LTER-ITALIA

12 - ALTO ADRIATICO

Descrizione generale del sito

Il sito Alto Adriatico è il bacino più settentrionale del Mar Mediterraneo. E'un mare poco profondo, caratterizzato da una circolazione dominante a carattere ciclonico. L'alto Adriatico è contraddistinto da un'elevata variabilità stagionale e interannuale dei parametri oceanografici e meteorologici. Tra le caratteristiche più rilevanti per l'ecosistema si riscontrano la corrente istro-dalmata (apporti di acqua oligotrofe e ad elevata salinità dal bacino adriatico meridionale), i cospicui apporti fluviali (lungo le coste italiane) e le notevoli escursioni di livello marino, particolarmente elevate per il bacino Mediterraneo. Importanti sono anche i reflui urbani ed industriali e gli scambi con le aree lagunari che si affacciano sul bacino.

Stazioni di ricerca (nome, sigla, localizzazione, comune, provincia, alt. s.l.m., lat., long., estensione).

Alto Adriatico
Estensione: 43° 60'- 45° 47' N; 12° 15'- 14° 20' E.
Altitudine: 0 m s.l.m.
Estensione: circa 10.000 km^2
Profondità media: 30 m
Profondità massima: 70 m

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Comunità biotiche principali

popolamenti pelagici e neritici; popolamenti bentonici di fondi molli e di fondi duri.

Ricerche in corso

Variabilità delle proprietà oceanografiche dell'Adriatico settentrionale su scale temporali dalla stagionale alla decadale.
Ecologia e struttura delle comunità planctoniche e bentoniche.
Evoluzioni trofodinamiche.
Processi di produzione di sostanza organica particellata e disciolta, del suo utilizzo e dell'eventuale formazione di aggregati gelatinosi.

Storia del sito

L'Alto Adriatico è un bacino soggetto a un notevole impatto antropico (apporti di nutrienti, urbanizzazione costiera, pesca, turismo, traffici marittimi, ecc.). In passato il bacino ha sofferto di fenomeni di eutrofizzazione e, più recentemente, è stato soggetto a frequenti ed estesi eventi di mucillagine.
E' stato oggetto di numerosissime ricerche a carattere ecologico, dalla seconda metà del secolo scorso, condotte da istituzioni nazionali e internazionali. Molte di queste attività sono state svolte e/o coordinate dal CNR ISMAR e dal LBM di Trieste, dagli anni settanta.

Dati raccolti
dati storici (tipo, frequenza ed eventuale banca dati)

Dati meteorologici sono raccolti presso siti costieri o prossimi alla costa a partire dal 1841. Il livello marino è osservato dalla fine del 19° secolo. La temperatura del mare sottocosta è misurata dall'inizio del 20° secolo. Le serie temporali sono continue almeno dagli anni '20 o '30 (in funzione del parametro).
Dati idrologici, di concentrazione di nutrienti, di materiale particellato, di abbondanza e composizione delle comunità fitoplanctoniche, zooplanctoniche e bentoniche sono stati raccolti in modo discontinuo dall'inizio degli anni '70 ai primi anni '90 e, in seguito, con periodicità pressochè mensile. Dagli anni '90 sono inoltre effettuate misure correntometriche e misure di flusso verticale di materiale particellato, mediante trappole di sedimentazione.

Parametri sedimentologici, mineralogici e geochimici nel sedimento e nel particellato sospeso sono stati raccolti in modo discontinuo dalla fine degli anni '80 ad oggi.
Tutti i dati sono stati raccolti in una rete di stazioni, con estensione variabile nel tempo.
I dati sono organizzati in banca dati presso il CNR ISMAR e presso il LBM di Trieste.

dati attuali (tipo, frequenza ed eventuale banca dati)

dati fisici
Dati meteorologici (temperatura, umidità, pressione, precipitazioni, radiazione solare, direzione e velocità del vento) presso stazioni costiere e piattaforme al largo con cadenza da oraria a giornaliera. Dati di livello marino presso stazione costiera con cadenza da oraria a giornaliera. Dati oceanografici (profili verticali sulla colonna d'acqua di temperatura, salinità, torbidità, velocità e direzione della corrente) da boe fisse, con cadenza da oraria a giornaliera e da misure in crociera con frequenza variabile da mensile a stagionale.

dati chimici
Dati idrologici relativi a salinità, pH e ossigeno disciolto, da boe fisse, con cadenza da oraria a giornaliera.
Dati di concentrazione di nutrienti, ossigeno disciolto e di materiale particellato, con frequenza variabile da mensile a stagionale.

dati biotici
Fluorescenza *in situ* da boe fisse, con cadenza da oraria a giornaliera.
Dati d'abbondanza e composizione delle comunità planctoniche (virioplancton, picoplancton, nanoplancton, microfitoplancton, microzooplancton e mesozooplancton) e bentoniche (microfitobentos, meiobentos e macrobentos), a frequenza variabile da mensile a stagionale.

dati sui processi
Flussi verticali di materiale particellato. Frequenza stagionale.
Stime del flusso di carbonio. Frequenza stagionale.
Stime del flusso di nutrienti. Frequenza stagionale.

<u>dati minimi garantiti a lungo termine</u>

Meteorologia, livello marino, idrologia di base, correntometria, comunità fito e zooplanctoniche in alcune stazioni rappresentative della variabilità del bacino.

Accesso ai dati

Su richiesta scritta e motivata per i dati dettagliati, con obbligo di citazione della fonte
E' in fase di progettazione un sito web per la consultazione in tempo reale dei dati provenienti dalle boe oceanografiche (proprietà ARPAV e CNR ISMAR).

Strutture disponibili (laboratori, strumentazione, mezzi per effettuare prelievi, strutture ricettive, ecc.)

Mezzi nautici e laboratori di ricerca presso CNR ISMAR (sezioni di Venezia, Bologna e Trieste) e presso LBM (Trieste).
Boa-meda Oceanografica (proprietà ARPAV), Golfo di Venezia.
Boa Oceanografica (proprietà ISMAR CNR Sezione di Bologna), Delta del Po.
Base CNR ISMAR Sezione di Bologna presso il porto San Vitale, Ravenna.

Stazioni meteorologiche, stazione mareografica, piattaforma oceanografica PALOMA (ISMAR CNR Trieste).

Progetti di ricerca ed enti finanziatori

Progetto Finalizzato CNR Oceanografia e Fondi Marini (1978-1984)
Progetto Finalizzato CNR Qualità dell'Ambiente (1978-984)
Programma ALPE-ADRIA, finanziamento Regione Veneto e Friuli Venezia Giulia: 1991-1993
Progetto Monitoraggio, finanziamento Ministero Ambiente: dal 1993
Programma PRISMA1, finanziamento MURST: 1994-95
Programma PRISMA2, finanziamento MURST: 1996-1998
Programma INTERREG2, finanziamento ARPAV-Regione Veneto: 1999-2001
Progetto INTERREG 2, finanziamento Regione Friuli Venezia Giulia- Dir. Ambiente e Comunità Europea: 1998 - 2001
Progetto MAT, Finanziamento Ministero Ambiente: 1999-2002.
Progetto ADRICOSM, finanziamento MURST : 2001-2004
Progetto INTERREG 3, finanziamento Regione Friuli Venezia Giulia- Dir. Ambiente e Comunità Europea: 2001 – 2006
Programma INTERREG3, finanziamento ARPAV-Regione Veneto: dal 2003 al 2006
Progetto Riattivazione del Sito S1, finanziamento Regione Emilia Romagna : 2002-2004
Regional Collaboration in Environmental Monitoring and Forecasting in the Northern Adriatic, finanziamento NSF e NOAA: 2002-2005
MAText, finanziamento Ministero Ambiente 2005
ADRICOSMext, finanziamento UNESCO 2005 – 2007
Progetto ESEAS-RI, finanziamento Commissione Europea: 2002-2005.
Progetto VECTOR, finanziamento MIUR, 2006-2008

Collaborazioni in atto

ARPA Veneto
ARPA Friuli Venezia Giulia
GLERL, NOAA, Ann Arbor, USA
Istituto Centrale per la Ricerca Scientifica e tecnologica Applicata al Mare (ICRAM), Brondolo, Chioggia
Horn Point Lab, University of Maryland, USA
Istituto Rudjer Boskovic, Centro per la Ricerca Marina, Rovigno, Croatia
Scripps Institution of Oceanography, San Diego, USA
Stazione di Biologia Marina, Istituto Nazionale di Biologia, Pirano, Slovenia
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ARPA-RER Servizio Meteorologico Regionale
Istituto Tethys - Milano
Osservatorio Geofisico Sperimentale, Trieste
Osservatorio Meteorologico Regionale dell'ARPA Friuli Venezia Giulia
CAI - Società Alpina delle Giulie, Trieste
Corpo Forestale della Regione Friuli Venezia Giulia

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LTER-ITALY

08 – NORTHERN ADRIATIC SEA

General description of the site

The Northern Adriatic Sea is the northernmost basin of the Mediterranean Sea. It is characterized by a shallow depth and by a dominant cyclonic circulation. The oceanographic and meteorological parameters show a marked seasonal and interannual variability. The remarkable river inputs (along the italian coast), the istro-dalmatian current (bringing high salinity and oligotrophic waters from the southern basin), and the notable sea-level range (relatively to the Mediterranean area), represent major forcings of the system. Of ecological relevance are also the urban and industrial inputs and the hydrodynamic exchange between the Northern Adriatic Sea and the lagoons, located along the italian coast.

Reasearch stations
(name, code, location, administrative information, alt. (m a.s.l.), lat., long., extension)

Northern Adriatic Sea
Extension: 43° 60'- 45° 47' N; 12° 15'- 14° 20' E.
Altitude: 0 m s.l.m.
Area: about 10.000 km^2
Mean depth: 30 m
Maximum depth: 70 m

Responsible institutions and contact persons (name, address, phone/fax/e-mail)

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Main biotic communities

Pelagic and neritic communities; soft and hard bottom benthic communities.

Current research topics

Variability of the ocean properties of Northern Adriatic on time scales from seasonal to decadal.
Ecology and structure of the planktonic and benthic communities.
Trophodynamic evolution.
Processes of particulate and dissolved organic matter production, in relation to its fate and utilization and to the appearance of mucilage aggregates.

Site history

The Northern Adriatic basin is subjected to a marked anthropic impact (nutrient inputs, coastal urbanization, fishing activity, tourism, maritime trade….). In the past the basin has undergone to eutrophication phenomena and, more recently, to frequent episodes of large mucilage aggregate appearance.
A large number of ecological research have been carried out in the Northern Adriatic Sea, since the second half of the last century, by national and international institutions. Since the 70s, most of these activities have been carried out and/or coordinated by CNR ISMAR and by LBM (Trieste).

Collected data
historical data (type, frequency, data base)

Meteorological data are collected at coastal or near-coastal sites since 1841. Sea level has been observed since the end of 19th century. Near-coast sea temperature has been measured since the beginning of 20th century. The time series are continuous at least since the 1920's or 1930's (depending on the parameter).
Data on hydrology, nutrient concentration, particulate organic matter, abundance and composition of phytoplankton, zooplankton and benthic communities have been gathered discontinuously from the beginning of the 70s to the early 90s and, then, more regularly, with a nearly monthly frequency.
Since the 90s measurements of the water currents and of the vertical flux of particulated matter (sedimentation traps) have been carried out.
From the end of the 80s until now, sedimentological, mineralogical and geochemical parameters have been considered, both in the sediments and in the suspended matter,

All these data have been gathered in a network of stations, with an extension that have been changing through the years.
The data are stored in the data banks of CNR ISMAR and LBM (Trieste).

current data (type, frequency, data base)

physical data

Hourly to daily meteorological data (temperature, humidity, atmospheric pressure, precipitation, solar radiation, wind direction and speed) at coastal stations and offshore platforms. Hourly to daily sea-level data at coastal station. Oceanographic data (vertical profiles along the water column of temperature, salinity, turbidity, current speed and direction) are gathered from oceanographic buoys, with a hourly to daily frequencies and during cruises with monthly to seasonal frequency.

chemical data

Salinity, pH, dissolved oxygen are gathered from oceanographic buoys, with hourly to daily frequencies.
Nutrient, dissolved oxygen and total suspended matter concentrations are measured with monthly to seasonal frequencies.

biotic data

In situ fluorescence is gathered from oceanographic buoys, with hourly to daily frequencies.
Abundance and composition of planktonic (virioplankton, picoplankton, nanoplankton, microphytoplankton, microzooplankton and mesozooplankton) and benthic community (microphytobenthos, meiobenthos e macrobenthos) are measured with monthly to seasonal frequencies.

processes data

Vertical fluxes of particulate matter and measurements of carbon and nutrient fluxes are estimated with a seasonal frequency.

<u>data guaranteed on a long-term perspective</u>

Meteorology, sea level, hydrology, currentometry, plankton communities, in some stations selected as representative of the whole basin variability.

Data delivering

Detailed data will be available only on request and after specific agreement with the responsible institutions.
A web site is about to be ready for the real time consultation of the data from the oceanographic buoys (by ARPAV and CNR ISMAR).

Facilities (laboratories, analysis and collection devices, accomodation, etc.)

Research vessels and laboratories at CNR ISMAR (departments of Venezia, Trieste, Bologna and Ancona) and at LBM (Trieste).
Oceanographic buoy (ARPAV), Gulf of Venice.
Oceanographic buoy (ISMAR CNR, Bologna), Po River Delta .
Meteorological stations, tide-gauge station, oceanographic platform PALOMA (ISMAR CNR Trieste).

Research projects and funding institutions

Progetto Finalizzato CNR Oceanografia e Fondi Marini (1978-1984)
Progetto Finalizzato CNR Qualità dell'Ambiente (1978-984)
Programma ALPE-ADRIA, supported by Veneto e Friuli Venezia Giulia Regions: 1991-1993
Progetto Monitoraggio, supported by Ministery of Environment from 1993 on
Programma PRISMA1, f supported by MURST: 1994-95
Programma PRISMA2, supported by MURST: 1996-1998
Programma INTERREG2, supported by ARPAV-Veneto Region: 1999-2001
Progetto INTERREG 2, supported by Friuli Venezia Giulia Region and UE : 1998 - 2001
Progetto MAT, supported by Ministery of Environment: 1999-2002.
Progetto ADRICOSM, supported by MURST: 2001-2004
Progetto INTERREG 3, supported by Friuli Venezia Giulia Region and UE : 2001 – 2006
Programma INTERREG3, supported by ARPAV- Veneto Region: 2003 - 2006
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On-going collaborations

ARPA Veneto
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GLERL, NOAA, Ann Arbor, USA
Istituto Centrale per la Ricerca Scientifica e tecnologica Applicata al Mare (ICRAM), Brondolo, Chioggia
Horn Point Lab, University of Maryland, USA
Istituto Rudjer Boskovic, Centro per la Ricerca Marina, Rovigno, Croatia
Scripps Institution of Oceanography, San Diego, USA
Stazione di Biologia Marina, Istituto Nazionale di Biologia, Pirano, Slovenia
Stazione Zoologica "A. Dohrn", Villa Comunale, Napoli
ARPA-RER S.O. Daphne di Cesenatico
ARPA-RER Servizio Meteorologico Regionale
Istituto Tethys - Milano
Osservatorio Geofisico Sperimentale, Trieste
Osservatorio Meteorologico Regionale dell'ARPA Friuli Venezia Giulia
CAI - Società Alpina delle Giulie, Trieste
Corpo Forestale della Regione Friuli Venezia Giulia

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