

NEW SOUTH AFRICAN SURVEY VESSEL : SAS " PROTEA "

by Commodore J. C. WALTERS SM, SA Navy

SAS *Protea*, a new survey vessel for the South African Navy will be commissioned early in 1972 at Scotstoun, Glasgow, where she has been building and fitting out since 1970. She is the first ship acquired by the SA Navy to be especially designed and built for hydrographic surveying and oceanographic data collecting. During the past fifty years South Africa has made use of converted warships of various classes to carry out hydrographic surveys, an expediency not in every way satisfactory. Nevertheless, these converted warships were put to good use and they produced excellent results. It is indeed a tribute to these early surveyors who sailed in those ships that many of the charts they produced are still valid and in use today.

SAS *Protea* bears a proud name and perpetuates the service of two earlier survey ships of the same name. The first *Protea* was commissioned in 1922 and the other in 1950. Both were employed in charting South African waters. There was also an anti-submarine escort vessel named *Protea* which served in the Mediterranean during the last War. South Africa's national flower, the King Protea (*P. cynaroides*) appears on SAS *Protea's* crest. It is one of the many varieties of Proteaceae, so called after Proteus, the versatile seagod.

For the purposes of hydrographic surveying and the collection of oceanographical data the new ship is fitted with special communications equipment, hydrographic surveying and oceanographic gear and instruments, survey launches and facilities for helicopter operations. Main propulsion is provided by four diesel engines driving through a gearbox to a single shaft and controllable pitch propeller. Two diesel engines will provide a cruising speed of 11 knots. She is also capable of operating at low speeds in the range of 2-5 knots for limited periods. A bow transverse thrust unit and passive roll stabilisation are fitted. The ship, which is strengthened for navigation in ice class 2, is capable of undertaking long ocean passages in any part of the world. Her main particulars are :

| | |
|-------------------------|-----------|
| Length overall | 79.2 m |
| Length B. P. | 71.6 m |
| Breadth moulded | 14.9 m |
| Depth moulded | 7.8 m |
| Load displacement | 2750 tons |

| | |
|------------------------------------|--------------------------|
| Corresponding mean draft | 4.6 m |
| Trial speed | 16 knots |
| Endurance | 12 000 miles at 11 knots |

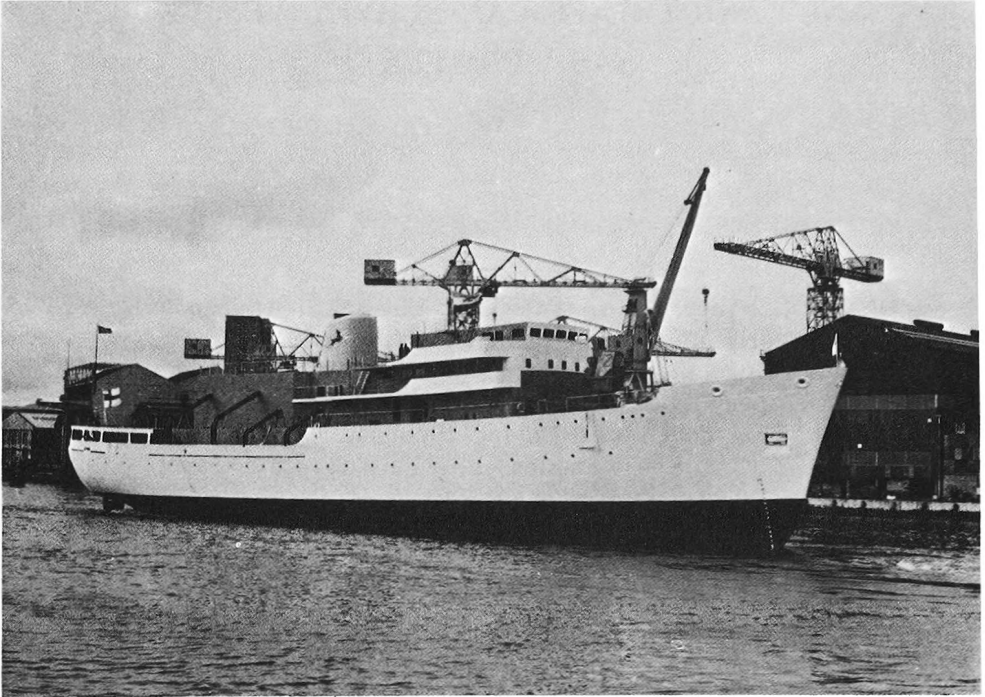


FIG. 1. — SAS *Protea* moving to her fitting out berth.

Much attention and detail have been devoted to the accommodation and living spaces in order to provide maximum comfort to personnel in view of the long periods the ship will be at sea. All living spaces for the company of twelve officers and one hundred and four ratings are air-conditioned. Accommodation for one senior and six scientists is also provided for occupation when the ship is employed on oceanographic cruises. In addition to living quarters most working space is air-conditioned. Laundry, with drying-room, library, canteen, sick-bay and cinema facilities are also provided. Senior ratings are accommodated in two-berth cabins; junior ratings are accommodated in dormitories and they all have dining / recreation rooms. The ship has a combined officers and crews galley with all electric equipment, deep-freeze and refrigeration facilities. A marine sewage plant which converts the sewage to a completely sterile liquid is installed to ensure that unpolluted sea water samples are obtained and to prevent pollution of harbours, docks and beaches.

For working beacon equipment over the ship's side port and starboard, and for handling stores through a forward hatch, an electric level luffing crane is positioned on No. 1 deck. The crane is capable of lifting a maximum load of 2 tons at a speed of 22.9 m per minute and creep speeds, at an outreach of 12.2 m that is at least 4.6 m clear of the ship's side and to a height of 11.6 m above the deep waterline.

An electrically driven oceanographic winch is sited on No. 1 deck starboard immediately forward of the superstructure. This is capable of taking 10 000 m of 4 mm diameter wire contained in 61 layers accurately spooled by the use of the " Lebus " system of double crossover parallel grooving in combination with the " Lebus " Fleet angle corrector. The control gives variation of speeds, from minimum 7.6 m per minute 1st layer increasing to 19 m per minute on 61st layer and maximum 75 m per minute on 1st layer increasing to 189 m per minute on 61st layer. The minimum and maximum speeds are related to 180 and 1 800 r.p.m. of motor speed respectively.

Two heavy duty bathythermograph winches with associated booms and rigging are fitted on No. 01 deck port and starboard. A portable expendable bathythermograph which can be fitted either the port or starboard side is also installed. A combined electrically driven survey sweep and berthing winch is fitted aft on No. 2 deck.

An electrically driven anchor and mooring windlass is sited on No. 1 deck forward. The windlass is fitted with two cast-iron warp ends on an intermediate shaft.

To pay out the mooring wire of small marker buoys or beacons laid in deep water a hand-operated deep mooring winch is positioned on No. 1 deck forward.

Taut wire measuring gear comprising a deck pedestal with drum of wire is fitted on No. 2 deck aft. A roller fairlead to lead the wire overboard and a measuring frame is also provided aft. The indicator is fitted in the enclosed bridge.

The steering gear, capable of moving the rudder hard over to hard over in 30 seconds with one pump in operation and in 20 seconds with two pumps in operation, is of electro-hydraulic type with two pumping units (one working and one standby). A Decca/Arkas steering pedestal with wheel for telemotor steering and auto pilot with control of auto pilot from the Omnitrac computer for Lambda and Decca lane following are also provided including override and emergency steering facilities. All electrical connections are run in duplicate between bridge and steering flat.

A Transverse Thrust Unit is fitted in a steel circular tunnel about 1.5 m diameter at the forward end of the vessel. The unit is capable of delivering a static thrust variable from 0 to 5.5 tons in either direction. The outboard ends of the Thrust Unit tunnel are fitted with non-watertight, robustly constructed, vertically sliding doors, which are raised and lowered by hydraulic cylinders. The doors when raised are stowed in recesses on the inboard side of the shell plating, and when closed are flush and fair with the outside of the shell. In addition to local control, a bridge control panel is provided incorporating On-Off push button, Port-starboard lever control, control lights and door indicator lights, pitch indicator, ammeter and dimmer, all situated in the main bridge console, together with safety interlocks between Thrust Unit and doors to prevent operation with the doors closed. Watertight control boxes are fitted on the bridge wings, port and starboard to facilitate manœuvring from these positions.

The ship carries two 8.8 m motor survey boats, for close inshore sur-

vey work. In addition a 8.2 m motor whaler, 4.3 m Bosun dinghy and one medium Gemini craft with outboard motor are also provided. Two sets of gravity davits, complete with cradles and trackways to suit a working load of 7 tons are fitted to expedite lowering and hoisting of the survey boats. An electrically driven winch gives three hoisting speeds up to a maximum of 9 m per minute. One set of gravity davits with an electrically driven winch to suit a working load of 2.5 tons and a normal hoisting speed of 9 m per minute is fitted for the motor whaler. A single arm radial type davit hand-operated through gearing is provided for the Bosun dinghy. The electrically driven davits are fitted with wire rope falls, slip hooks, tricing pendant assemblies, block and suspension links. The davits are constructed for continuous hoisting and lowering of boats, with crew and stores on board. Adequate shock absorbing arrangements are provided to prevent snatching of falls when working the survey boats and motor whaler in heavy weather.

A helicopter hangar and landing platform are sited at the after end of No. 1 deck. The guard rails on the landing platform are hinged and fitted with safety nets. Arrangements are also provided for fuelling and defuelling the helicopter in the hangar and on the flight deck. Adequate work-bench facilities are provided in the hangar for maintenance and stowage of rotor blades, tail rotor, main rotor head, engine change unit, gearbox change unit and other equipment associated with the helicopter.

Holding down bolts and eyeplates are fitted on No. 1 deck port side, for securing a landrover type vehicle when embarked to support shore survey parties.

A complete Decca Lambda equipment is fitted with the master transmitting aerial sited on top of the hangar. Associated control, receiver and display panels are sited in the Plotting Room. Two shore station equipments, basically similar to the master are carried for erection as required on shore. These are crated and stowed in the Bulk Survey store, except for certain electronic units for which special stowage is provided in the Lambda office.

The Surveying Instrument Room, sited on No. 1 deck is equipped with desk, nest of drawers, tall cupboards, metal workbench with sink, cupboards and drawers, vice, tool cupboard, and all necessary equipment, and provides stowage for theodolites, levels, tripods, tachymetric staves, sextants, tellurometers, hydrodists, thermometers and instrument boxes.

The surveying chartroom which is sited on No. 01 deck contains a 2.4×2.1 m chart table fitted with rollers at its fore and aft ends and drawers under, a chart table 1.8×1.4 m, two trans-illuminated tracing tables, one chart press, one IME 86 S desk top computer with 512 step programmer, 0.3 m solenoid typewriter printout and output link. In addition four desks and chairs, stools, cupboard for aerial photographs, foot stools, and bookcases, are fitted. Stowage is also provided for sounding boards, station pointers, metal scales, beam compasses, straight edges, parallel rulers and echo sounding trace readers.

Other important compartments to enable the ship to carry out her tasks are, a photographic dark room, electronics maintenance room, wet

and dry laboratories, navigating chart room, gyro and gravity meter room, all suitably fitted out with the necessary equipment.

A gyro compass and a gyro magnetic compass are provided, both compasses feed to a compass retransmission unit, via a change over switch, which in turn feeds to tape repeaters, azimuth repeater and any other item of equipment requiring a compass transmission. Thirteen such repeaters are provided throughout the ship.

An electrical clock system, controlled by a master clock feeds twenty-two clock repeaters in strategic positions throughout the ship.

A fifty-line automatic telephone exchange provides internal communications. In addition a survey intercom system with talk back facilities is installed in all survey compartments and spaces. A main general broadcast system is provided to give full coverage of the ship. A sound reproduction system comprising a console for radio receiver, amplifier and record player is connected to loudspeakers with On-Off switching and volume controls situated in the wardroom, recreation spaces, dormitories, galley and Sick Bay. Headsets with volume controllers are also provided adjacent to each cot in the Sick Bay. The SRE system and Main Broadcast are integrated so that when the main broadcast is working the SRE system is cut off.

An electro magnetic log is provided and speed and distance indicators are sited in the enclosed bridge, surveying chart room and laboratory. Speed signals are also provided to the Radar and any other items of equipment which require them.

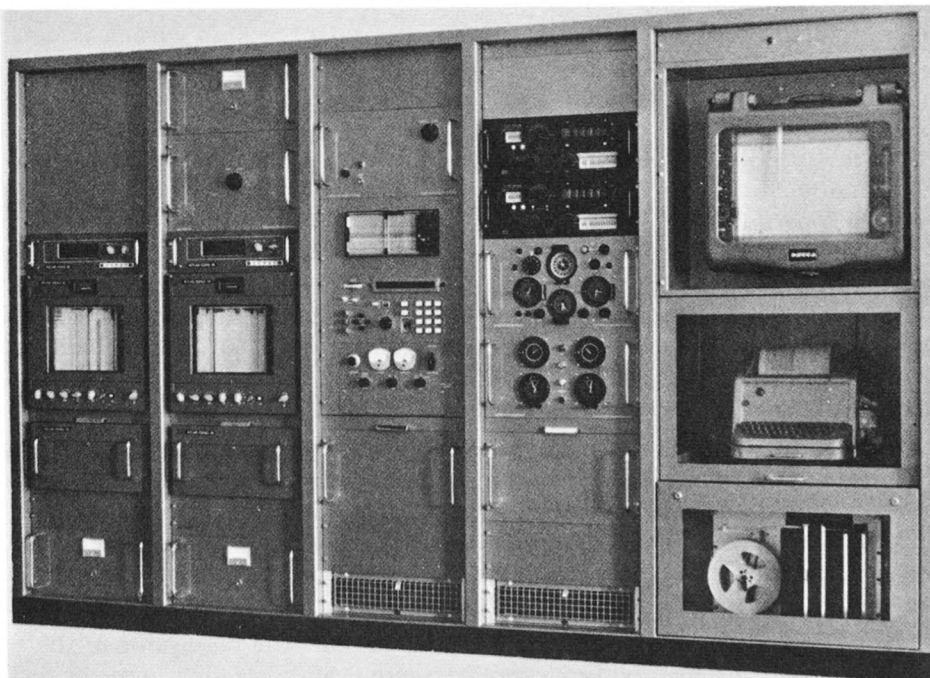


FIG. 2. — Plotting room console, survey system.

The enclosed Bridge and Plotting Room is situated on No. 02 deck forward and contains a console extending across the bridge front and which incorporates the following : main machinery controls, bow thrust controls, engine room telegraph, engine selection panel, siren control, voice pipes, EM log, speed and distance indicator, navigation lights indicator, rudder indicator, gyro repeater, clock, telephones and intercom, main broadcast, miscellaneous alarms, miscellaneous lighting controls and helicopter communication. A chart table, radar display, pelorus, steering pedestal, captain's chair and hinged seat for the helmsman are also provided in the fore part of the bridge. The Plotting Room, which is divided from the bridge by a lightproof curtain, contains a 1.5×1.5 m plotting table, drawers and cupboards under, four desks and chairs, hinged bench and shelves for six sextants. A Decca Survey system, which provides automatic position control and the ability to maintain the ship within a few metres of the required track is installed in the bridge plotting room.

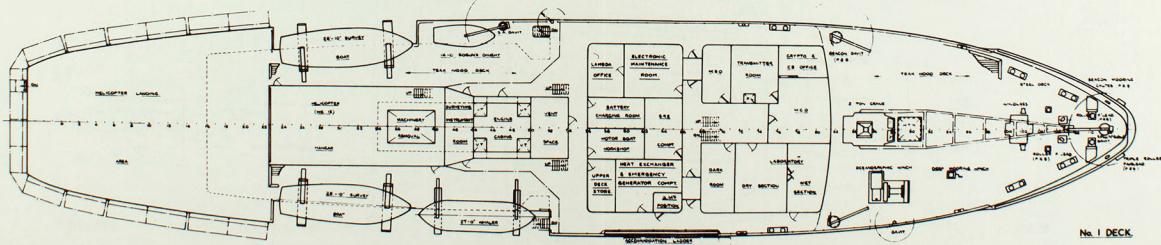
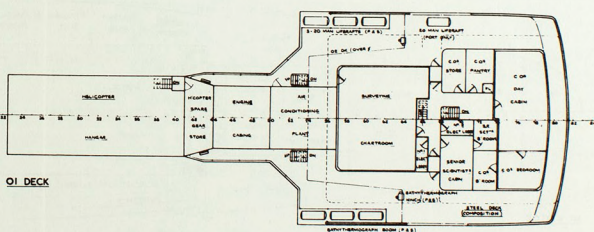
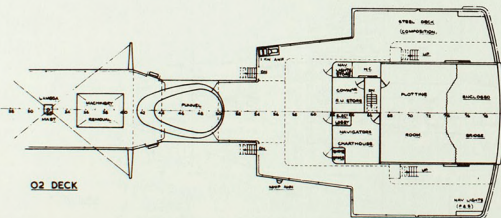
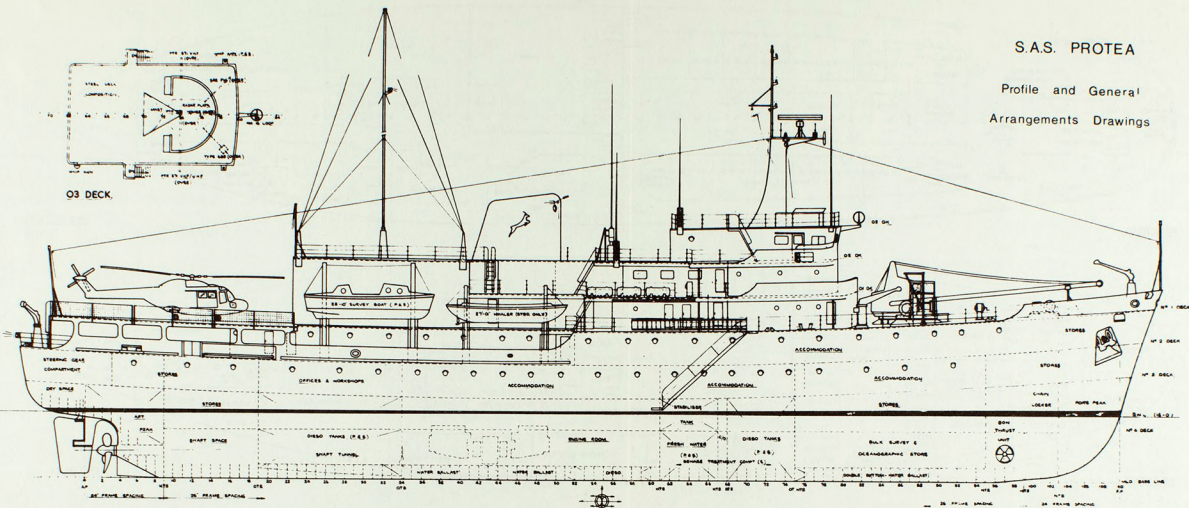
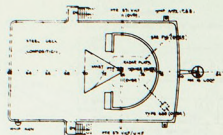
The integrated electronic control system consists of : Decca Lambda and main Decca Navigational chain receivers for position measurement; two Atlas DESO 10 echo-sounders with digital display for depth measurement; Decca Omnitrac type 70 computer for the conversion of circular and hyperbolic co-ordinates to rectilinear; Decca Sea-track and 750 autopilot for automatic control of ship's position; two data-loggers, one providing a printed record of serial number, time Decca or Lambda co-ordinates, XY conversion and depth, and the other recording the same data but at a higher rate on perforated tape for computer chart processing ashore, and finally a Decca track plotter type 8991C for direct display of ship's position related to Decca or Lambda patterns. The installation is arranged around a central console which provides a focal point for the whole survey operation. Computer and direct co-ordinate control of ship's track is determined from this point. The various displays of position and depth are also mounted in the console together with data-logging equipment, thus enabling the surveyor to check quickly the past and present results, and thus to specify the forward programme. This facility of being able continually to monitor results and modify the survey programme as required permits optimum plotting density. The ship position control arrangements are extremely flexible and apart from normal manual steering, automatic guidance is available in many forms. The autopilot can be readily switched to gyrocompass reference, Lambda or Decca main chain co-ordinated reference or computer reference. With this latter arrangement the computer can be programmed for straight line methods of control, a linked series of straight lines, or a linked series of parallel straight lines.

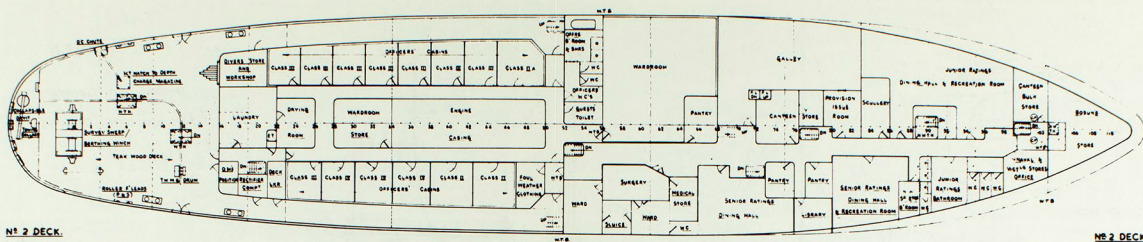
In addition to the two Atlas echo sounders a deep (6 000 m) echo sounder is installed. Other oceanographic instruments fitted include a gravity meter, thermograph for recording sea surface temperatures, wave recorder, magnetometer, seismic reflective apparatus, salinometer, wind speed and direction indicator, precision aneroid barometer and a barograph.

This modern and specially designed survey ship, is among the finest survey ships in the world and she will now become the main unit in the SA Hydrographic Service taking over surveying and oceanographical tasks from SAS *Natal* when she is finally paid off. The acquisition of the new

S.A.S. PROTEA

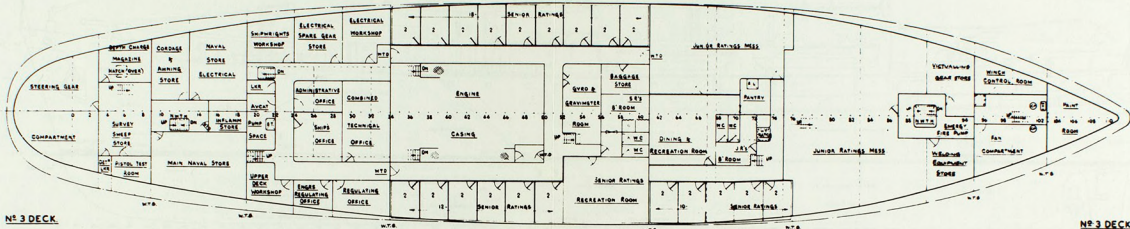
Profile and General
Arrangements Drawings





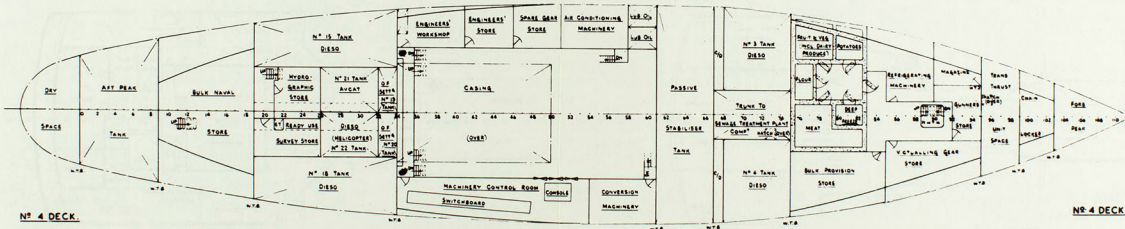
No. 2 DECK.

No. 2 DECK.



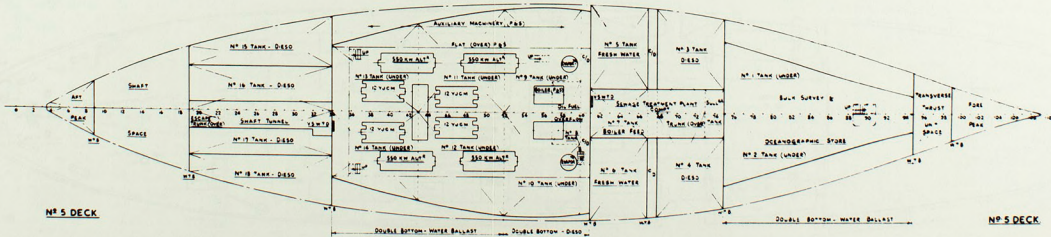
No. 3 DECK.

No. 3 DECK.



No. 4 DECK.

No. 4 DECK.



No. 5 DECK.

No. 5 DECK.

ship is especially welcome in view of the present importance and the ever increasing use of the Cape sea route by very large bulk-carriers as she is well equipped to explore uncharted waters. Furthermore she will be able to carry out oceanographic investigations effectively while facing nature's most violent storms.