



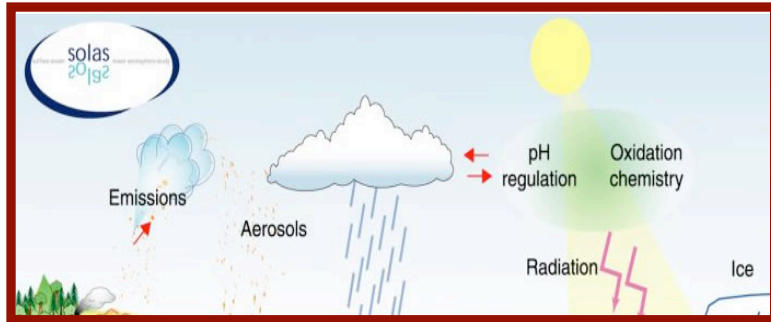
WRF sensitivity to coupling

Dr. Priscilla A. Mooney

2016 COAWST training

15-August-2016

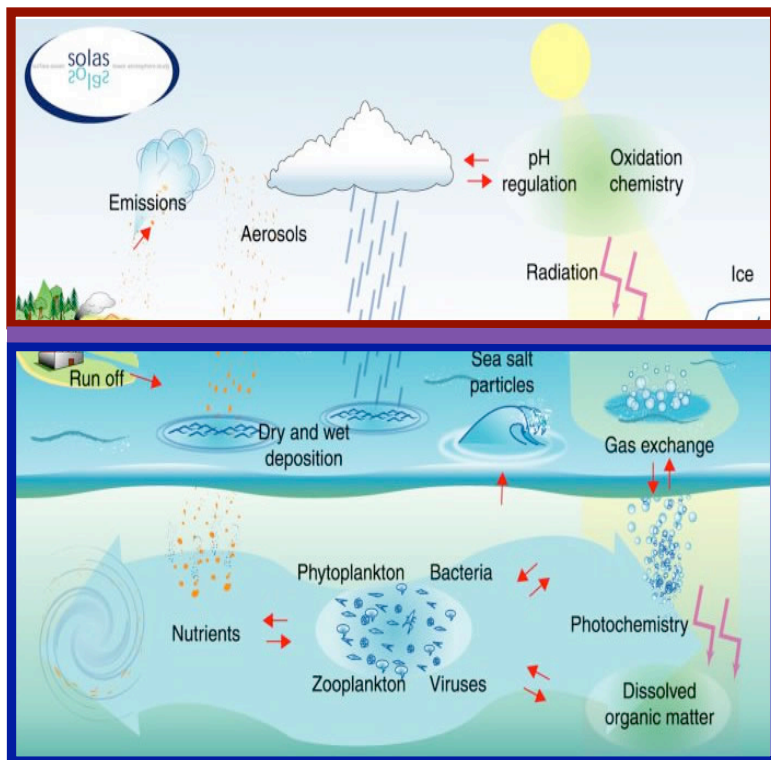
How WRF sees the seas



WRF

Image from: http://www.bodc.ac.uk/solas_integration/

How WRF sees the seas



WRF

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How WRF sees the seas

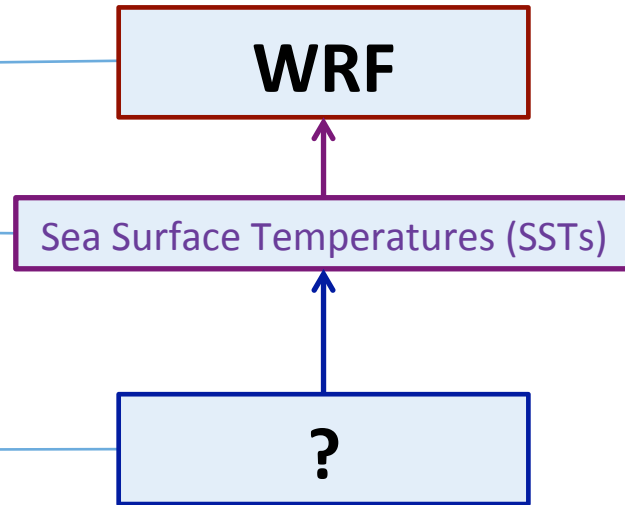
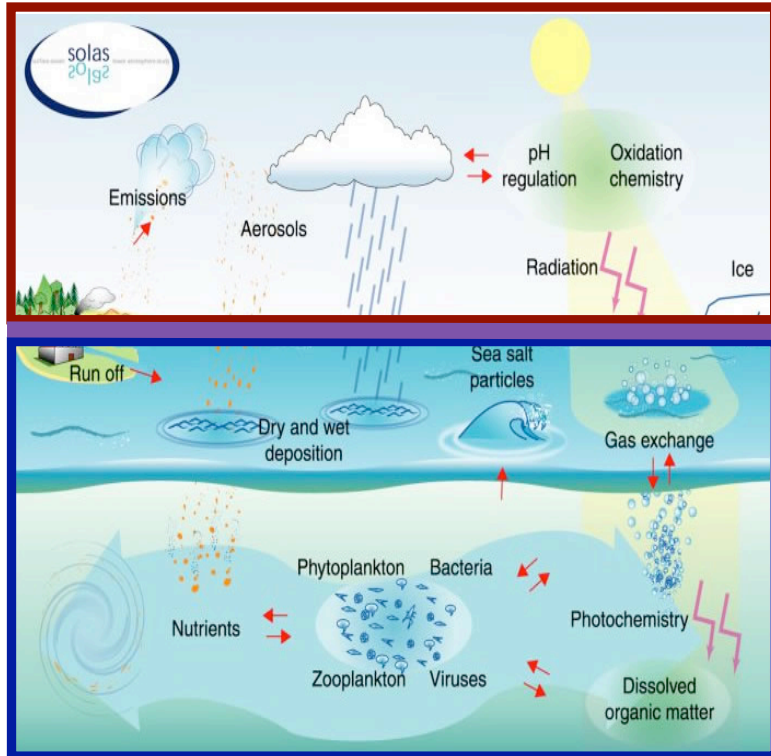


Image from: http://www.bodc.ac.uk/solas_integration/

1. Providing SSTs from observations at initial time and/or at set intervals through out the run.

In the WRF namelist.input file set

```
sst_update = 1
```

WRF can also modify these SSTs in response to surface winds and changes in radiative fluxes using the scheme described in Zeng and Beljaars (2005).

In the WRF namelist.input file set

```
sst_skin = 1
```

How WRF sees the seas

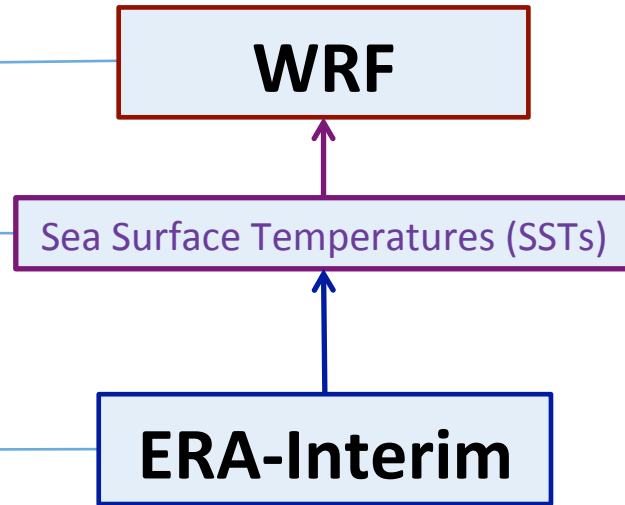
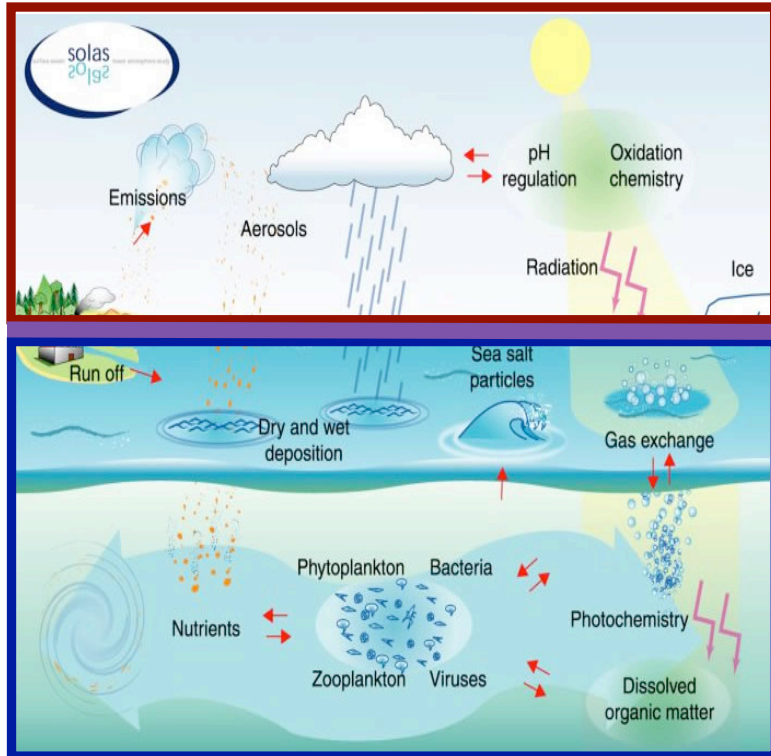


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How WRF sees the seas

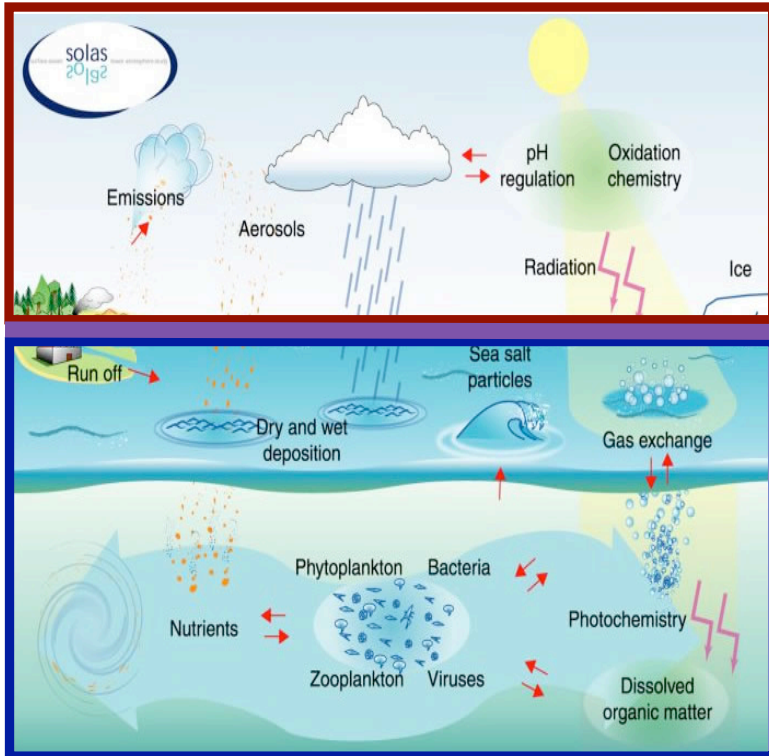
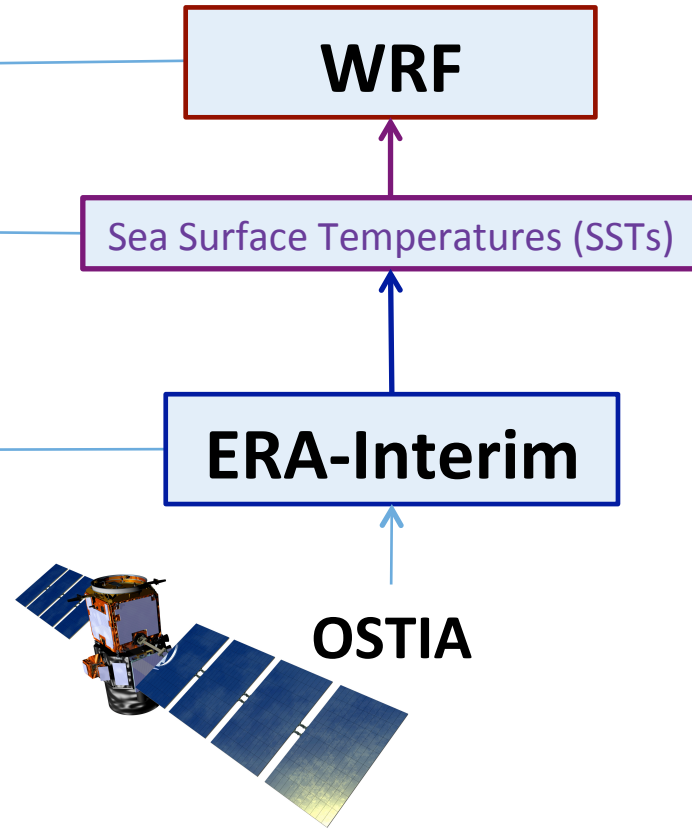


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2. Ocean Mixed Layer model e.g. Davis *et al.* (2008) based on Pollard *et al.* (1972).

How WRF sees the seas

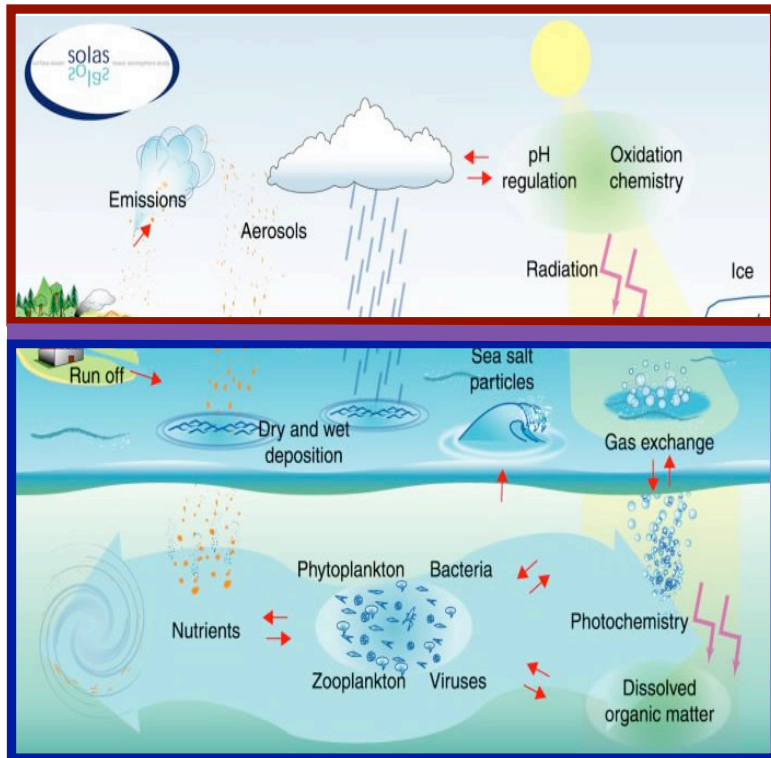
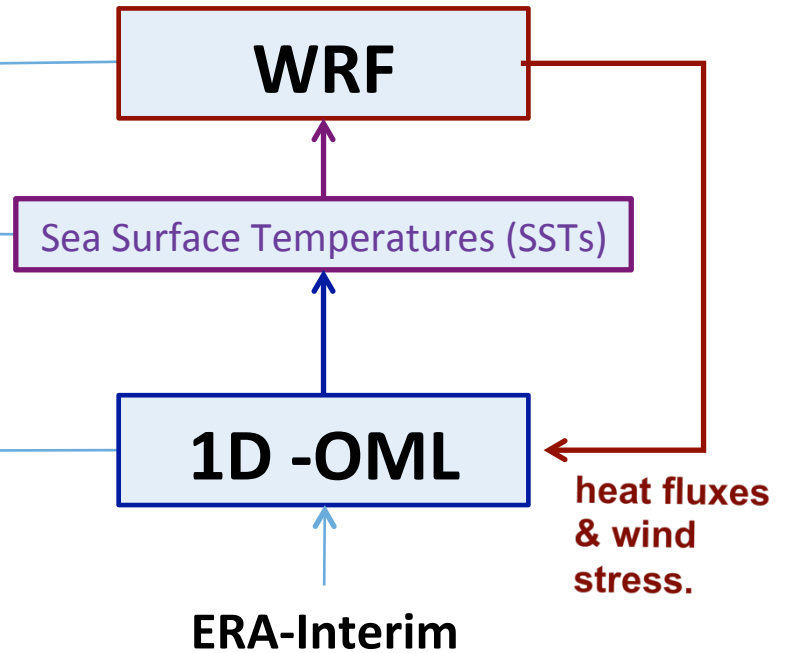


Image from: http://www.bodc.ac.uk/solas_integration/



2. Ocean Mixed Layer model e.g. Davis *et al.* (2008) based on Pollard *et al.* (1972).

Basically,

Determine depth of mixing (h_{new}).

If $h_{\text{new}} > h_{\text{old}}$,

Then:

$$\delta h = h_{\text{new}} - h_{\text{old}}$$

$$\delta T = \delta h \times \Gamma$$

Else: No vertical mixing and no cooling

In the WRF namelist.input file set

```
sf_ocean_physics = 1
```

```
oml_hml0 =
```

```
oml_gamma =
```

3. Coupled ocean model e.g. COAWST (Warner *et al.*, 2010)

How WRF sees the seas

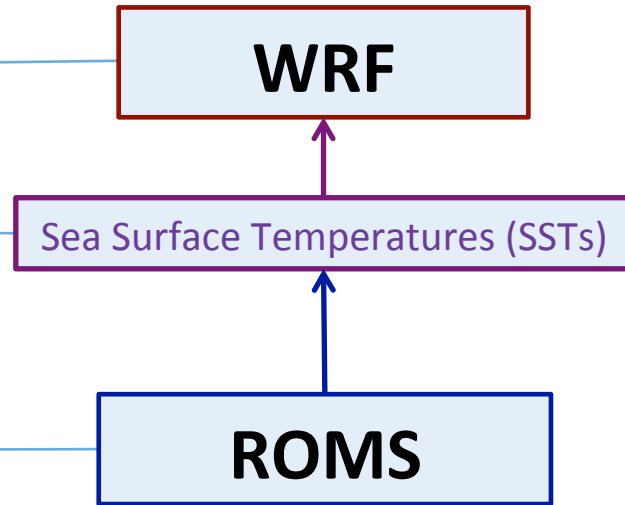
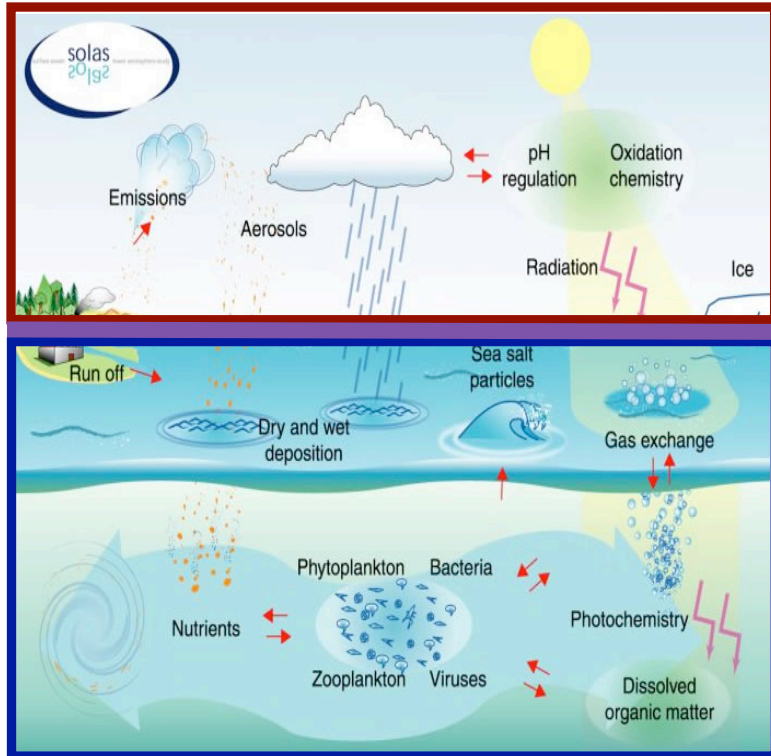
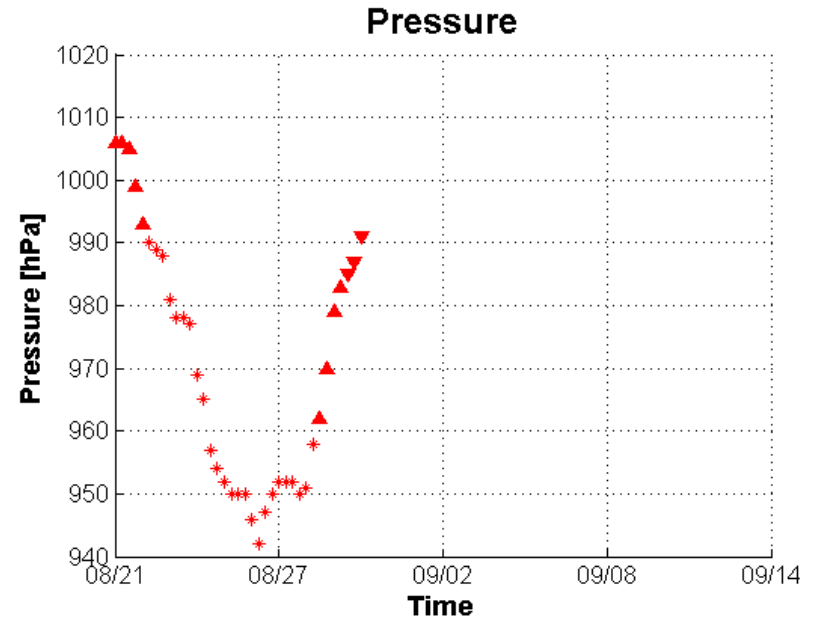
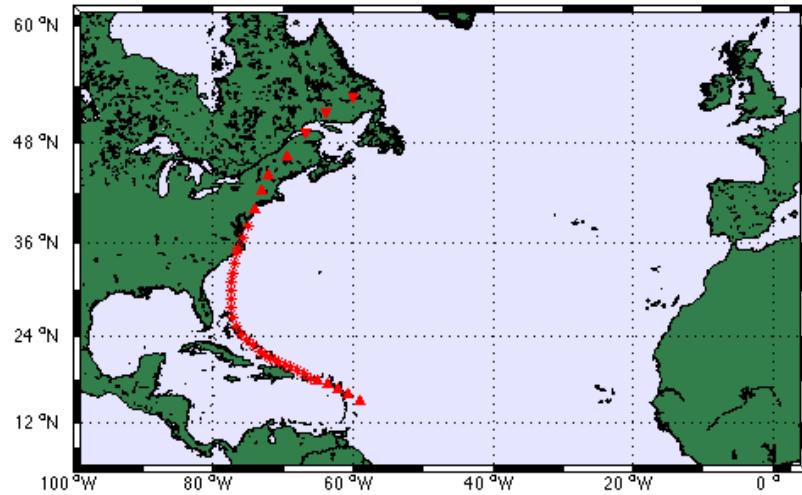
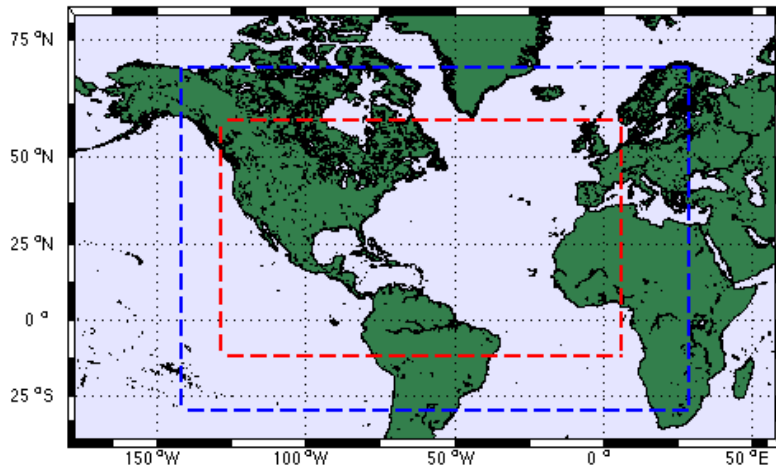


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Case Study: Hurricane Irene (2011)



Case Study: Hurricane Irene (2011)



WRF V3.6.1

Initial and boundary data: *ERA Interim*

Resolution: **36km, 12km**

Start Date: **23rd August 2011**

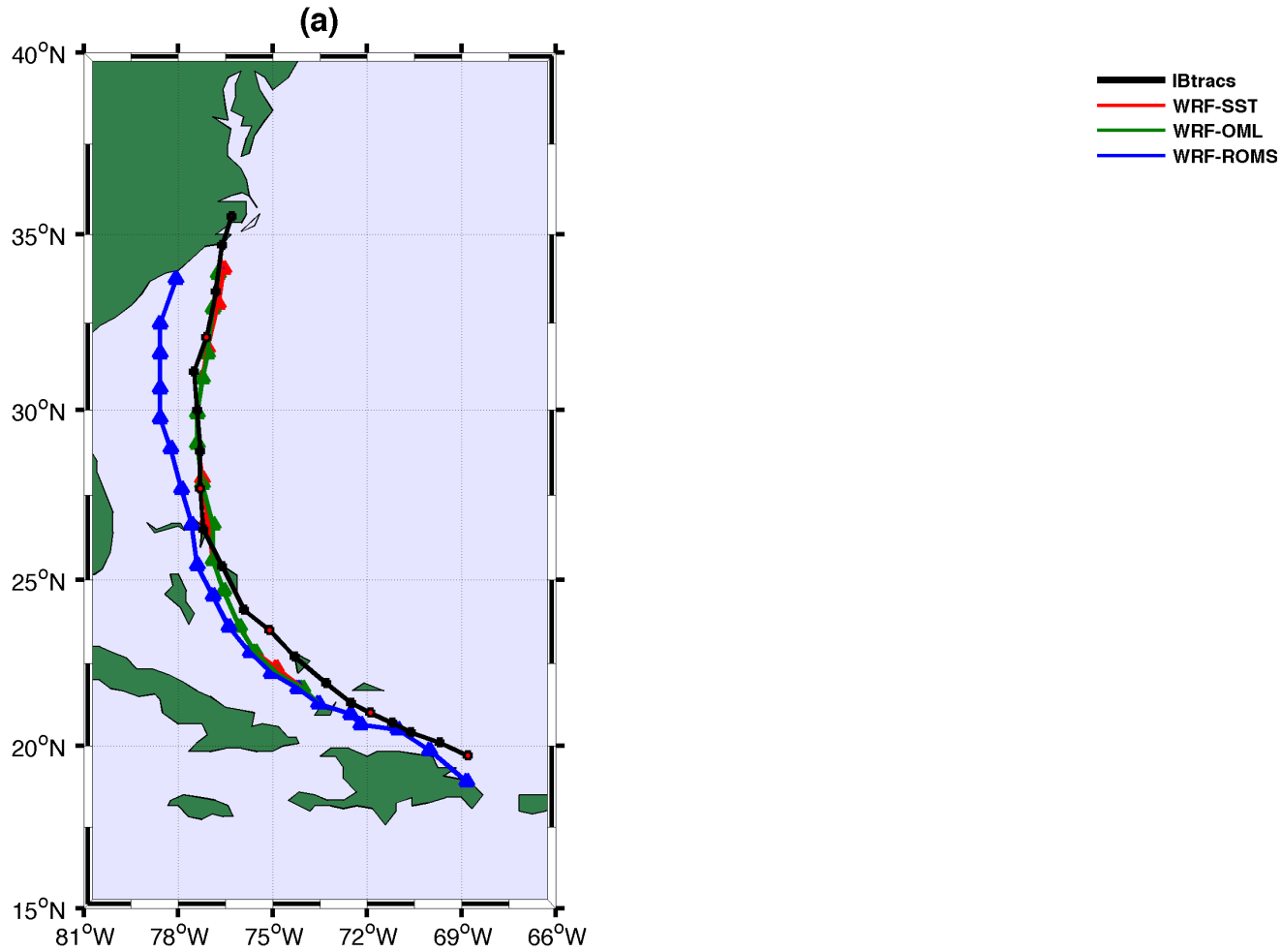
ROMS V3.7

Initial and boundary data: *HYCOM*

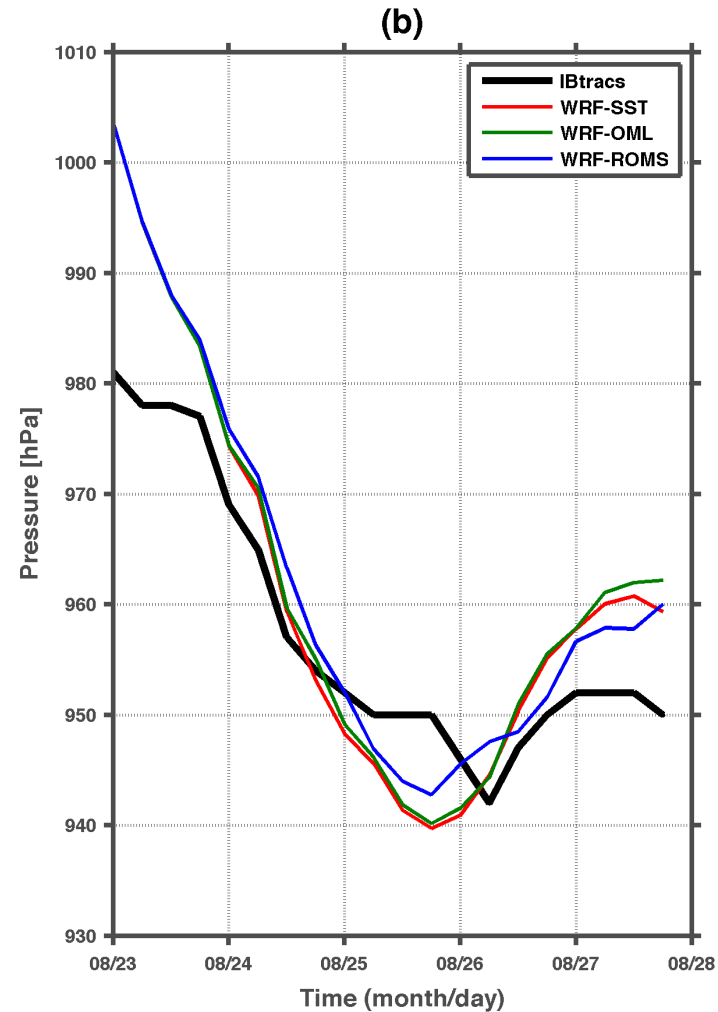
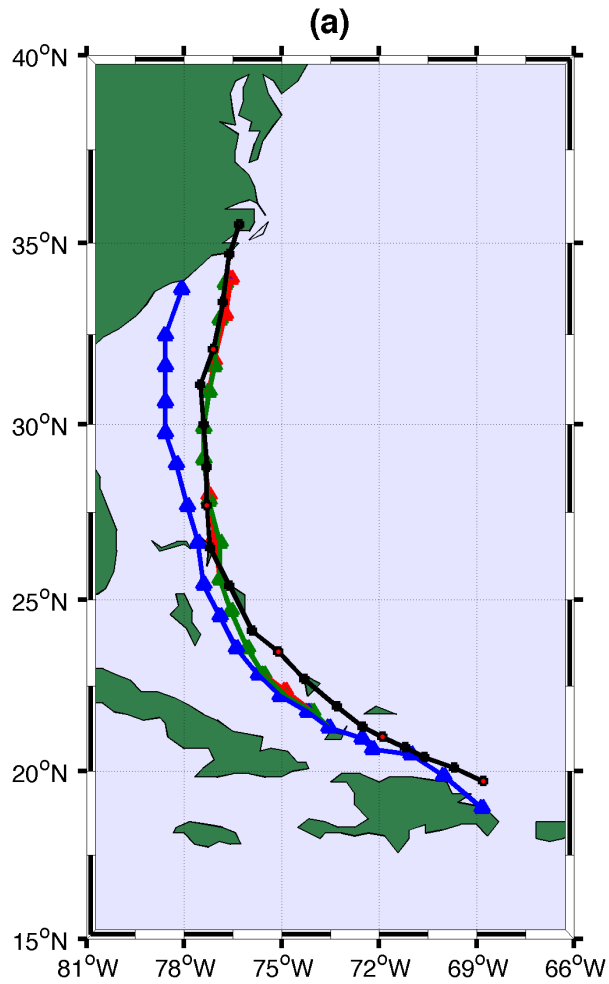
Resolution: **12km**

Start Date: **23rd August 2011**

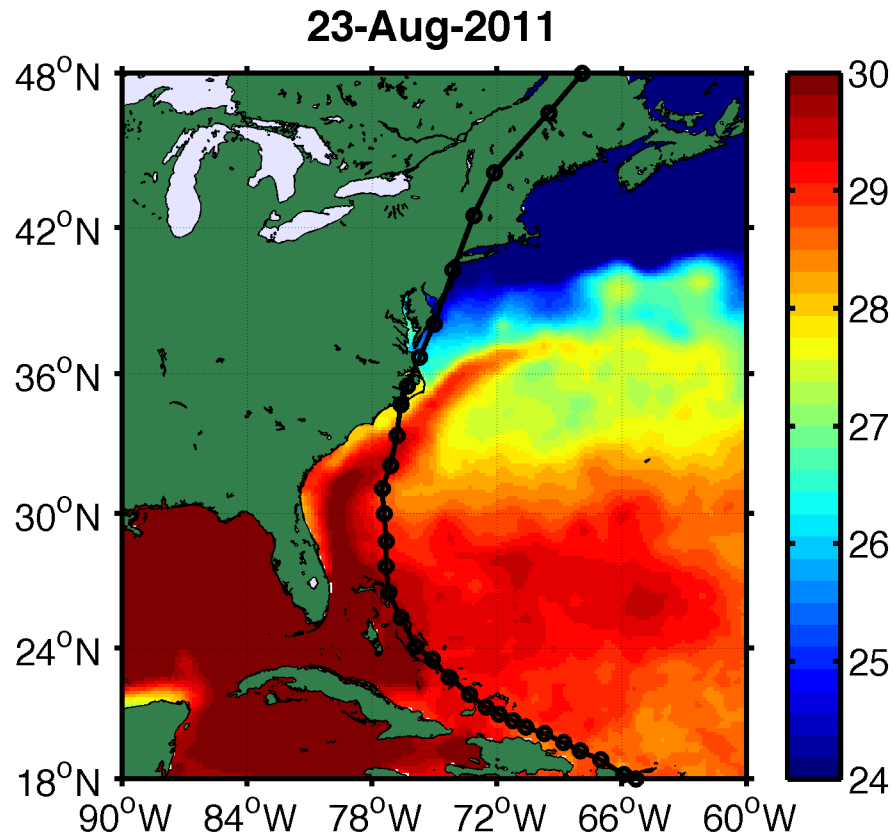
Case Study: Hurricane Irene (2011)



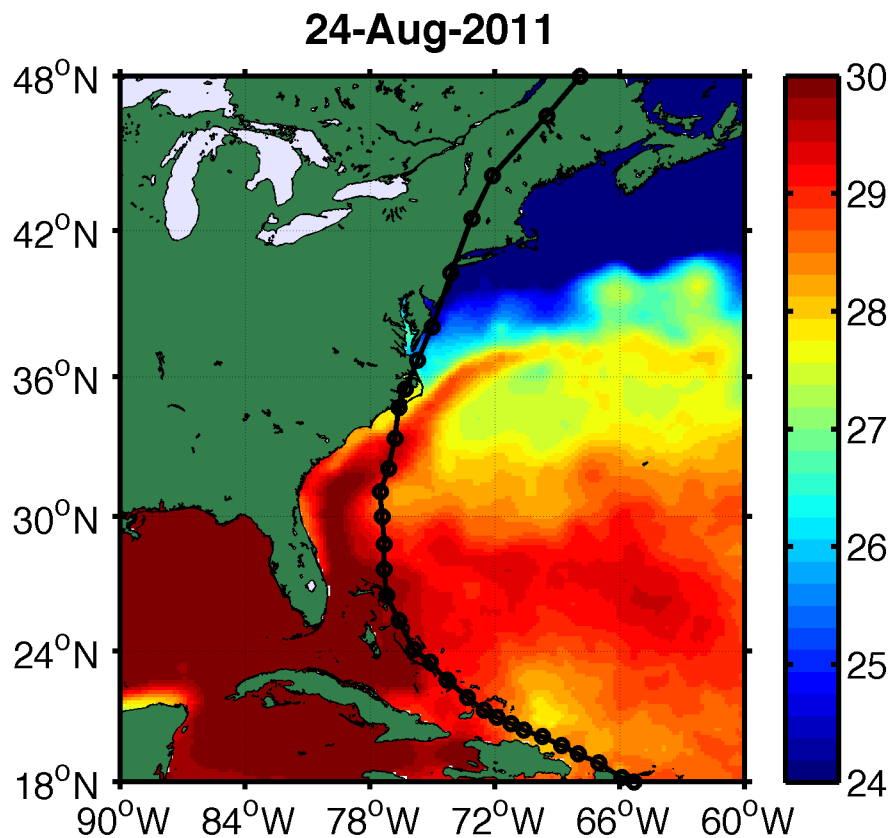
Case Study: Hurricane Irene (2011)



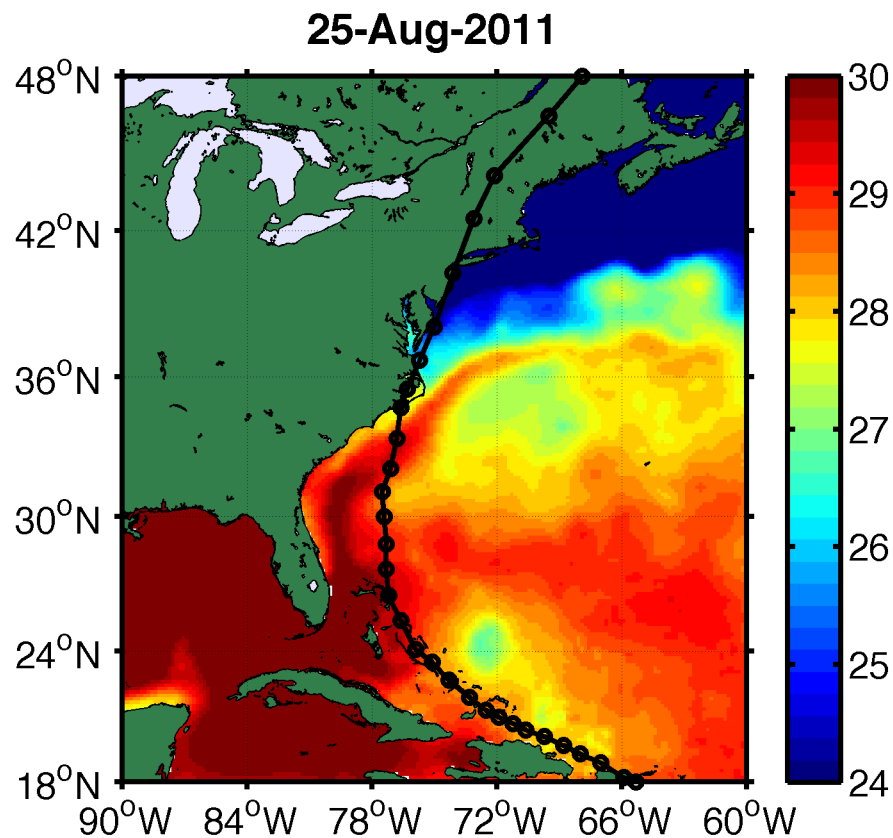
How WRF sees the seas



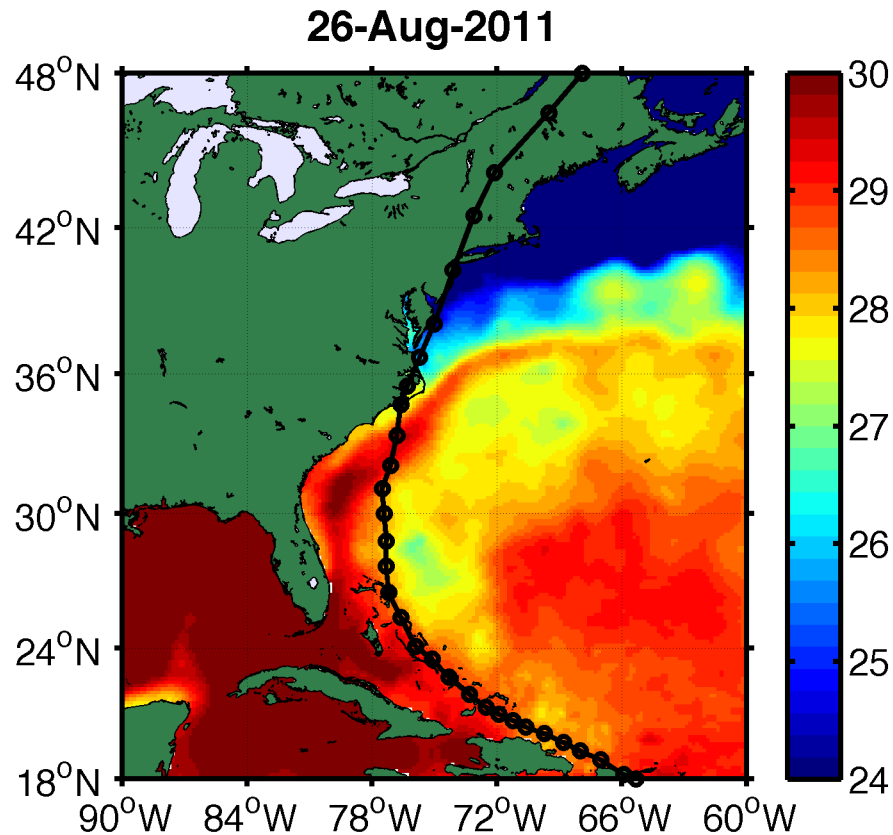
How WRF sees the seas



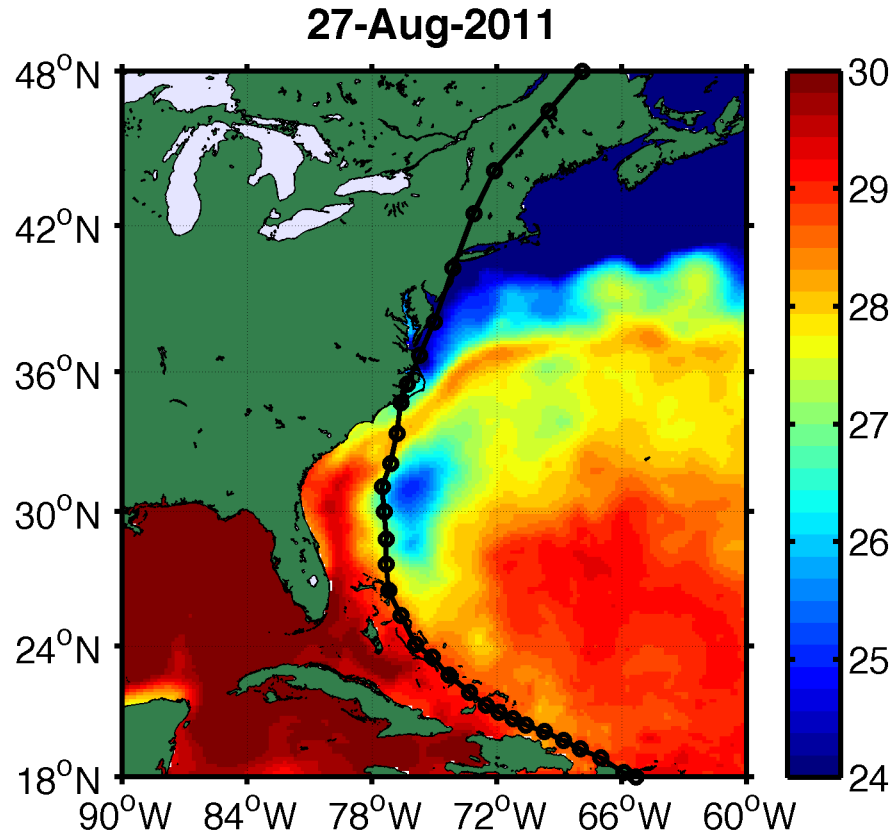
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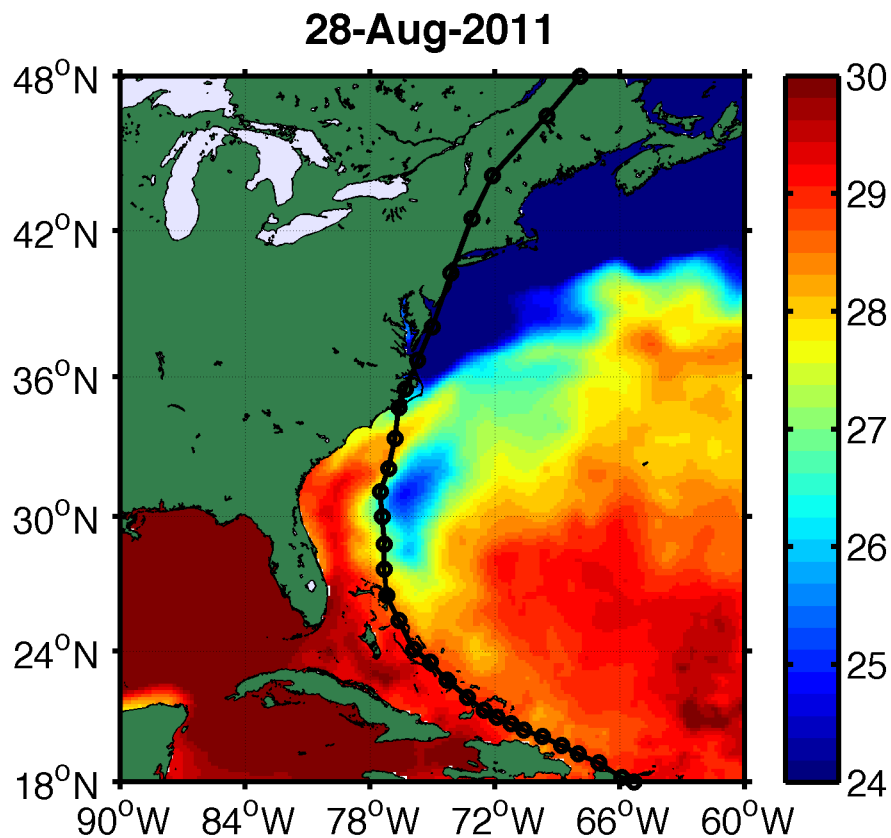
How WRF sees the seas



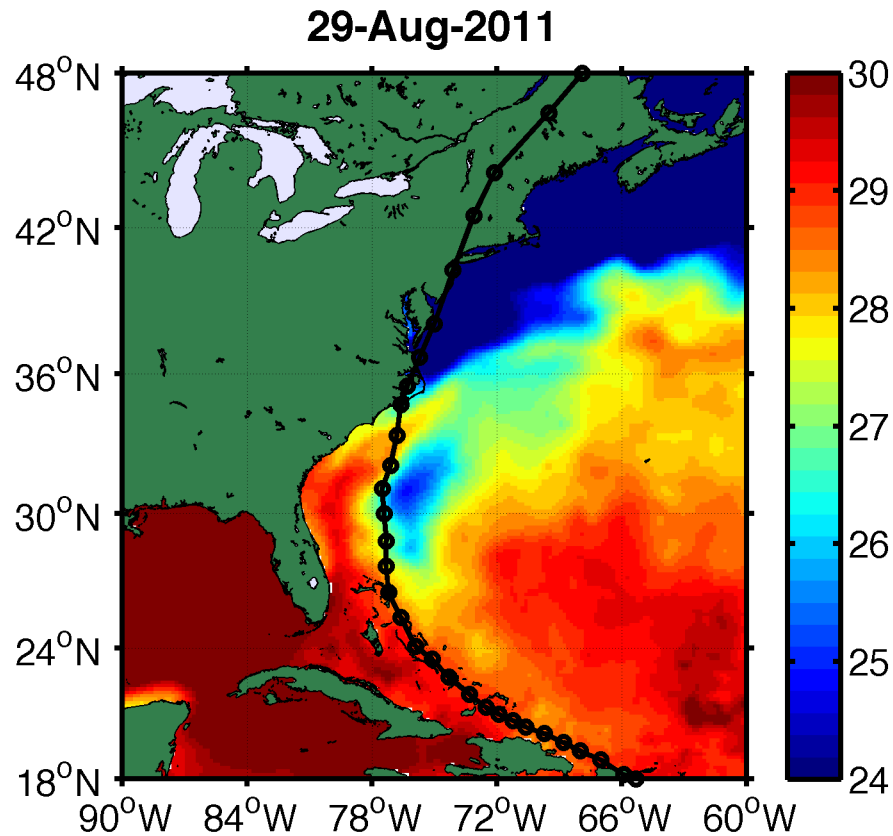
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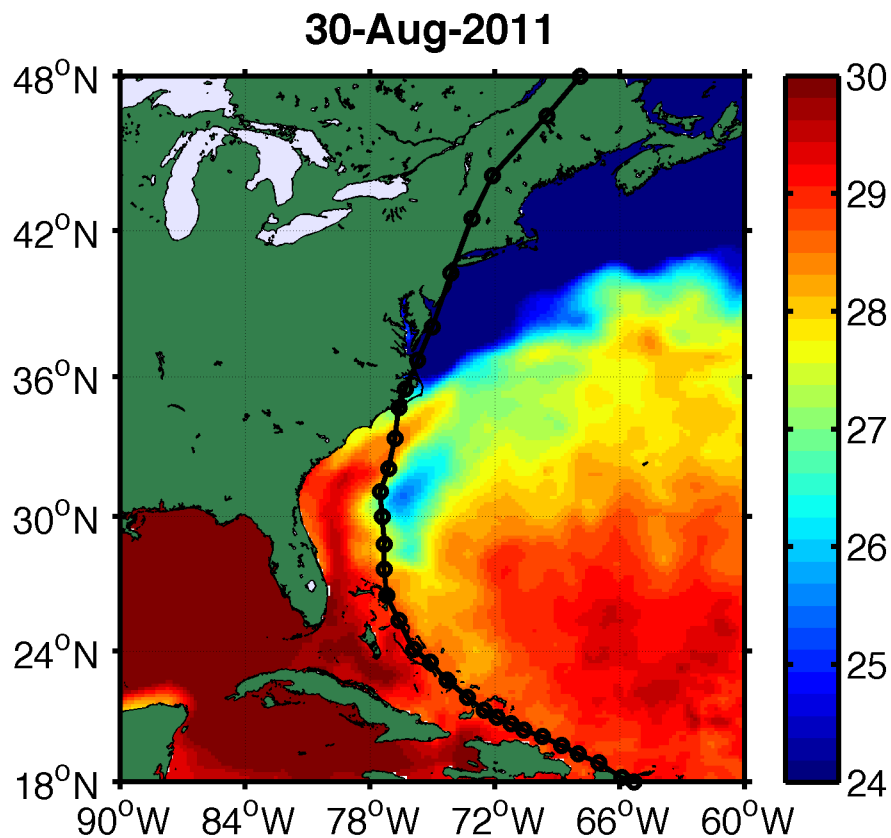
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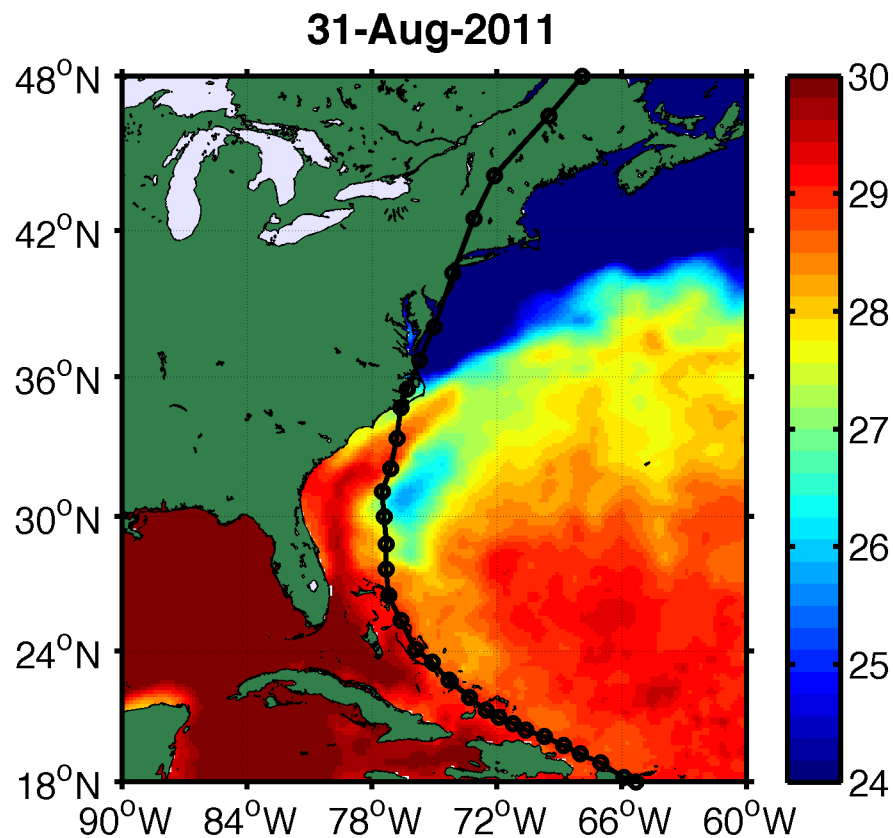
How WRF sees the seas



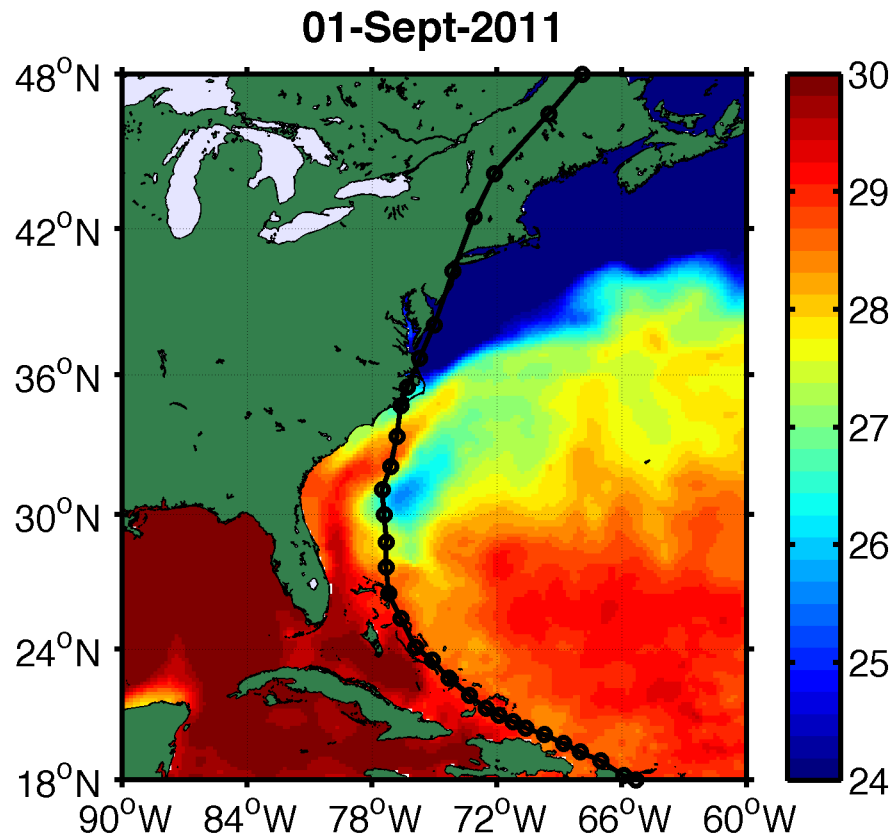
How WRF sees the seas



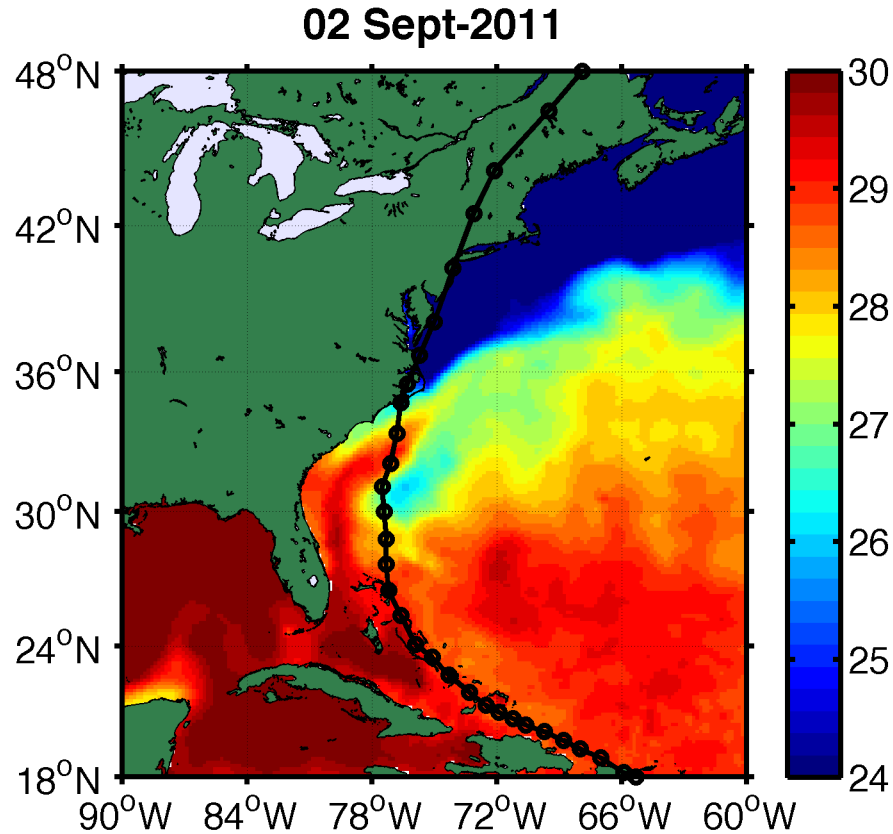
How WRF sees the seas



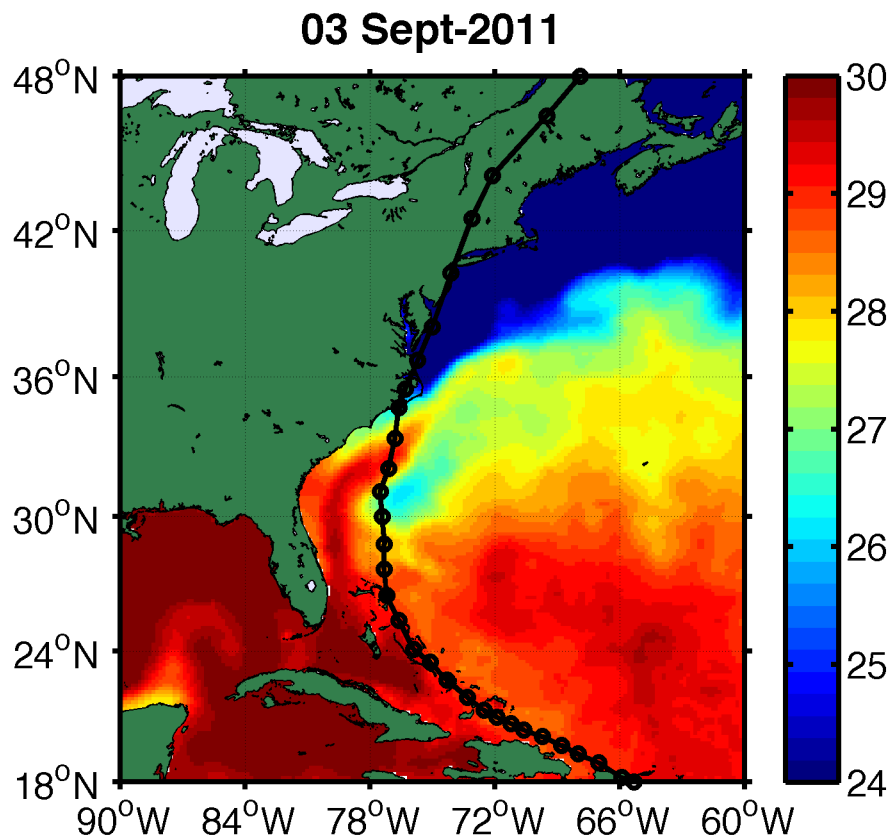
How WRF sees the seas



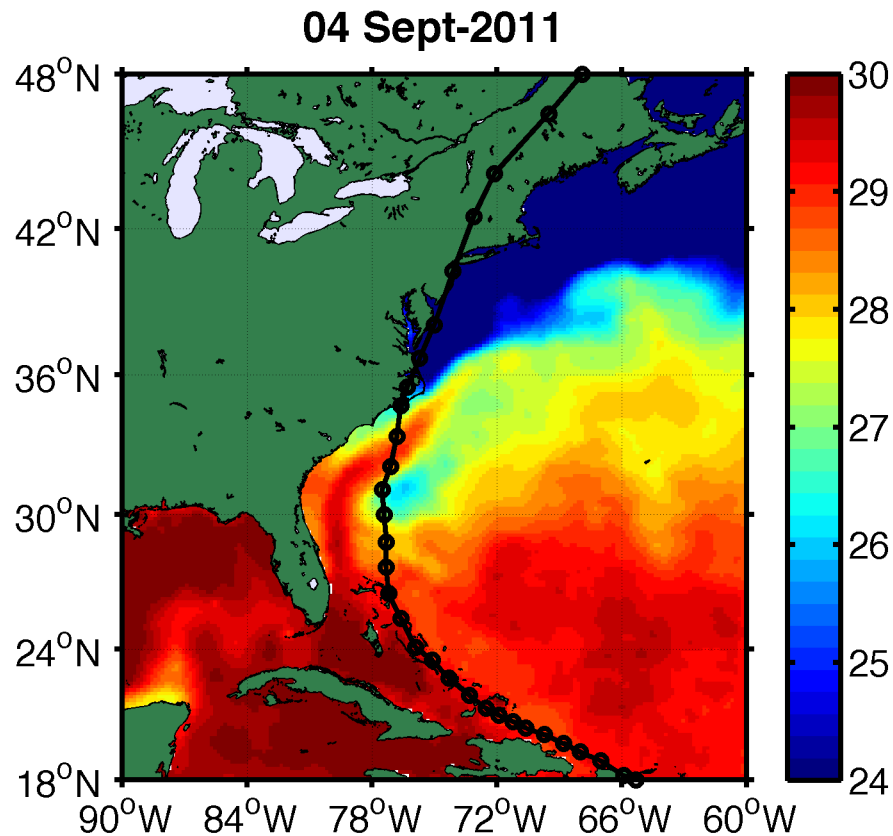
How WRF sees the seas



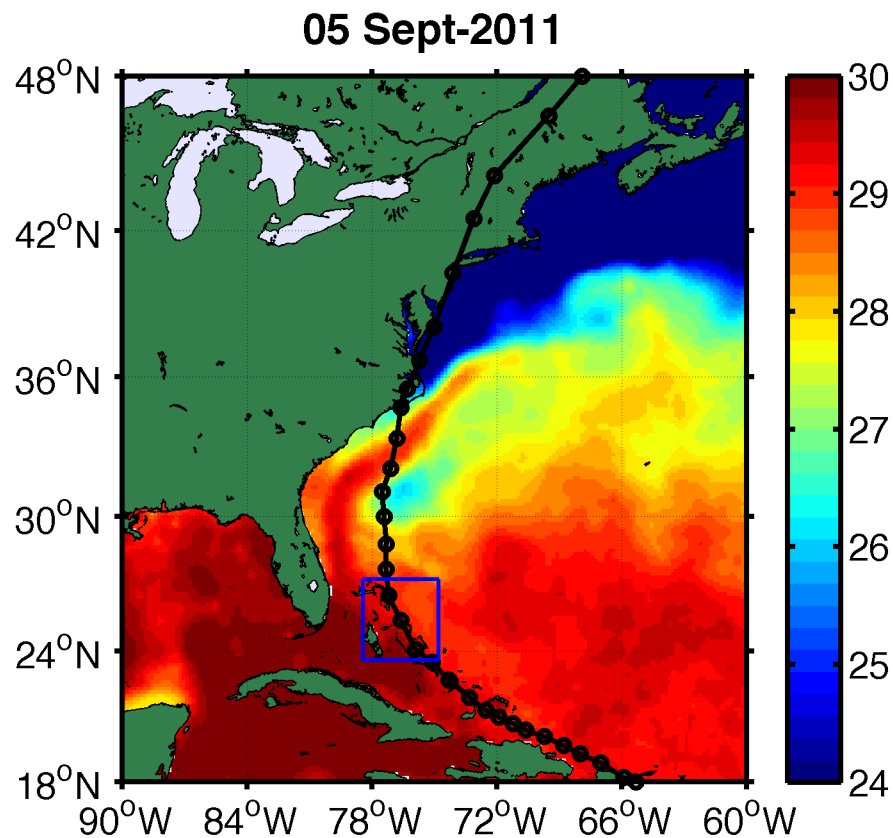
How WRF sees the seas



How WRF sees the seas

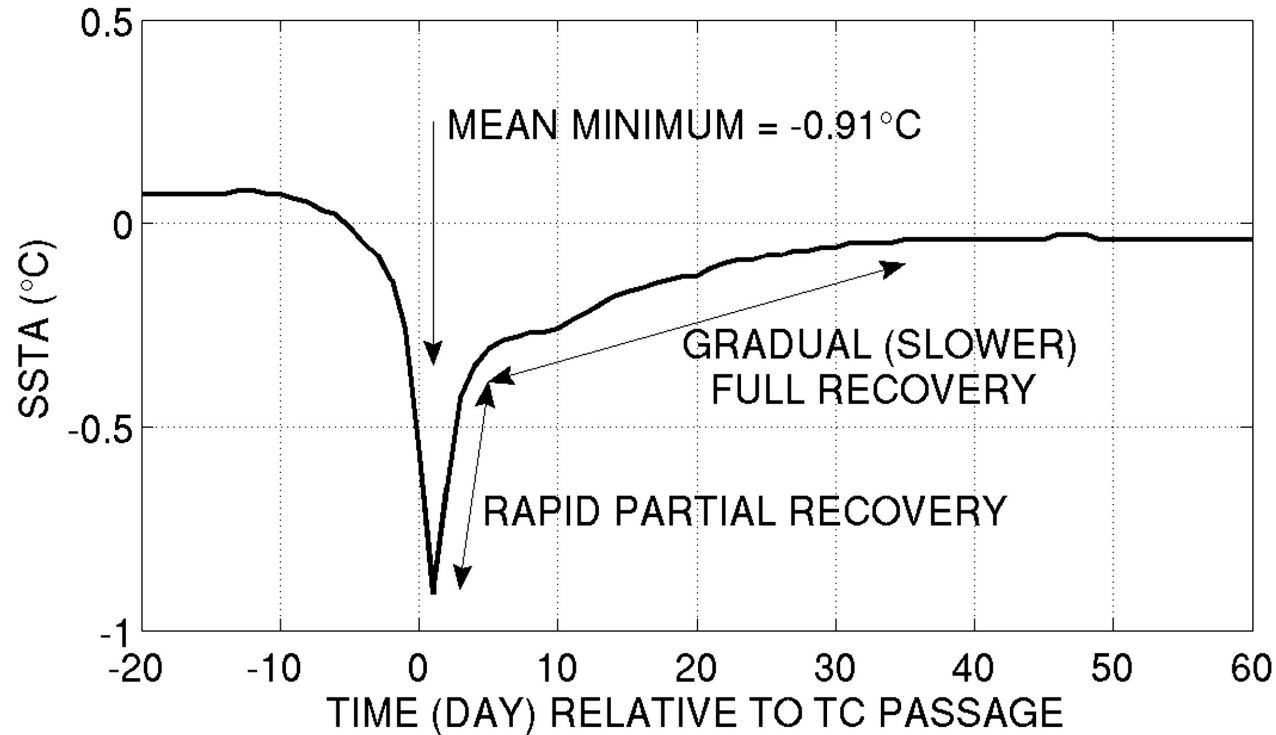


How WRF sees the seas

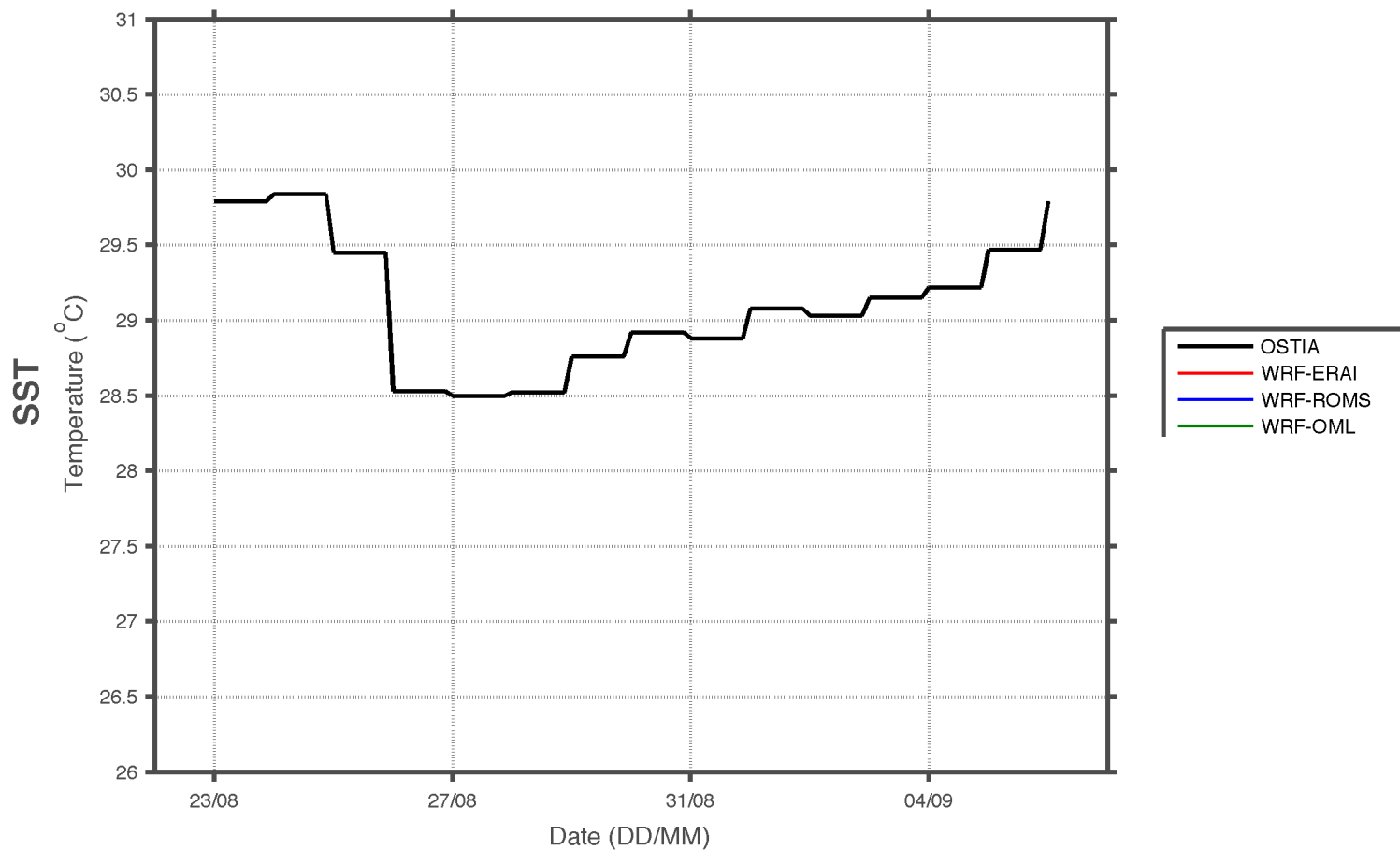


How WRF sees the seas

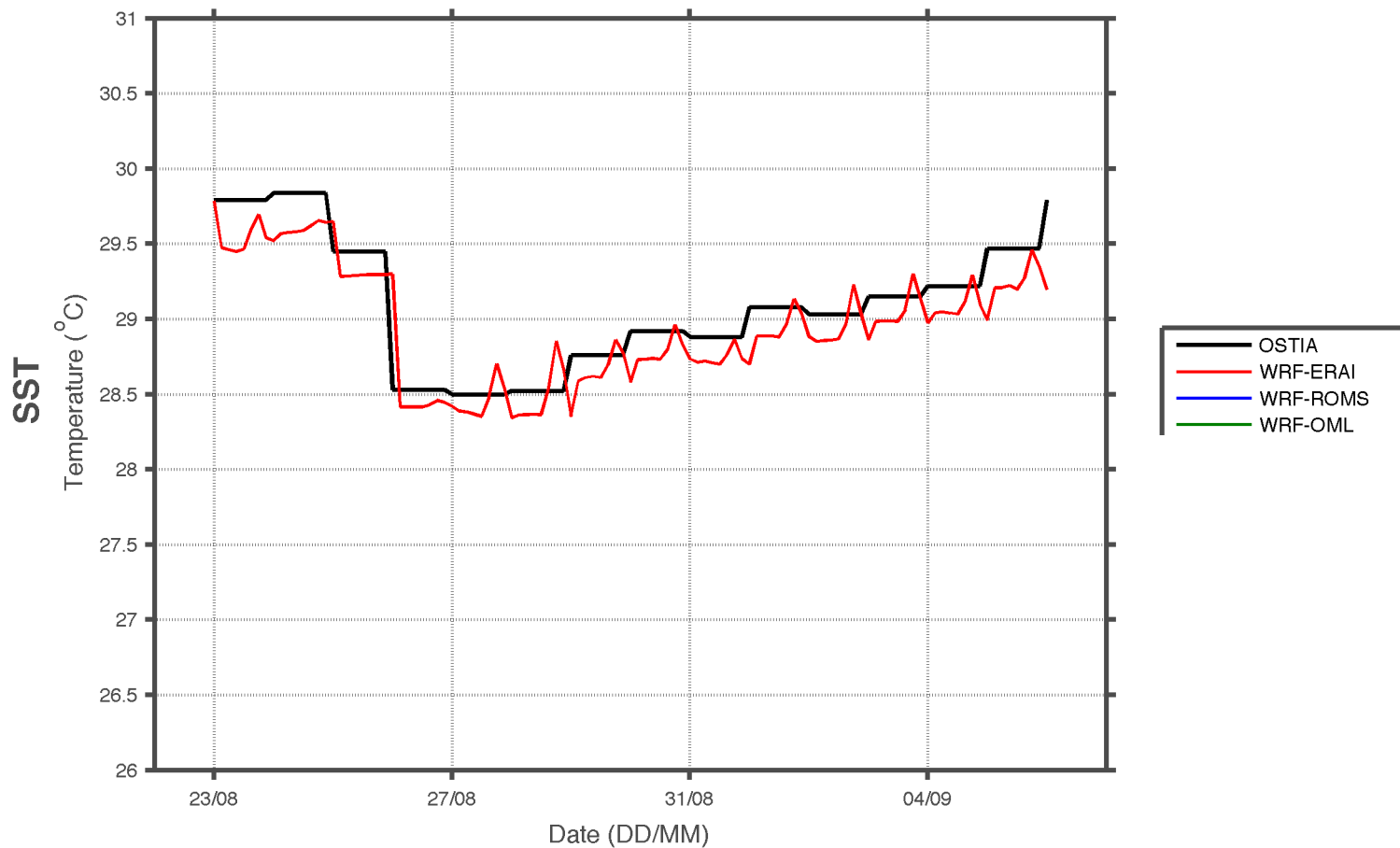
(b) GLOBAL MEAN RESPONSE OF SST TO TC PASSAGE (ALIGNED)



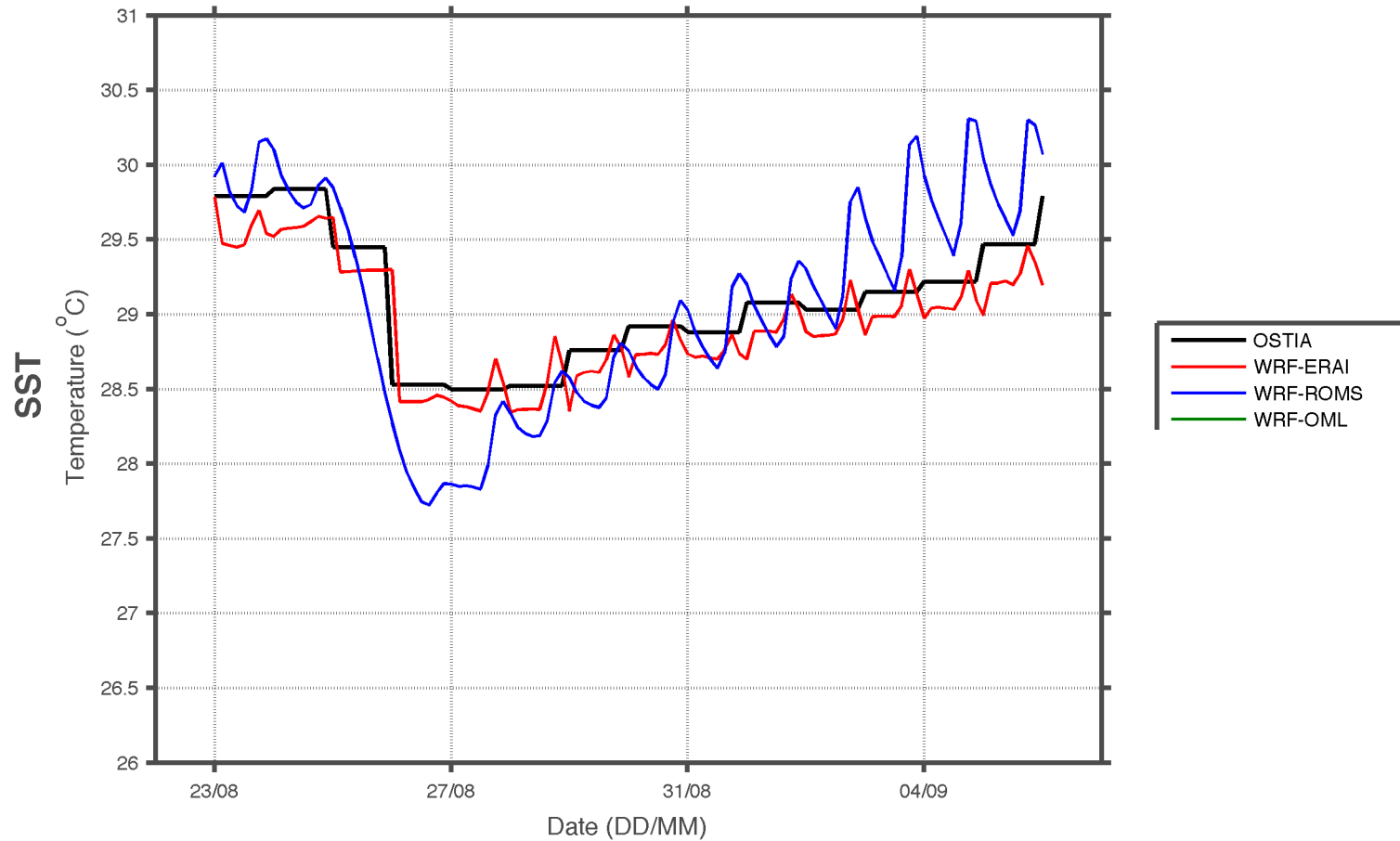
How WRF sees the seas



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Modelled SSTs



Modelled SSTs

