



Gulf Stream Characteristics

June 2002

Note No. 3

[W. Frank Bohlen](#)

When we last visited the Gulf Stream in the way of the rhumb line on May 31st a significant meander was in the process of forming in the vicinity of 70W. Over the past ten days this feature has progressively deepened (see Figs 1, 2, and 3 attached) producing northerly flows along the rhumb line in the vicinity of 68W. There has also been an evident compression reducing the separation between the rhumb line and the westerly, south going, limb of the meander. Despite this compression, the center of the feature remained nearly fixed in-place. This behavior seemed to favor an eventual merger of waters across the rhumb line near 38N and the "cutting off" of the southern limb of the meander to form a cold core ring.

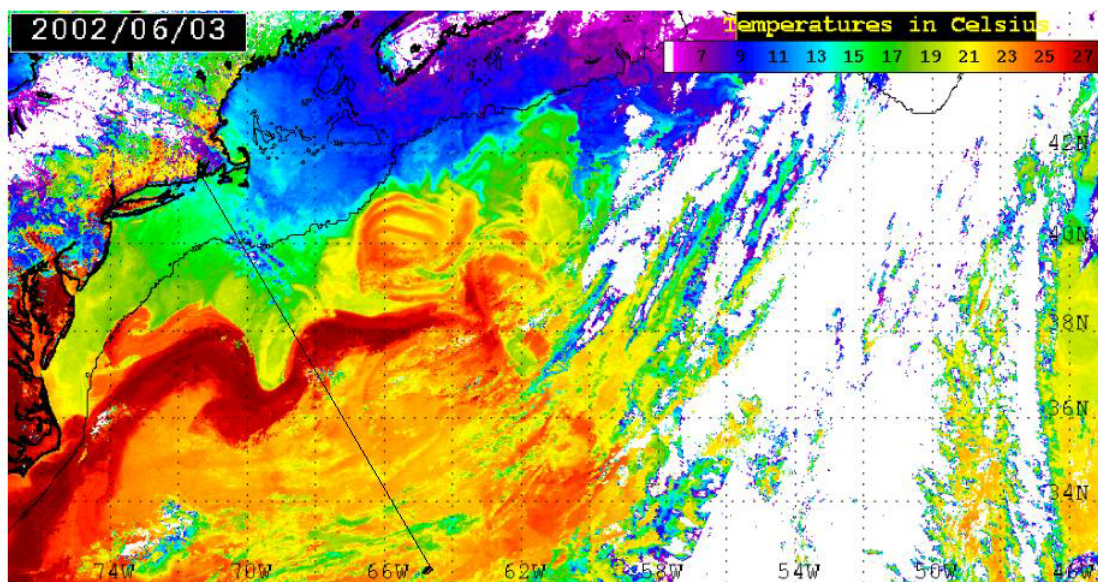


Figure 1 Sea Surface Temperature – Composite Satellite Image
Rutgers University Site June 3, 2002

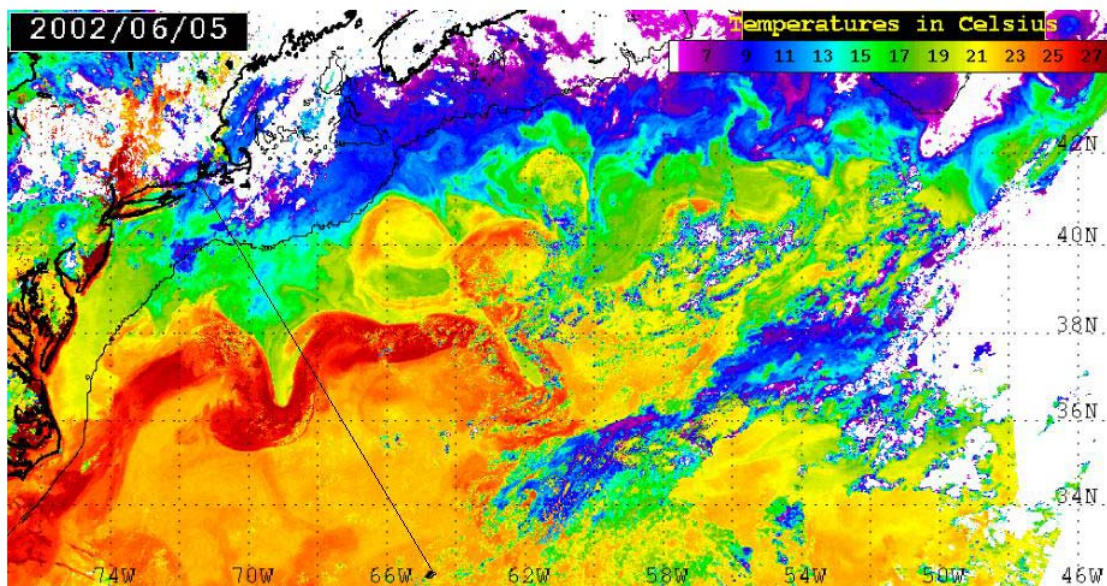


Figure 2 Sea Surface Temperature – Composite Satellite Image
Rutgers University Site June 5, 2002

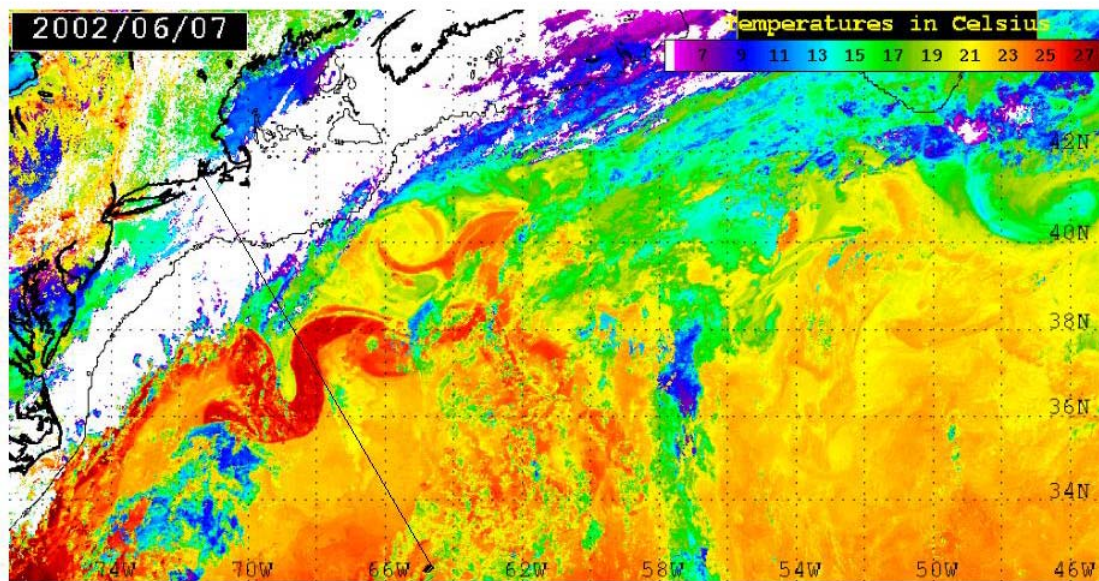


Figure 3 Sea Surface Temperature – Composite Satellite Image
Rutgers University Site June 7, 2002

Over the last four days this progression has continued resulting in the apparent entrainment of portions of the south going limb into the northerly flows near 69W 38N

(see Fig 4). However, this entrainment may be an artifact of the averaging associated with the production of this image.

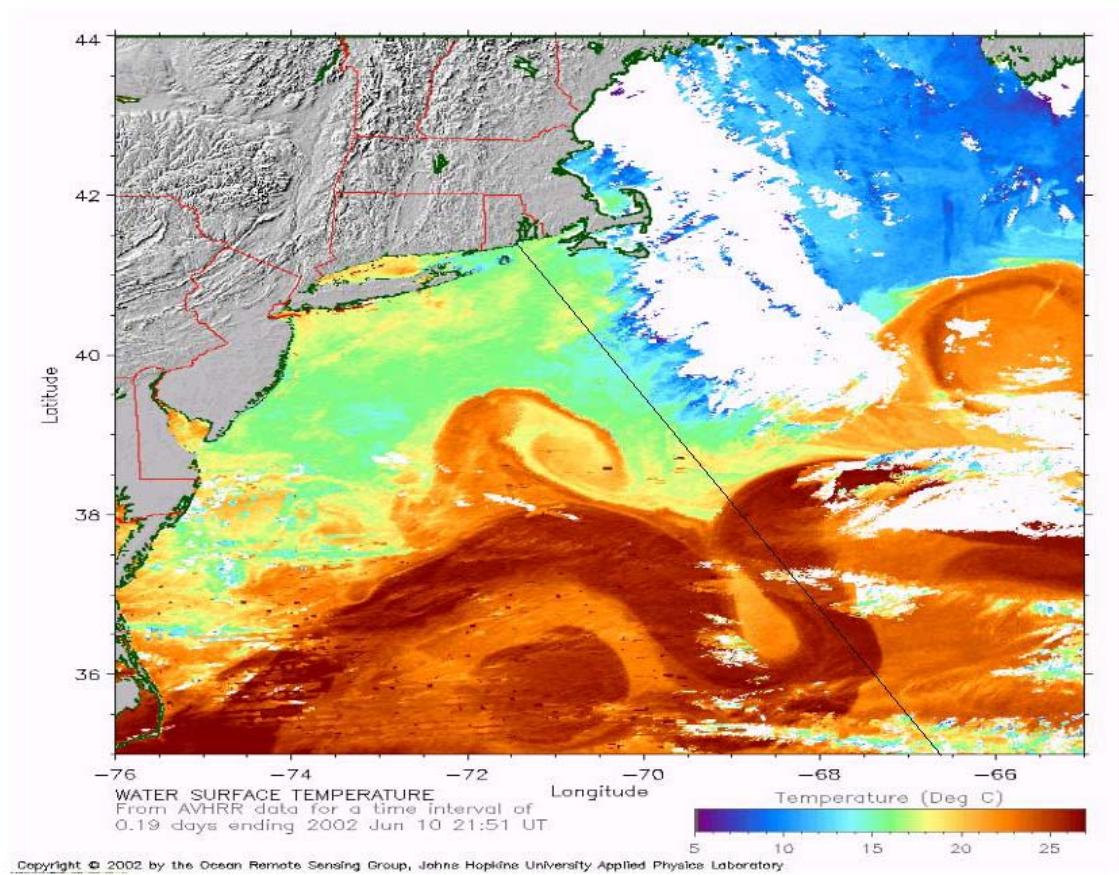


Figure 4 Sea Surface Temperatures – Johns Hopkins University Site – June 10, 2002

This possibility can be reduced and/or eliminated by examination of the image resulting from a single satellite pass such as that shown in [Figure 5](#).

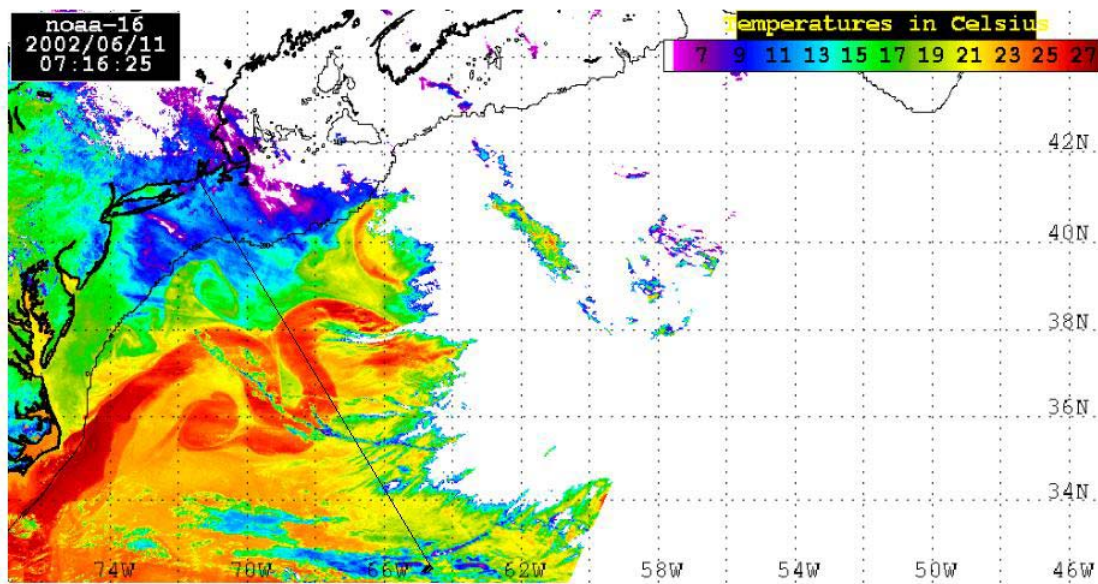


Figure 5 Sea Surface Temperature – Single Satellite Image
Rutgers University Site – June 11, 2002

This view from the 11th continues to show entraining in the vicinity of 38N suggesting that over the next few days we will see the development of a cold core ring to the south of the main body of the Gulf Stream. Depending on its rate of formation this ring should have little effect in terms of optimum routing to Bermuda since it will have experienced only minor east-west migration. Recalling that cold core rings tend to rotate in a counterclockwise fashion (CC = cold core =Counter Clockwise) this should leave the western limits of the feature as the favored track.

In addition to the meandering within the main body of the Stream and the possibility of cold core ring formation, a warm core ring remains in place to the north of the Stream near 70W39N. This is the ring that we tracked across the rhumb line from early April. It has moved little over the past ten days due to the influence of the developing meander and may be entrained or displaced eastwards if the meander proceeds any further to the north. At the moment it remains well clear of the rhumb line.

In contrast to the activity adjoining the main body of the Stream there appears to be relatively little in the way of organized flow features or rings south of the Stream to Bermuda. This is not to say that there will not be some local flows produced by small patches of warm and cool water. Remember that gradients in water temperature of sufficient size will always have some amount of flow associated with them due to the associated changes in the density of the water column and the resulting horizontal pressure gradients. These flows may show up in set and drift calculations but they will generally decrease and disappear after a short time and are often replaced by counterflows. The effects are generally off-setting resulting in little influence on average course and speed. For the moment then it looks like all of the activity of interest will be

confined to the areas between 35N and 39N. Remember that much of this will remain active and move only slightly over the next two weeks. As a result it has the potential to affect the return trip as much as the Race.