: **UT Universal Time; CET- Central European Time.**

The broadcast can be followed from the website sky-live.tv.

Educational Activity

Environmental data (including temperature, pressure, light intensity, and humidity) will be collected and made available live on the web. Using this data, students can perform some educational activities. These activities can be accessed through the web portal of GLORIA (gloria-project.eu).
Credits

The Seventh Framework Programme of the European Union (EU, FP7/2007-2013, INFRASTRUCTURES-2011-2, INFRA-2011-1.2.1: e-Science environments) contributes to the relay under the GLORIA - GLObal Robotic telescopes Intelligent Array for e-Science "(Grant Agreement Number 283783). In the broadcasting, the Department of Science and Technology at the University of the Faroe Islands as well as the Center of Maritime Studies & Engineering will also participate. The English version of broadcast will be conducted by SLOOH. The technical part of the live broadcast will be supported by Systemagic AB.

Web partners
Partners

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TOTAL SOLAR ECLIPSE 2015  6
ANNEX 1. Table of Local Times (March 20th, 2015)

-Faroe Island, Torshavn-

Duration of total solar eclipse: **2 minutes**

<table>
<thead>
<tr>
<th>Contacts</th>
<th>Hour (UT)</th>
<th>Alt</th>
<th>Azi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial eclipse starts (C1):</td>
<td>08:38:50</td>
<td>13.8°</td>
<td>118.1°</td>
</tr>
<tr>
<td>Total eclipse starts (C2):</td>
<td>09:40:52</td>
<td>19.7°</td>
<td>133.1°</td>
</tr>
<tr>
<td><strong>Maximum eclipse:</strong></td>
<td><strong>09:41:53</strong></td>
<td><strong>19.8°</strong></td>
<td><strong>133.3°</strong></td>
</tr>
<tr>
<td>Total eclipse ends (C3):</td>
<td>09:42:53</td>
<td>19.9°</td>
<td>133.6°</td>
</tr>
<tr>
<td>Partial eclipse ends (C4):</td>
<td>10:47:39</td>
<td>24.6°</td>
<td>150.3°</td>
</tr>
</tbody>
</table>