# RADS: steppingstone to an International Altimeter Service

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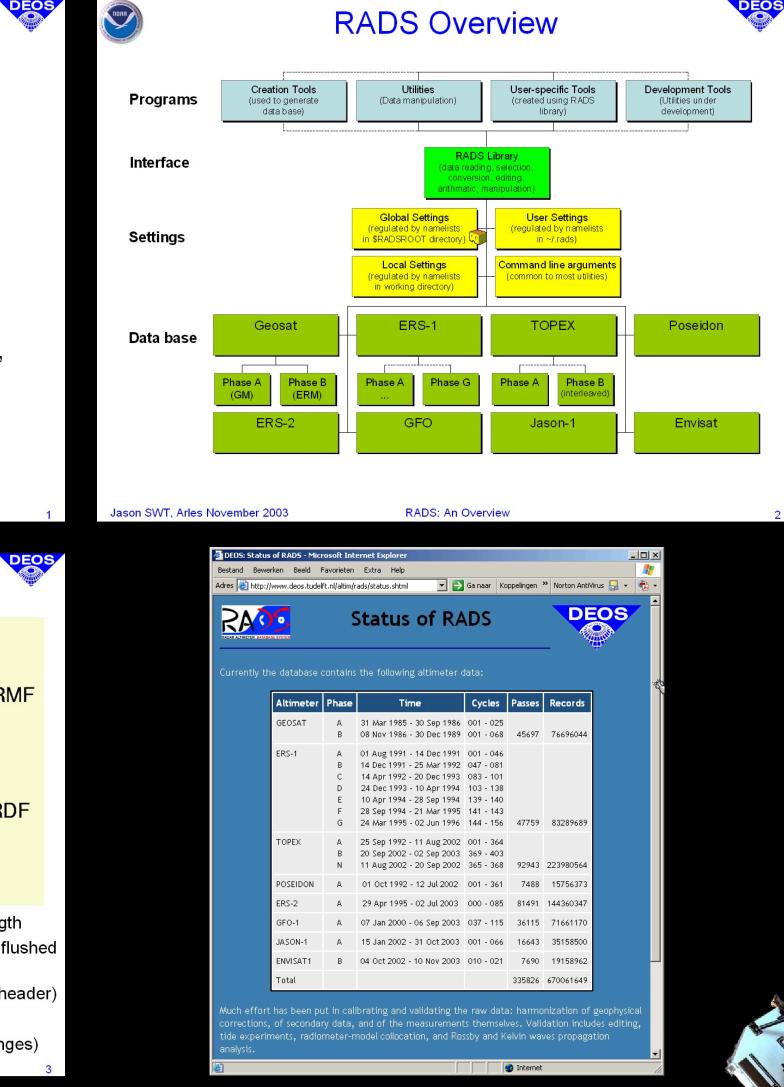
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### Abstract

In order to serve interdisciplinary research programs, applications and operational tasks on an international scale, operational observing systems like satellite altimetry call for International Services. DEOS' anticipated the need for global altimeter services and launched the Radar Altimeter Database System (RADS) project in 2001. Since then RADS has been embedded in the Netherlands Earth Observation NETwork (NEONET) and as such has been supported by the Dutch government. In this project we setup and explored a facility to easily manage and access calibrated and validated altimeter data that are in many respects consistent throughout the entire data base (e.g. reference frame). For this purpose we collected the altimeter and ancillary data from all available altimeter missions and combined them with the latest (correction) models, arriving at an (inter)nationally appreciated altimeter data set, comprising almost 20 years' worth of valuable sea level, wave height and wind data. To date, whenever new data (including latest GFO, Jason-1 and Envisat), models or knowledge arrive, the data base is updated. However, validated data and consistency is not RADS' only asset. Much effort has been put in the build of a data organization incorporating common data and meta file formats and ultra-flexible file (data) augmentation, in the development of a webinterface (www.deos.tudelft.nl/altim/rads), not only providing access to (almost) raw, processed and value-added data, but also access to other altimeter related information, and in the development of (RADS) data utilities like data extractors and converters, a collinear track analyzer and a multi-satellite crossover generator.

#### RADS Data Base

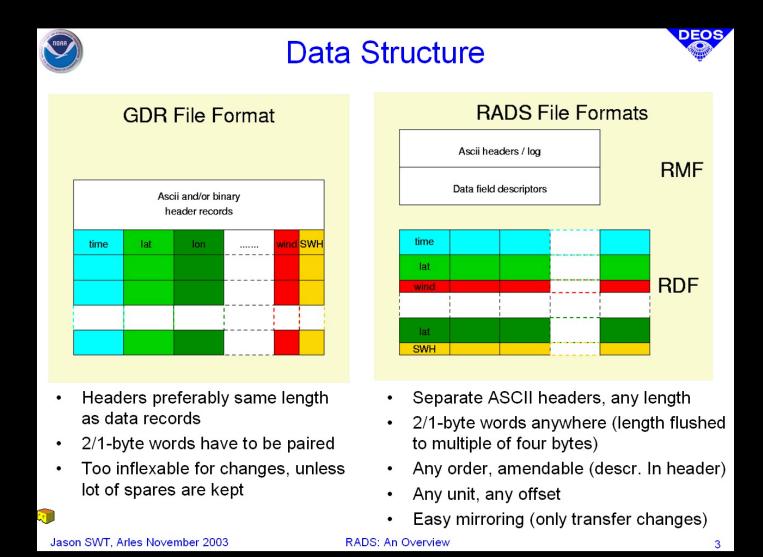
- Up-to-date with most current GDR data
- All instrumental corrections applied or provided
- Geophysical corrections and reference frame common to all altimeters
- Common data file format (stream of integer binaries)

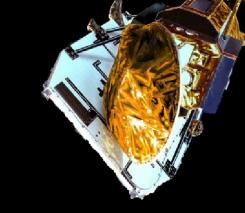


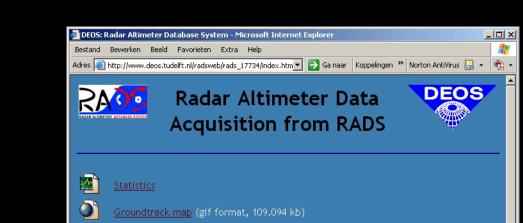
• Common meta file format (description of data, scale, offset, and constants)

RADS: An Overview

- Ultra-flexible file augmentation
- Preferences controlled by namelists



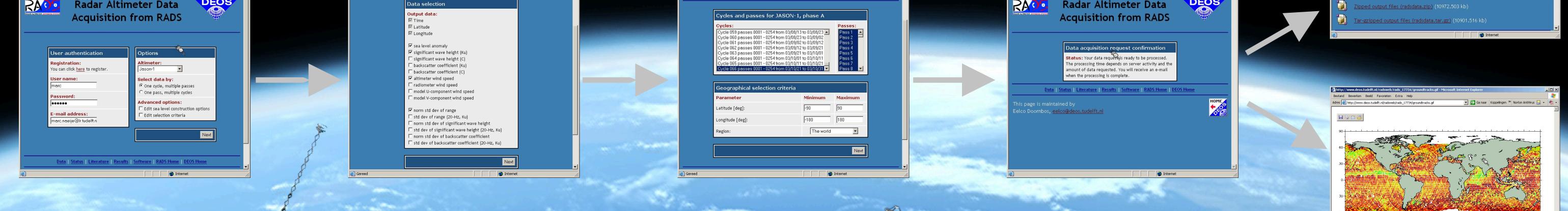




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DEOS: Radar Altimeter Database System - Microsoft Internet Explorer
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 DEOS: Current velocities of the Gulfstream - Microsoft Internet Explorer
 Image: Current velocities of the Gulfstream - Microsoft Internet Explorer

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 Image: Current velocities
 Norton AntiVirus
 Image: Current velocities



Last updated automagically: Wednesday 12 November 2003 22:03:37 CET

Note: Since 22 July 2003 the maps presented here are based on Envisat (instead of ERS-2) altimeter data. At the same time the mapped area was increased to show more of the upstream regions of the Gulf Stream.

Gulf Stream velocity fields are derived from near-realtime radar altimeter data of the European Environmental Satellite Envisat.

This page presents three maps of current velocities of the Gulf Stream in the vicinity of the East coast of North-America. Velocities are represented in **meters per second**. To get the approximate velocity in **knots** you have to multiply by 2 (1.9438445 to be precise).

For more **information** about the images, follow this <u>link</u>. The maps represent the situations on three days different lays, each seperated by one week from the next.

Figure 1. One week ago: Wednesday 5 November 2003
Figure 2. Two weeks ago: Wednesday 29 October 2003
Figure 3. Three weeks ago: Wednesday 22 October 2003

Chese maps are **updated daily** and can also be retrieved by means of <u>anonymous FTP</u>.

El Niño observed by ERS/Envisat altimetry

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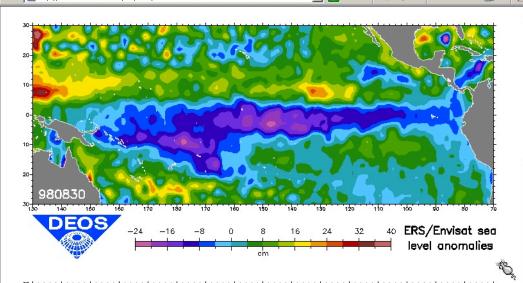
Last update: Wed Nov 12 23:29:25 CET 2003 Read our <u>article</u> in *Earth Observation Quarterly, No. 59.* Envisat data is included in the data processing since 1 April 2003. <u>The latest view of 02 Nov 2003</u> shows that the 2002 El Niño has fully subsided.

#### Latest view of El Niño

The satellite radar altimeters on board the European Remote Sensing Satellites <u>ERS-1</u>, <u>ERS-2</u> and <u>Envisat</u> measure or have neasured sea surface heights continuously since July 1991. One of the areas of interest is the Equatorial Pacific Ocean where the amous El Niño roars every few years. This event is characterised by relatively high sea level along the west coast of Central America ccompanied by a radical switch of the regional climate with heavy rainfall. At the same time, sea level drops in the Western quatorial Pacific, where extreme droughts devastate crop yields. The opposite extreme is called La Niña.

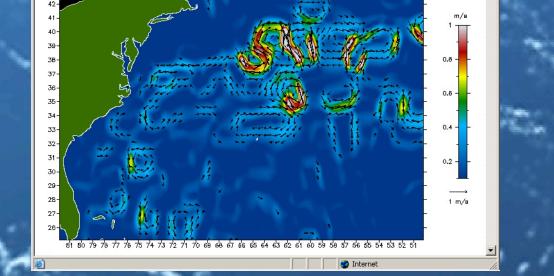
Read all about El Niño at the El Niño Pages of <u>NOAA/PMEL</u> or <u>KNMI</u>.

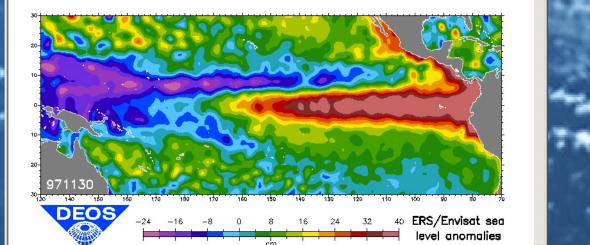
Figure 1*a* shows an *image* of sea level anomalies on 30 Nov 1997, clearly illustrating the effect of El Niño: high sea levels near the coast of Ecuador and Columbia, but also as north as Mexico; low sea levels in the Western Pacific. Figure 1*b* gives the situation on 30 Aug 1998 when the opposite phenomenon is happening. Now sea levels much lower than normal are seen along the Equator. This is as deep as the La Niña became following the 1997/1998 El Niño. Figure 1*c* is the most recent snapshot of sea level anomalies (02 Nov 2003). The 2002 Niño has clearly worn out and sea level has returned to its normal level.



This poster presents an overview of RADS as it is today: from core system (data management), through enhancements, screening, formatting and harmonization. Validation is used to assess the data quality and to enhance algorithms for deriving the geophysical parameters. Two examples of RADS based value added products are the DEOS Gulf Stream and El Niño web pages: here Hovmuller diagrams and eddy kinetic energy plots are refreshed in weekly intervals.

The successful usage of RADS by (inter)national research partners indicates the need for such services and we think the time has come to link similar national and international operational ocean data service initiatives into an International Altimeter Service.





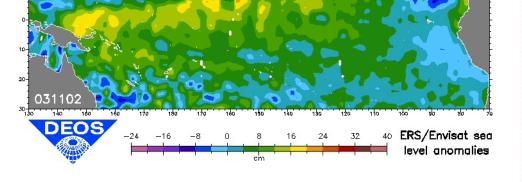


Figure 1. The sea level of the Equatorial Pacific Ocean on 30 Nov 1997 (a, top), on 30 Aug 1998 (b, middle) and on 02 Nov 2003 (c, bottom), based on ERS satellite radar altimeter data spanning a 16-day period centred on this epoch. The OSU MSS95 long-term mean sea level model is used as reference for these sea level anomalies. (Click on any of the maps to get a time-longitude diagram for the latitude indicated by the vertical position of your cursor.)



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