A31B-10 1115h

Airborne Sunphotometry in Support of the Chesapeake Lighthouse and Aircraft Measurements for Satellites (CLAMS) Experiment, 2001

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As part of the Chesapeake Lighthouse and Aircraft Measurements for Satellites (CLAMS) experiment, July 10 - August 2, 2001, the 14-channel NASA Ames Airborne Tracking Sunphotometer (AATS-14) was operated successfully aboard the University of Washington CV-580 during 10 research flights, totaling 45.09 flight hours. The CLAMS campaign was a clear sky, shortwave (SW) closure campaign sponsored by CERES, MISR, MODIS-Atmospheres, and the NASA/GEWEX Global Aerosol Climatology Project (GACP), and entailed measurements from the Chesapeake Lighthouse research platform, several land sites, 6 research aircraft and the TERRA satellite. Among the CLAMS research goals were the validation of satellite-based retrievals of aerosol properties, vertical profiles of radiative fluxes, temperature and water vapor.

AATS-14 measures the direct solar beam transmission at 14 discrete wavelengths (354-1558 nm), yielding aerosol optical depth (AOD) spectra, columnar water vapor and columnar ozone. Differentiation of AOD (CWV) with respect to altitude in favorable flight patterns, allows the derivation of aerosol extinction (water vapor density). During coordinated flights of the UW CV-580, AATS-14 measured full column aerosol optical depth spectra at exact TERRA overpass time on at least 7 occasions. For five of these opportunities, AOD at 499nm was at or below 0.1. During TERRA overpass time on July 17, 2001, AATS-14 measured the highest AOD encountered during the entire experiment (ca. 0.48 at 499nm), including a horizontal gradient in AOD of more than 0.1 over a horizontal distance of ca. 80 kilometers.

In this paper, we will show first sunphotometer-derived results regarding the spatial variation of AOD and CWV during TERRA overpass time at key locations for the CLAMS experiment. Preliminary comparison studies between our AOD/aerosol extinction data and results from (i) extinction products derived using in situ measurements aboard the UW CV-580 and (ii) AOD retrievals using the Multi-angle Imaging SpectroRadiometer (MISR) aboard the TERRA satellite will also be presented.

A31B-11 1130h

Measurements of Absorbing Aerosols Using in Situ and Remote Sensing Techniques

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Reliable measurements of light absorption by aerosol particles are essential for an accurate assessment of the climate radiative forcing by aerosol particles. Depending on the absorption properties, the radiative forcing of the aerosols may change from a cooling to a heating effect. New techniques for the remote sensing of aerosol absorption over land and ocean are developed and applied in combination with in situ measurements for validation and addition of complementary information. Spectral measurements show the effects of aerosols on absorption of light from the UV to the near infrared. Depending on particle size and structure, there is a significant absorption component that must be accounted for the radiative forcing in the near infrared. Remote sensing results from MODIS and from the CLAMS field experiment, as well as in situ validation data will be discussed.

A31B-12 1145h

Global Modeling of Tropospheric Aerosols by LLNL IMPACT and Comparisons with Field Measurements*

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A new version of LLNL IMPACT (Integrated Massively Parallel Atmospheric Chemical Transport) model driven by NCAR MACCM3 has been used to study the global aerosol cycle in the troposphere. This new version with compact chemical mechanisms (~21 prognostic species) is aiming at developing the aerosol climatology and exploring the impact of aerosols on climate variability and climate change. We will present global distributions of four major aerosol components (sulfate, carbonaceous, dust and sea salt) and their seasonal variations. By applying the monthly averages of OH, HO2, and H2O2 from previous IMPACT simulations with full chemistry (~100 prognostic species), sulfate is formed through both gas and aqueous oxidation from SO2 and DMS emissions. Other aerosol types are assumed to be injected into the global model in the particulate form. Individual aerosol concentrations are compared with field measurements at different geographical locations to validate the accuracy of the model.

*Work performed under the auspices of the U.S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.

A32A MC: Hall D Wednesday 1330h

The Arctic Oscillation and the North Atlantic Oscillation: Mechanisms, Coupling, and Climate Change *(joint with OS)*

Presiding: **T Furevik,** Nansen Environmental and Remote Sensing Center

A32A-0023 1330h POSTER

Does the NAO index represent zonal circulation? The influence of the NAO on North Atlantic surface temperature

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We investigate the influence of zonal and meridional flow on surface temperature in the North Atlantic/European region. The degree to which the North Atlantic Oscillation (NAO) index reflects these two different flow types is considered, as is the relationship between the NAO index and surface temperature. Zonal and meridional circulation indices extending back to the early 19th or 18th centuries are based on surface pressure observations from the North Atlantic and Europe and on an Empirical Orthogonal Function (EOF) analysis of European surface pressure from 1845-1995. The NAO index appears to integrate aspects of both zonal and meridional flow types. The surface temperature changes associated with the NAO index is composed of a quadrupole correlation pattern, showing positive correlations over Europe and the Sargasso Sea and negative correlations over north-west Africa and the Greenland/Labrador Sea region. It appears that the relationship between the NAO index and temperatures downstream of the Atlantic is associated with zonal flow, whereas the influence of the NAO on temperatures upstream is more closely linked to meridional flow patterns. Running correlations indicate that while there is no obvious link between the NAO index and the secular temperature trend, the second principal component of temperature is closely linked to atmospheric circulation, with a relationship which in winter has remained fairly steady through the 20th century. Notwithstanding this, there have been changes in the strength of the correlation between temperature and circulation. These fluctuations in climate-circulation relationships should be further investigated and addressed in studies of climate change, especially in the calibration of paleoclimatic time series and downscaling models.

A32A-0024 1330h POSTER

Diagnose of the Northern Hemisphere Annular Mode by Means of an Approach Based on the Relative Angular Momentum

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There is an interesting debate about the hemispheric character of the main mode of climate variability in the northern hemisphere extratropics (NAO-AO). Recent studies suggest that NAO is a regional expression of the Northern Hemisphere Annular Mode (AO). However the lack of an apparent link between Atlantic and Pacific sectors questions the annular paradigm.The main aim of this study is to diagnose the Northern Hemisphere annular mode using an annular magnitude, such as the relative angular momentum (RAM). Annual means of RAM are computed for the polar cap from 55 to 90°N using NCAR-NCEP and ECMWF reanalysis data. Values of RAM by 60° longitude sectors as well as the whole cap are then calculated and correlated to temperature and geopotential height at different levels. The results are similar in all cases: the Arctic region is dominated by very negative correlations whereas midlatitudes are dominated by positive correlations, although in this case there is not a regular annular pattern but intermittent significant regions. Since an annular pattern is characterized by its hemispheric symmetry, three symmetric latitude rings are expected in the correlation maps (negative-positive-negative), but only the polar one (negative) is detected, the rest being incomplete, so the results do not support the annular paradigm, understood as organized along latitude sectors, but an hemispheric dimension cannot be excluded.

A32A-0025 1330h POSTER

Anomalies in the Seasonal Cycle of Sea Level Pressure in Iceland and the North Atlantic Oscillation

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An analysis of a new homogenized time series of daily mean sea level pressure (SLP) from Reykjavk and Stykkishlmur Iceland from 1823-1999 is presented. Time series statistical techniques including harmonic analysis are used to identify the seasonal march of pressure and its variability through the record. The results are assessed regarding the North Atlantic Oscillation (NAO) index. In addition to the well-known annual cycle, the seasonal march of SLP has an appreciable semi-annual cycle, as well as anomalies (abrupt rises and

falls) occurring at remarkably distinct times in spring and winter.

Interdecadal variability is apparent in the seasonal cycles and the anomalies. A shift in intraseasonal variability is observed in recent decades, including an extension of the winter Icelandic Low enhancement period into March. Increasing failure or delay of the usual abrupt pressure rise in Iceland in late February has contributed to the unusually positive winter NAO index values since the 1960s. The Icelandic Low varaibility is also considered in regards to the "Barents Oscillation".

A32A-0026 1330h POSTER

Observed and Simulated Seesaw Between Aleutian and Icelandic Lows and its Interdecadal Modulation

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The authors have recently found that the variability associated with the late-winter seesaw between the Aleutian and the Icelandic Lows (AL and IL, respectively) was predominant over the last 30 years in the upper-tropospheric interannual variability over the wintertime extratropical Northern Hemisphere. In this study we examine how realistically the seesaw is simulated in an AGCM and the appearance was modulated, if any, on multi-decadal time scales. The AGCM integrations are composed of a 60-year control run with global SST fixed to the climatological seasonal march and a set of eight 50-year hindcast experiments forced by global SST anomalies observed since 1949. The NCEP/NCAR reanalysis data for the period of 1948-1999 are also used.

Though not necessarily significant, the correlation was found negative between interannual anomalies of the AL and IL intensities for any winter month in any of the AGCM integrations. In many of the integrations the seasonality of the seesaw formation is not as distinct as in the observation for the recent decades. Still, five out of the eight hindcast integrations exhibit a clear tendency that the negative correlation becomes stronger towards the later part of the winter, in accordance with the observation.

A rather distinct interdecadal modulation was observed in the seasonality of the seesaw formation. The negative AL-IL correlation has been strongest in late February since the 1970s, and it was so in January during the 1950s, but the correlation was not significant in the 1960s. This observed modulation was not reproduced well in the hindcast integrations where no systematic interdecadal tendency was found in the AL-IL correlation. Interestingly, an clear interdecadal tendency in the AL-IL correlation was found in the control run. Reflecting this tendency, the leading EOF of the wintertime interannual variability over the Northern Hemisphere for each of the mutually overlapping 15-year periods changes its structure from a zonally-symmetric pattern similar to the Arctic Oscillation (AO) to a wavier pattern representing the AL-IL seesaw. The leading wintertime EOF for any of the 15-year periods based either on the observation or simulation appears to be represented as a linear combination of the AO and AL-IL seesaw.

It is argued that the AO (more precisely, the annular mode) and the AL-IL seesaw may be two of the fundamental patterns of the interannual tropospheric variability in the wintertime Northern Hemisphere, both of which can be generated by internal dynamics of the atmosphere. The remote influence of ENSO does not set a necessary condition for the seesaw formation. It is also argued that the midlatitude air-sea coupling might be important in reproducing the observed features. It will be discussed in the presentation whether or not the observed interdecadal modulation in the seesaw is attributable to any of the corresponding tendencies in the basic state.

A32A-0027 1330h POSTER

The NAO/AO Signal in the Bergen Climate Model: A Twin Experiment With/Without Flux Adjustment

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Here we will give a brief introduction to the Bergen Climate Model (BCM), where ARPEGE/IFS has been coupled to a global version of MICOM, having a sea ice module incorporated. The synchronizing and field exchange is made by the coupling tool OASIS.

In this presentation we will show results from two control experiments with T63 truncation in the atmosphere and an approximately 2.4 by 2.4 degree resolution in the ocean. The lengths of the experiments are 100 and 300 years respectively, with and without flux adjustment. While there is a rapid drift towards a new stable climate in temperatures and a more constant drift in salinities in the first case, the climate in the 300 years integration with flux adjustment is stable and realistic.

Here we present results of the large scale variability in the two experiments, with focus on the North Atlantic climate. The leading mode of variability (NAO/AO signal) and impacts on atmosphere and ocean, will be compared with the NCEP/NCAR reanalysis data, and with results from NAO analysis of the models participating in the Coupled Model Intercomparison Project (CMIP).

A32A-0028 1330h POSTER

The influence of anomalous atmospheric circulation on the annual cycle of precipitation in high northern latitudes

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To a large extent, the transport of water vapor and the patterns of moisture sources and sinks are determined via the large-scale atmospheric circulation. In previous studies the precipitation distributions over the Arctic basin have been used to demonstrate the impact of decadal-scale circulation anomalies associated with wintertime teleconnection patterns. The mean annual cycle of precipitation over the north polar cap has been shown to have largest values in the summertime however; additionally the character of the average annual cycle has a strong regional sensitivity. For example, the annual cycle of precipitation over Greenland varies radically over short distances, from a maxima in the wintertime in the southeast to a summertime maxima in the north. This suggests that the distribution of surface moisture fluxes may be used to diagnose the significant summertime circulation features and their anomalies over the Arctic basin and surrounding terrestrial watersheds. In this paper we utilize available regional model and reanalysis data as validated against in situ observations to characterize the annual cycle of precipitation over high northern latitudes and its relation to the atmospheric circulation. An analysis is then performed to identify the years of anomalous precipitation and characterize the atmospheric circulation patterns leading to these regional precipitation events. The influence of anomalous circulation on moisture recycling and precipitation efficiency will also be evaluated. Several derived data sets will be presented for the analysis of summertime atmospheric circulation and moisture, including a method for partitioning the net surface moisture flux into source and sink quantities, and a climatology of high latitude atmospheric convective available potential energy (CAPE).

A32A-0029 1330h POSTER

Chemical and Temporal Characteristics of Saharan dust Episodes Inferred from Aerosols Collected over the Subtropical North Atlantic - A Link to the North Atlantic Oscillation Revisited

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We studied temporal patterns of Saharan dust transported from source regions in North Africa to three sites in the North Atlantic Ocean: Izania (Canary Islands), Barbados (West Indies), and Bermuda. Samples representing dust episodes were selected from daily air filters based on a semi-quantitative color-based method and validated by comparing their elemental composition with the previously obtained data for Saharan dust and aerosols.

Out of more than 6000 aerosol samples collected for the Atmosphere/Ocean Chemistry Experiment (AEROCE) over the period of ten years (1989-1998), about 2000 air filters displayed brown color deposit indicative to the presence of mineral dust. The absolute concentrations (ppm) of 33 elements (Na, Mg, Al, Cl, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Zn, As, Se, Br, Rb, Sb, I, Cs, Ba, La, Ce, Nd, Sm, Eu, Tb, Yb, Lu, Hf, Ta, and Th) in Saharan aerosol sampled at Barbados and Izania were calculated using the measured Al to ash ratio of 0.104 in brown color samples. For Izania and Barbados, annual concentrations of aluminum, an indicator of atmospheric dust, revealed weak but significant correlation with the annual North Atlantic Oscillation Index (NOA). On a more detail scale, however, a time series of average monthly dust concentrations (1989-1998) for these two sites was generally out of phase with NAO index but become correlated when the dust time series were lagged by 2 to 6 months. This finding brings a new insight to the relationship between dust production and climate modes especially in assessing the contribution of soil condition and transport variations to dust concentration over the North Atlantic Ocean.

A32A-0030 1330h POSTER

On the Role of the Labrador Sea in Controlling the North Atlantic Oscillation

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The atmospheric response to a sea-ice anomaly and sea surface temperatures in the Labrador Sea is investigated by means of an AGCM. The simulated response resembles the North Atlantic Oscillation (NAO) pattern in the low-level pressure field, with low temperatures and heavy ice conditions in the Labrador Sea being associated with a low NAO index. The result indicates that atmospheric response to changes in the sea ice and sea surface temperatures in the Labrador Sea might constitute a negative feedback which can cause phase shifts in the NAO. The result is also consistent with the hypothesis that heavy ice conditions perturbes the region of strong baroclinicity in the entrance to the North Atlantic storm track southwards.

A32A-0031 1330h POSTER

Decadal Variability in the North Atlantic Ocean Involving Ocean-Atmosphere Interactions

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Variability in the North Atlantic Oscillation (NAO) and the Arctic Oscillation (AO) are shaping the North Atlantic basin and European climate on time-scales of decades and longer. Fifty years (1950-1999) of NCEP/NCAR individual monthly reanalysis products and other data (e.g., AO index of Thompson et al. 1998, GRL) are used to describe decadal climate variability in the North Atlantic basin that involves ocean-atmosphere interactions. The interaction between the ocean and atmosphere was investigated using the Smith et al. (1996, JCL) reconstructed sea-surface temperature (SST), and sea level pressure (SLP). The study period of Jan 1950-Dec 1999 contains 600 individual months. This presentation will address the details of SST-SLP-AO association at low frequencies in the North Atlantic. SST and AO/SLP are used as indicators of upper ocean and surface atmospheric variability, respectively.

The dominant decadal coupled ocean-atmosphere covariability modes were identified from a canonical correlation analysis (CCA) between SST and SLP gridded fields. Before applying CCA, the SST and SLP data were prepared in the following manner: (a) for each grid point and for each individual month, anomalies were computed with respect to the mean climatological values derived for the given calendar month; (b)

for each grid point and for a given month, the gridded time series anomalies were normalized by the temporal standard deviation of the calendar month; (c) a 61-term low-pass Lanczos filter was applied to the gridded standardized departures to retain only the low frequencies (periods greater than 5 years) (Duchon 1979, JAM); and (d) we performed EOF analysis of both SST and SLP fields to capture spatial coherent variability. Only the first 6 EOFs of SST and first 5 EOFs of SLP were retained as input to the CCA procedure. The SST canonical mode has a dipole-like structure with maximum positive amplitudes in the central-western Atlantic, and minimum amplitudes southeast of Greenland. The SLP mode reflects AO/NAO pattern. These SST and SLP CCA patterns are similar to those derived by Dima et al. (2001, JCL). Spectra of these CCA time series exhibit significant peaks at a period of about 12 years.

This diagnostic study also seeks to contribute to our understanding to how the North Atlantic atmospheric circulation would respond to forcing by the ocean on decadal time-scales, and to determine the extent to which SST anomalies feed back on the atmospheric circulation. The nature of the AO variability and ocean- atmosphere interaction on longer timescales was investigated by computing a CCA-based monthly cross-correlation lag-lead function among the low frequency AO index and the dominant CCA modes of SST and SLP. Significant correlations are found with either the SST leading the SLP/AO atmospheric field or the SLP/AO leading the SST oceanic field. Our results suggest that there is coherent interaction among the AO, the ocean and the atmosphere on longer timescales. The decadal mode, which involves AO/NAO, is consistent with the coupled ocean-atmosphere model results of Grotzner et al. (1998, JCL).

We will also investigate the relationships of the low frequency variability of the winter storm track over the North Atlantic basin to low frequency variability of SLP, SST and the AO/NAO circulations. This will be made possible with recently constructed monthly cyclone density fields (after Serreze et al. 1997, JCL).

A32A-0032 1330h POSTER

Atmospheric Response to Variations in Arctic Sea Ice Conditions

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While it is generally accepted that changes in air temperature and circulation determine sea ice conditions, it is not understood how the atmosphere is influenced by changes in sea ice. We employ the NCAR CCM 3.6 with specified ice extent and sea surface temperatures (sst). The overarching question addressed in this study is: how do variations in sea ice influence the atmosphere? We are particularly interested in the summer time response to highlight this unique aspect of this research.

A control experiment has been integrated for 55 years by repeating the mean annual cycle of observed sea ice extent (either 0% or 100% ice cover) and sst, based on the period 1979-99. Sets of 50 member ensemble experiments were constructed by integrating the CCM from October to April using climatological sst (same as control) and observed sea ice extent from the winters of 1982-83 (ice maximum) and 1995-96 (ice minimum). Similar summertime sensitivity experiments were performed using ice extent conditions from April to October during 1982 (maximum) and 1995 (minimum). While responses were found both in winter and summer, the results described below refer to the summer of 1995. A set of 50 ensembles was also integrated for the summer of 1995 using sea ice concentration instead of extent.

During the summer of 1995, negative sea ice anomalies were particularly large in the Siberian Arctic. Sea ice reductions result in increased surface and air temperatures and enhanced latent, sensible, and longwave fluxes out of the ocean. However, the net heat flux out of the ocean decreases because the changes are dominated by increased absorption of solar radiation over the low-albedo ocean. Cloud feedbacks are important in the Arctic and the downwelling solar at the surface decreases. The total cloud amount decreases due to reductions in low level clouds, however, convective cloud amounts increased. The net cloud radiative (shortwave and longwave) forcing is smaller in the experiment than the control, which acts to cool the surface and oppose the albedo effect. In addition, we will discuss the downstream atmospheric circulation response and compare the sensitivity to forcing the model with ice concentration instead of extent.

A32A-0033 1330h POSTER

Influence of North Atlantic SST and Sea-ice Anomalies on the NAO: Importance of Vertical Stability

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In winter the atmospheric vertical stability is at a minimum over the relatively warm ocean surrounding Iceland, which is usually taken as the northern center of the NAO. Deep convection typically sets in at the end of November when vigorous warming from the ocean overturns more or less the whole troposphere in the area (T. Jonsson 2000, personal communications). Some Icelandic meteorologists refer to this as the onset of the "Atlantic monsoon".

Given this backdrop, we examine the structure of the response in an atmospheric GCM (CCM3) to North Atlantic SST anomalies of both signs and different amplitudes, and sea-ice anomalies. Warm SST anomalies and removal of sea ice give by far the largest amplitude response in all fields, and in particular the strongest projection on the NAO. We relate this difference in response to differences in static stability in each case. In the warming/sea-ice removal cases, the response is deep (equivalent barotropic). The response in the cooling/sea-ice increase cases is considerably shallower so that the signal of changed surface fluxes does not get carried deep into the atmosphere. Here, we shall primarily concentrate on the vertical structure of the response.

A32A-0034 1330h POSTER

Atmospheric Regimes: Their Recent Behavior and Future Change

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Northern Hemisphere low-frequency atmospheric variability over recent decades is examined for nonlinear regime behavior. Nonlinear regimes are shown to exist during this period with their number and character depending on the time-scales retained in the analysis. The relationship between nonlinear regimes and the Arctic and North Atlantic Oscillations will be discussed. A coupled global climate model reproduces this historical behavior and predicts significant future change under enhanced greenhouse gas and aerosol forcing. These results offer a new perspective on historical atmospheric variability and predicted 21^{st} century change.

A32A-0035 1330h POSTER

Climate Trends of the 20th Century within the NAO/NAM Framework

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The leading mode of interannual wintertime atmospheric variability in the Northern Hemisphere is characterized by back and forth exchanges of mass between latitudes poleward and equatorward of 55N. Whether this mode is better described as the North Atlantic Oscillation (NAO) or the Northern Hemisphere annular mode (NAM) remains a point of contention. Available observational data from the last 100-150 years suggest that on the whole the NAO/NAM varies essentially randomly on interannual time scales with only small autocorrelation from one winter to the next. However, time series of the NAO/NAM exhibit a strong trend in the last few decades of the 20th century.

We examine winter-mean sea level pressure (SLP) and surface air temperature (SAT) data from gridded and station data sets from the 20th century to assess the uniqueness of the recent NAO/NAM trend compared to other periods during which trends can be discerned. The intervals 1920-1940 and 1949-1969 were marked by the strongest trends of the extended period 1920-1969 when NAO/NAM indices showed an overall decline. These two intervals were chosen for comparison with the recent interval, defined here as 1969-2000, in which the trend has been upward.

The SLP and SAT trends for 1969-2000 more closely match the SLP and SAT spatial patterns associated with the NAO and NAM than the trends for 1920-1940 and 1949-1969. SLP trends for 1920-1940 and 1949-1969 appear very similar to each other and are dominated by a regional-scale dipole over the North Atlantic sector, while the 1969-2000 SLP trends are marked by SLP decreases throughout high latitudes. SAT trends for the three periods differ from each other substantially. Much of the SAT trends for 1949-1969 and 1969-2000 appear consistent with the NAO/NAM SAT regression patterns, but those for 1920-1940 appear much less so. Also, consistent with the spatial patterns derived from both gridded and station data, the recent trend stands out more clearly in NAM indices than in NAO indices.

A32A-0036 1330h POSTER

Signature of the North Atlantic Oscillation and Other Climate Patterns on Stratospheric Ozone

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The primary modes of wintertime variability, such as the North Atlantic Oscillation (NAO) have a marked signature on the ozone layer. The recent realisation that the NAO is part of a more global pattern, termed the Arctic Oscillation (AO), which extends from the surface upwards into the stratosphere, highlighted the coupling of the NAO with the stratosphere and the ozone layer.

We examine nearly 20 years of global TOMS observations, and diagnose the signatures of the leading patterns of climatic variability upon total ozone. Our main emphasis is on the E uropean and Atlantic sector. These signatures are twofold. We seek for influences on both the seasonal-mean (quasi-stationary) ozone, and else on the fast transient (eddy) ozone variability linked to passing weather systems.

We hence systematically examine how leading climate patterns influence seasonal-mean ozone in winter and spring, through a statistical analysis using empirical orthogonal functions. In addition, we carried out an analysis of ozone synoptic variability. Satellite column ozone observations indicate a strong signature of storm tracks in ozone, with marked asymm etries between the Pacific and Atlantic storm tracks. Of particular interest are the large amplitude ozone "minihole" events that frequently develop over the Atlantic in winter. We examine the relationship between the occurrences of such ozone minihole events and the NAO or other climate patterns.

A32A-0037 1330h POSTER

Characteristic features of the vertical propagation of ultra-long planetary waves and their interdecadal change

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One fundamental mechanism for the dynamic troposphere-stratosphere coupling is the vertical propagation of tropospheric planetary Rossby waves into the stratosphere where these waves interact with the mean stratospheric flow. The modification of the structure of tropospheric waves due to the downward reflection of wave energy has been proposed to be the most relevant mechanism for a downward dynamic influence. NCEP reanalysis data are used to isolate characteristic features of vertical propagating Rossby waves for different seasons of the year. Interdecadal changes in these characteristic features are described and possible causes for these changes are discussed. Control simulations with different versions of the GISS model are used to investigate the sensitivity of the wave propagation to the height of the upper boundary of the atmospheric GCM.