IV. French nuclear forces

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France’s nuclear arsenal contains approximately 300 warheads earmarked for delivery by submarine-launched ballistic missiles (SLBMs) and aircraft-launched cruise missiles (see table 16.5). In a speech in February 2015 President François Hollande reaffirmed France’s commitment to maintaining an up-to-date nuclear deterrence strike force (force de frappe), consisting of sea- and air-launched components, at a level of ‘strict sufficiency’.1 France has allocated 12 per cent (€22 billion) of its annual defence budgets for 2014–19 to maintaining and modernizing its nuclear forces and infrastructure.2

The main component of France’s nuclear arsenal consists of four Triomphant class nuclear-powered ballistic missile submarines (SSBNs) based at Île Longue in western Brittany. Each submarine is armed with 16 M45 or M51.1 SLBMs carrying up to 6 warheads per missile. The French Navy deploys one SSBN on patrol at all times, while the other submarines are in various stages of refit and overhaul work.3

France continues to modernize its SSBN force. The French Navy is modifying the Triomphant class submarines to carry the M51 SLBM, a three-stage solid-propellant missile, which replaces the ageing M45 missile.4 The work is expected to be completed by 2019. As of August 2015, two submarines had been retrofitted to carry an initial version of the missile, the M51.1. A third Triomphant-class vessel, commissioned in 2010, was upgraded to carry the M51.1 missile while under construction.5 On 30 September 2015 an M51.1 missile was successfully launched from a land-based platform at the missile testing centre at Biscarrosse to an impact zone in the North Atlantic.6 This was the first test-launch of an M51.1 since an unsuccessful test of the missile from a submerged SSBN in 2013.

1 Hollande, F., ‘Discours sur la dissuasion nucléaire: Déplacement auprès des forces aériennes stratégiques’ [Speech on nuclear deterrence: Visit to the strategic air forces], Istres, 25 Feb. 2015.
The SSBN fleet will be equipped with an enhanced version of the missile, the M51.2, beginning in 2016. The M51.2 will carry the TNO warhead (tête nucléaire océanique, oceanic nuclear warhead). The new warhead has a

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7 French Senate, Projet de loi de finances pour 2016: Défense: équipement des forces [Finance Bill 2016: Defence: equipping the forces], no. 166 (French Senate: Paris, 19 Nov. 2015); and Hollande (note 1).
variable explosive yield similar to that of the current TN-75 warhead, but it features a more robust design for improved reliability and a longer life-span.\(^8\)

France is beginning preliminary design work on a next-generation SSBN. The goal is to have a successor submarine to the Triomphant class in service by 2035.\(^9\) The new submarine will carry the M51.3 SLBM, which will have greater range and accuracy than earlier versions. Design work will begin in 2016, and the missile is expected to enter service in the mid-2020s.\(^10\)

The airborne component of the French nuclear forces consists of the land-based Mirage 2000N and Rafale F3 combat aircraft; and the Rafale MK3 deployed on the aircraft carrier Charles de Gaulle. The Mirage 2000Ns will be replaced by Rafale F3 aircraft by 2018.\(^11\) The aircraft are equipped with the ASMPA (air-sol moyenne portée amélioré, medium-range air-to-surface–improved) cruise missile, which entered service in 2009. A mid-life refurbishment programme for the ASMPA is scheduled to begin in 2022.\(^12\) The missiles are armed with the TNA (tête nucléaire aéroportée, airborne nuclear warhead), which has a reported yield of up to 300 kilotons. The French MOD has initiated studies for a successor missile, designated air-sol nucléaire fourth-generation, ASN4G (air-to-surface nuclear fourth-generation), with a focus on enhanced stealth and hypersonic technologies.\(^13\)


\(^9\) Le Drian, J. Y., French Minister of Defence, ‘Discours de clôture du colloque pour les 50 ans de la dissuasion’ [Speech closing the Conference to mark the 50th anniversary of deterrence], French Ministry of Defence, 21 Nov. 2014.

\(^10\) ‘Hollande annonce des études pour préparer le SNLE de troisième génération’ [Holland announces study to prepare the third generation SSBNs], Le Marin, 19 Feb. 2015.

\(^11\) Hollande (note 1).

\(^12\) French Senate (note 7), p. 52.

\(^13\) Le Drian (note 9); and Tran, P., ‘France studies nuclear missile replacement’, Defense News, 29 Nov. 2014.