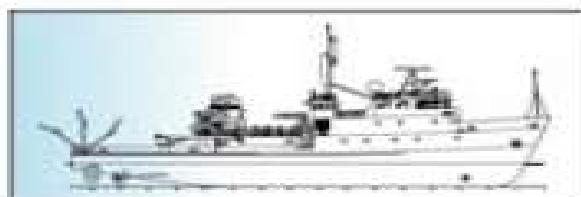


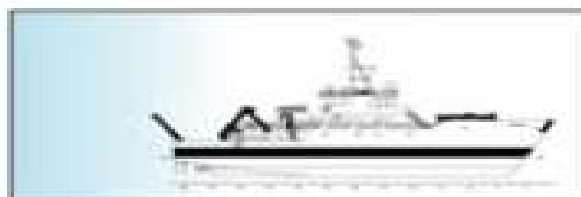
California-based Intermediate Class & smaller ships

Research vessels able to carry out California's local research and education needs have decreased from 3 to 1, with the last remaining ship approaching the end of its service life. **A new vessel is needed.**



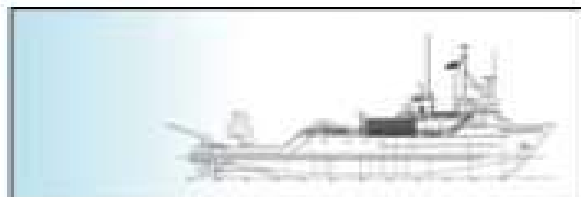
INTERMEDIATE

R/V *New Horizon*
170 feet / 40-day endurance
12 crew / 19 scientists



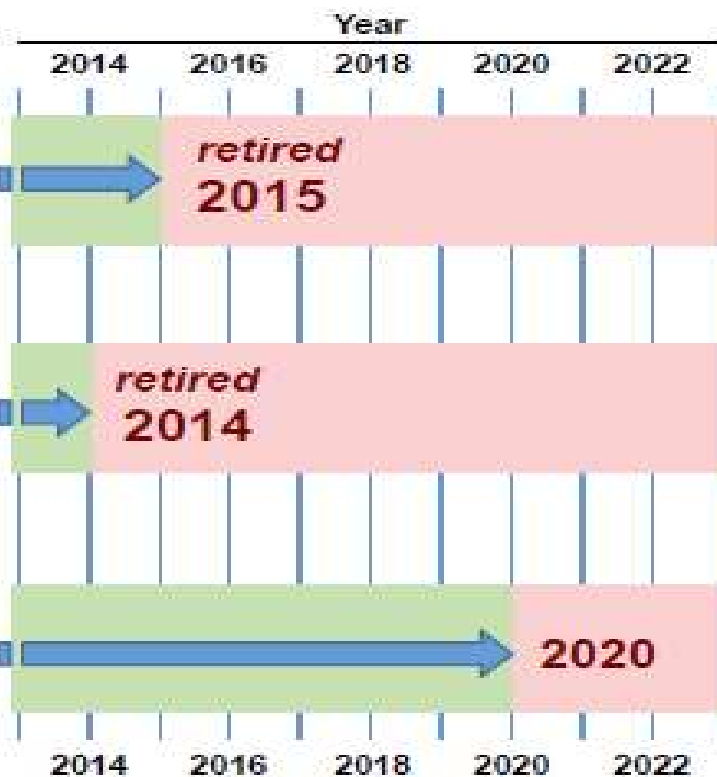
REGIONAL

R/V *Pt Sur*
135 feet / 21-day endurance
8 crew / 12 scientists



LOCAL / COASTAL

R/V *Robert Gordon Sproul*
125 feet / 14-day endurance
5 crew / 12 scientists



**Needed
2020 onward**

Collaborating on a shared research vessel

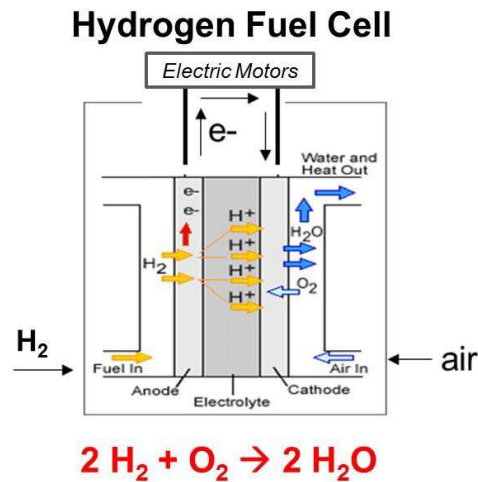


Vision: establish a new kind of partnership within California, involving public and private universities, research institutions, state agencies and non-governmental organizations to support a new **California Coastal Research Vessel (CCRV)** for seagoing education and research.

Efforts to date:

- **Moss Landing Marine Laboratories (California State University)** and the **Scripps Institution of Oceanography (University of California)** have agreed to collaborate jointly on this effort.
- Committed significant seed funding from each institution
- Assembled *Scripps Small Ship Task Force* to define institutional needs
- Sent *Dear Colleague* letter to 100+ ship users statewide to solicit input
- Scripps began a DOT-sponsored feasibility study (with Sandia National Labs) of a zero-emission research vessel (ZERo/V), including conceptual design

Hydrogen Fuel Cell Use in Maritime Applications



Going In:
H₂ and air

Going Out:
Electricity
Waste Heat
Warm humidified air

H₂ Fuel Cell Power Provides:

- ✓ Zero emissions
- ✓ No fuel Spills
- ✓ Quiet Operation



SF-BREEZE Optimization

